User Manual

Tektronix

K1297-G20
Protocol Tester

C73000-B6076-C83-20

This document supports software version V6.20 and above
and the device types 7KK1200-B (K1297) and
7KK1200-P (K1297 Compact)

Revised: December 2006

Contacting Tektronix

Tektronix, Inc.
14200 SW Karl Braun Drive or P.O. Box 500
Beaverton, OR 97077 USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non–Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE LISTED PRODUCTS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Contents

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified service personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the *Appendix C* for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

With some interfaces only voltages corresponding to the default of the relevant connector are applied at the measuring sockets. However, high voltages from the line may occur at some of the measuring sockets. These measuring sockets are protected against accidental contact and are specially labelled.

Use Proper AC Adapter. Use only the AC adapter specified for this product.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Do Not Look into the End of a Fibreglass Cable. Never look into the end of a fibreglass cable or a single fibre which could be connected to a laser source. Laser radiation can damage your eyes because it is invisible and your pupils do not contract instinctively as with normal bright light. If you think your eyes have been exposed to laser radiation, you should have your eyes checked immediately by an eye doctor. The optical output's radiation power in our system corresponds to the laser class 1 in accordance with EN60825–1, IEC 825-1, and U.S. CDRH regulations.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Certifications and Compliances

Consult the product specifications in the *Appendix C* for certifications and compliances.

Safety Terms and Symbols

Terms in This Manual. These terms may appear in this manual:

WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. These symbols may appear on the product:

WARNING
High Voltage

WARNING
Laser Radiation
Laser Class 1

CAUTION
Refer to Manual

Protective Ground
(Earth) Terminal

Observe precautions for handling
electrostatic discharge sensitive
devices

WARNING
End of a Fibre-
class Cable

Service Safety Summary

Only qualified service personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Preface

The K1297 is a powerful multi-protocol and multi-interface tester for narrowband and broadband networks.

The K1297 can be deployed for analyzing signaling protocols of layers 2 to 7 of the ISO/OSI layer model. It supports a large and steadily increasing number of protocols for all important wide area communication network types such as Core, Access and Mobile Radio networks.

With the K1297 you can perform emulations and simulations - the K1297 permits both subscriber and network simulation. It can be used as a monitor and as a conformance tester for acceptance, validation and compatibility tests.

The K1297 is designed with the following in mind:

- **Flexible in numerous measurement situations.** Due to its modular hardware and software design the K1297 realizes various configurations and combinations and is extendable for almost any future applications.
- **Convenient to operate.** The K1297 Protocol Tester is operated via a graphical user interface under Microsoft Windows XP and works locally as well as remotely controlled.
- **Easy to transport.** The K1297 is light weight and can be transported without any trouble. A transport case is available to protect the instrument.

K1297 and K1297 Compact. The K1297 is available in two variants. The *K1297 Protocol Tester (device type 7KK1200-B)* has a 7 slot housing that can be equipped with up to 6 parallel interface boards, the *K1297 Compact Protocol Tester (device type 7KK1200-P)* has a 4 slot housing that can be equipped with 3 parallel interface boards.

Device Concept

The modular concept of the K1297 is based on compact and upgradable hardware with powerful processors and communication controllers. User and measuring processes are assigned to several processors.

The standard user interface and periphery management are based on a PC-board with connection to the VME bus system of the measuring modules.

Currently available are the following interface measurement boards and modules:

- E1/DS1
- ISDN BAI S_0 and BAI U_{2B1Q}
- Ethernet
- ATM boards for physical interfaces: E1/DS1/J1 and STM-1 optical

---

NOTE. *Since software version 3.0 ATM Power-AAL boards are not supported anymore.*

NOTE. *We also offer a wide range of cables and adapters as accessories, which you can order. Take a look in the WWW under Tektronix.com at our Cable and Accessory Guide or contact your local sales partner.*

K1297-G20 Software Concept

The modular and flexible hardware concept of the K1297 is complemented by the K1297-G20 software. To give you an overview, the concepts and tools of the K1297-G20 software are briefly described in the following:

Usability

Usability is a conceptional approach to the K1297-G20 software design which covers various aspects. For one, the K1297-G20 runs on Windows XP. This means its graphical user interface is modeled according to Windows standards, but also that services such as system control, network access, etc. can be carried out via Windows.

Then, K1297-G20 software offers a uniform set of configuration tools. You can adapt every tool to suit your special test tasks. The settings you change during this process can be stored and loaded again – for every individual tool, for a number of tools, or as an overall configuration.

Furthermore pre-defined test solutions - which can be deployed in a modular and complementary manner - are offered as a basis for the emulation of whole network elements. Modules for the automatic generation of calls are available for various protocol emulations.

Expansion Capability

The K1297-G20 software has a modular design. This means that it will be easy for you to create your optimal test environment. On the hardware side, you can combine any boards you like. And on the software side, you can combine and activate the hardware configurations in a measurement scenario.

With the protocol stack editor you can relate individual protocols to each other. A complete new generation of protocol stacks as well as a modification of pre-defined stacks are possible. An adaptation of the software by the manufacturer is not necessary.

The testing of a protocol always takes place in a specific protocol layer within a protocol stack. As a prerequisite, all protocol layers situated underneath this layer must be emulated correctly. With the emulation scenario editor, you can relate the protocol emulations to the individual protocol descriptions.

Programmability

The programming concept of the K1297-G20 software is made up of two main components and offers solution-oriented options for the beginner and the expert:

1. With the Message Building System, you can determine which messages are to be used in simulations or emulations. To control the relevant emulation, protocol data units of a specific protocol layer or abstract service primitives can be generated.

   In addition to fully defined messages for sending, you can also define comparison messages for the checking of received messages. The definitions generated in the message building system are stored in a message pool. Owing to the exchange of message pools, you can use the same scripts for different protocol configurations. Sample message pools are provided which you can adapt to suit your purposes.

2. A variety of protocol-independent programming tools are available for the generation of test cases, simulations and emulations; the definitions stored in the message pool are always used for the sending and receiving of messages.

   Message Sequence Chart: The Message Sequence Chart (MSC) is used to represent the flow of messages with the help of graphical elements. A single step is sufficient for the documentation and an executable test case description. The MSC is especially suitable for simple and average-complexity finite message sequences.

   FORTH: With the script language FORTH you can program access to all relevant elements of the emulation environment. The advantage of this is that you can obtain interactive and direct access to the emulation environment. With FORTH, you can define not only simple but also complex message sequences.

   C Programming Interface (C-API): With the C programming interface you can program access to all relevant elements of the emulation environment. The advantage here is the high execution speed of the converted code. With the C programming interface you can define not only simple but also very complex message sequences.

NOTE. *The new FORTH environment is not compatible with the formerly used FORTH in the K1297-Classic software. However, the classic FORTH applications can also be run with the K1297-G20 software without modification.*

Task Distribution

Another essential concept of the K1297-G20 software is the modularization of steps for the generation of test cases. With this, a step-by-step abstraction from the details of a test environment is achieved and as a consequence your results can be reused to a very large extent.

For the generation of messages in MBS, for instance, protocol-related expert knowledge is necessary. With the test case implementation, you can largely neglect the details in the messages and concentrate on the flow of the predefined messages. This step therefore requires a less thorough knowledge of protocols.

Similar conditions apply for the definition of the test configurations. Expert knowledge is only required for the generation of the MSC templates in which all configuration-specific parameters (protocol and emulation stacks) are defined. When the test cases are defined this knowledge automatically supports you as the choice of available messages (ASPs), for example, is reduced accordingly.

Interworking

With the K1297-G20 software, you can simultaneously simulate on different physical interfaces within the framework of a test scenario and using different protocol structures. This interworking concept, i.e. test configurations with any given combination of physical interfaces and available protocols is becoming more and more important as network integration progresses.

NOTE. *Since software version 3.0 K1297-Classic applications are not supported anymore.*

Fields of Application

The K1297 has been designed for various purposes:

- To detect interferences in individual network segments
- To support the integration of different network elements
- To develop integration tests and to test new software versions

As a programmable unit the K1297 is designed for development purposes and use in test laboratories. Due to its portability, it can also be used for measurement tasks in the field.

The K1297 is employed by manufacturers of communication systems and components, private and public network operators and test laboratories.

Prerequisites

You should have the following qualifications to work with the K1297:

- Knowledge of PC and Windows XP
- Knowledge of the measurement application field as well as experience with communications test applications
- Familiarity with the safety requirements for electrical equipment for measurement, control and laboratory use
- Completion of a K1297 training course

NOTE. *The participation in a K1297 training course is recommended. Information on training courses is available from your local sales partner or via the support unit.*

Assistance

To help you use the K1297, the following documentation is provided:

- The User Manual assists you when starting the Protocol Tester. The User Manual is also available as a PDF online manual.
- A context sensitive online help system is the K1297-G20 software reference documentation. To open the Help window, press <F1> from within a K1297-G20 application window.

NOTE. *The scope of the provided documentation does not necessarily mirror your order but might go beyond to give you a overview of what is available.*

- The release notes are delivered separately and contain the latest information on the current software version (readme.txt).
- Windows XP online help: To open the Windows XP online help, click in the taskbar on *`Start: Help and Support`*.

NOTE. *The Windows XP installation is an OEM version. Therefore the Microsoft Support cannot be used. The K1297 Protocol Tester is supported by Tektronix only.*

About the User Manual

The User Manual gives you an overview on how to work with the K1297:

- The most important part of the introductory chapter is the safety instructions.
- *Technologies* gives you an overview of the most important applications of the K1297.
- *Getting Started* tells you how to make the K1297 ready for start-up, for example how to set up the device and how to establish the measuring connection, how to exchange modules, how to configure and start applications.
- *K1297-G20 Workflow* describes the general way of how to work with the K1297-G20 applications.
- *Operating Modes* shows how the K1297 performs when monitoring, simulating or emulating on the different interfaces.
- In the *Appendices* you will find an explanation of the interfaces, the keyboard description, the technical data and a Windows XP trouble-shooting section.

The following text styles and markings have specific meaning in this manual:

Text style	Description
`Courier`	The Courier font indicates menus and menu functions as well as commands, parameters and examples.
<Key>	Keys or key sequences are in angle brackets.

K1297 and K1297 Compact. The differences between *K1297 Protocol Tester* and *K1297 Compact Protocol Tester* are marked specially.

Training Information

Contact your local sales office or our service support staff for information on training for the communications test technology with the K1297.

Third-Party Products

To offer you complete solutions, it is sometimes necessary to buy products - such as modems and remote operation software - from third-party suppliers, and sell them together with our products.

So, if you are using our products in a standard configuration that has not been tested by Tektronix, we request that please contact directly the supplier of the third-party product for support.

Getting Started

This chapter tells you how to prepare the Protocol Tester for start-up, this means how to set up the device, how to exchange the measuring modules, how to connect the data line, and how to switch on the device.

CAUTION. *The safety instructions must be strictly adhered to prior to installing and switching on the K1297.*

The most important safety instructions have been compiled at the beginning of the manual for your convenience.

Services such as system control, file operations, device configuration, network access, installation and start of applications can be carried out via Windows XPe.

Information on switching off the device and how to prepare the K1297 for transport is included at the end of this chapter.

NOTE. *The device has been delivered according to your requirements.*

Please examine the merchandise for visible transport damage and for completeness using the pick slip.

Device Description

The Protocol Tester consists of a basic device and the individual measuring modules (interface boards) which are for fitting the basic device according to your individual application purposes.

The basic device is equipped with a Pentium PC board, a hard disk of ≥ 2 GB and VME bus.

- With K1297 six slots are available for the measuring modules.
- With K1297 Compact four slots are available for the measuring modules.

The K1297 basic device also features a TFT display (XGA), a 3.5’’ floppy disk drive and a removable keyboard with integrated trackball.

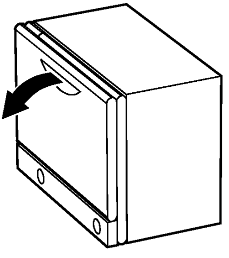
CAUTION. *To avoid equipment damage, do not insert foreign objects into the disk drives.*

Insert the 3.5” disks into the floppy drive with the label field forward.

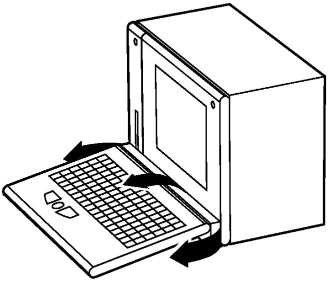
K1297: Setting-up the Device

Proceed as follows when setting up the device:

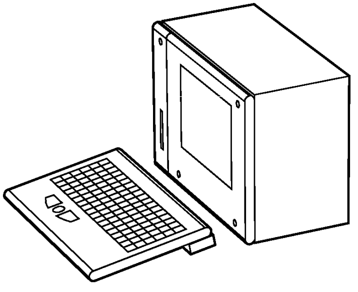
1. Pull the dark-gray release handle above the logo forward and fold the keyboard down.



2. Remove the gray cable box from the monitor frame by pulling it away from the device until you hear a loud click: Place both hands at the sides of the cable box and pull the cable box away from the monitor frame. Or place one hand between cable box and monitor frame and press the cable box away from the monitor frame.



3. Take the cable out of the cable box and fold the cable box underneath the keyboard. The keyboard is now positioned in a working angle in front of you.



4. Pull on the lower monitor frame to position the monitor in a working angle.

The mains cable must be supplied to the non-heating appliance socket on the rear of the K1297. The mains plug must be plugged into a socket with protective ground.

External PE GND. On back of the device, next to power cord connector, power switch, and fuses you will find an external PE GND screw. You can use this screw terminal to connect a separate protective earth to the K1297.

To do so, use at least an AWG18 cable. Connect the protective earth cable between the screw head and flat washer of the PE GND. Make also a good connection at the point where you connect the other end of the cable.

NOTE. *The K1297 is intended to be electrically grounded. The delivered power cord is equipped with a three-wire grounding plug that has a third grounding pin. Connect this plug to a grounded AC socket.*

If you are not sure that your AC socket has a protective ground, you can connect a protective earth separately to the K1297 at the rear PE GND screw terminal.

Changing the Fuses for K1297. Spare fuses can you find in the delivered accessories box. If the fuses need to be changed, proceed as follows:

1. Switch off the device.
2. Disconnect the power cord.
3. The black fuse tray is placed on the right hand side of the mains switch, on the rear of the device.

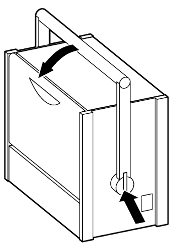
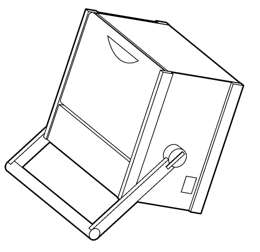
   Use an appropriate tool, such as a flat screw-driver, insert it into the slot above the on/off switch. Open the tray, pull the red strip and exchange the broken fuse.

   Make sure to always use two fuses of the proper fuse type and rating.
4. Close the fuse tray.

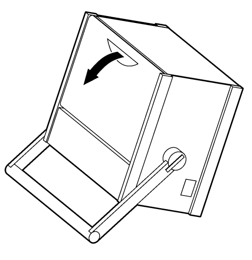
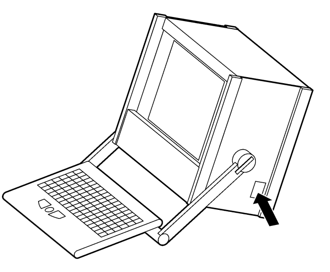
K1297 Compact: Setting-up the Device

Proceed as follows when setting up the device:

1. Press in both of the lateral handle hinges (handle variant: push up hinges), fold down the handle and set the device in the desired position.

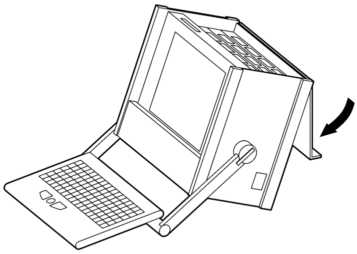
2. Pull the dark grey handle above the logo and lift the keyboard from the device.

The handle can now be used as keyboard rest.

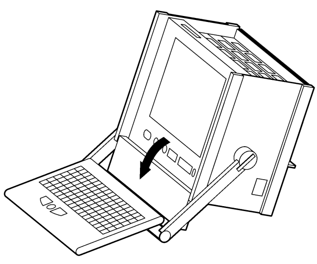
The mains connector and the ON/OFF switch are both located on the right side of the device. The fuses are located underneath the switch cover.

3. Fold the device cover (top) towards the rear until it locks at the back.



The PC board is located in slot 1. The floppy disk drive is also located underneath the device cover on the left side. For further information on the individual interfaces, please refer to *Appendix A: Interfaces*.

4. Push the front cover upwards and fold the cover towards you.



Furthermore, the LEDs for power supply ⏻ (top) and hard disk access ◎ are located beneath the display.

NOTE. *You will find information on pin assignment of the individual sockets also in Appendix A.*

Changing the Fuses for K1297 Compact. Spare fuses can you find in the delivered accessories box. If the fuses need to be changed, proceed as follows:

1. Switch off the device.
2. Disconnect the power cord.
3. The black fuse tray is placed on the right hand side of the mains switch on the right sight of the device.

   Use an appropriate tool, such as a flat screw-driver, insert it into the slot above the on/off switch. Open the tray, pull the red strip and exchange the broken fuse.

   Make sure to always use two fuses of the proper fuse type and rating.
4. Close the fuse tray.

Connecting an External Monitor

The PC board of the K1297 provides a Video Graphics Array (VGA) port for connecting an external monitor. You can operate an external monitor in the following use cases:

- Displaying the same information on both monitors
- Expanding the display across both monitors
- Operating only the external monitor

Displaying the Same Information on Both Monitors. To display the same information on both monitors, proceed as follows:

1. Connect the external monitor to the VGA port of the PC board.
2. Switch on both devices: the K1297 and the external monitor.
3. On the K1297 *Desktop*, open the context menu by clicking the right mouse button and click *Properties*. The *Display Properties* dialog box opens.
4. Open the *CHIPS* tab in the *Display Properties* dialog box.
5. Select *Single Display Mode* from the list in the upper part of this dialog box and *BOTH* in the *Display Device* check box.
6. Confirm your settings with *OK*.
7. To exit this operating mode, open the *Display Properties* dialog box / *CHIPS* tab as described in step 3 and 4.

   Select *Single Display Mode* from the list in the upper part of this dialog box and *LCD* in *Display Device* check box.

   Confirm your selection by *OK*.

Expanding the Display Across Both Monitors – Dual Display Mode. In this mode, the display is divided horizontally or vertically into two parts. One part is displayed on the build-in display, the other one on the external monitor. To set up your computer for dual–display mode, perform the following steps:

1. Connect the external monitor to the VGA port of the PC board.
2. Switch on both devices: the K1297 and the external monitor.
3. On the K1297 *Desktop*, open the context menu by clicking the right mouse button and click *Properties*. The *Display Properties* dialog box opens.
4. Open the *CHIPS* tab in the *Display Properties* dialog box.
5. Select *Dual Display Mode* from the list in the upper part of this dialog box.
6. In the lower part of the dialog box you can now configure further settings such as vertical or horizontal monitor position.

   Here, you can also select whether the external monitor (CRT) or the K1297 (LCD) should be in left / top or right / bottom position.
7. Start the dual display mode by pressing the *Apply* button.

   Both monitors show full-sized images only when the display resolution is set correctly.
8. To set the display resolution, open the *Display Properties* dialog once again (see step 3) and open the *Settings* tab.
9. Change the resolution according to the monitor position: set the *Desktop area* to 1024x1536 pixels for vertical aligned monitors and 2048x768 pixels for horizontal aligned monitors.
10. To exit the dual display mode, open the *Display Properties* dialog box as described in step 3, open the *CHIPS* tab, and select *Single Display Mode* from the list in the upper part of this dialog box. Confirm your selection by *OK*.

Operating only the External Monitor. Use this mode, if you want to work with more screen area. Connect a larger monitor and increase the display resolution. To operate only the external monitor, proceed as follows:

1. Connect the external monitor to the VGA port of the PC board.
2. Switch on both devices: the K1297 and the external monitor.
3. On the K1297 *Desktop*, open the context menu by clicking the right mouse button and click *Properties*. The *Display Properties* dialog box opens.
4. Open the *CHIPS* tab in the *Display Properties* dialog box.
5. Select *Single Display Mode* from the list in the upper part of this dialog box and *CRT* in the *Display Device* check box.
6. Confirm your settings with *OK*.

   The external monitor operates and the built-in LCD display turns gray.
7. To enlarge the screen area, increase the display resolution. Therefore, open the *Display Properties* dialog once again (see step 3) and open the *Settings* tab. Change the *Desktop Area* to 1600x1200 maximum.
8. To exit this operating mode, open the *Display Properties* dialog box / *CHIPS* tab as described in step 3 and 4.

   Select *Single Display Mode* from the list in the upper part of this dialog box and *LCD* in *Display Device* check box.

   Confirm your selection by *OK*.

NOTE. *Before disconnecting the external monitor, always remember to switch back to the LCD mode. Otherwise the K1297 display remains gray.*

CD-RW Drive

The external CD-RW drive (Plexwriter) from Plextor can be used to write CDs and as a CD-ROM drive. The CD-RW drive is delivered with the original Plextor manual. Read this manual carefully. Pay particular attention to the safety instructions.

For using the CD-RW drive with K1297 Protocol Testers, you should adhere to the following instructions as well:

- The SCSI-Bus-ID of the CD-RW drive should be set to a value between 2 and 6. We recommend to set the SCSI-Bus-ID to 3 before connecting the device. Then, connect one of the two SCSI interfaces of the CD-RW drive to the SCSI interface of your Protocol Tester using the supplied cable.
- Do not install the software of the Plextor Software Utilities (Plex Tools) CD on your Protocol Tester.
- If you like to write CDs with the CD-RW drive you need to install the delivered Nero burning software. To install this software insert the NERO Burning ROM (Plextor Version) from AHEAD. The CD starts automatically and opens the *Ahead Installer* dialog box. Start the installation process by clicking the *Nero* button. We recommend not to install the following Nero components:

  – NeroMediaPlayer
  – InCD Packet-Writing
  – UDF reader

NOTE. *The delivered Nero software is not usable for Windows 3.11 operating systems. Users of Protocol Testers with Windows 3.11 who like to write CDs are asked to upgrade their devices. Please contact the Tektronix hotline.*

- Before writing a CD, carefully study the Nero online manual. We recommend to close all K1297-G20 applications before writing. The running applications or the writing process might be disturbed or interrupted when running simultaneously. Use only high-quality CDs.
- Do not insert CDs with Autostart mechanism into the CD-RW drive during the operation of K1297-G20 applications. Automatically started software may disturb or interrupt your running applications.

Exchanging Measuring Modules

The measurement unit comprises the application processor and different modules for carrying out the individual measurements. The modules are VME bus modules of double Eurocard size.

WARNING. *The device must be switched off completely. All modules contain electrostatically sensitive components. Observe the necessary precautions and ESD safety instructions.*

Make sure the VME bus address (CPU number) on the new module is set correctly (see the following pages).

You can easily install and remove the measuring modules from the slots. You can control the individual measuring modules and the interface sockets via the K1297-G20 application.

CAUTION. *Any installing of an ATM PCE I board combination - this also includes mounting of a PCE I board or a PCE I board exchange - must be performed by qualified Tektronix service personnel or service personnel certified by Tektronix. For details, contact the Tektronix Service Support.*

Setting the VME Bus Address

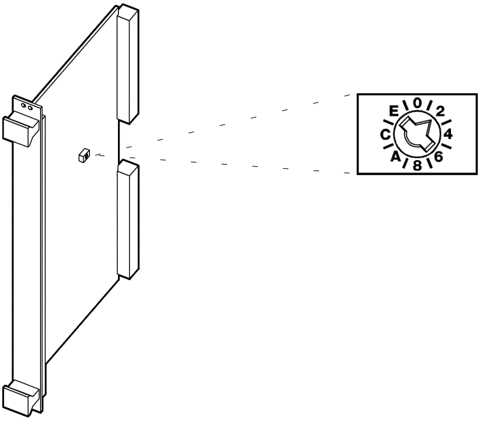
1. To check the used CPU numbers, open the K1297-G20 Status Window via the appropriate button in the toolbar.

Write down the CPU numbers displayed in square brackets in order to identify which numbers are free for addressing.

If it should be necessary to change a CPU number of a board, only an experienced service technician should perform this procedure.

CAUTION. *Defining new CPU numbers must be performed at an ESD approved workplace. Electrostatic discharge can permanently destroy components that have to be temporarily removed from your device.*

2. S_0 - U_{2B1Q}, V./X, and E1/DS1 boards: Adhere to the correct setting of the VME bus address using the yellow hex switch when installing measuring modules.



The hex switch is yellow with the scale from 0 to F around it and it is located in the center of the upper third of the modules. The hex switch can be set to the desired value using an appropriate tool. To avoid conflicts during initialization, the addresses must be unique.

CAUTION. *The PC board is set to address 9 upon delivery and no manual switching is necessary. The first AP board is set to address 0 upon delivery. The AP-4 board is automatically addressed and no manual switching is necessary. Never try to change the CPU numbers of the PC board and the AP-4 board.*

K1297. Make sure that the CPU numbers are set as follows:

Table 1: Setting the VME bus address

Board	CPU number	Slot
PC board	9	1
AP-4 board 1	0	2
AP-4 board 2	2	3
Interface board 1	1	8
Interface board 2	2 (if not used by second AP board)	7
Interface board 3	3	6
Interface board 4	4	5
Extension	5	4
Extension	6	3

CAUTION. *The Ethernet board and the ATM boards are addressed via software.*

The Ethernet board is set to address 7 upon delivery (with 8 implicitly). See the description of the Ethernet board in Appendix A on how to adapt the VME bus address setting via software for further Ethernet boards.

The PCE I host processor board has address setting 3 upon delivery. If you work with a second set of ATM boards, see Appendix F on how to adapt the VME bus address setting via software.

K1297 Compact. Make sure that the CPU numbers in combination with the narrowband interface boards are set as follows:

Table 2: Setting the VME bus address

Board	CPU number	Slot
PC board	9	1
AP-4 board 1	0	2
AP-4 board 2	2	3
Interface board 1	1	5
Interface board 2	2 (if not used by second AP board)	4
Interface board 3	3	3

CAUTION. *The Ethernet board and the ATM boards are addressed via software.*

The Ethernet board is set to address 7 upon delivery (with 8 implicitly). See the description of the Ethernet board in Appendix A on how to adapt the VME bus address setting via software for further Ethernet boards.

The PCE I host processor board has address setting 3 upon delivery.

Which Measurement Board into which Slot?

The measuring boards and the slots are marked with different colors. So exchanging the measuring modules is made easy for you. The colors have the following meaning:

- GREEN stands for all measuring boards for WAN interfaces such as E1/DS1, BAI_{S0}, BAI_{U2B1Q}, Ethernet. Put green boards into green slots.
- VIOLET stands for ATM PCE-1 board combinations: Put violet boards into violet slots. Refer to *Appendix F* for details on how to install PCE-1 board combinations.
- BLUE stands for PCE I board combinations: Put blue boards into blue slots. Refer to *Appendix F* for details on how to install PCE I boards.
- YELLOW stands for the AP-4 board: You can put yellow boards in either green, red, or transparent slots.
- TRANSPARENT stands for special board layout such as for the AP1: Put transparent boards into transparent slots.

CAUTION. *If you put a “wrong” board into a slot, you could damage the board and the instrument.*

Slot 0 and 1 are reserved for the PC boards only. Do not put the PC board into other slots and do not put other boards into slots 0 and 1.

Any installing of an ATM PCE I board combination - this also includes mounting of a PCE I board or a PCE I board exchange - must be performed by qualified Tektronix service personnel or service personnel certified by Tektronix. For details, contact the Tektronix Service Support.

The following color assignment matrix gives you an overview of which measurement board you can put into which slot:

Table 3: Which measurement board into which slot?

Slot / Board	GREEN	RED	BLUE	TRANSPARENT
GREEN	yes	no	no	no*
VIOLET	no	yes	no	no
BLUE	no	no	yes	no
YELLOW	yes	yes	no	yes
TRANSPARENT	no**	no	no	yes

* Restrictions could occur with some applications due to the P2 backplane adapter.

** The “transparent” Ethernet board can be installed in a “green” slot.

K1297. The VME bus of the measurement unit offers a total of eight slots which must be assembled generally as follows:

- Slot 1 is reserved for the system processor (PC).
- Slot 2 is reserved for the application processor (AP).
- Slot 3 is reserved for extensions and can be assembled with the optional ADSP board for GSM data services applications.
- Slot 4 is also reserved for extensions.
- Slots 5 to 8 can be assembled with the interface boards.

  In case of an ATM installation slot 7 and 8 are used by an installed PCE I combination. A second ATM board combination would have to be installed in slot 5 and 6.

CAUTION. *If you work with a second set of ATM boards, see Appendix F on how to adapt the VME bus address.*

K1297 Compact. The VME bus of the measurement unit offers a total of five slots which must be assembled generally as follows:

- Slot 1 is reserved for the system processor (PC).
- Slot 2 is reserved for the application processor (AP).
- Slot 3 to 5 can be assembled with the interface boards.

  In case of an ATM installation slot 4 and 5 are used by an installed PCE I combination.

Installing Modules

If you install modules, proceed as follows:

1. Switch the device off and unplug the mains plug.
2. Remove the cover if necessary and put the module on the guide rails of the relevant slot.
3. Push the module completely into the slot.
4. Tighten the module with the two cross-head screws.

CAUTION. *Make sure the VME bus address on the new module is set correctly (see above).*

Any installing of an ATM PCE I board combination - this also includes mounting of a PCE I board or a PCE I board exchange - must be performed by qualified Tektronix service personnel or service personnel certified by Tektronix. For details, contact the Tektronix Service Support.

NOTE. *If you have to install a new E1/DS1 or BAI board, the Protocol Tester reprograms the boot Flash-PROM of this new board.*

Reprogramming is done automatically during the start-up sequence of the main application and takes much more time than the normal start-up sequence. Therefore just be patient. You must <u>not</u> switch off or shut down the Protocol Tester during this time.

The reprogramming is finished as soon as the LEDs of the new boards are off and the Protocol Tester shows the Data Flow window. Although the Protocol Tester is then ready to work, we recommend that you close the application and start it again.

Removing Modules

If you remove modules, proceed as follows:

1. Switch the device off and unplug the mains plug.
2. Unscrew the two cross-head screws of the module’s front cover. The screws must be completely loosened.
3. Use your thumbs to simultaneously press outwards the levers located beneath the screws.
4. Then pull the module carefully out of the device. Make sure that the spring strip on the long side of the module cover is not being damaged.
5. If the two springs located behind the screws on the internal side of the module’s front cover catch when removing the module, press the springs carefully back using an appropriate tool. Then pull the module completely out of the device.

Connecting the Data Line

The Protocol Tester can be connected to the data line in the *on* or *off* state using the cables available as accessories.

***NOTE**. For each interface board a cable is delivered free of charge. Thus you are able to work right away with your Protocol Tester. We also offer a wide range of cables and adapters, which you can order.*

For further information take a look in the WWW under Tektronix.com at our Cable and Accessory Guide or contact your local sales partner.

We recommend that the cable length be less than 3 m.

You can control the individual measuring modules and the interfaces (sockets) via the K1297-G20 application.

To connect the Protocol Tester to the data line, plug the right plug on one end of the cable into a socket of the measuring module.

***CAUTION.** You will find information on pin assignment of the individual sockets in Appendix A.*

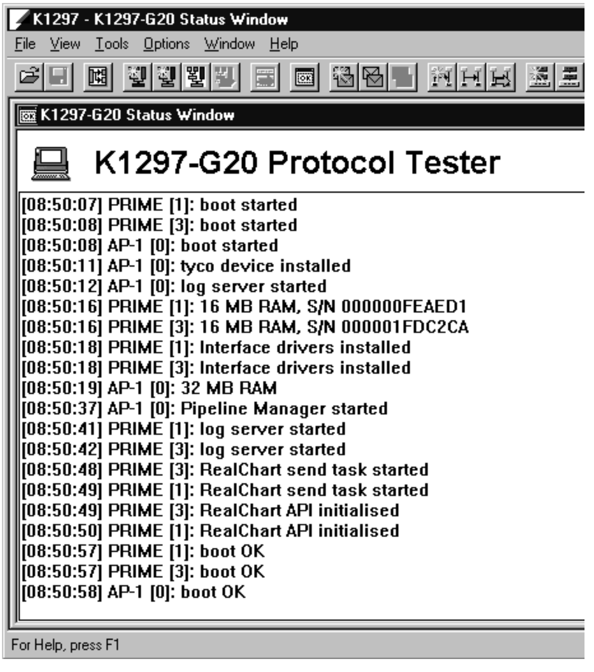
Please pay attention to possible impedance differences. The impedance can be set via the K1297-G20 application.

Switching on the Device

Make sure that the keyboard cable is connected to the keyboard interface, the mains cable is supplied to the non-heating appliance socket and the mains plug is plugged into a socket with protective ground.

1. Switch on the Protocol Tester using the mains switch 0/ (see page 16).
2. The Protocol Tester is set ready-to-run upon delivery.

   The device automatically boots after switching on. The operating system is loaded and the K1297-G20 application is then started automatically.
3. The following window *K1297-G20 Status Window* appears on the screen, indicating the initialization of your configuration:



4. Wait until the *K1297-G20 Status Window* disappears as minimized in the taskbar.

If you start Windows XPe for the first time, you are automatically logged on as administrator with the following information:

```
User name: Administrator-TEK
Password: xinortketket
```

CAUTION. *Do not change the pre-configured Administrator-TEK account, since password changes also require modifications of the automatic logon.*

For those changes, precise knowledge about the concept of user accounts and user groups in Windows XP is required. The risk of changes which the customer undertakes is carried by the customer.

Reprogramming of Flash-PROMs. When you first start an older software version, the Flash-PROMs of your interface boards may be reprogrammed after installation. This may take some time. Do NOT switch off the K1297-G20 during the reprogramming process.

After reprogramming is completed, close and restart the K1297-G20 application.Depending on the type and number of interface cards, you may have to do this once for each interface card.

Updating Expired License. The K12xx software will not start if a product license has expired. To help you avoid this situation, product license information is available from the Licenses option in the Help Menu in the Data Flow window. For products with licenses that will expire in 21 days or less, product expiration warnings will also be displayed after the system start.

If a license does expire, you can use the normal K12xx set up program to either uninstall the expired product or update the license key file.

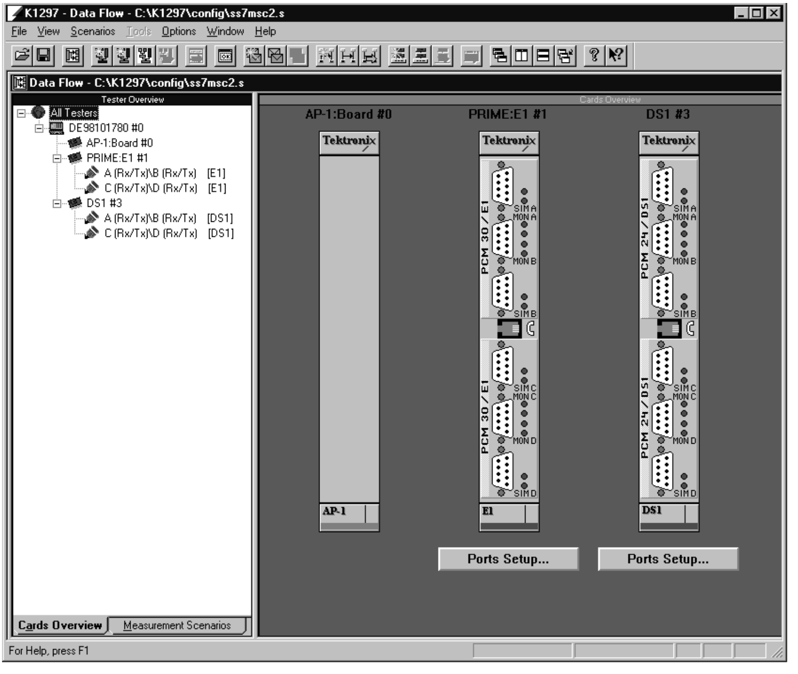
K1297-G20 Application

The K1297-G20 application is started with an initial screen which shows the version number of your K1297-G20 application on top of the screen and information on the load state of the software at the bottom.

Data Flow Window. If you start the autoconfiguration, the autoconfiguration feature automatically detects the signaling channels and the framing of the connected data lines. After the autoconfiguration has been carried out, the active signaling channels are available and you can start the measurement: the *Data Flow Window* appears.

There are two different tabs for setting parameters of interface modules, links and measurement scenarios: *Cards Overview* and *Measurement Scenarios*.

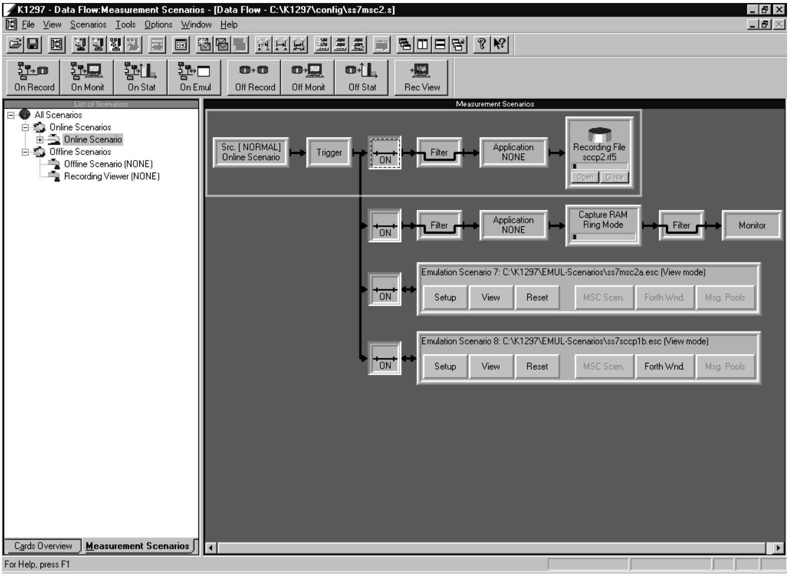
Cards Overview. The `Cards Overview` tab provides an overview of the connected interface modules. Here you can define the setup settings of modules and ports or change existing configuration settings. These are assigning symbolic names to the ports and defining frame types and line codes.



The left pane, `Tester Overview`, displays the interface modules, ports and the line configurations currently set. The right pane, `Cards Overview`, shows the individual sockets on the cards including module designation.

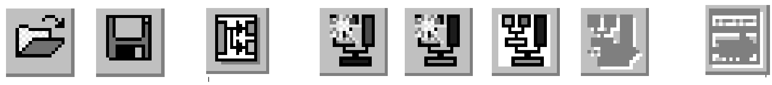
Measurement Scenarios. In the *Measurement Scenarios* tab of the Data Flow window, configure your measurement task by defining data sources and parameters for the measurement. The *Measurement Scenarios* tab keeps you informed about the currently active parameter settings and system status at all times.

The grey boxes in the pipelines represent measurement modules (processing elements) with the connecting lines indicating the data flow between the modules.



The left pane, *List of Scenarios*, displays the available measurement tasks (scenarios) as well as the measurement tasks currently configured and the outline sources. On the right, the *Measurement Scenarios* pane displays the pipelines assigned to the measurement tasks.

Navigation Icons.



Configuration:
Open Files
Save Files

Protocol Stack Editor:
Create MTP Protocol Stack
Create LAPx Protocol Stack
Open Protocol Stack Editor
Toggle between Open Stacks

Data Flow Window

Toggle between Monitor Windows

Message Building System:
Create Message Pool with MBS
Open Message Pool with MBS
Toggle between Message Pools

Message Sequence Chart:
Create MSC
Open MSC
Toggle between
Open Charts

Show Status Window

Emulation Scenario:
Create Scenario
Open Scenario
Toggle between
ESE Windows

Window Arrangement:
Cascade Windows
Tile Vertically
Tile Horizontally
Arrange Icons

Toggle between Forth Terminal Windows

NOTE. *As soon as you are in the K1297-G20 application, the K1297-G20 online help is available: simply click* `Help` *in a K1297-G20 application window using the trackball or mouse or press <F1>.*

The K1297-G20 online help gives you context-sensitive assistance.

Record Viewer

The Record Viewer software is already contained in your K1297-G20 software so a parallel installation should not necessary.

However, if you would like to install it in parallel to an existing installation (K1297-G20 or K1297-Classic) use a different destination path for the Record Viewer (such as ’c:\record’).The Record Viewer supports the following Operating Systems:

- Microsoft Windows NT version 4.0 with Service Pack 6a
- Microsoft Windows 2000
- Microsoft Windows XP Professional

PC Configuration

The protocol tester is delivered completely configured. The following software components are already installed:

- Windows XP Embedded (XPe) SP1
- Internet Explorer 6.0
- Acrobat Reader 5.0
- Software components for initializing the measurement boards
- Measurement applications as ordered

The hard disk is divided into two partitions**:**

- `C:` with the volume label `BOOT` contains the operating system, some non-application-specific programs and files, and the K1297-G20 specific installation files under `C:\K1297`
- `D:` is initially empty and serves for the installation of conformance test products

Operating System

The user interface application of the K1297-G20 runs under Microsoft Windows XPe.

CAUTION. *The K1297-G20 is delivered with a specially configured version of Windows XP Embedded.*

The Windows XPe installation is supported by Tektronix only. Microsoft Support Services do not support this installation.

The risk of changes (software developments or expansions) which the customer undertakes is carried by the customer. Regarding this Tektronix assumes no responsibility.

Windows XPe is delivered in the English version. It starts immediately after you set up and switch on your K1297. Activation is not necessary.

Windows XPe is described in detail in the Windows XP online help. To open the online help, click *Start: Help and Support* on the taskbar. *Help and Support* is your comprehensive resource for Windows XPe information and tools.

Preconfigured Accounts, Automatic Logon

Upon delivery, the device is configured with the following user accounts:

Table 4: Account Data

User name	Password	State
Administrator-TEK	xinortketket	on (default)
Administrator	xinortkeTKET	on (built-in)
Guest	(none, left blank)	off

CAUTION. *Do not rename the accounts and do not change the Group Memberships of the accounts, because this might make the device unusable.*

Autologon Account. *Administrator-TEK* is pre-configured as autologon account. Use always this account when:

- Operating the K1297
- Operating the Remote Desktop Client

CAUTION. *Do not change the pre-configured Administrator-TEK account, since password changes also require modifications of the automatic logon.*

For those changes, precise knowledge about the concept of user accounts and user groups in Windows XPe is required. The risk of changes which the customer undertakes is carried by the customer.

The password for the autologon account is visible in the registry for everyone who has physical access to the device.

CAUTION. *For safety reasons, do not use the password of the autologon account for other accounts and on other system units (PCs, Unix networks, etc.)*

If you change the autologon account you must adapt the automatic logon as well. To change the automatic logon, proceed as follows:

1. Select *Start / All Programs / Powertoys for Windows XP / TweakUI for Windows XP.* The Tweak UI dialog box opens.
2. Select *Logon / Autologon* from the tree view and change the automatic logon.

Do not forget the changed passwords, as you might be locked out from using the device. For further hints on how to select good passwords, see for example
http://archive.ncsa.uiuc.edu/SCD/Consulting/Security/passwords.html

Security Requirements

Security Requirements for Stand Alone Systems. The pre-configuration of the device has been chosen for a stand-alone system without enhanced security requirements for ease of operation. Particular security measures are not necessary.

Security Requirements for Network Operation. If you apply the Protocol Tester within a network or by way of a modem, then implement further and enhanced security measures.

We strongly recommend to observe for instance the following general statements:

- Access via an individual LAN

  If you operate your Protocol Testers within an individual LAN network, then protect this network against access from other PCs.

- Access via a company-wide Intranet

  If you operate your Protocol Testers within an Intranet, then implement an extended user administration and employ up-to-date virus scanners and firewalls.

- Access via Internet or modem

  If you want to access your Protocol Tester via the Internet, implement the same security measures as in Intranets (see above). You can also implement additional security measures with the help of virtual private networks (VPNs).

To implement additional security measures, contact your local system administrator or the Tektronix service center.

⚠ ***CAUTION.*** *The implementation of extended security measures is your sole responsibility. It is realized at customer's own risk and without liability to Tektronix.*

You should implement these measures especially while applying the Remote Desktop *software or when transferring files via a network.*

Ethernet Connection

If you want to operate the protocol tester in a local Ethernet network, you can use the built-in network adapter of the protocol tester. To establish an Ethernet connection, connect your Ethernet cable to the 10BaseT / 100BaseTX connector of the K1297 PC board.

The properties for the default connection can you see in the *Local Area Connection Properties* dialog box. To open this dialog box, proceed as follows:

1. Select *Start / Control Panel / Network Connections.* The *Network Connections* dialog box opens.
2. Double-click an active *Local Area Connection*. A *Status* dialog box for this connection opens. By pressing the *Properties* button you open the *Local Area Connection Properties* dialog box.

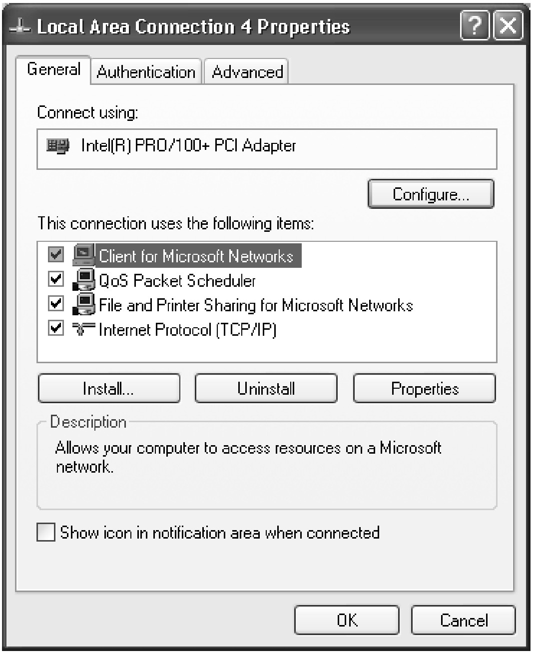


Figure 1: Local Area Connection Properties, Generals tab

TCP/IP Protocol. The TCP/IP protocol is configured by default upon delivery. The IP address is automatically assigned to the network card by a DHCP server.

If your network does not have a DHCP server, ask your network administrator for the necessary parameters, such as IP address and subnet mask. Type in the parameters as follows:

1. Open the *General* tab of the *Local Area Connection Properties* dialog box (see figure 1).
2. Press the *Properties* button in the *General* tab of the *Local Area Connection Properties* dialog box.

   The *Internet Protocol (TCP/IP) Properties* dialog box opens.
3. Select *Use the following IP address* and enter your IP address and Subnet Mask.
4. Press the *OK* button to close the *Internet Protocol (TCP/IP) Properties* dialog box and the *Close* button to close the *Local Area Connection Properties* dialog box.

CAUTION. *Only the software components configured upon delivery guarantee faultless operation of the Protocol Tester.*

Internal IP Connection Between the Measurement Boards. To activate an internal IP connection between the measurement boards, a virtual ethernet adapter (SmEth) has to be installed on your Protocol Tester.

To check if the SmEth adapter is already installed and preconfigured, proceed as follows:

1. Open the *Network Connections* dialog box as described on page 48.
2. Pause with the cursor over one of the *Local Area Connection* entries. A ToolTip comes up telling you the name of the network connection.

   If the ToolTip displays T*Q based backplane ethernet driver*, a virtual ethernet adapter is installed.
3. Repeat step 2 for all other *Local Area Connection* entries in the *Network Connections* dialog box.

If there is no such entry, you must install the virtual Ethernet adapter as described in Appendix D.

Remote Operation

Remote Desktop. The protocol tester can be remotely operated with the help of Remote Desktop. Using Remote Desktop you can connect each Windows computer to a K1297. This allows you to remotely control your K1297 without being in field or test laboratory.

- Computers with operating system Windows XP Professional can be connected immediately to your K1297.
- To connect computers running Windows 95 or a more recent version of Windows to your K1297, you must install the Remote Desktop Connections Client software.

  The Remote Desktop Connections Client software is available under *C:\Setup.etc* . To install it, copy this file to the local PC, and start the *msrdpcli.exe* .

To activate Remote Desktop, proceed as follows:

1. Enable the Remote Desktop feature on your K1297: click *Start –> Control Panel –> System*. The *System Properties* dialog box opens.
2. Open the *Remote* tab and enable *Allow users to connect remotely to this computer*. Close the *System Properties* dialog box.
3. On the control computer side: Select *Start –> All Programs –> Accessories –> Communications –> Remote Desktop Connection*. The *Remote Desktop Connection* dialog box opens.

Figure 2: Remote Desktop dialog box

4. Press the *Options* button and enter computer name, user name, and password of the K1297.
5. Start Remote Desktop by clicking **Connect**.

Remote Assistance. Use Remote Assistance if you need remote support on your K1297. Using this feature you can invite somebody to connect to your K1297. During Remote Assistance both of you can operate the K1297.

To activate Remote Assistance, proceed as follows:

1. Click *Start –> Control Panel –> System*. The *System* dialog box opens.
2. Open the *Remote* tab and *enable Allow Remote Assistance invitations to be sent from this computer.*
3. Click *Start –> Help and Support*. Click *Invite a friend to connect to your computer with Remote Assistance* under *Ask for assistance*.
4. Follow the Remote Assistance wizard.

Connecting Peripherals

External devices can be connected to your K1297 in several ways. Some devices, such as keyboard, mouse, or USB devices, are connected to the front panels of the installed boards of your K1297. Other devices, like printers and external drives, are connected to ports on the rear panel of your protocol tester.

For a device to work properly with Windows, a device driver must be installed on the system. Each device is supported by one or more device drivers, which are typically supplied by the device manufacturer. However, some device drivers are included with the operating system. If the device is Plug and Play, Windows XPe can automatically detect it and install the appropriate device drivers.

If the device is not automatically installed by the operating system, the *Found New Hardware Wizard* will appear and ask you to insert any media, such as compact discs or floppy disks, that were provided with the device.

Non-Plug and Play devices are installed using the *Add Hardware Wizard*. To start this wizard, click *Start –> Control Panel –> Add Hardware*.

Before manually installing device drivers, you should consult the device documentation provided by the manufacturer.

CAUTION. *To avoid product damage, always power off the K1297 before installing any accessories.*

Software Installation

Important Hints

The Protocol Tester is ready for use upon delivery. Windows XPe and the K1297-G20 application have already been installed.

Base software, application programs, updates, and upgrades are supplied on DVD, with a setup program and a readme.txt file located directly under the root directory of the DVD. You should read the readme file before installing the software.

Device-specific software keys protect the software against unauthorized access. To enable the software on your Protocol Tester, you also receive an additional *Software Keyfile / License Information Disk* (key disk).

Mixing Different Software Versions. Software products from different applications are NOT designed to be mixed. The Setup program has a security mechanism that will ensure that such version mixes cannot be installed:

After having selected your software products from this DVD, you will be warned about older software products in your existing configuration that will be removed.

- If you confirm with *Yes*, the Setup program removes the old products automatically and proceeds with the installation of the new products.
- If you want to keep an old product, cancel the Setup program, backup the software as described below, and then restart the Setup program again.

If you want to install different applications in parallel, first perform a complete backup of the existing software. This will ensure you the best control about the software configuration on your system and possible dependencies with other software packages you might have installed.

Types of Installation. You have two options to install Protocol Tester software:

- Installation of additional software packages: Install further software packages in addition to the already installed software version such as protocols, emulations, application programs.
- Installation of a new software version: Install a complete new version of the base software and additional software packages.

***NOTE**. The K1297 Protocol Tester has been pre-configured with Microsoft Windows XPe and therefore provides you with all possibilities offered by this industry standard. This enables you to choose from a variety of available software products for the analysis and evaluation of your measurement results. Such programs can be installed and used directly on your Protocol Tester.*

Within this context, please observe the following: The installation of additional software reduces the disk space required for saving measurement results. During the course of a measurement, only Protocol Tester applications should be run in order to ensure the exclusive availability of the disposable CPU performance for the measurement task.

User Data. It is important to always save user data to an appropriate back up system before performing any installation. Detailed instructions for the back up are given in the appropriate section.

User data are files and directories:

- not provided by Tektronix
- stored under the installation path of the Protocol Tester

***NOTE**. If you modify files and directories provided by Tektronix, it is necessary to save them under a different name. Otherwise a subsequent installation might fail or become incomplete, or your data might be overwritten.*

Pre-Installation Checks

1. Ensure that the system date and time have been set to the actual date and time. Failure to do so may result in a situation where the software cannot be started.
2. Ensure that your boards meet the following memory requirements:

■ AP-4 board	32 MB RAM
■ E1/DS1 monitoring boards	16 MB RAM
■ E1/DS1 simulation boards	32 MB RAM
■ BAI boards	8 MB RAM

***NOTE**. In older devices with AP-1 board, this board must provide at least 32 MB RAM.*

You cannot operate boards that do not meet these requirements unless you upgrade the RAM. A message will appear in the K1297-G20 *Status Window* if memory is not sufficient.

To install a RAM upgrade on a board, close all applications and Windows XPe, switch off your system and remove the board from the system. Then follow the steps described in *”K1297 Boards: AP, BAI, PRIME. Mounting Instructions”* (C73000-T6074-C80, available on request).

***NOTE**. There are E1/DS1 simulation boards which can not be upgraded to 32 MByte RAM. You can identify these boards by their serial number printed on a sticker on the VME bus connector of the board.*

E1/DS1 simulation boards with serial numbers starting with DE9707..., or BF9707, or earlier dates must be reprogrammed before upgrading to 32 MByte RAM.

To reprogram such an E1/DS1 simulation board, proceed as follows:

- Ensure that your K1297 is switched off and remove the board from the system.
- Note the VME bus address indicated by the yellow hex switch.
- Plug in the E1/DS1 simulation board again and boot the K1297 device.
- Execute the command line ”winflash <board number>” from the Windows *Start* menu - *Run*. For example, if you have an E1/DS1 emulation board installed as board number 1, enter:

  ```
  winflash 1
  ```

- Wait for the end of the operation.

CAUTION. *Do NOT interrupt the reprogramming operation.*

In case of problems, contact your technical support representative.

For fully equipped older devices with AP-1 as board number 0, you must use an AP-1 EPROM version 6. This EPROM provides more shared memory.

NOTE. *Version 6 does not support Windows 3.11 K1297 devices.*

Pre-Installation Checks for K1297-G20 PC Software. The K1297-G20 PC Development Environment is supported for Windows XP Professional. It requires a dongle (aka. Aladdin Software Hardlock). For information on obtaining and configuring this special version contact your Tektronix representative. When using this version with the dongle please observe the following guidelines:

- Never attempt to attach the dongle to the appropriate port (LPT1 or USB) without first shutting the PC or Laptop down. This may damage the dongle or the hardware to which it was attached.
- Never attempt to detach the dongle from the appropriate port (LPT1 or USB) without first shutting the PC or Laptop down. This may damage the dongle or the hardware to which it was attached. If the dongle is removed while the K1297-G20 software is running, the software will terminate.

Installation of Additional Software Packages

If you have purchased additional software packages you need to install them on top of your existing software installation. Therefore, do not remove the existing software or change its installation path (`c:\K1297`).

NOTE. *There are logical dependencies between single software packages and the basic software package (prerequisites). Such information is provided in the order information and will be checked during the setup process. Only matching combinations can be installed.*

Missing Destination Drives. The Setup program warns you, if products cannot be installed on your system because of missing destination drives. The affected products (such as Conformance Tests which require a D: disk drive) are reported in a warning dialog box; they will NOT be listed in the ”List of Available Products” of the Setup program.

1. If such a warning appears, create the necessary destination drives outside of the Setup program. Refer to the Microsoft Windows online help on how to do this.

2. Restart the Setup program. The affected products will now become accessible in the ”List of Available Products”.

To install additional software packages, proceed as follows:

1. Close all applications.

   Make sure that the K1297-G20 application and any applications that run from a directory under `c:\K1297\` are closed. This might be for example `MS-Control` with `e2e.exe`, `TMS` with `msc-tcm.exe`, or `MicroDPE` with `uDPE.exe` that runs in the system tray.

2. Connect an external DVD drive to your Protocol Tester or create an access to a network DVD drive.

   If you install the software from a DVD network drive, do not browse the network neighborhood to access this location. Map the share containing the DVD to an unused drive letter instead, such as ”E:” or ”F:”

3. Insert the key disk into the floppy disk drive of the Protocol Tester. The key disk contains a serial number, which has to be the same as the nameplate fabrication code (*Ser.-No.*) on the back of the device.

4. Insert the installation DVD into the DVD drive. The *Setup Guide* starts automatically. *The Setup Guide* helps you to successfully install your Protocol Tester software. Follow the *Setup Guide* instructions.

   If the installation does not start automatically, double-click `RunIntro.bat` from the root directory.

   Follow the setup program instructions. Read the enclosed license agreement carefully and respond to the prompts.

   Specify a valid keyfile within the keyfile selection dialog box, if you do not want to use the `keyfile.txt` of the key disk in the floppy disk drive.

   In the subsequent dialog boxes, click `Next`.

5. In the product selection dialog box installed software packages are indicated by their version numbers in the column *`State`*.

   DO NOT deselect any installed products!

   Check that all additional software packages that will be installed are selected. Their selection might fail if:

   a. an incorrect or incomplete keyfile was selected before or

   b. not all necessary software packages were purchased or installed.

   In case **a.**, choose the correct keyfile using the button that indicates the currently used keyfile.

   In case **b.**, install all software packages that you have purchased for this system. You might need to access all keyfiles you have received in all deliveries for this software version for this system. If you cannot proceed, contact the technical support.

6. Press *`Next`* to test your selection against the provided keys.

NOTE. *The* `Next` *button may be disabled. One possible reason is that not enough space is available on partition C: or D: (conformance test products). In that case, try to save space until the setup program displays at least 20% free disk space.*

---

7. Press *`Start`* when the key check finishes successfully.

CAUTION. *Do not interrupt the installation program once you have clicked* `Start`*. If the program is inadvertently interrupted, rename the file* `C:\WINDOWS\UNINSTALL.K12XX.INI.0x` *with the highest number for x to* `C:\WINDOWS\UNINSTALL.K12XX.INI.`
Start the installation program again.

---

8. After the installation is complete, remove the key disk from the floppy disk drive and reboot your Protocol Tester.

Installation of a New Software Version

Software products from different applications are NOT designed to be mixed. The Setup program has a security mechanism that will ensure that such version mixes cannot be installed.

If you install a new software version on top of an existing software version, the existing version will be automatically removed.

If you want to install software products in parallel on one Protocol Tester, first perform a complete backup of the existing software.

Back Up the Software. To back up your existing K1297-G20 installation, proceed as follows:

1. Close all applications.

   Make sure that the K1297-G20 application and any applications that run from a directory under *`c:\K1297\`* are closed. This might be for example *`MS-Control`* with *`e2e.exe`*, *`TMS`* with *`msc-tcm.exe`*, or *`MicroDPE`* with *`uDPE.exe`* that runs in the system tray.

2. Use the Windows Task Manager to end the process *`dio.exe`*.

3. Rename the original K1297-G20 directory *`C:\k1297`* (for example, *`c:\k1297.vxxx`*), or move the directory to a different partition.

4. Rename the file *`C:\WINDOWS\UNINSTALL.K12XX.INI`* (for example, *`C:\WINDOWS\UNINSTALL.K12XX.INI.vxxx`*) before you install the new K1297-G20 software.

CAUTION. *If you do not rename this file before installing the new software, the software will not start.*

CAUTION. *If you create multiple installation sets on your hard disk by such back up operations, keys for different software versions will remain in your keyfile* `c:\WINDOWS\keyfile.txt`. *The KeyManager program will not be able to identify each back up. A subsequent call of this tool might announce keys of back up installations erroneously as "obsolete". Do not delete "obsolete" keys: a restored installation will not run without its keys. To overcome such possible problems, rename the keyfile accordingly (for example* `c:\WINDOWS\keyfile.txt.vxxx`*).*

Installing the Software. To install a new software version, proceed as follows:

1. Close all applications.
2. Connect an external DVD drive directly to your Protocol Tester or create an access to a network DVD drive.

   If you install the software from a DVD network drive, do not browse the network neighborhood to access this location. Map the share containing the DVD to an unused drive letter instead, such as ”E:” or ”F:”
3. Insert the key disk into the floppy disk drive of the Protocol Tester. The key disk contains a serial number, which must be the same as the nameplate fabrication code (*Ser.-No.*) on back of the device.
4. Insert the installation DVD into the DVD drive. The *Setup Guide* starts automatically. *The Setup Guide* helps you to successfully install your Protocol Tester software. Follow the *Setup Guide* instructions.

   If the installation does not start automatically, double-click `RunIntro.bat` from the root directory of the DVD.

   Follow the setup program instructions. Read carefully the enclosed license agreement and respond to the prompts.

   Specify a valid keyfile within the keyfile selection dialog box, if you do not want to use the `keyfile.txt` of the key disk in the floppy disk drive.

   In the subsequent dialog boxes, click `Next`.

NOTE. *The Setup program warns you, if products cannot be installed on your system because of missing destination drives. The affected products (such as Conformance Tests which require a D: disk drive) are reported in a warning dialog box; they will NOT be listed in the ”List of Available Products” of the Setup program.*

If such a warning appears, proceed as described on page 60.

---

5. In the product selection dialog, check that all software packages that will be installed are selected. Their selection might fail if:

a. an incorrect or incomplete keyfile was selected before or

b. not all necessary software packages were purchased or installed.

In case **a.**, choose the correct keyfile using the button that indicates the currently used keyfile.

In case **b.**, install all software packages that you have purchased for this system. You might need to access all keyfiles you have received in all deliveries for this software version for this system. If you cannot proceed, contact the technical support.

6. Press `Next` to test your selection against the provided keys.

NOTE. *The* `Next` *button may be disabled. One possible reason is that not enough space is available on partition C: or D: (conformance test products). In that case, try to save space until the setup program displays at least 20% free disk space.*

---

7. Press `Start` when the key check finished successfully.

CAUTION. *Do not interrupt the installation program once you have clicked* `Start`. *If the program is inadvertently interrupted, rename the file* `C:\WINDOWS\UNINSTALL.K12XX.INI.0x` *with the highest number for x to* `C:\WINDOWS\UNINSTALL.K12XX.INI`.
Start the installation program again.

If you re-install an older K1297-G20 version such as V3.10 and a conflict related to the tqdll.dll file is displayed, select the Overwrite *button to continue although the already installed file is newer.*

---

8. After the installation is complete, remove the key disk from the floppy disk drive and reboot your Protocol Tester.

Removing the Software

To remove K1297-G20 software from the system, proceed as follows:

1. Close all applications.

Make sure that the K1297-G20 application and any applications that run from a directory under *c:\K1297* are closed. This might be for example *MS-Control* with *e2e.exe*, *TMS* with *msc-tcm.exe*, or *MicroDPE* with *uDPE.exe* that runs in the system tray.

2. Start the Tektronix K12xx remove program by selecting: *Start / Settings / Control Panel / Add or Remove Programs: Tektronix K12xx Protocol Tester* and press *Add/Remove*.

Remove the K1297-G20 software by selecting dedicated or all entries in the list of installed components.

User Data will be preserved.

3. Reboot the system after removing has been terminated successfully.

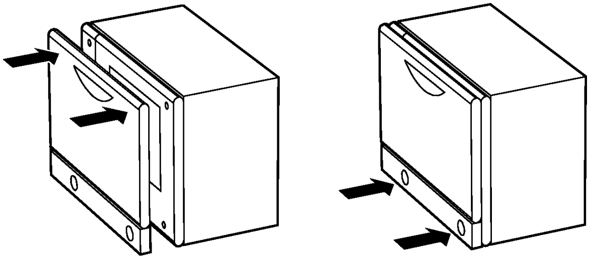
Switching Off and Transporting the Device

Before you switch off the Protocol Tester, shut down the operating system, and then switch off the Protocol Tester using the I/O switch.

K1297. When folding the keyboard up, keyboard and cable box must be connected and the cable must be completely inside the cable box.

1. First put the keyboard into the holding pins which are located at the top of the monitor frame (a); then press the two locking buttons on the cable box until you hear them click (b).

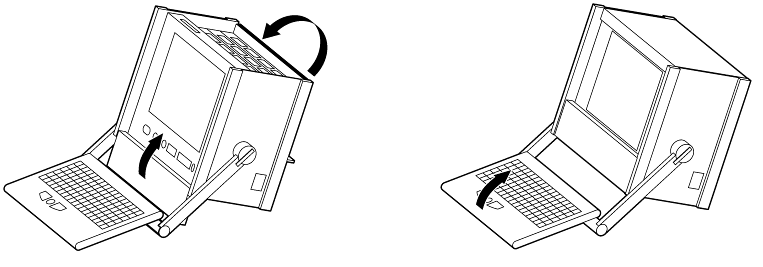
a. b.



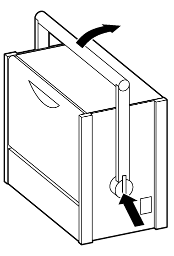
Use the optional transport case to transport the device over longer distances.

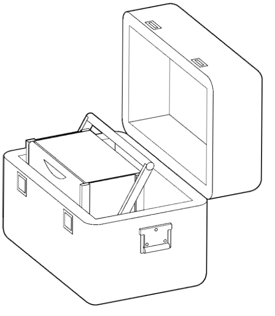
K1297 Compact. For transport purposes fold the cover over the slots again.

1. The cover beneath the display is folded upwards and the keyboard is folded back in front of the display to protect it against damage.



2. Press the lateral handle hinges (variant handle: push up hinges) and put the handle into a vertical position.
3. Use the transport case in which the device has been delivered to transport the K1297 Compact over longer distances. Put the device into the transport case as shown below:





Before closing the transport case make sure that the handle is pointed toward the rear edge of the device.

K1297-G20 Workflow

In the whole, working with K1297-G20 takes place in the following three phases:

- Configuration and protocol setup
- Emulation and simulation composing
- Monitoring and evaluating the tests

This chapter guides you through these phases and through different aspects of working with the K1297-G20. Some of the descriptions are closely related to the *How-to* instructions of the K1297-G20 online help.

NOTE. *The following chapter should help you get started by explaining some basic principles of the K1297-G20.*

For detailed step by step instructions see the K1297-G20 online help.

Configuration and Protocol Setup

This phase comprises the hardware configuration, the configuration of the logical links, the setup of the protocols, and the configuration of the measurement scenarios.

Table 5: Configuration and Protocol Setup

Configure Cards and Logical Links
To carry out an online measurement with the Protocol Tester you must set up a connection between the system to undergo a simulation or emulation and the hardware installed in the K1297. Furthermore, the logical rules for the processing of the data flow must be defined. For this, the Protocol Tester must be connected to the data lines; all interface modules required for the measurement must have been initialized (check in *K1297-G20 Status Window* if *boot ok*); a configuration must have been created, and the *Data Flow* window must be open.
Configure Protocol Stacks
A protocol stack contains the interpretation rules for the processing of measurement data. The interpretation rules are derived from the protocols in the stack, the parameters of these protocols, and the relations between them. For this, the protocol descriptions (*.upd* files) you want to use in the protocol stack must have been installed. A number of predefined protocol stacks for measurements in various networks are provided in the *c:\k1297\stacks* directory. For simulations you can build customized protocol stacks for a particular test system. To do this you can change an existing stack and save it as a new one, or create an entirely new stack.

Table 5: Configuration and Protocol Setup (Cont.)

Configure Measurements Scenarios
The Protocol Tester provides a model for creating and managing configurations that groups together the physical, logical and application-oriented settings in measurement scenarios. Scenarios are represented by pipelines in the *Data Flow* window, the *Emulation Scenario Control* and in the *Monitor*. Pipelines comprise various processing elements representing the data sources, the data links and the application-dependent measurement modules of a measurement scenario. In online scenarios, the Protocol Tester is connected with the data lines; logical links serve as the data sources of this scenario type. In offline scenarios, the data sources on which the monitoring is based are recording files. To carry out a measurement with the Protocol Tester, you have to set up a suitable measurement scenario first. You can use predefined pipelines containing all of the elements required for a measurement scenario.

Example

NOTE. *The single tasks you have to undergo depend on exactly what you want to perform.*

1. To start with the port configuration of an installed interface board, click in the `Data Flow Window` on the `Cards Overview` tab.

   Then, double-click in the right pane, `Cards Overview`, on the socket illustration of the port you want to work with and select the ports settings in the `Ports Setup` box.

2. To configure a logical link and assign a protocol stack, click in the `Data Flow Window` on the `Measurement Scenarios` tab.

   In the `Measurement Scenarios` pane double-click on a source pipeline processing element, for example `Scr Empty`.

   Select at least the following items from the `Logical Link Setup` box: `Card`, `Port`, `Protocol Stack`, `Channel No` or `VPI/VCI`.

NOTE. *FISU suppression should only be used to duplicate MTP based protocol stacks. For ISDN, V5, GPRS protocol stacks select* `No`.

Emulation and Simulation Composing

To establish a connection on the lower protocol layers, the Protocol Tester must provide the services and methods of these protocol layers. The services and methods are realized by emulations that are configured into various protocol combinations in emulation stacks.

A specific test case can require additional procedures or behavior patterns such as the simulation of a user’s behavior, the simulation of several communications terminal devices, or a test of components with illegal or faulty data. Simulations such as these are also realized by programs which you can integrate as part of an emulation stack. The simulations thus use the services and procedures of emulations.

The Protocol Tester is delivered with a number of predefined emulations, emulation stacks, and simulations. You can use the emulations and simulations in your own emulation stacks. Additionally, you can create your own emulations and simulations.

Table 6: Emulation and Simulation Composing

Load, Configure and Start Emulation Scenarios
An emulation scenario provides a complete description of the configuration of an emulation control element. By loading an emulation scenario, you configure and activate the Protocol Tester for the execution of a particular measurement task. This could be, for example, the emulation of a particular network component or the testing of a special Implementation under Test. The emulation scenario editor is the environment in which you load and configure emulation scenarios and monitor the execution of the measurement task. Various predefined emulation scenarios (*.esc*) for tests in different networks have been provided in the directory *c:\k1297\EMUL-Scenarios*. In this directory you will also find all of the stack, parameter and link assignment files used by these scenarios. You can use an existing emulation scenario for your test structure, or create a new emulation scenario. An emulation scenario uses various files in which parts of the configuration are stored: Emulation Stack File (*.esf*): The emulation stack functions as the scenario's basic framework. It describes the simulation and emulation instances of an emulation stack, their arrangement on the screen, and the connections between the items. Emulation Parameter File (*.esp*): The items that can be used in an emulation stack generally have a number of configurable parameters. For every item of an emulation stack, the parameter file stores the value that is to be used for the emulation scenario. Logical Link Assignment File (*.lla*): This file describes the scenario's data source and establishes the connection between the emulation stack and the current link configuration.

Table 6: Emulation and Simulation Composing (Cont.)

Create Messages and Primitives Using the Message Building System
In message pools, you can create descriptions of data to be sent or received. You can use these data descriptions in simulations or emulations. Data to be send is created as a pattern that is used to assemble the data. Data to be received is available as a control pattern that is evaluated when data is received. The data structure of a message pool is based on the OSI reference model. You can create messages (protocol data units, PDUs) for a particular protocol layer, and abstract service primitives (ASPs) for controlling a corresponding emulation. Which protocol layers are available in a message pool is determined by the protocol stack that is connected to the message pool. The assignment of an emulation to a protocol layer determines which primitives can be created. When creating a new message pool, you determine which protocol or emulation layers are available by selecting a protocol stack. Predefined message pools, which you can use for your own simulations or emulations, have been provided in the *c:\k1297\MBS-Pools* directory. You can change an existing message pool and save it as a new one, or create an entirely new message pool. To create a message pool, you need the protocol stack on which the message pool is based. Install the required protocol stacks or create the desired protocol stack in the protocol stack editor. To create primitives, the emulation to be used must also be installed. With the help of the corresponding emulation description (feature file, .fxt), the MBS determines which service access points (SAP) are available and the possible primitives for the selected SAP.

Table 6: Emulation and Simulation Composing (Cont.)

Create Message Sequence Chart Scenarios
The graphic message sequence chart tool enables the fast and easy creation of message sequences. An MSC scenario determines which emulations will be used for communication. In a gateway, you also determine which message pool holds the messages (PDUs) and primitives (ASPs) that can be used in the individual charts. If the desired control sequence is modeled in the MSC scenario, the MSC scenario can be compiled with a special compiler. The result of a successful compilation process is a Forth script (*.4th*) and a description file (feature file, *.fxt*) that enables the application of the MSC scenario to an emulation scenario. Predefined MSC scenarios that you can use for your own simulations or emulations have been provided in the *c:\k1297\MSC-Scenarios* directory. You can also change an existing MSC scenario and save it as a new one or create an entirely new MSC scenario.

Create and Start Simulations Using MSC or Forth
With the MSC you can control the data flow of an emulation scenario. With the Portable Forth Environment (PFE) you can control an emulation scenario using a Forth script. Both tools can be used to create simple message flows or finite state machines without having to fall back on the comprehensive but more complex resources of the programming environment (C-API). Prepared files have been provided in the following directories: MSC scenarios in *c:\k1297\MSC-Scenarios* Forth scripts in *c:\k1297\share\pfe* Measurement scenarios in *c:\k1297\config* You can use existing scripts and scenarios or create new scripts and scenarios.

Monitoring and Evaluating the Tests

To evaluate the communication process during a measurement in a test case, you must analyze the received or transmitted data correctly. To support this task, the Protocol Tester offers a number of components that make it possible to interpret data in various views and using various interpretation aids.

Table 7: Monitoring and Evaluating the Tests

Monitor
In the *Monitor* window you can view the protocol data flow during a measurement. In addition, the monitor of some applications or emulations displays text messages indicating whether a predefined state has been reached or displaying or a process status.
Filter
With a filter you restrict the amount of data to the scope relevant for your test case.
Trigger
With a trigger you can start an action when a certain state or when a certain event occurs.
Applications
Additional applications can be looped into in the data flow for certain measurement tasks. These applications interpret the received data. Applications can display the interpretation of the data either in a separate window or as text messages in the *Monitor*.
Realchart
Some applications enable the statistical recording and evaluation of counters. RealChart displays this data in various views.

Table 7: Monitoring and Evaluating the Tests (Cont.)

Recording
A delayed interpretation, for example, of long-term measurements, is made possible by the recording of measurement data. The recording can be played in again and evaluated at a later point of time.

Emulation Example

This chapter shows how to set up and monitor a back-to-back online test scenario with the MTP layer 2 emulation. The MTP layer 2 emulation is used in several application examples of upper layer emulations. The emulation scenario editor is used to configure this example.

Preliminary Steps

- The Protocol Tester's E1/DS1 emulation board has been connected to the measuring sockets of the data line using the appropriate cables.
- Hardware and logical links have been configured.
  Refer to chapter *K1297-G20 Workflow* in the *K1297-G20 User Manual* and to topic *How to Configure Cards and Logical Links* in the *Online Help* for further information.
- An MTP-based protocol stack has been created.
  Refer to chapter *K1297-G20 Workflow* in the *K1297-G20 User Manual* and to topic *How to Create New Protocol Stacks* in the *Online Help* for further information.

Creating the Emulation Scenario

Our example needs an online scenario pipeline consisting of three branches (see figure 3):

- monitoring branch
- emulation scenario branch for the Test Center (TC)
- emulation scenario branch for the Item Under Test (IUT)

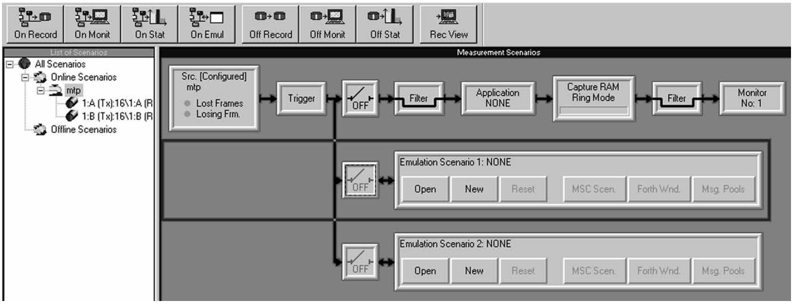


Figure 3: Online measurement scenario pipeline with configured data source (example)

NOTE. *For more information on how to create an online scenario pipeline with different branches and how to configure the data source, refer to topic* How to Configure Measurement Scenarios *in the* Online Help.

To create an online measurement scenario and configure the data source in the *Data Flow Window*, proceed as follows:

1. To create an emulation scenario for the **Test Center**, click the *New* button on the online emulation processing element (see figure 4). This will open the Emulation Scenario Editor (ESE).

Figure 4: Online emulation processing element

2. Edit the Test Center emulation stack in the *Diagram View* window of the ESE:

   a. Add the *ss7mtp2a* emulation to the (empty) stack and connect it to the *LDS Placeholder.*
   Refer to topic *Editing Emulation Stacks* in the *Online Help* for further information.

   b. Configure the *LDS Placeholder.*
   Refer to topic *Configuring the LDS Placeholder* in the *Online Help* for further information.

   c. Click on the *Parameter View* tab to change to the *Parameter View* window of the ESE.

   d. Select the *Timers* menu in the left pane. The MTP layer 2 emulation supports ITU-T, BELLCORE, and BELLCORE LI1 timer settings.

   Set *Timing* to BELLCORE for ANSI-BELLCORE operation (see figure 5).
   Refer to topic *Parameterizing Items* in the *Online Help* for further information.

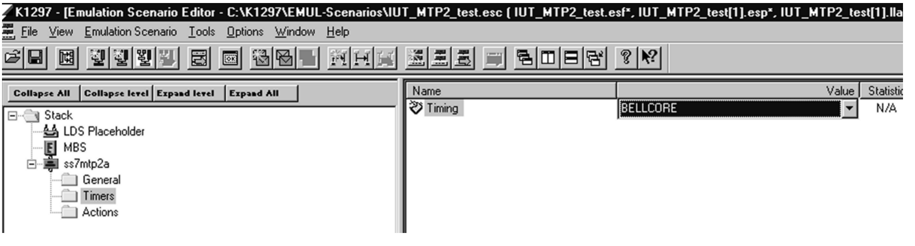


Figure 5: Parameterizing an emulation (example)

3. Repeat the preceding steps for the **Item under Test**:

Create an emulation scenario for the Item under Test; click the *New* button on the second online emulation processing element and edit the Item Under Test emulation stack.

Starting the Emulation

To start the emulation, proceed as follows:

1. Change to the *Data Flow Window* and close the monitoring pipeline branch.
2. Upload the emulation scenario and close the pipeline switch for the emulation scenario branches: first for the Test Center branch, then for the Item under Test branch (see figure 6).

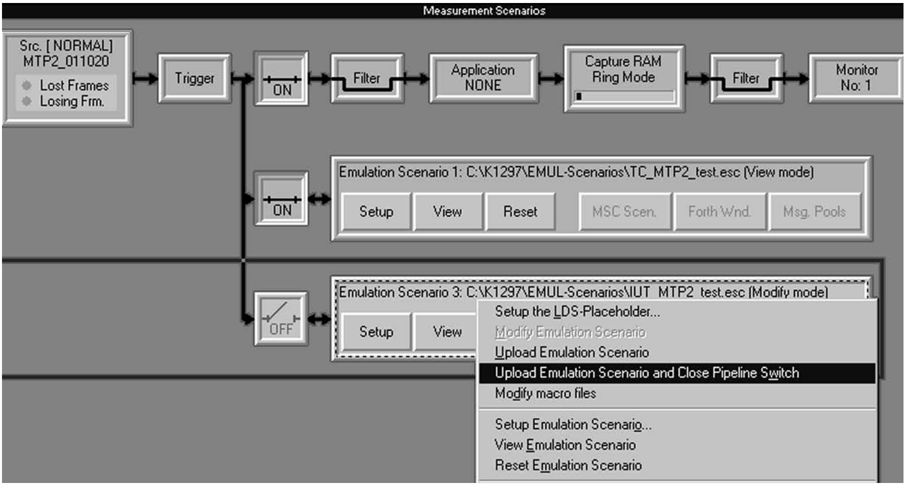


Figure 6: Context menu with *Upload Emulation Scenario and Close Pipeline Switch*

3. Start the emulations of both emulation scenario branches manually. Refer to topic *Starting Emulation Scenarios* in the *Online Help* for further information

   a. Change to the ESE *Parameter View* window.

   b. Start the MTP layer 2 emulation of the Test Center branch by selecting *Connect* in the *Actions* menu (see figure 7).

   c. Start the MTP layer 2 emulation of the Item under Test branch by selecting *Emergency* in the *Actions* menu.

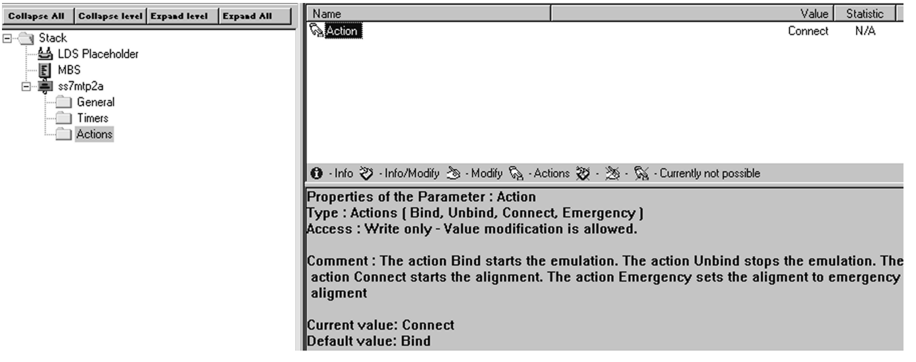


Figure 7: Starting the emulation using the *Connect* action

NOTE*. If you use the MTP layer 2 emulation as lower layer emulation, the upper layer emulation (MTP layer 3 emulation) automatically starts the MTP layer 2 emulation. In this case the action menu's default setting (Bind) has not to be changed.*

Monitoring the Emulation

To monitor the emulation, proceed as follows:

1. Change to *Diagram View* to check that the MTP layer 2 emulations of both branches have started and are in *ACTIVE* state (see figure 8). Refer to topic *Checking Emulation States* in the *Online Help* for further information.

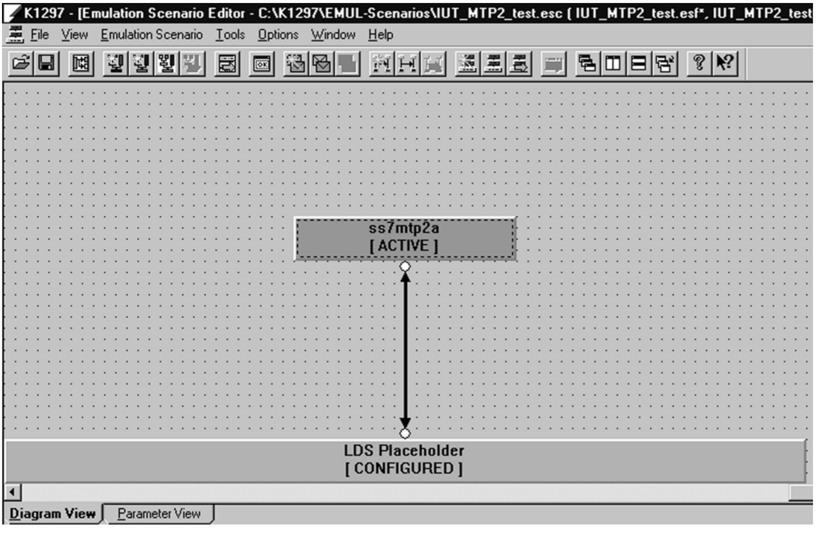


Figure 8: Emulation started and in the *ACTIVE* state

2. Change to the *Monitor* window to view the measurement data (see figure 9).
   Refer to topic *Monitor* in the *Online Help* for further information.

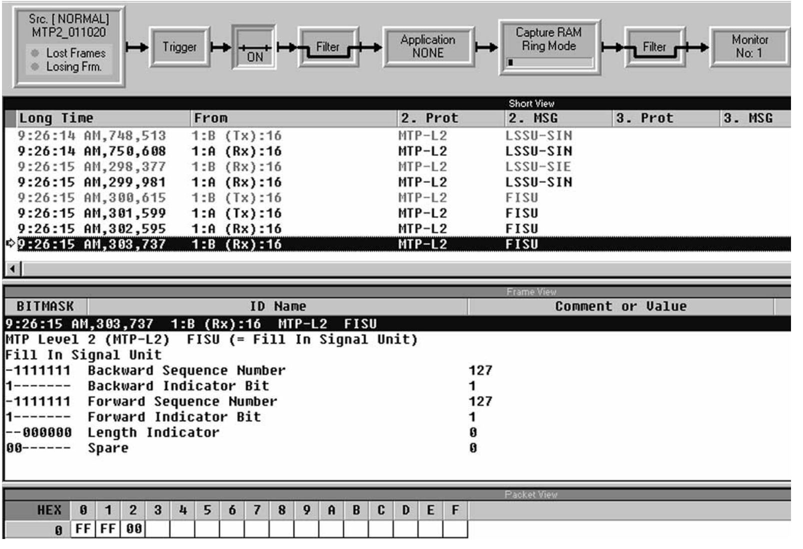


Figure 9: Monitor window displaying emulation data

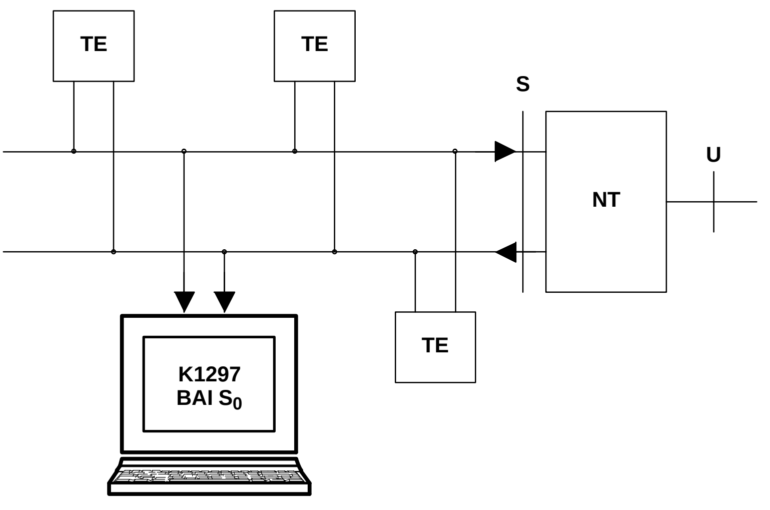
Operating Modes

An overview of the Protocol Tester operating modes and of typical applications follows. The individual terms are often listed without differentiation in the technical literature; the descriptions of the operating modes represent the definitions applicable to the Protocol Tester.

Measurements on the BAI S_0 Interface

Monitoring

Two receivers (one in NT mode, one in TE mode) receive data in both directions on the S bus in Monitoring mode. The connection has the impedance of a TE, but does not affect the S bus.

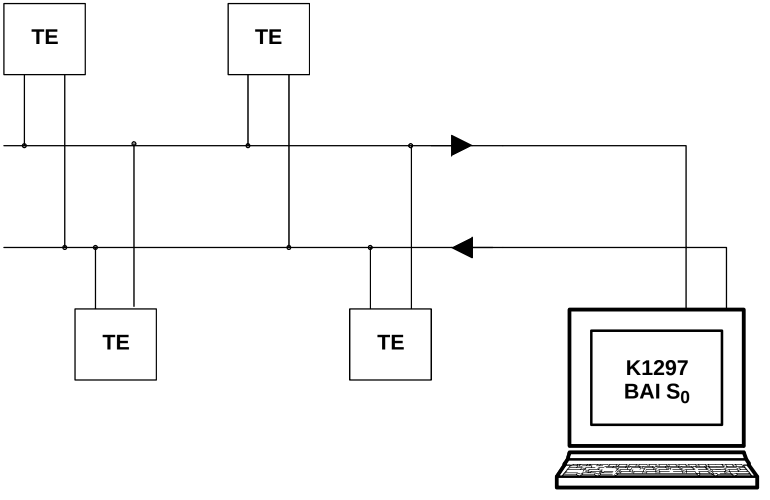


Headphones can be connected so that voice data can be monitored bi-directionally in B channels. For this purpose, two ARCOFIs (Audio Ringing Codec Filter) are on the interface which processes the voice signals accordingly.

The clock pulses are derived from the signals of the TE receivers.

NT Emulation

In NT emulation mode, the BAI interface simulates a network termination.

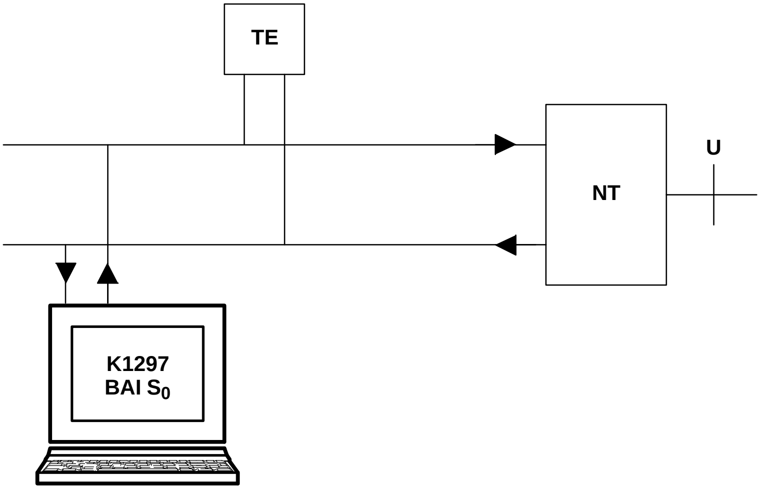


Handsets can be connected so that voice data can be processed bi-directionally in one B channel.

Furthermore, it is possible to supply the TEs with auxiliary power by using the DC/DC converters on the supply module.

TE Emulation

In TE emulation mode, the BAI interface simulates terminal equipment, such as a telephone.



Handsets can be connected so that voice data can be processed bi-directionally in one B channel.

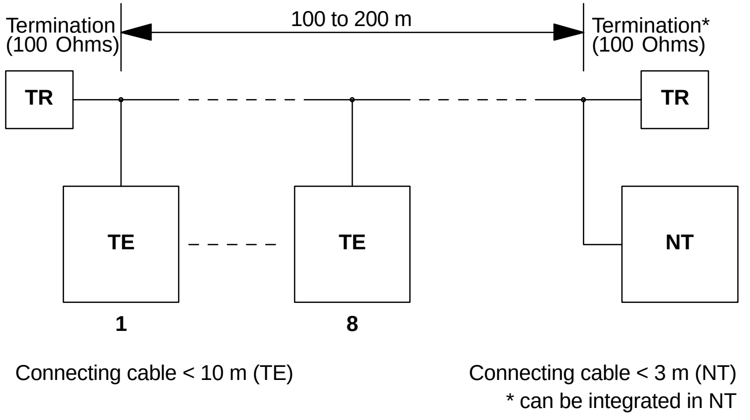
The clock pulses are derived from the signals of the TE receivers.

S_0 Interface: Configurations

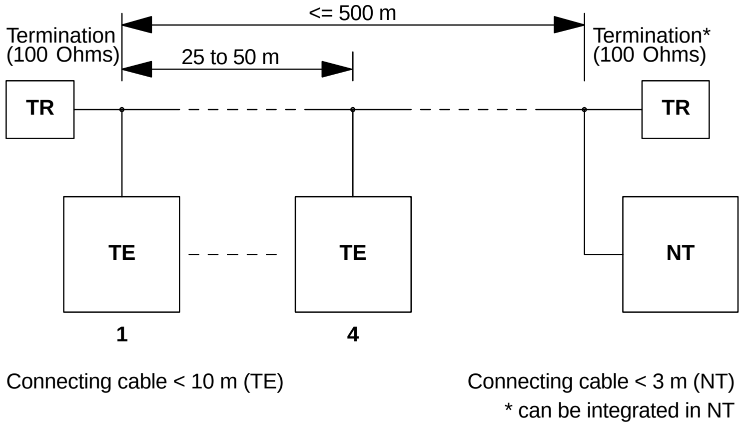
Point-to-Multipoint (Passive Bus)

The passive bus can be implemented as a short passive bus or an extended passive bus.

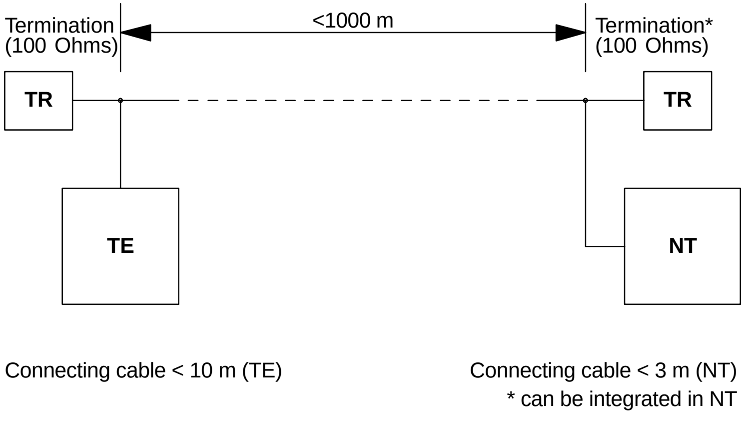
Short passive bus



Extended passive bus



Point-to-Point

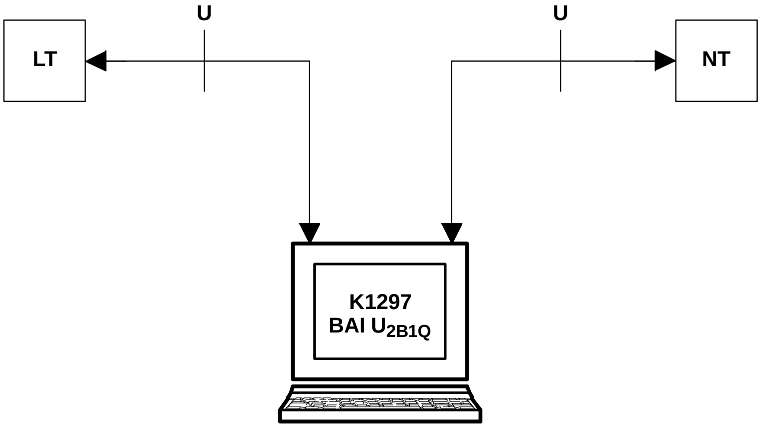


Measurements on the BAI U_{2B1Q} Interface

Monitoring

Due to the transfer procedure, the U interfaces are pure point-to-point connections. Monitoring, by switching in the Protocol Tester on an existing line, is not possible.

This means that the line must be interrupted to implement the monitoring functions. After this, two point-to-point connections are established using the measuring instrument. In this context, the BAI interface represents a U-Repeater.



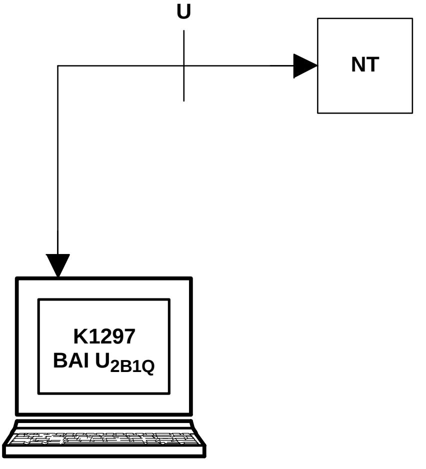
The clock pulses are derived from the LT and transferred to the NT.

The feed voltage supplied by the LT is switched-through to the NT.

You can connect headphones for monitoring bi-directionally voice data on one B-channel; two ARCOFIs (Audio Ringing Codec Filters) on the interface process the voice signals accordingly.

LT Emulation

In LT emulation mode, the BAI interface emulates a line termination.



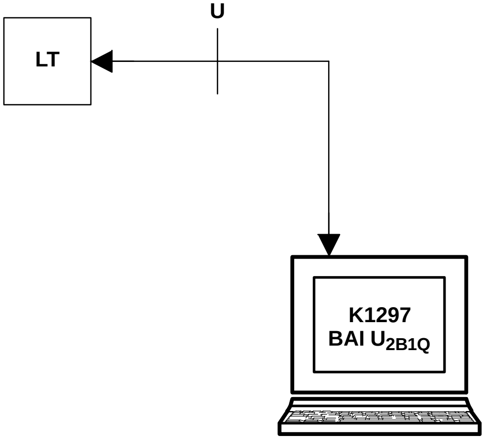
You can connect a telephone headset for conducting telephone conversations; an ARCOFI (Audio Ringing Codec Filter) on the interface processes the voice signals appropriately.

Remote feeding of the NT is possible using the DC-DC converter on the feed module.

The clock pulses are derived either internally from the internal 15.36 quartz or from another PRI or BAI module.

NT Emulation

In NT emulation mode, the BAI interface emulates a line termination.



You can connect a telephone headset for conducting telephone conversations; an ARCOFI (Audio Ringing Codec Filter) on the interface processes the voice signals appropriately.

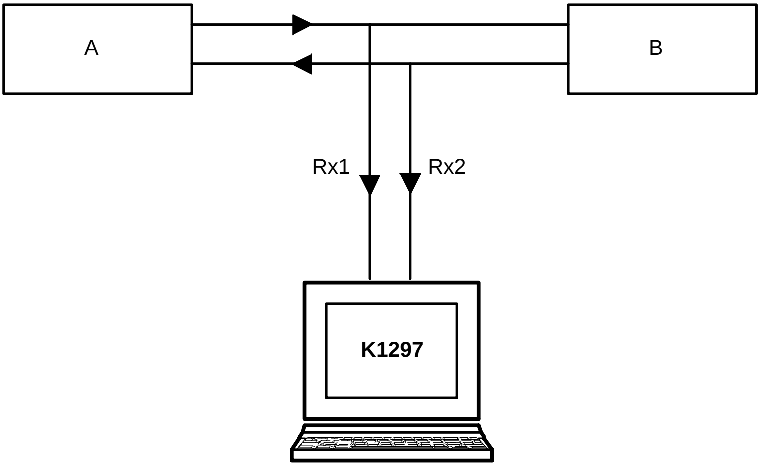
The clock pulses are derived from the signals of the NT receiver.

Measurements on the E1/DS1 Interface

The monitor functionality of the Protocol Tester makes passive reading of data on signaling lines possible. The signaling and user channel data in both directions are displayed.

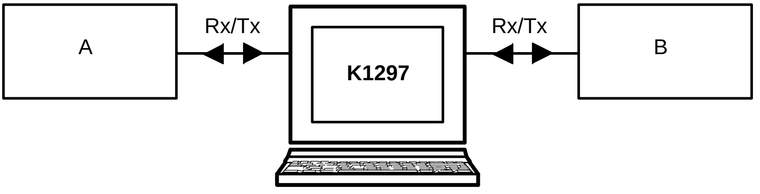
Passive Monitoring

Traffic A-B is read. Both communication directions are monitored. The connection of the tester is established such that a physical as well as logical non-reactive override is carried out. This can be effected, for example, by high-resistance interfacing. The Protocol Tester does not include a sender.



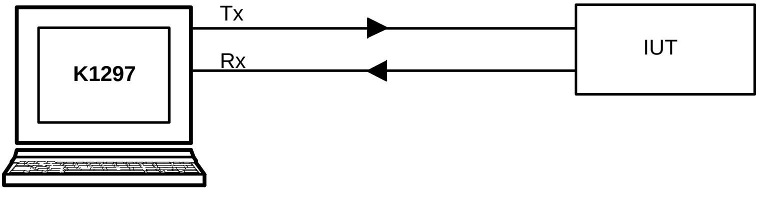
Active Monitoring on Lines in Duplex Operation

With active monitoring on lines in duplex operation there is no possibility for a passive monitor to allocate the relevant direction from the signal. The state machines must be tracked correctly on both Rx/Tx points, for communication from A to B to be possible at all.



Simulation and Multi-Link Simulation

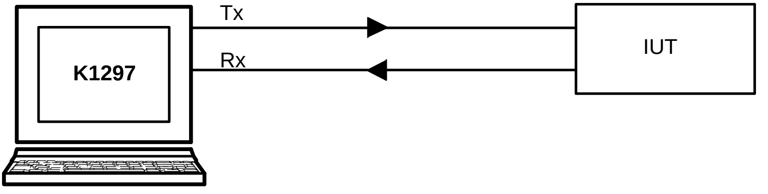
The Protocol Tester takes on the task of a communication partner, layer by layer. The protocol runs according to a program which is created by the user. Thus, you can perform even faulty protocol implementations.



A typical application is the simulation of a layer in connection with emulations of the layers lying underneath.

Emulation

The Protocol Tester takes on the task of a communication partner, layer by layer. The protocol is run automatically and always correctly, so it is not necessary to program the tester.



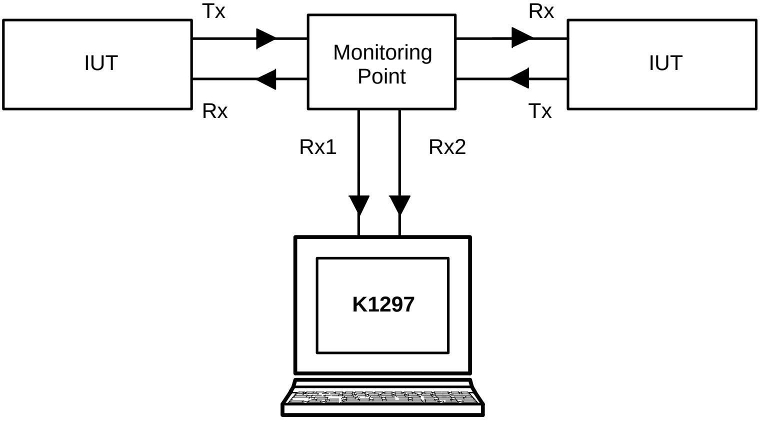
A typical application is the emulation of the lower layers to support the simulation of the overlying layer.

NOTE. *The simulation and emulation on multiple links is possible. Up to 16 interfaces can be simulated in parallel.*

Measurements on ATM Interfaces

Passive Monitoring with Optical STM-1 LIFs via Monitoring Points

If available, use the protected monitoring points of your IUT to establish a connection between the K1297 and the IUT.

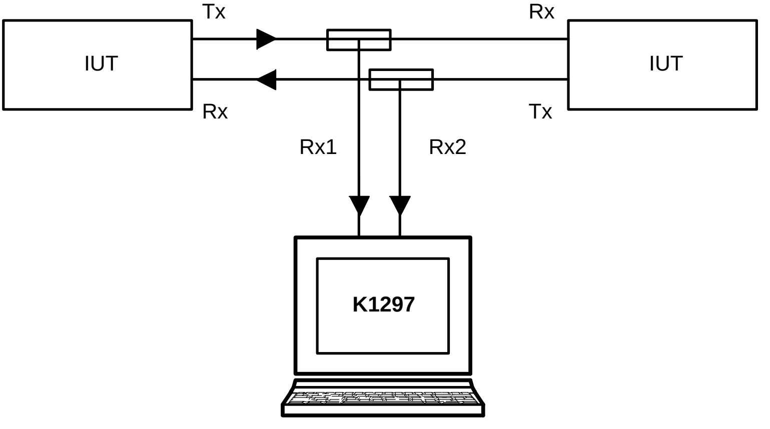


Monitoring points transmit optical signals either in singlemode signals or in multimode fashion. Depending on the transmission mode, you must select the required cable.

Make sure that the optical input power at the optical input ports of the K1297 and the IUT complies with the specified Sensitivity value (see page A-71). To check the optical input power you need an optical power meter.

Passive Monitoring with Optical STM-1 LIFs via Optical Couplers

If your IUT has no monitoring points, connect your K1297 via two optical couplers (splitters) to the IUT.



Optical couplers have one input and two outputs. They split an optical input signal into two optical output signals. They split the power of the input signal either into equal shares (symmetrical couplers) or into unequal shares (asymmetrical couplers).

Different couplers are required for singlemode and for multimode applications. Depending on your IUT, you must select the required coupler.

Make sure that the input power provided at the optical inputs of the K1297 and of the IUT comply with their specified values. Therefore, select couplers with an appropriate split ratio.

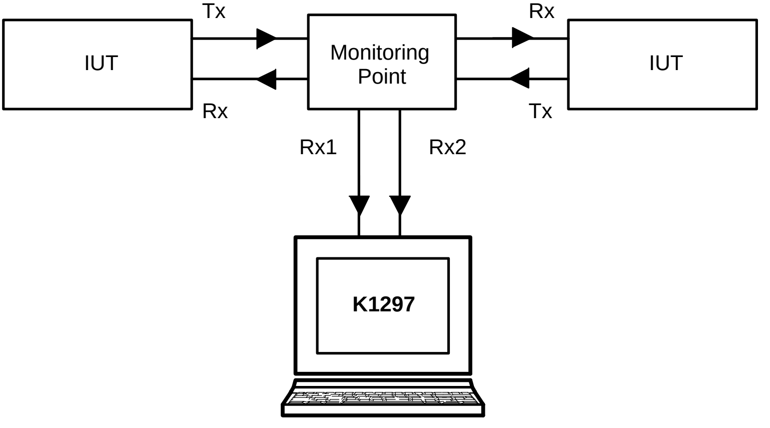
To connect the coupler to your IUT, proceed as follows:

1. Connect the coupler input to the Tx port of your IUT.
2. Connect one coupler output to the regular Rx port or your IUT.
3. Connect the second coupler output to a free port of the optical STM-1 interface of your K1297.

WARNING. *Never look into the end of a fibreglass cable or a fibre which could be connected to a laser source. Laser radiation can damage your eyes because it is invisible and your pupils do not contract instinctively as with normal bright light. If you think your eyes have been exposed to laser radiation, you should have your eyes checked immediately by an eye doctor.*

Passive Monitoring with E1/DS1/J1 LIFs via Protected Monitoring Points

If available, use the protected monitoring points of your IUT to establish a connection between the K1297 and the IUT.



Protected monitoring points can send either E1 data (75 Ohms asymmetrical or 120 Ohms symmetrical), DS1 data (100 Ohms symmetrical), or J1 data (110 Ohms symmetrical). Depending on this type of data, you must select the required cable.

For this monitoring mode, the cable length can be more than 3 meters.

CAUTION. *For E1 connections, please pay attention to possible impedance differences. The impedance can be set via the K1297-G20 application.*

Control the electrical requirements via the K1297 application, via *Ports Setup / Advanced Settings*:

- Set *Mode* either to E1, DS1, or to J1

  For E1 mode, select 75 Ohms (asymmetrical) or 120 Ohms (symmetrical) as *Impedance*.

  For DS1 mode, select 100 Ohms (symmetrical) as *Impedance*.

  For J1 mode, select 110 Ohms (symmetrical) as *Impedance*.

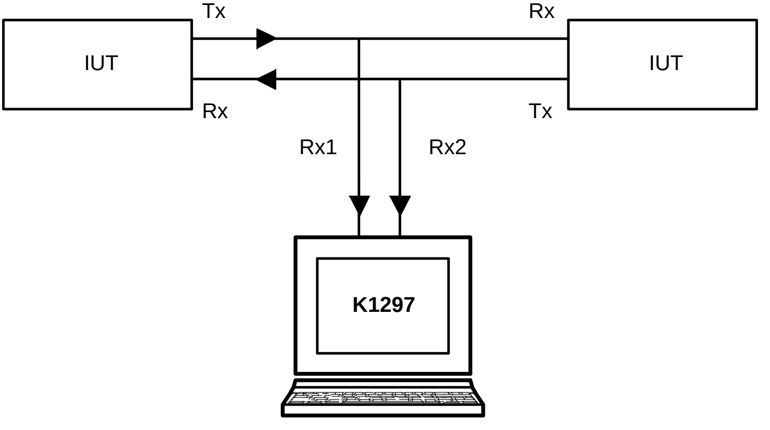
- Set the *Boost (Rx)* to the value that complies with the attenuation of the monitor point.

Passive Monitoring with E1/DS1/J1 LIFs Without Monitoring Points

If your IUT provides no monitoring points, connect the K1297 to the IUT via so-called wire stubs.

Adding wire stubs to communication links disturbs signal transmission because of signal reflections. Therefore, the length of the wire stubs should be kept as short as possible. Usually the impact of reflection caused by wire stubs that are shorter than 3 meters can be neglected.

The cable length of the wire stubs should be less than 3 meters.



Control the electrical requirements via the K1297 application via *Ports Setup / Advanced Settings*:

- Set the *Impedance* to high-resistant
- Set the *Boost* to 0 dB.

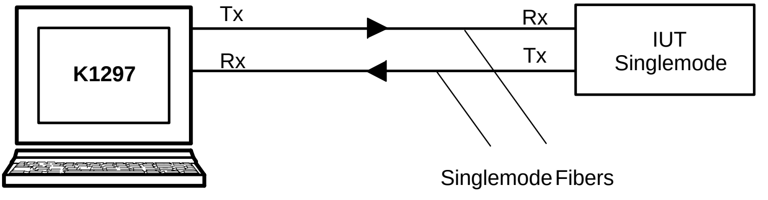
Simulation and Emulation with STM-1 Optical LIFs

For simulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol runs according to a measurement scenario which is created by the user. Thus, you can perform even faulty protocol implementations.

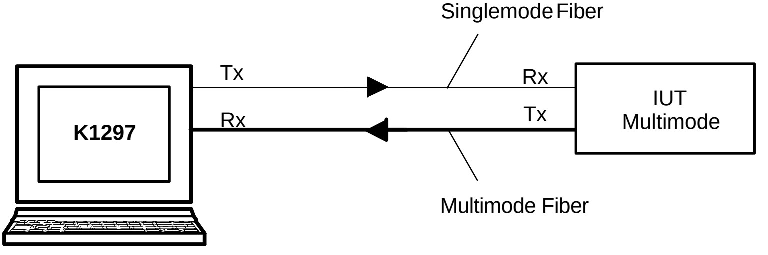
For emulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol is run automatically and always correctly, so it is not necessary to program the tester.

The connections between the K1297 and the IUT are identical for simulation and emulation.

Simulation / Emulation with Singlemode IUTs. To simulate / emulate connections to singlemode IUTs, establish the connection between the K1297 and the IUT according to the following figure.

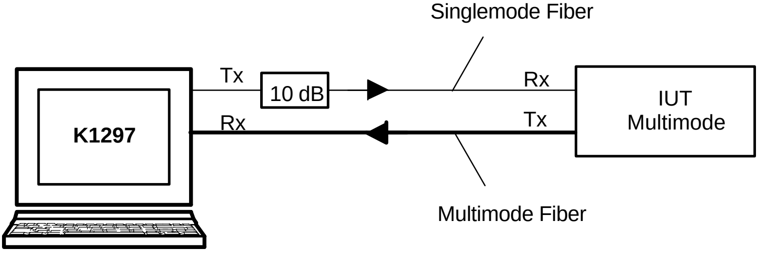


Simulation / Emulation with Multimode IUTs without Attenuator. To simulate / emulate connections to multimode IUTs, establish the connection between the K1297 and the IUT according to the following figure.



Simulation / Emulation with Multimode IUTs with Attenuator. In some cases the optical transmitter of the K1297-G20 overloads the IUT's optical receiver. Typically, in these cases errors on the physical layer (such as bit errors, loss of frame) occur. Inserting an optical attenuator into the connection adjusts the optical power to the sensitivity range of the IUT's receiver.

To simulate / emulate connections to multimode IUTs via attenuator, establish the connection between the K1297 and the IUT according to the following figure.



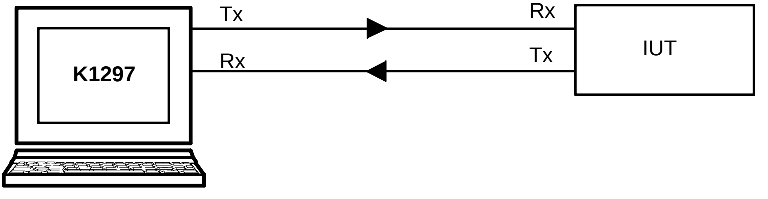
Simulation and Emulation with E1/DS1/J1 Electrical LIFs

For simulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol runs according to a measurement scenario that you create, so you can perform even faulty protocol implementations.

For emulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol is run automatically and always correctly, so it is not necessary to program the tester.

The connections between the K1297 and the IUT are identical for simulation and emulation.

Connection with E1/DS1/J1 Electrical LIFs. To simulate / emulate connections with electrical E1/DS1/J1 line interface boards, establish the connection between the K1297 and the IUT according to the following figure.



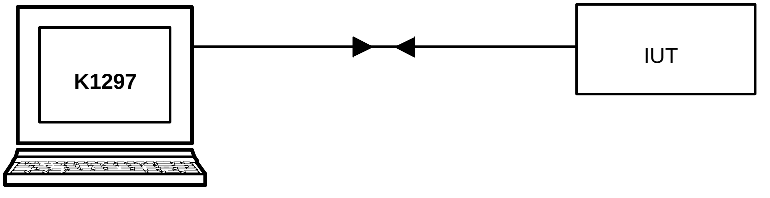
Simulation and Emulation with 10/100/1000 Ethernet Electrical LIFs

For simulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol runs according to a measurement scenario that you create, so you can perform even faulty protocol implementations.

For emulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol is run automatically and always correctly, so it is not necessary to program the tester.

The connections between the K1297 and the IUT are identical for simulation and emulation.

Connection with 10/100/1000 Ethernet Electrical LIFs. To simulate/emulate connections with electrical 10/100/1000 Ethernet line interface boards, establish the connection between the K1297 and the IUT according to the following figure.



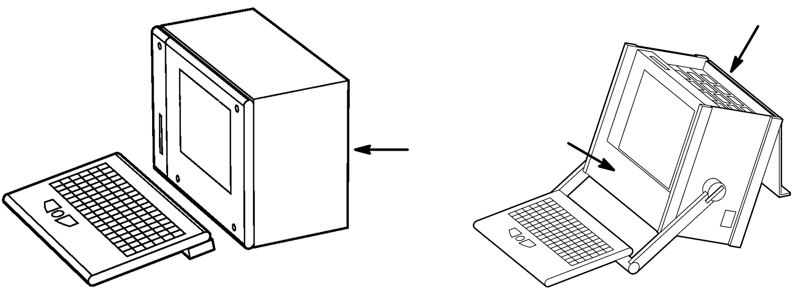
***NOTE**. If the IUT is an Ethernet Host, use a cross cable to connect the electrical 10/100 Ethernet LIF.*

Appendix A: Interfaces

The location of the interfaces is shown in the following figure.

K1297. Interfaces are on the rear of the device, on the PC board front panel and on the front panels of the measuring modules.

K1297 Compact. Interfaces are on the PC board front panel and on the front panels of the measuring modules on top of the device underneath the device cover. Further interfaces are located behind the front cover beneath the display.



K1297 K1297 Compact

⟶ Location of interfaces

The individual interfaces are described in detail in the following sections.

System Unit

The system unit contains the system processor PC as its main component. The processor coordinates control and sequence of the user processes. Further components are: keyboard, monitor, and floppy disk drive. A switched mode mains power supply and regulated fans serve for supply and ventilation of the modules.

CAUTION. *K1297 only: Two green LEDs on the front of the device indicate the active operating state of the system processor and the SCSI connection. If the software can not access the hardware serial number during the boot process, the* Power *LED turns red. In this case, contact the service support.*

PC-7 Board

The Intel-based PC-7 board is a VME bus board with a Celeron system processor.

This board provides the following interfaces:

- PS2 keyboard interface
- Standard serial COM 1 interface for connecting external devices
- USB 1.1 interface for connecting external devices
- LPT1 interface for printer connection
- Ethernet (twisted pair, 100BaseTx) interface for LAN connection
- VGA interface for monitor connection

  The VGA graphics card supports flat screen, external monitor, and dual display mode.

- Four USB 2.0 Highspeed (480MBit/s) interfaces with A Type connectors
- Analog stereo output (LINE_OUT) via stereo mini jack (3.5mm)
- Analog stereo input (LINE_IN) via stereo mini jack (3.5mm)
- Analog mono input (MIC_IN) via stereo mini jack (3.5mm)

To reset the Protocol Tester in an emergency, use a pointed tool and insert it into the RESET switch located on the cover of the PC board. An LED indicates the operating state of the hard disk drive (HD) and a second LED indicates network operation.

Keyboard Interfaces (KEYBOARD and KBD)

Two keyboard interfaces are available:

- K1297 keyboard interface KEYBOARD
- additional interface KBD for an external keyboard

Interface: KEYBOARD

K1297. The K1297 keyboard interface is accessible from the bottom of the device. It is covered by a metal sheet which you have to remove first.

K1297 Compact. The K1297 keyboard interface is behind the front cover beneath the display.

NOTE. *If the external keyboard interface (KBD) is used with an external keyboard, the K1297 keyboard connector must not be plugged in.*

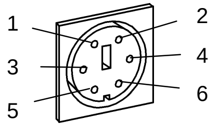


Table A–1: Pin assignment for the KEYBOARD interface (PS/2 interface)

Pin	Assignment	Pin	Assignment
1	Keyboard data	4	+ 5 V
2	PS/2 Mouse data	5	Keyboard clock
3	Ground	6	PS/2 Mouse clock

Interface: KBD

K1297. The interface of the external keyboard is on the rear of the device on the PC board front panel.

K1297 Compact. The interface of the external keyboard is on top of the device on the PC board front panel.

NOTE. *If the additional keyboard interface KBD is used with an external keyboard, the KEYBOARD connector must not be plugged in.*

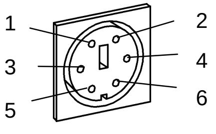


Table A–2: Pin assignment for interface KBD (PS/2 interface)

Pin	Assignment	Pin	Assignment
1	Keyboard data	4	+ 5 V
2	PS/2 Mouse data	5	Keyboard clock
3	Ground	6	PS/2 Mouse clock

Serial Interface (COM1)

K1297. The serial interface COM1 is on the rear of the device on the PC board front panel.

K1297 Compact. The serial interface COM1 is on top of the device on the PC board front panel.

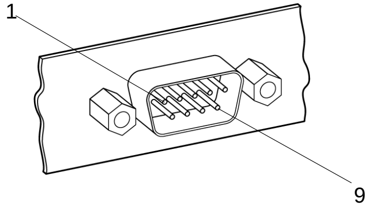


Table A–3: Pin assignment for interface COM1

Pin	Assignment	Pin	Assignment
1	DCD	6	DSR
2	RxD	7	RTS
3	TxD	8	CTS
4	DTR	9	RI
5	Ground		

USB 1.1 and 2.0 Interface

K1297. The USB interfaces are on the rear of the device on the PC board front panel.

K1297 Compact. The USB interfaces are on top of the device on the PC board front panel.

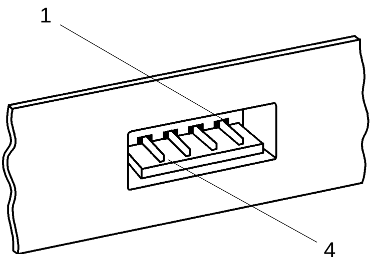


Table A–4: Pin assignment for the USB interfaces

Pin	Assignment	Pin	Assignment
1	5 V	3	USB_P0+
2	USB_P0-	4	Ground

Parallel Interface (LPT1)

K1297. The parallel interface is on the rear of the device on the PC board front panel.

K1297 Compact. The parallel interface is on top of the device on the PC board front panel.

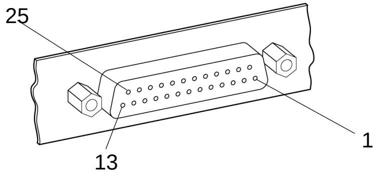


Table A–5: Pin assignment for interface LPT1

Pin	Assignment	Pin	Assignment
1	STROBE	14	Auto feed
2	DB0	15	Error
3	DB1	16	Initialize
4	DB2	17	Select input
5	DB3	18	Ground
6	DB4	19	Ground
7	DB5	20	Ground
8	DB6	21	Ground
9	DB7	22	Ground
10	ACK	23	Ground
11	BSY	24	Ground
12	Paper end	25	Ground
13	Select		

Ethernet Twisted Pair Interface (10BaseT)

K1297. The ethernet twisted pair interface is on the rear of the device on the PC board front panel.

K1297 Compact. The ethernet twisted pair interface is on top of the device on the PC board front panel.

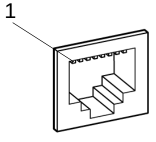


Table A–6: Pin assignment for interface 10BaseT

Pin	Assignment	Pin	Assignment
1	TxD +	5	Not connected
2	TxD -	6	RxD -
3	RxD +	7	Not connected
4	Not connected	8	Not connected

External Monitor’s Interface (VGA)

K1297. The interface for an external VGA monitor is on the rear of the device on the PC board front panel.

K1297 Compact. The interface for an external VGA monitor is on top of the device on the PC board front panel.

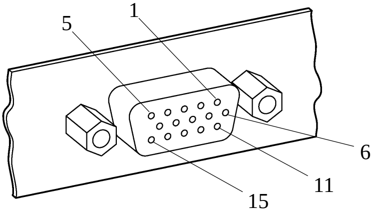


Table A–7: Pin assignment for interface VGA

Pin	Assignment	Pin	Assignment
1	Red	9	Not connected
2	Green	10	Ground
3	Blue	11	Not connected
4	Not connected	12	Monitor data
5	Ground	13	HSY
6	Ground	14	NC
7	Ground	15	Monitor data
8	Ground		

Ethernet BNC Interface (10Base2)

K1297. The ethernet BNC socket is on the rear of the device on the PC board front panel.

K1297 Compact. The ethernet BNC socket is on top of the device on the PC board front panel.

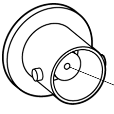


Table A–8: Pin assignment for interface 10Base2

Pin	Assignment	Pin	Assignment
1	RxI/TxO	2	CDS (Signal ground)

Serial Interface (COM2)

K1297. The serial interface (COM2) is on the rear of the device next to the PC board front panel.

K1297 Compact. The serial interface (COM2) is behind the front cover beneath the display.

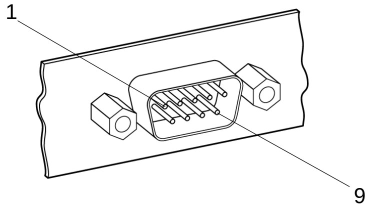


Table A–9: Pin assignment for interface COM2

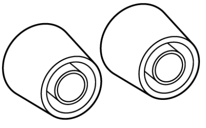
Pin	Assignment	Pin	Assignment
1	DCD	6	DSR
2	RxD	7	RTS
3	TxD	8	CTS
4	DTR	9	RI
5	Ground		

Alarm and Synchronizing Sockets (RELAIS and CLK I/O)

Alarm and synchronizing sockets you can order as an option for your K1297.

K1297. The alarm and synchronizing sockets are on the rear of the device in the left bottom corner.

K1297 Compact. The alarm and synchronizing sockets are behind the front cover beneath the display.



The following voltages are the maximum turn-off voltages that you may apply:

42 V AC peak with maximum turn-off current 5 A or
30 V DC with maximum turn-off current 5 A or

60 V DC with maximum turn-off current 1.5 A resistive load or
60 V DC with maximum turn-off current 0.5 A non-resistive load.

The maximum relay ratings are:

250 V AC with 5 A or
30 V DC with 5 A or

60 V DC with 1.5 A resistive load or
60 V DC with 0.5 A non-resistive load.

The synchronizing sockets can be used for data or timestamp synchronization of several K1297 and for clock synchronization of interface boards.

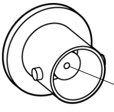


Table A–10: Pin assignment for interface CLK I/O

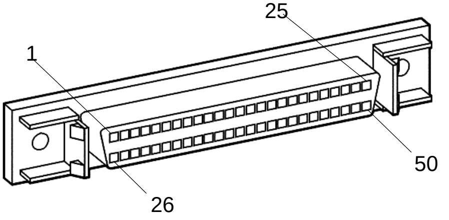
Pin	Assignment	Pin	Assignment
1	RxI/TxO	2	CDS (Signal ground)

***NOTE**. The described options will need to be enabled by the appropriate software.*

SCSI Interface (SCSI I/O BUS)

K1297. The SCSI interface is on the rear of the device in the right bottom corner.

K1297 Compact. The SCSI interface is behind the front cover beneath the display.



Up to six peripheral devices can be connected to the controller of the system processor via the SCSI socket. Each peripheral device must be assigned an individual address (SCSI ID). The controller occupies address 7 as standard. Since the controller boots from the device with the lowest address, the internal hard disk of the K1297 is set to address 1. When not connected with a peripheral device the SCSI socket is terminated automatically.

The interface is single ended.

CAUTION. *Assign one of the free addresses 2 - 6 to the devices that you want to operate via the external SCSI connection. Do not assign address 1. Switch on the Protocol Tester first and before switching on the SCSI connected device.*

Table A–11: Pin assignment for interface SCSI I/O

Pin	Assignment	Pin	Assignment
1	Ground	26	D0
2	Ground	27	D1
3	Ground	28	D2
4	Ground	29	D3
5	Ground	30	D4
6	Ground	31	D5
7	Ground	32	D6
8	Ground	33	D7
9	Ground	34	DP
10	Ground	35	Ground
11	Ground	36	Ground
12	Ground	37	Ground
13	Ground	38	TERMPWR
14	Ground	39	Ground
15	Ground	40	Ground
16	Ground	41	ATN
17	Ground	42	Ground
18	Ground	43	BSY
19	Ground	44	ACK
20	Ground	45	RST
21	Ground	46	MSG
22	Ground	47	SEL
23	Ground	48	C/D
24	Ground	49	REQ
25	Ground	50	I/O

Connecting Wide SCSI-3 Devices (68 Pins)

It is possible to connect a wide SCSI-3 device (68 pins) to the K1297 Protocol Tester using the delivered SCSI adapter.

The SCSI interface of your Protocol Tester is wired like a SCSI-1 interface. To connect a wide SCSI-3 device (68 pins) you need this specially qualified 50-to-68 pins SCSI adapter.

CAUTION. *Some commercially-made adapters may cause a short circuit between TERMPWR and GROUND if they connect pins 12, 13 and 37 of the 50 pins SCSI interface to pins 17, 18 and 51 of the wide 68 pins SCSI interface. Such an internal wiring will cause the failure of the SCSI connection.*

Use only the SCSI adapter delivered with your Protocol Tester.

The following table shows the crucial pin connections of the qualified Tektronix 50-to-68 pin SCSI adapter:

Table A–12: Correct internal pin assignment of 50-to-68 pin SCSI adapter

Pin of 50-pin SCSI interface	Required internal connection	Pin of 68-pin SCSI interface
12	Not connected	17
13	Not connected	18
37	Not connected	51

AP-4 and AP-4/256 Board

The Additional Processor Board (AP-4) is a single slot card that increases the K1297-G20 Protocol Tester's processing power by a factor of 5 to 10 depending on the application.

When using 3 or more measurement cards it is recommended to include the AP-4 card; it is necessary when using 5 or 6 boards in the K1297 benchtop device.

AP-4 and AP-4/256 boards provide the following features:

- 64 or 256 MB Memory Capacity
- 1 MB Memory L2 Cache
- 140 MHz Memory Cache Bus Clock Frequency
- 350 MHz Processor Clock Frequency
- Serial interface via RJ45 front panel connector
- Ethernet interface (10-BaseT/100-BaseTx) via RJ45 front panel connector
- Two PCI Mezzanine card slots

***NOTE**. AP-4/256 boards require software version K1297-G20 V2.00 or above.*

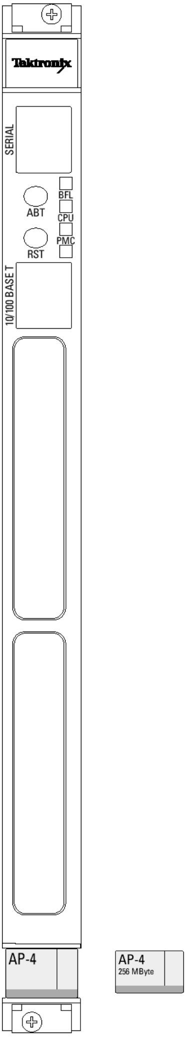


Figure A–1: AP-4, AP-4/256 Board

K1297. For the K1297 the usage of an AP-4 or AP-4/256 board depends on the number of interface boards.

K1297 Compact. For the K1297 Compact the AP-4 or AP-4/256 board is optional.

For configurations with 1 or 2 interface boards an AP-4 or AP-4/256 board will only be needed for heavy demanding applications. Using an AP-4 or AP-4/256 board speeds up decoding approximately by factor 10. The disk throughput performance raises by at least factor 2.

For configurations using 3 and 4 interface boards we recommend using an appropriate processor also for lighter loads.

For configurations with 5 and 6 interfaces the AP-4 or AP-4/256 board is mandatory.

NOTE. *Keep in mind that using an additional application processor in the K1297/K1297 Compact housing needs an additional VME bus slot.*

CAUTION. *Before installing a new board ensure that the VME bus address is set correctly (cf. chapter Getting Started, section Exchanging Measuring Modules).*

Defining new CPU numbers must be performed at an ESD approved workplace. Electrostatic discharge can permanently destroy components that have to be temporarily removed from your device.

Working With Two AP-4 / AP-4/256 Boards. Upon delivery, AP-4 boards are set to ”0”. If you work with a second AP-4 board, make sure its VME bus address (CPU number) is set correctly.

The VME bus addresses throughout the system must be unique. The AP-4 and Ethernet boards require an odd address number. In addition, the next even address number must NOT be used in the system:

- A system with a second AP-4 board with VME address ”7” (and ”8” implicitly) works fine if there are no other board conflicts with ”7” and ”8”.
- A system with a second AP-4 board with VME address ”3” (and ”4” implicitly) plus an E1/DS1 Emulation board with VME address ”1” works fine if there are no other board conflicts with ”3”, ”4”, and ”1”.

CAUTION. *The PC board is set to address ”9” upon delivery (and ”10” implicitly), and the first AP board is set to address 0. Never change the addresses of the PC board and the first AP-4 board.*

See the description on how to define CPU numbers of the Ethernet board on page A-95 and proceed accordingly if you want to work with a second AP-4 board.

The *Status Window* displays the VME addresses that are in use (however, the implicitly used numbers for boards such as AP-4 and ETH-100 are not displayed).

CAUTION. *Only a qualified service technician should perform this procedure at an ESD approved workplace. To avoid injury and to prevent damage to the board or any products connected, review all safety precautions in the User Manual when adapting CPU numbers.*

The following interfaces are located on the front panel of the AP-4 / AP-4/256 board:

- Serial interface
- 10BaseT / 100BaseTX

The SERIAL interface (RJ45 connector) can be used as asynchronous serial debug port for service purposes.

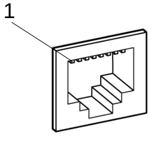


Table A–13: Pin assignment for the SERIAL interface (DTE)

Pin	Assignment	Pin	Assignment
1	DCD	5	RxD
2	RTS	6	Ground
3	Ground	7	CTS
4	TxD	8	DTR

In addition an RJ45 10BaseT / 100BaseTX connector is provided on the front panel (for future use, not yet supported).

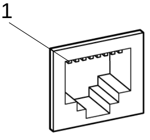


Table A–14: Pin assignment for the 10BaseT / 100BaseTX interface

Pin	Assignment	Pin	Assignment
1	TD +	5	Not connected
2	TD -	6	RD -
3	RD +	7	Not connected
4	Not connected	8	Not connected

The two covered holes at the bottom can be equipped with PCI mezzanine cards for special applications as for example GPRS.

The two switches on the front panel have the following function:

ABT	Abort (for future use, not yet software supported)
RST	Reset all onboard devices

The four status LEDs on the front panel have the following meaning:

BFL	Board failure
CPU	CPU is accessing the bus
PCM	Top PCI mezzanine card, if installed, is active
PCM	Bottom PCI mezzanine card, if installed, is active

BAI Board

The BAI board (Basic Access Interface) is required for measurements on ISDN lines and connections. The BAI board can be fitted with up to two interface modules depending on the purpose of application. The interface modules establish the necessary different circuits dependent on the interface standard.

NOTE. *EN 60950, IEC 950, UL 1950: The interface boards are designed for connecting to a telecommunication network (TNV-1 circuits); the appropriate interfaces are provided.*

The supply voltage necessary for supplying power to the terminal equipment to be tested is supplied by a separate supply module, which is plugged on the interface board and connected to the base module.

WARNING. *High voltages may occur on the following supply connectors and sockets: under “S_0 Simulation / Monitoring” with “TE A” or “TE M”, “MON A B” or “MON M N”, “TE/NT B” or “TE/NT N”;*
under “U_{2B1Q} Simulation / active Monitoring” with “LT A” or “LT M” and “NT/LT B” or “NT/LT N”.

With older front panels the following supply connectors and sockets are concerned: “to NT”, “S-BUS MON”, “to TE(NT)”, “to LT”, “to NT(LT)”. These older terms are marked in the following with old.

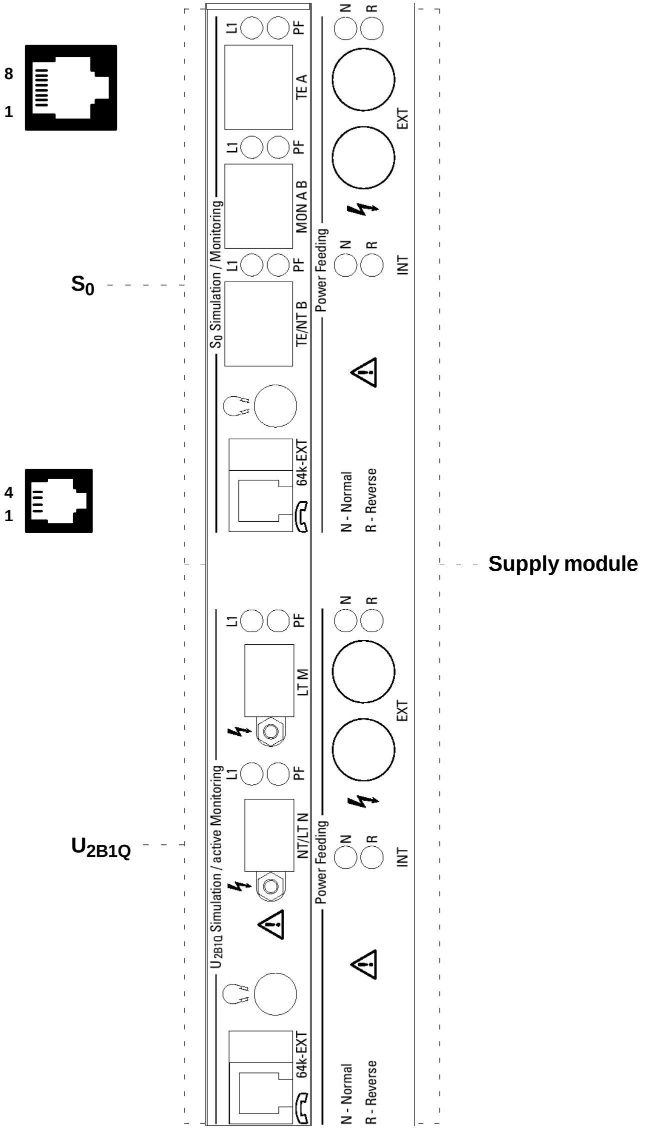


Figure A–2: BAI board with S_0 and U_{2B1Q} interface

BAI S_0 Interface Module

The S_0 interface module provides three RJ45 connectors for line connection, which are designated as follows:

- "TE A" or "TE M" (old: "to NT")
- "MON A B" or "MON M N" (old: "S-BUS MON")
- "TE/NT B" or "TE/NT N" (old: "to TE(NT")

Modes of Operation. To monitor lines with the S_0 interface module, proceed as follows:

1. Deactivate the line and connect the S bus with connector "MON A B"/ "MON MN".
2. Activate the line from the NT or TE.

To emulate, proceed as follows:

If you want to carry out a TE Emulation, connect the network/exchange line with the "TE/NT B"/"TE/NT N" connector. You can set a high-resistance terminating element (S bus) or a 100 Ω terminating element in the configuration menu.

If you want to carry out an NT Emulation, connect your terminal equipment with the "TE A"/"TE M" connector. This line is terminated with 100 Ω in the interface module.

If you want to carry out a Dual TE Emulation - the Dual TE Emulation is a special mode in which the Protocol Tester uses one interface module to emulate two TEs -, check the correct configuration of this mode of operation before establishing the line connections . Connect one NT with the "TE/NT B"/"TE/NT N" connector and the other NT with the "TE A"/"TE M" connector.

CAUTION. *Make sure to only use the "MON A B"/"MON M N" connector when connecting the S bus.*

Line status. Two LEDs, “L1” (Layer 1 activated) and “PF” (Power Feeding), are assigned to each line connector. The LEDs indicate the line status, as shown in the following table.

Table A–15: Line status S_0 interface module

L1	PF	Meaning
on	on	After booting: Reset of the interface. Else: Activated, normal power feeding
alternating with PF	alternating with L1	Port is initialized and deactivated: Activate. Internal: deactivated, no power feeding
on	off	Activated, no power feeding
off	on	Deactivated, normal power feeding
off	blinking	Deactivated, restricted power feeding
on	blinking	Activated, restricted power feeding
off	off	Port not active

In NT Emulation operating mode, the auxiliary supply voltage source present on the supply module can be activated. According to the S_0 lines specification, the specified supply voltage at the power feeding point for terminal equipment is 40 V DC (+2 /-6 V).

Pin Assignment. The connectors of the S_0 interface module have the following pin assignment:

Table A–16: Pin assignment for connectors TE A and TE M

Pin	Assignment	Pin	Assignment
1	Not connected	5	Rx-
2	Not connected	6	Tx-
3	Tx+	7	Not connected
4	Rx+	8	Not connected

Table A–17: Pin assignment for connectors MON A B and MON M N

Pin	Assignment	Pin	Assignment
1	Not connected	5	Rx TE-
2	Not connected	6	Rx NT-
3	Rx NT+	7	Not connected
4	Rx TE+	8	Not connected

Table A–18: Pin assignment for connectors TE/NT B and TE/NT N

Pin	Assignment	Pin	Assignment
1	Not connected	5	Tx-
2	Not connected	6	Rx-
3	Rx+	7	Not connected
4	Tx+	8	Not connected

BAI U_{2B1Q} Interface Module

The U_{2B1Q} interface module provides two connectors for line connection, which are designated as follows:

- "LT A" or "LT M" (old: "to LT")
- "NT/LT B" or "NT/LT N" (old: "to NT(LT)")

Modes of Operation. To monitor lines with the U_{2B1Q} interface module, proceed as follows:

1. Deactivate the line concerned and separate it.
2. Connect the network to the socket labelled "LT A"/"LT M" and connect the NT to the socket labelled "NT/LT B"/"NT/LT N". The interface module responds in the line like a U-repeater.

To emulate, proceed as follows:

If you want to carry out an LT Emulation, connect your NT or your terminal equipment to the "NT/LT B"/"NT/LT N" socket.

If you want to carry out an NT Emulation, connect the network station to the "LT A"/"LT M" socket.

If you want to carry out a Dual NT Emulation - the Dual NT Emulation is a special mode in which one interface module is used to emulate two NTs -, check the correct configuration of this mode of operation before establishing the line connections. Connect one of the LTs to the "LT A"/"LT M" socket and the other LT to the "NT/LT B"/"NT/LT N" socket.

Line status. Two LEDs, “L1” (Layer 1 activated) and “PF” (Power Feeding), are assigned to each line connector. The LEDs indicate the line status, as shown in the following table.

Table A–19: Line status U_{2B1Q} interface module

L1	PF	Meaning
on	on	After booting: Reset of the interface. Else: Activated, normal power feeding
alternating with PF	alternating with L1	Port is initialized and deactivated: Activate. Internal: deactivated, no power feeding
on	off	Activated, no power feeding
off	on	Deactivated, normal power feeding
off	blinking	Deactivated, restricted power feeding
on	blinking	Activated, restricted power feeding
off	off	Port not active

In LT Emulation operating mode, the auxiliary supply voltage source present on the supply module can be activated. For standard power feeding of NTs with short line connections to the LT, a supply voltage of 55 V DC is used.

Pin Assignment. The connectors of the U_{2B1Q} interface module have the following pin assignment:

Table A–20: Pin assignment for connectors LT A and LT M

Pin	Assignment	Pin	Assignment
1	TIP*	2	RING*

Table A–21: Pin assignment for connectors NT/LT B and NT/LT N

Pin	Assignment	Pin	Assignment
1	TIP*	2	RING*

* Either polarity is possible.

Auxiliary Connections

The modules also provide the following auxiliary connections:

- Headphones: A 3.5-mm stereo jack is used as headphone connector. Software has not been not implemented yet but is coming soon: a B channel can be monitored bi-directionally via the stereo headphones.

CAUTION. *Use a headphone or headset with a ferrite sleeve in order to fulfill EMC regulations. See Appendix C, Certifications and compliances table.*

- B channel connection “64k EXT”: The B channels can be accessed externally with the appropriate setting in the configuration menu (also see below *B Channel Access Adapter*).
- Handset: Software not implemented yet but coming soon: Running a simulation a voice connection can be established in a B channel via a connected handset (see below *Handset connection*).
- Supply module, auxiliary connection “EXT”, red and black, for supply voltage: Two 4-mm banana jacks are provided for measuring the supply voltage (red: normal + and black: normal -) supplied by the NT (with S_0) or the LT (with U_{2B1Q}) when monitoring.

CAUTION. *Due to EMC reasons, use only high quality, shielded cables!*

B Channel Access Adapter. B channel data is extracted using an optional accessories adapter cable, which features two connectors: a 10-pin mini plug for the interface module (“64k EXT”) on one end and a female 15-pin D-Sub plug on the other end with the following pin assignment.

***NOTE**. We also offer a wide range of cables and adapters, which you can order. Take a look in the WWW under Tektronix.com at our Cable and Accessory Guide or contact your local sales partner.*

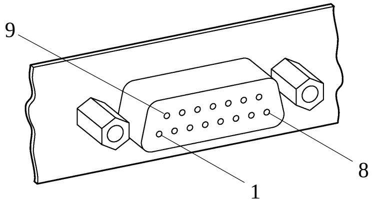


Figure A–3: B channel connection

Table A–22: Pin assignment for B channel connection

Pin	Assignment	Pin	Assignment
1	Output RxD/B1 from network-side when monitoring	9	Output RxD/B2 from user-side when monitoring
2	Not connected	10	Output RxD/B2 from network-side when monitoring
3	Output RxD/B1 from user-side when monitoring	11	Not connected
4	Input TxD/B2	12	Input TxD/B1
5	Not connected	13	Output TxC (64 kHz inverted to RxC)

Table A–22: Pin assignment for B channel connection (Cont.)

Pin	Assignment	Pin	Assignment
6	Output RxC (64 kHz)	14	Not connected
7	Output frame signal B1 (8kHz)	15	Digital Ground
8	Output frame signal B2 (8kHz)		

The signals are TTL level with an impedance of 75 Ω.

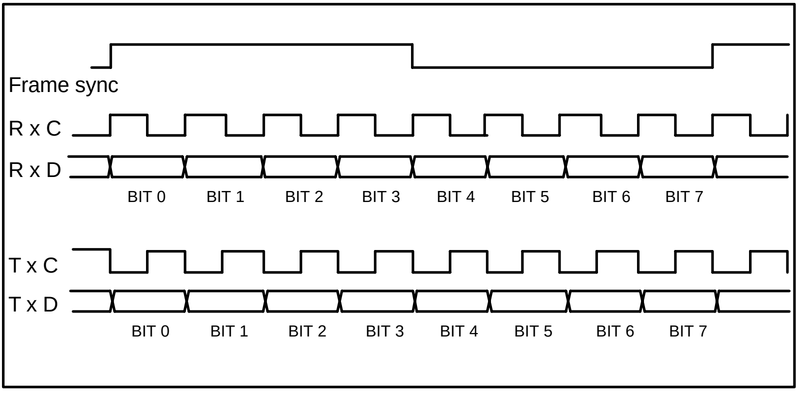


Figure A–4: Time diagrams

Handset Connection. Running a simulation a voice connection can be established in a B channel via a connected handset (not yet software supported).

Table A–23: Pin assignment handset

Pin	Assignment	Pin	Assignment
1	Transmitter capsule -	3	Receiver capsule +
2	Receiver capsule -	4	Transmitter capsule +

E1/DS1 Emulation Board

Simulations and emulations on PCM sections can be carried out via the available E1 and DS1 emulation modules (PRIME modules: Primary Rate Monitor and Emulation).

Two transmission rates are supported, 2.048 Mbit/s (E1; PCM 30) and 1.544 Mbit/s (DS1; PCM 24).

Each module can simulate or emulate up to four physical PCM connections, monitor up to two connections, or simulate/emulate two connections and monitor one connection. The lines are connected via separate simulation/monitoring sockets. Configuration errors are thus excluded from the beginning.

NOTE. *EN 60950, IEC 950, UL 1950: The interface boards are designed for connecting to a telecommunication network (TNV-1 circuits); the appropriate interfaces are provided.*

The following overview shows the supported framing formats and the electrical specifications of the two versions:

E1: PRIME_2	Framing Format	Transmitter	Receiver
E1 2.048 MBIT/S	PCM30 HDB3	Output Pulse acc. to G.703 § 6.2	Input Sensitivity min. -35 dB
	CRC4 ON/OFF HDB3	Bit Rate acc. to G.703 § 6.1	Impedance Low / High 75, 120 / > 650 ohms
		Output Jitter acc. to G.823 § 2	Jitter tolerance acc. to G.823 § 3.1
			Return Loss acc. to G.703 § 6.3
			Unbalance > 22 dB

DS1: PRIME_1.5	Framing Format	Transmitter	Receiver
DS1 1.544 MBIT/S	F4 AMI / B8ZS	Output Pulse acc. to G.703 § 2.6	Input Sensitivity min. -35 dB
	F12 D3/D4 AMI / B8ZS	Bit Rate acc. to G.703 § 2.2	Impedance Low / High 75, 100 / > 650 ohms
	ESF CRC6 ON/OFF AMI / B8ZS	Output Jitter acc. to G.824 § 3	Jitter tolerance acc. to G.824 § 4.2
	F72 AMI / B8ZS		Return Loss acc. to G.703 § 6.3
			Unbalance > 22 dB

The interfaces of the E1 and DS1 modules implement the physical and electrical connections to the PCM section. For simulation, the sockets feature a transmitter and receiver each for PCM signals. For monitoring, two receivers of the adjacent simulations each are used and combined on a socket.

The assignment of the connections is included in the following overview. The assignment of the transmitters and receivers of all four simulation sockets as well as the receiver of both monitoring sockets are identical.

Accessories. The DS1 and E1 modules require lines with a 9-pin D-Sub plug on the test object side. For the system connection side, the following test cables are available:

- Open ends (no plug) with Z=120 Ω
- 1.6/5.6 plug with coax cable with Z=75 Ω. A 1.6/5.6 adapter on BNC makes the connection of the cable to BNC sockets possible.
- 3-pin with Z=120 Ω
- Bantam with Z=110 Ω

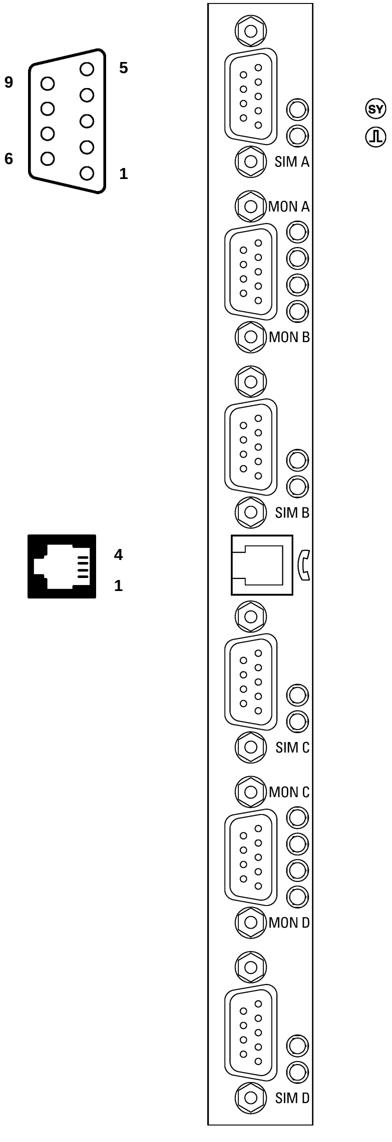


Figure A–5: E1/DS1 emulation board (PRIME)

Four 9-pin D-Sub simulation connectors are on the board.

Table A–24: Pin assignment D-Sub connectors

Pin	Assignment	Pin	Assignment
1	Rx-	6	Rx+
2	Not connected	7	Not connected
3	Not connected	8	Not connected
4	Not connected	9	Tx+
5	Tx-		

Two 9-pin D-Sub monitoring connectors are on the board.

Table A–25: Pin assignment D-Sub connectors

Pin	Assignment	Pin	Assignment
1	Rx- MON A, C	6	Rx+ MON A, C
2	Not connected	7	Not connected
3	Not connected	8	Not connected
4	Not connected	9	Rx+ MON B, D
5	Rx- MON B, D		

Handsets or headsets can be connected so that voice data can be processed bi-directionally in one B channel.

Table A–26: Pin assignment of the handset connector

Pin	Assignment	Function
1	MIN	Microphone input negative
2	HON	Handset output negative
3	HOP	Handset output positive
4	MIP	Microphone input positive

CAUTION. *Use a headphone or headset with a ferrite sleeve in order to fulfill EMC regulations. See Appendix C, Certifications and compliances table.*

The status LEDs on the front panel have the following meaning:

SY — Synchronous: Receive frame recognized, if LED is on.

Signal ok: Receive signal recognized, if LED is on.

E1/DS1 Monitoring Board

Each E1/DS1 monitoring board (PRIMO: primary rate monitoring) has four independent PCM monitor interfaces and can receive eight signaling links with HDLC data. The Protocol Tester can be extended to simultaneously monitor 16 PCM interfaces and 32 signaling links.

NOTE. *EN 60950, IEC 950, UL 1950: The interface boards are designed for connecting to a telecommunication network (TNV-1 circuits); the appropriate interfaces are provided.*

The following overview shows the supported framing formats and the electrical specifications:

DS1

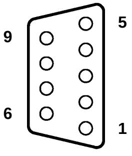
DS1	Framing Format
DS1 1.544 MBIT/S	F4 AMI / B8ZS
	F12 D3/D4 AMI / B8ZS
	ESF CRC6 ON/OFF AMI / B8ZS
	F72 AMI / B8ZS

Receiver input: 0 - 36 dB
75 ohms / 100 ohms / >650 ohms

E1

E1	Framing Format
E1 2.048 MBIT/S	PCM30 HDB3
	CRC4 ON/OFF HDB3

Receiver input: 0 - 36 dB
75 ohms / 120 ohms / >650 ohms



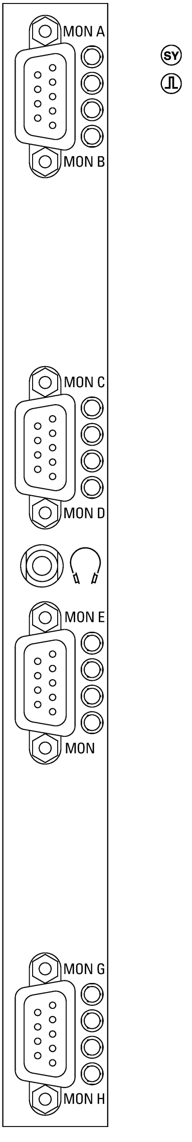


Figure A–6: E1/DS1 monitoring board (PRIMO)

9-pin D-Sub connectors are available as interfaces.

Table A–27: Pin assignment D-Sub connectors

Pin	Assignment	Pin	Assignment
1	Rx- MON A, C, E, G	6	Rx+ MON A, C, E, G
2	Not connected	7	Not connected
3	Not connected	8	Not connected
4	Not connected	9	Rx+ MON B, D, F, H
5	Rx- MON B, D, F, H		

In addition a headphone connector with a mini jack is provided for listening to audio data.

The status LEDs on the front panel have the following meaning:

SY — Synchronous: Receive frame recognized, if LED is on.

⎍ — Signal ok: Receive signal recognized, if LED is on.

Ethernet Board

The set of Ethernet boards is equipped with two Ethernet single-wide PCI mezzanine modules for special applications such as GPRS Gn/Gi.

The Ethernet modules comply with the IEEE 802.3 for 10BaseT and 100BaseTX. Both full duplex and half duplex modes are supported.

Due to performance reasons, an AP board and a E1/DS1 or a S_0 - U_{2B1Q} board are prerequisites for using the Ethernet board.

NOTE. *EN 60950, IEC 950, UL 1950: The interface boards are designed for connecting to a telecommunication network (TNV-1 circuits); the appropriate interfaces are provided.*

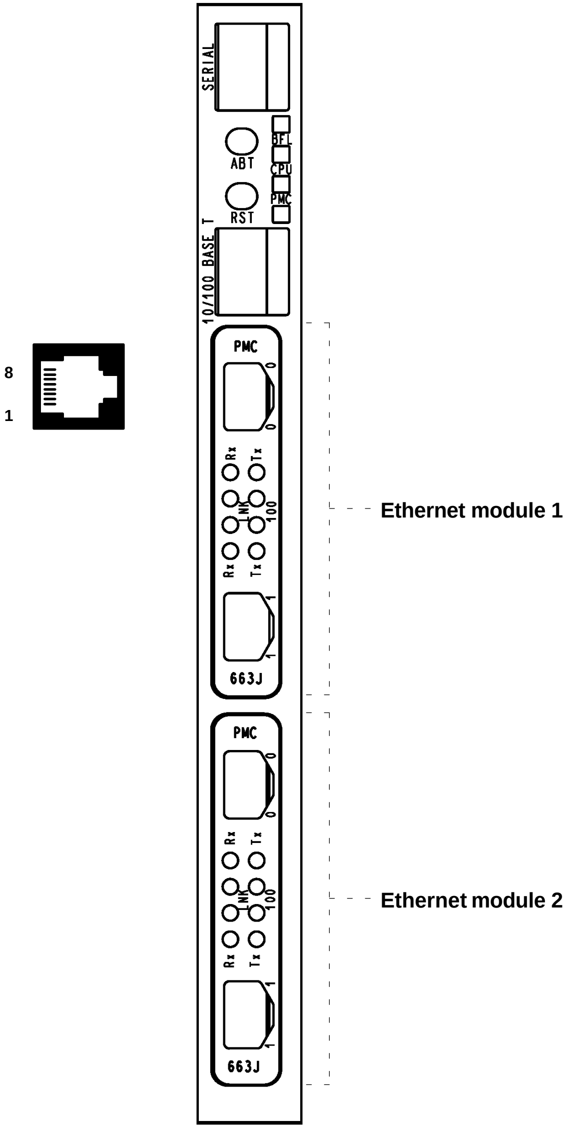


Figure A–7: ETH board with two Ethernet PCI mezzanine modules

The SERIAL interface (RJ45 connector) can be used as asynchronous serial debug port for service purposes.

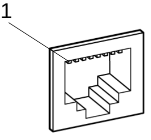


Table A–28: Pin assignment for the SERIAL interface (DTE)

Pin	Assignment	Pin	Assignment
1	DCD	5	RxD
2	RTS	6	Ground
3	Ground	7	CTS
4	TxD	8	DTR

In addition an RJ45 10-BaseT/100-BaseT connector is provided on the front panel (for future use, not yet supported).

Table A–29: Pin assignment for the 10-BaseT/100-BaseT interface

Pin	Assignment	Pin	Assignment
1	Tx +	5	Not connected
2	Tx -	6	Rx -
3	Rx +	7	Not connected
4	Not connected	8	Not connected

The two switches on the front panel have the following function:

ABT	Abort (for future use, not yet software supported)
RST	Reset all onboard devices

The four status LEDs on the front panel have the following meaning:

BFL	Board failure
CPU	CPU is accessing the bus
PMC	Top PCI mezzanine card, if installed, is active
PMC	Bottom PCI mezzanine card, if installed, is active

Ethernet Modules

Two independent high performance Fast Ethernet interface controller ports (RJ45 connectors) are on an Ethernet module.

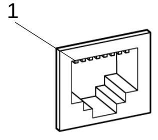


Table A–30: Front Panel I/O Pin Assignment

Pin	Signal	Pin	Signal
1	Tx +	5	Not connected
2	Tx -	6	Rx -
3	Rx +	7	Not connected
4	Not connected	8	Not connected

Each Ethernet port provides a set of four LED status indicators on the front panel with the following information:

Rx Traffic is sensed on the network.
Tx A data packet is sent.

The LEDs have the following meaning:

LINK Link integrity: LED is on means, link is good in either 10 or 100 Mbps mode.
LED is off means, link is bad.

100 Speed: LED is on means, the data rate is 100 Mbps.
LED is off means, the data rate is at 10 Mbps.
LED retains its last known state when the link is down.

GbETH Board

GbETH stands for Gigabit Ethernet. The Gigabit Ethernet board processes the data streams, which are transmitted and received via its two Gigabit Ethernet ports.

NOTE. *In the* Port Setup *dialog for the GbETH board, you cannot set the bit rate manually. Instead use the* Auto Mode *option.*

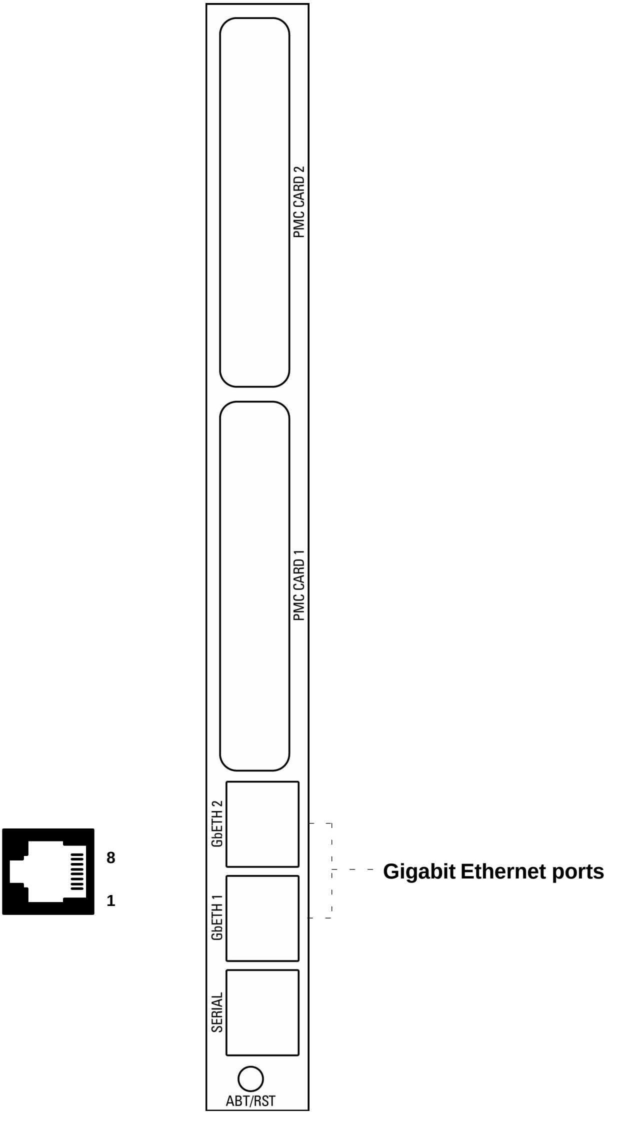


Figure A–8: GbETH (Gigabit Ethernet) Board

The following hardware configurations are supported:

Table A–31: Maximum Configurations with the GbETH Board

Number of measurements boards Device type	AP-4	GbETH	E1/DS1 (PRIME)	PCE-1	ETH
K1297-G20 Benchtop	1	1	–	1	–
K1297-G20 Benchtop	1	1	–	–	2
K1297-G20 Benchtop	1	1	4	–	–
K1297-G20 Benchtop	1	1	1	–	2
K1297-G20 Benchtop	1	1	2	–	1
K1297-G20 Benchtop	1	2	1	–	–
K1297-G20 Portable	1	1	–	–	–
K1297-G20 Portable	1	1	1	–	–

NOTE. *GbETH boards require software version K1297-G20 V4.00 or above.*

CAUTION. *Before installing a new board ensure that the VME bus address is set correctly (cf. chapter Getting Started, section Exchanging Measuring Modules).*

Defining new CPU numbers must be performed at an ESD approved workplace. Electrostatic discharge can permanently destroy components that have to be temporarily removed from your device.

The following interfaces are located on the front panel of the GbETH board:

- Two Gigbit Ethernet interfaces
- Serial interface

GbETH1 and GbETH2 interface: Access to the dual Gigabit Ethernet is provided by two transpower RJ–45 connectors with integrated magnetics and LEDs located on the front panel. The pin assignments for these connectors are as follows:

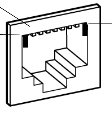


Table A–32: Pin assignment for the 1000Base-T mode

Pin	Assignment	Pin	Assignment
1	B1_DA + *	5	B1_DC –
2	B1_DA –	6	B1_DB –
3	B1_DB +	7	B1_DD +
4	B1_DC +	8	B1_DD –

Table A–33: Pin assignment for the 10Base-T/100Base-T mode

Pin	Assignment	Pin	Assignment
1	TD +	5	Not connected
2	TD –	6	RD –
3	RD +	7	Not connected
4	Not connected	8	Not connected

The status LEDs on the ports have the following meaning:

LED 1 yellow	PHY_10_100_LINK_L
LED 1 green	PHY_1000_Link_L
LED 2 yellow	PHY_XMT_L
LED 2 green	PHY_RCV_L

The SERIAL interface (RJ45 connector) can be used as asynchronous serial debug port for service purposes.

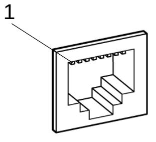


Table A–34: Pin assignment for the SERIAL interface

Pin	Assignment	Pin	Assignment
1	DCD	5	RX
2	RTS	6	GNDC
3	GNDC	7	CTS
4	TX	8	DTR

The switch on the front panel has the following function:

ABT Abort
RST Reset all onboard devices

CAUTION. *ABT and RST are for future use. They are not yet supported. Do not touch the switches.*

ATM Boards: PCE I Board Combinations

PCE I board combinations are measuring boards to measure transmission rates of up to 155.520 Mbps.

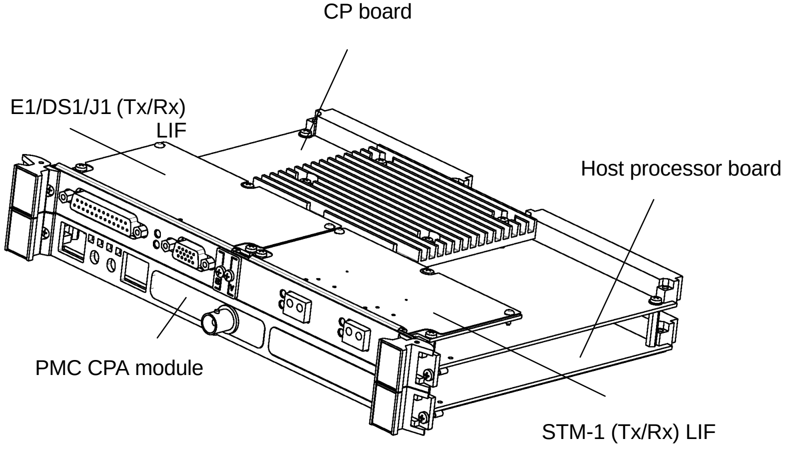


Figure A–9: ATM PCE I board combination

PCE I board combinations consist of a PCE I board and one or two line interfaces (LIFs).

The PCE I board consists of the following components:

- Host processor board
- PMC Cell Processor Adaptation (CPA) module for communication between host processor board and cell processor board
- Cell processor (CP) board. This board carries the high performance C-port network processor C5.

The PCE I board is combined with one or two line interface modules. The following modules are available:

- STM-1 (Tx/Rx) optical line interface
- STM-1 (Rx/Rx) optical line interface
- E1/DS1/J1 (Tx/Rx) electrical line interface
- E1/DS1/J1 (Rx/Rx) electrical line interface

NOTE. *EN 60950, IEC 950, UL 1950: The interface boards are designed for connecting to a telecommunication network (TNV-1 circuits); the appropriate interfaces are provided.*

General Features

PCE I board combinations provide the following features:

- Entirely per software programmable emulation of virtually any type of broadband network interfaces and data link layers up to link rates of STM-1.
- Adjusted and optimized firmware packages enabling a wide range of monitoring and simulation solutions for different types of physical interfaces with support of several types of data link and network layers protocols.
- Fast reload capability of firmware packages and flexible (re)configuration options per software.
- Sophisticated life statistics (counting / gathering capabilities).
- PCE I physical interfaces can be fully synchronized according to their network transmit clock options.
- PCE I board combinations operate internally with high resolution time stamps (5 ns granularity) synchronized over all PCE I interfaces for Tx and Rx PDUs (Last Bit Out / Last Bit In).
- Automatic power on self diagnostics software running at every system start.
- Support of AAL2 and AAL5 technologies, simultaneous handling of AAL2 and AAL5 based PDUs.
- Support of UMTS interfaces such as Iu-CS, Iu-PS, Iu-BC, Iub and Iur.

CAUTION. *When using PCE I board combinations, always provide proper ventilation. The environmental temperature of the PCE I board is permanently monitored by the PCE I system driver software. If the critical temperature level is exceeded all active board and software components will be immediately disabled or interrupted. The board could be damaged.*

Host Processor Board

The PCE I host processor board processes the data streams, which are output of the interface modules.

Table A–35: Characteristics of the host processor board

Characteristic	Description
Processor	IBM PPC750, ≥ 400 MHz 1MByte L2 Cache
Memory	≥ 64 MByte SDRAM module ≥ 100 MHz 4 MByte strata flash
Bus interface	Local PCI bus 32 bit, 33 MHz
Ethernet interface	One 10/100 BaseTx connector, RJ45 connector on front panel
Serial interface	Serial RS-232 debug interface on front panel

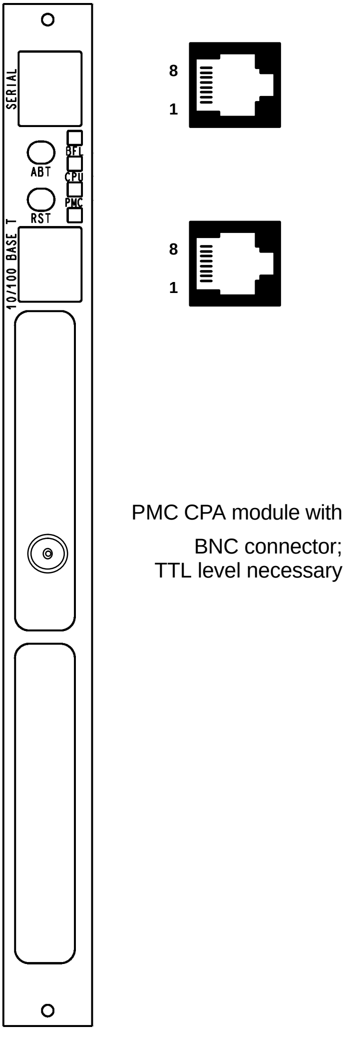


Figure A–10: Host Processor Board

The SERIAL interface (RJ45 connector) can be used as asynchronous serial debug port for service purposes.

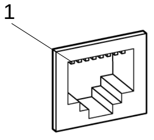


Table A–36: Pin assignment for the SERIAL interface (DTE)

Pin	Assignment	Pin	Assignment
1	DCD	5	RxD
2	RTS	6	Ground
3	Ground	7	CTS
4	TxD	8	DTR

The two switches on the front panel have the following function:

ABT Abort (for future use, not yet software supported)
RST Reset all onboard devices

The four status LEDs on the front panel have the following meaning:

BFL Board failure
CPU CPU is accessing the bus
PMC Top PCI mezzanine card, if installed, is active
PMC Bottom PCI mezzanine card, if installed, is active

In addition an RJ45 10BaseT / 100BaseTX connector is provided on the front panel (for future use, not yet supported).

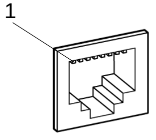


Table A–37: Pin assignment for the 10BaseT / 100BaseTX interface

Pin	Assignment	Pin	Assignment
1	TD +	5	Not connected
2	TD -	6	RD -
3	RD +	7	Not connected
4	Not connected	8	Not connected

The two covered holes at the bottom can be equipped with PCI mezzanine cards for special applications as for example UMTS.

For an external clock a TTL signal is necessary. This signal is transferred via the BNC connector. The BNC connector is part of the PMC module.

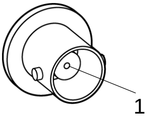


Table A–38: Pin assignment for BNC connector

Pin	Assignment	Pin	Assignment
1	Rx	2	CDS (Signal ground)

STM-1 (Tx/Rx) Optical Line Interface

Each STM-1 optical interface provides the following features:

- 155.520 Mbps ± 20 ppm
- ITU G.957-S1.1 optical
- ITU G.708
- SDH (SONET) section, line and path overhead processing
- 2 x Tx, single mode, output power -13 dbm typical, 1310 nm typical
- 2 x Rx, sensitivity -3 to -28,5 dbm, 1200-1600 nm (single and multimode)

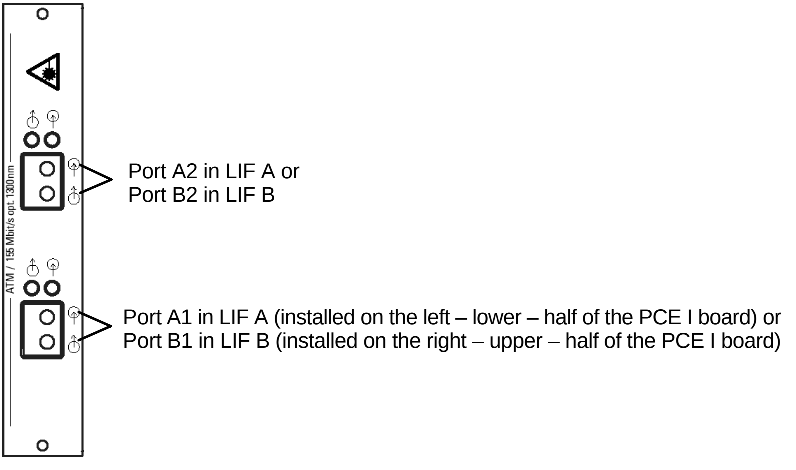


Figure A–11: Front panel of the STM-1 (Tx/Rx) optical line interface

Each STM-1 (Tx/Rx) optical line interface provides two ports. Each port provides a duplex LC connector.

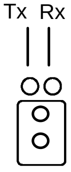
SC singlemode connections are possible with the standard adapter cables. For SC multimode connections the optional Multimode Kit is required. ST, FC/PC connections for single- and multimode are possible with the optional adapters.

Achievable distances depend on the fiber cable quality. With a good cable, you may reach up to 15 kilometers.

WARNING. *Never look into the end of a fibreglass cable or a fibre which could be connected to a laser source. Laser radiation can damage your eyes because it is invisible and your pupils do not contract instinctively as with normal bright light. If you think your eyes have been exposed to laser radiation, you should have your eyes checked immediately by an eye specialist. The optical output's radiation power corresponds to the laser class 1 in accordance with IEC 825-1, 11.93 and U.S. CDRH regulations.*

CAUTION. *Observe ESD safety regulations because otherwise wrong measurement results could occur.*

LEDs. The four LEDs on the front panel show the state of the associated ports:



Tx	green	Valid Tx signals
Tx	orange	No signal
Rx	green	Valid Rx signals
Rx	red	No signal

Specific Features. The firmware for PCE I board combinations with STM-1 (Tx/Rx) optical line interfaces supports the following features:

- Supporting one (2 x STM-1/STS-3c ATM Tx/Rx) or two (4 x STM-1/STS-3c ATM Tx/Rx) STM-1/OC-3c PCE I line interfaces
- Selection between SDH/SONET framing
- SDH/SONET OAM procedures and Performance Monitoring functions at regenerator/multiplex section layer and VC-4/SPE-3c HO path layer for path-terminating equipment (PTE)
- ATM cell adaptation for STM-1/STS-3c according to ITU I.432.1/I.432.2 and ANSI T1.646-1995
- ATM cell header correction mode
- Idle cells (ITU I.432.1) or unassigned cells (ANSI-T1.627) as filler cells
- User-Network Interface (UNI) and Network-Node Interface (NNI) as ATM mode selectable
- Cell Shaping/scheduling per ATM interface within service categories CBR, VBRnrt, VBRrt and UBR available per VCL (VPI/VCI); lowest configurable cell rate for PCR/SCR is 87 cells/s (37 Kbit/s)
- Each ATM interface allows to open up to 44 ATM Tx VCL's (VPI/VCI) with a non-UBR service category. For Rx max. 4096 open ATM VCL's are supported simultaneously - available to all ATM interfaces
- Automatic handling of ATM OAM Fault Management (FM) cells with emulation of OAM/FM functions for terminating ATM equipment
- Online AAL segmentation and reassembling for AAL5 CPCS (ITU I.363.5), AAL2 SSSAR (ITU I.363.2 and ITU I.366.1) and AAL0 (raw ATM cells)
- Optional AAL2 CPS layer shaping with maximum bit rate control for Tx CID's inside surrounding Tx VCL (VPI/VCI), lowest configurable bit rate at AAL2 CPS SDU level is 1kBit/s increasing with (fixed) step size of 1 Kbit/s up to 2 Mbit/s
- Maximum of 128 AAL5 CPCS or AAL0 Tx connections and 128 AAL2 SSSAR Tx CID's for all ATM interfaces

- Support of 8192 AAL2 Rx CID's simultaneously (over all ATM interfaces)
- Comprehensive signal/error as well as performance statistics for Tx and Rx at SDH/SONET layers, at ATM cell level and for all ATM adaptation layers, separated (aggregated) for each physical interface, ATM VCL (VPI/VCI) or AAL2 connection (CID)

Applied Standards. With PCE I board combinations with STM-1 (Tx/Rx) optical line interfaces you can monitor and simulate interfaces according to the following standards:

- ITU-T, Recommendation G.707, Network node interface for the synchronous digital hierarchy (SDH), 03/1996
- ITU-T, Recommendation G.783, Characteristic of synchronous digital hierarchy (SDH) equipment functional blocks, 04/1997
- ANSI, T1.105-1995, SONET Basic Description including Multiplex Structure, Rates, and Formats, 10/1995
- ANSI, T1.231-1997, Digital Hierarchy Layer 1 In-Service Digital Transmission Performance Monitoring, 10/1997
- ITU-T, Recommendation I.432.1, B-ISDN user-network interface-Physical layer specification: General characteristics, 02/1999
- ITU-T, Recommendation I.432.2, ISDN user-network interfaces - Physical layer specification , 155 520 kbit/s and 622 080 kbit/s operation, 08/1996
- ITU-T, Recommendation I.361, B-ISDN ATM layer specification, 02/1999
- ANSI, T1.646-1995, Broadband ISDN Physical Layer Specification for User-Network Interfaces including DS1/ATM, 05/1995
- Bellcore, GR-1248-CORE, Generic Requirements for Operations of ATM Network Elements, Issue 3, 08/1996
- ITU-T, Recommendation I.610, B-ISDN Operation and Maintenance Principles and Functions, 02/1999
- ITU-T, Recommendation I.371, Traffic control and congestion control in B-SDN, Draft Revised 02/2000
- ATM Forum, Traffic Management Specification V4.1, af-tm-0121.000, 04/1996
- ITU-T, Recommendation I.363.2, B-ISDN Adaptation layer specification: Type 2 AAL, 09/1997

- ITU-T, Recommendation I.366.1, Segmentation and Reassembly Service Specific Sublayer for AAL Type 2, 09/1998
- ITU-T, Recommendation I.363.5, B-ISDN Adaptation layer specification: Type 5 AAL, 08/1996

STM-1 (Rx/Rx) Optical Line Interface

The STM-1 (Rx/Rx) optical line interface provides the following features:

- 155.520 Mbps ± 20 ppm
- ITU G.957-S1.1 optical
- ITU G.708
- SDH (SONET) section, line and path overhead processing
- 4 x Rx, sensitivity -3 to -28,5 dbm, 1200-1600 nm (single and multimode)

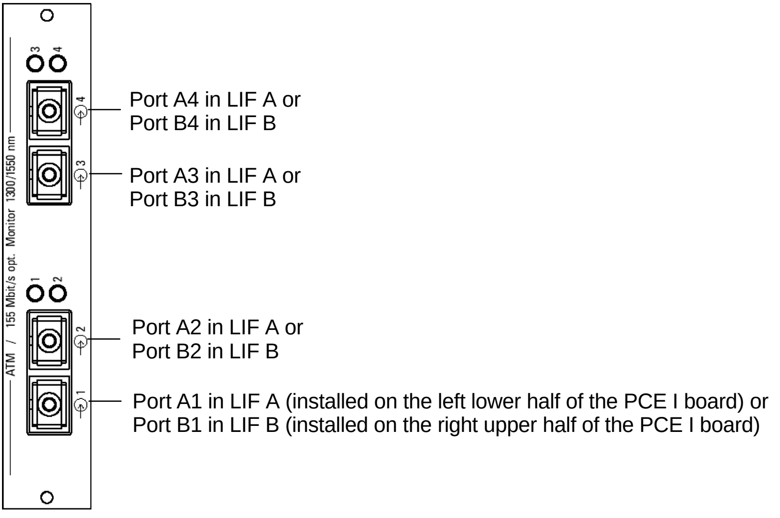


Figure A–12: Front panel of the STM-1 (Rx/Rx) optical line interface

Each STM-1 (Rx/Rx) optical line interface provides 4 Rx ports for monitoring 2 bidirectional lines. Each Rx port is a separate SC connector.

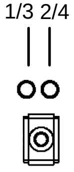
SC singlemode connections are possible with a standard SC-SC cable. For SC multimode connections, the optional multimode fiber cables are required.

ST, FC/PC connections for single- and multimode are possible using the optional adapters.

WARNING. *Never look into the end of a fibreglass cable or a fibre which could be connected to a laser source. Laser radiation can damage your eyes because it is invisible and your pupils do not contract instinctively as with normal bright light. If you think your eyes have been exposed to laser radiation, you should have your eyes checked immediately by an eye doctor.*

CAUTION. *Observe ESD safety regulations because otherwise wrong measurement results could occur.*

LEDs. The four LEDs on the front panel show the state of the associated Rx port:



1/3	green	Valid Rx signals
1/3	orange	No signal
2/4	green	Valid Rx signals
2/4	red	No signal

Specific Features. The firmware for PCE I board combinations with STM-1/SONET OC-3c line interfaces supports the following features:

- Supporting one (2 x STM-1/STS-3c ATM Rx/Rx) or two (4 x STM-1/STS-3c ATM Rx/Rx) STM-1/OC-3c PCE I line interfaces
- Selection between SDH/SONET framing
- SDH/SONET OAM procedures and Performance Monitoring functions at regenerator/multiplex section layer and VC-4/SPE-3c HO path layer for path-terminating equipment (PTE)
- ATM cell adaptation for STM-1/STS-3c according ITU I.432.1/I.432.2 and ANSI T1.646-1995
- ATM cell header correction mode
- Idle cells (ITU I.432.1) or unassigned cells (ANSI-T1.627) as filler cells
- User-Network Interface (UNI) and Network-Node Interface (NNI) as ATM mode selectable
- Cell Shaping/scheduling per ATM interface within service categories CBR, VBRnrt, VBRrt and UBR available per VCL (VPI/VCI); lowest configurable cell rate for PCR/SCR is 87 cells/s (37 Kbit/s)
- Each ATM interface allows to open up to 44 ATM Tx VCL's (VPI/VCI) with a non-UBR service category. For Rx max. 4096 open ATM VCL's are supported simultaneously - available to all ATM interfaces
- Automatic handling of ATM OAM Fault Management (FM) cells with emulation of OAM/FM functions for terminating ATM equipment
- Online AAL segmentation and reassembling for AAL5 CPCS (ITU I.363.5), AAL2 SSSAR (ITU I.363.2 and ITU I.366.1) and AAL0 (raw ATM cells)
- Optional AAL2 CPS layer shaping with maximum bit rate control for Tx CID's inside surrounding Tx VCL (VPI/VCI), lowest configurable bit rate at AAL2 CPS SDU level is 1kBit/s increasing with (fixed) step size of 1 Kbit/s up to 2 Mbit/s
- Maximum of 128 AAL5 CPCS or AAL0 Tx connections and 128 AAL2 SSSAR Tx CID's for all ATM interfaces

- Support of 8192 AAL2 Rx CID's simultaneously (over all ATM interfaces)
- Comprehensive signal/error as well as performance statistics for Tx and Rx at SDH/SONET layers, at ATM cell level and for all ATM adaptation layers, separated (aggregated) for each physical interface, ATM VCL (VPI/VCI) or AAL2 connection (CID)

Applied Standards. With PCE I board combinations with STM-1/OC-3c line interfaces you can monitor interfaces according to the following standards:

- ITU-T, Recommendation G.707, Network node interface for the synchronous digital hierarchy (SDH), 03/1996
- ITU-T, Recommendation G.783, Characteristic of synchronous digital hierarchy (SDH) equipment functional blocks, 04/1997
- ANSI, T1.105-1995, SONET Basic Description including Multiplex Structure, Rates, and Formats, 10/1995
- ANSI, T1.231-1997, Digital Hierarchy Layer 1 In-Service Digital Transmission Performance Monitoring, 10/1997
- ITU-T, Recommendation I.432.1, B-ISDN user-network interface-Physical layer specification: General characteristics, 02/1999
- ITU-T, Recommendation I.432.2, ISDN user-network interfaces - Physical layer specification , 155 520 kbit/s and 622 080 kbit/s operation, 08/1996
- ITU-T, Recommendation I.361, B-ISDN ATM layer specification, 02/1999
- ANSI, T1.646-1995, Broadband ISDN Physical Layer Specification for User-Network Interfaces including DS1/ATM, 05/1995
- Bellcore, GR-1248-CORE, Generic Requirements for Operations of ATM Network Elements, Issue 3, 08/1996
- ITU-T, Recommendation I.610, B-ISDN Operation and Maintenance Principles and Functions, 02/1999
- ITU-T, Recommendation I.371, Traffic control and congestion control in B-SDN, Draft Revised 02/2000
- ATM Forum, Traffic Management Specification V4.1, af-tm-0121.000, 04/1996
- ITU-T, Recommendation I.363.2, B-ISDN Adaptation layer specification: Type 2 AAL, 09/1997

- ITU-T, Recommendation I.366.1, Segmentation and Reassembly Service Specific Sublayer for AAL Type 2, 09/1998
- ITU-T, Recommendation I.363.5, B-ISDN Adaptation layer specification: Type 5 AAL, 08/1996

Accessories for STM-1 Optical Line Interfaces

STM-1 (Tx/Rx). For these line interface modules you can order the following cables and adapters as an option:

- 4 fiber optical cables, single mode, LC-SC
- 4 fiber optical adapters, single mode, SC-SC

Additionally, the following packages of cables and adapters are available:

- Multimode Kit:
  2 fiber optical cables, single mode, LC-SC with 10 db attenuator and
  2 fiber optical cables, multi mode, LC-SC in one package
- 4 fiber optical adapters, SC-ST, single mode
- 4 fiber optical adapters, SC-FC/PC, single mode

STM-1 (Rx/Rx). For these line interface modules you can order the following cables and adapters as an option:

- 4 fiber optical cables, single mode, SC-SC
- 4 fiber optical cables, multi mode, SC-SC
- 4 fiber optical adapters, single mode, SC-SC
- 4 fiber optical adapters, SC-ST, single mode
- 4 fiber optical adapters, SC-FC/PC, single mode

E1/DS1/J1 (Tx/Rx) Line Interface

The E1/DS1/J1 (Tx/Rx) interface provides the following features:

- 2.048 Mbps ± 20 ppm (E1), 1.544 Mbps ± 50 ppm (DS1 and J1) Software switchable between E1, DS1, and J1
- 75 Ω asymmetrical (E1)
- 120 Ω (E1), 110 Ω (J1), 100 Ω (DS1), all symmetrical
- ETSI ETS 300 019 Part 1-3, Class 1-3 for telecommunication centers: Operational and nonoperational environment, vibration
- AF-PHY-0086.001; Inverse Multiplexing for ATM (needs to be supported by optional software)
- Able to simulate ATM data on 4 E1/DS1/J1 lines
- Able to monitor ATM data on 2 bi-directional E1/DS1/J1 lines
- One 25-pin D-sub connector, containing 4 Tx/Rx lines (75 Ω asymmetrical, 100-120 Ω symmetrical)
- One 15-pin D-sub connector, for future use

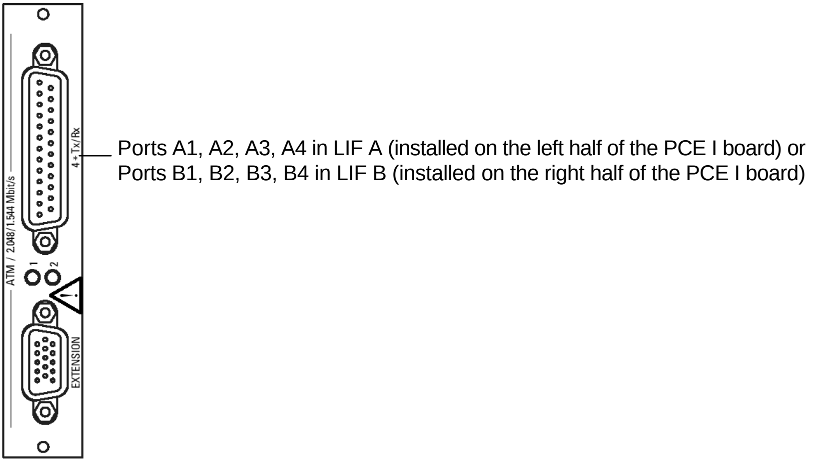


Figure A–13: Front panel of the E1/DS1/J1 (Tx/Rx) line interface

Each E1/DS1/J1 (Tx/Rx) line interface has 4 independent simulation (Tx/Rx) ports. The 4 Rx ports can also be used for monitoring 2 bidirectional lines.

CAUTION. *Observe ESD safety regulations because otherwise wrong measurement results could occur.*

Connectors. The following connectors are available:

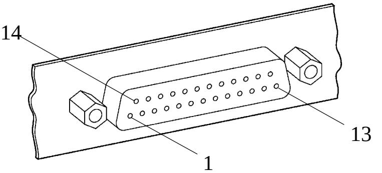
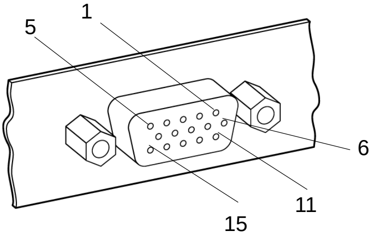


Table A–39: 25-pin D-sub connector

Pin	Assignment	Pin	Assignment
1	not connected	14	not connected
2	not connected	15	Tx 4-
3	Tx 4+	16	Rx 4-
4	Rx 4+	17	Tx 3-
5	Tx 3+	18	Rx 3-
6	Rx 3+	19	not connected
7	not connected	20	not connected
8	not connected	21	Tx 2-
9	Tx 2+	22	Rx 2-
10	Rx 2+	23	Tx 1-
11	Tx 1+	24	Rx 1-
12	Rx 1+	25	not connected
13	not connected		

The 15-pin D-sub connector is a proprietary connector for future use (not yet supported).



CAUTION. *Do not connect external devices to this connector. Always, protect this connector with the delivered cap.*

LEDs. The two LEDs on the front panel have the following meaning:

- LED 1 is reserved for future use.
- LED 2 indicates the status of the line interface.

Table A–40: LED status E1/DS1/J1 (Rx/Tx) line interface module

State Indication	LED 1	LED 2
After power up	orange	orange
Initialization	orange	orange / shortly red after reset
In operation	off	green
Failure	red	orange / red

Specific Features. The firmware for PCE I board combinations with E1/DS1/J1 (Tx/Rx) line interfaces supports the following features:

- Supporting one (4 x E1/DS1/J1 ATM Tx/Rx) or two (8 x E1/DS1/J1 ATM Tx/Rx) E1/DS1/J1 PCE I line interfaces
- ATM cell adaptation according to ITU-T I.432.1 and ITU-T I.432.3
- Idle cells (ITU-T I.432.1) or unassigned cells (ANSI-T1.627) as filler cells
- User-Network Interface (UNI) and Network-Node Interface (NNI) as ATM mode selectable
- Cell Shaping/scheduling per ATM interface within service categories CBR, VBRnrt, VBRrt and UBR available per VCL (VPI/VCI); lowest configurable cell rate for PCR/SCR is 9 cells/s (4 Kbit/s)
- Each ATM line interface allows to open up to 88 ATM Tx VCL's (VPI/VCI) with a non-UBR service category (over all 4 ATM interfaces of one line interface). For Rx max. 4096 open ATM VCL's are supported simultaneously - available to all ATM interfaces.
- Automatic handling of ATM OAM Fault Management (FM) cells with emulation of OAM/FM functions for terminating ATM equipment
- Online AAL segmentation and reassembling for AAL5 CPCS (ITU-T I.363.5), AAL2 SSSAR (ITU-T I.363.2 and ITU-T I.366.1) and AAL0 (raw ATM cells)
- Optional AAL2 CPS layer shaping with maximum bit rate control for Tx CID's inside surrounding Tx VCL (VPI/VCI), lowest configurable bit rate at AAL2 CPS SDU level is 1kBit/s increasing with (fixed) step size of 1 kbit/s up to 2 Mbit/s
- Maximum of 128 AAL5 CPCS or AAL0 Tx connections and 128 AAL2 SSSAR Tx CID's for all ATM interfaces
- Support of 8192 AAL2 Rx CID's simultaneously (over all ATM interfaces)
- Comprehensive signal/error as well as performance statistics for Tx and Rx at synchronous frame structure layers, at ATM cell level and for all ATM adaptation layers, separated (aggregated) for each physical interface, ATM VCL (VPI/VCI) or AAL2 connection (CID)

Applied Standards. With PCE I board combinations with E1/DS1/J1 (Tx/Rx) line interfaces you can monitor interfaces according to the following standards:

- ITU-T, Recommendation G.703, Physical/electrical characteristics of hierarchical digital interfaces, 10/1998
- ITU-T, Recommendation G.704, Synchronous frame structure used at 1544, 6312, 2048, 8448 and 44746 kbit/s hierarchical levels, 10/1998
- TTC, JT-G.703 (J1 specification)
- ITU-T, Recommendation G.775, Loss of Signal (LOS), Alarm Indication Signal (AIS) and Remote Defect Indication (RDI) defect detection and clearance criteria for PDH signals, 10/1998
- ITU-T, Recommendation I.431, Primary rate user-network interface - Layer 1 specification, 03/93
- TTC, JT-I.431 (J1 specification)
- ANSI, T1.403-1995, Network and Customer Installation Interfaces - DS1 Electrical Interface, 1995
- ANSI, T1.408-1990, Integrated Services Digital Network (ISDN) Primary Rate - Customer Installation Metallic Interfaces Layer 1 Specification, 09/1990
- ANSI, T1.231-1997, Digital Hierarchy Layer 1 In-Service Digital Transmission Performance Monitoring, 10/1997
- ITU-T, Recommendation G.823, The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy, 03/2000
- ITU-T, Recommendation G.804, ATM cell mapping into Plesiochronous Digital Hierarchy (PDH), 02/1998
- ITU-T, Recommendation I.432.1, B-ISDN user-network interface - Physical layer specification: General characteristics, 02/1999
- ITU-T, Recommendation I.432.3, B-ISDN user-network interfaces - Physical layer specification: 1544 kbit/s and 2048 kbit/s operation, 02/1999

- ITU-T, Recommendation I.361, B-ISDN ATM layer specification, 02/1999
- ANSI, T1.646-1995, Broadband ISDN Physical Layer Specification for User-Network Interfaces including DS1/ATM, 05/1995
- Bellcore, GR-1248-CORE, Generic Requirements for Operations of ATM Network Elements, Issue 3, 08/1996
- ITU-T, Recommendation I.610, B-ISDN Operation and Maintenance Principles and Functions, 02/1999
- ITU-T, Recommendation I.371, Traffic control and congestion control in B-SDN, Draft Revised 02/2000
- ATM Forum, Traffic Management Specification V4.1, af-tm-0121.000, 04/1996
- ITU-T, Recommendation I.363.2, B-ISDN Adaptation layer specification: Type 2 AAL, 09/1997
- ITU-T, Recommendation I.366.1, Segmentation and Reassembly Service Specific Sublayer for AAL Type 2, 09/1998
- ITU-T, Recommendation I.363.5, B-ISDN Adaptation layer specification: Type 5 AAL, 08/1996
- ATM Forum AF-PHY-086-001, Inverse Multiplexing for ATM, V1.1

Accessories for the E1/DS1/J1 (Tx/Rx) Electrical Line Interfaces

For the E1/DS1/J1 (Tx/Rx) line interface modules the following cables and adapters are available:

- Adapter cable D-sub25 – D-sub9, 3m, balanced, 120 Ω
- Connecting cable D-sub25 – Bantam, 3m, balanced, 120 Ω
- Connecting cable D-sub25 – Open ends, 3m, balanced, 120 Ω
- Connecting cable D-sub25 – Coax 1.6/5.6, 3m, unbalanced, 75 Ω

NOTE. *For more information take a look into the WWW under Tektronix.com at our Cable and Accessory Guide or contact our local sales partner.*

E1/DS1/J1 (Rx/Rx) Electrical Line Interface

The E1/DS1/J1 line interface provides the following features:

- 2.048 Mbps ± 20 ppm (E1), 1.544 Mbps ± 50 ppm (DS1 and J1) Software switchable between E1, DS1, and J1
- 75 Ω asymmetrical (E1)
- 120 Ω (E1), 110 Ω (J1), 100 Ω (DS1), all symmetrical
- ETSI ETS 300 019 Part 1-3, Class 1-3 for telecommunication centers: Operational and nonoperational environment, vibration
- AF-PHY-0086.001; Inverse Multiplexing for ATM (needs to be supported by optional software)
- Able to monitor ATM data on 4 bi-directional E1/DS1/J1 lines
- Two 15-pin D-Sub connectors, each one contains 4 Rx lines (75 Ω asymmetrical, 100-120 Ω symmetrical)

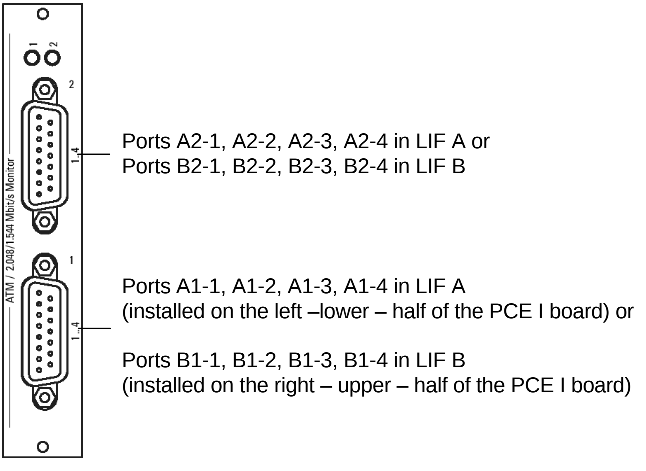


Figure A–14: Front panel of the E1/DS1/J1 (Rx/Rx) electrical line interface

Each E1/DS1/J1 (Rx/Rx) ATM line interface has 8 Rx ports for monitoring 4 bidirectional lines.

CAUTION. *Observe ESD safety regulations because otherwise wrong measurement results could occur.*

Connectors. Two 15-pin D-sub connectors are available:

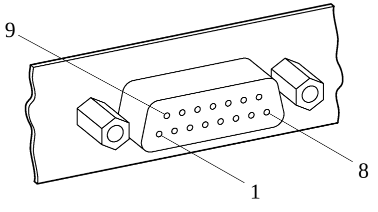


Table A–41: Pin Assignment for the 15-pin D-sub Connector

Pin	Assignment	Pin	Assignment
1	Not connected	9	Not connected
2	Rx0 (Tip)	10	Rx0 (Ring)
3	Rx1 (Tip)	11	Rx1 (Ring)
4	Not connected	12	Not connected
5	Not connected	13	Rx2 (Tip)
6	Rx2 (Ring)	14	Rx3 (Tip)
7	Rx3 (Ring)	15	Not connected
8	Not connected		

LEDs. The two LEDs on the front panel show the progress of initialization during the boot process:

- LED 1 is reserved for future use.
- LED 2 indicates the status of the line interface.

Table A–42: LED Status: E1/DS1/J1 (Rx/Rx) Line Interface Module

State indication	LED 1	LED 2
After power up	orange	orange
Initialization	orange	orange /shortly after red
In operation	off	green
Failure	orange / red	orange / red

Specific Features. The firmware for PCE I board combinations with E1/DS1/J1 (Rx/Rx) electrical line interfaces supports the following features:

- Supporting one (4 x E1/DS1/J1 ATM Rx/Rx) or two (8 x E1/DS1/J1 ATM Tx/Rx) E1/DS1/J1 PCE I line interfaces
- ATM cell delineation according to ITU-T I.432.1 and ITU-T I.432.3
- User-Network Interface (UNI) and Network-Node Interface (NNI) as ATM mode selectable
- Max. 4096 open ATM VCL's are supported simultaneously - available to all ATM interfaces.
- Online AAL reassembling for AAL5 CPCS (ITU-T I.363.5), AAL2 SSSAR (ITU-T I.363.2 and ITU-T I.366.1) and AAL0 (raw ATM cells)
- Support of 8192 AAL2 Rx CID's simultaneously (over all ATM interfaces)
- Comprehensive signal/error as well as performance statistics for Rx at physical layers, at ATM cell level and for all ATM adaptation layers, separated (aggregated) for each physical interface, ATM VCL (VPI/VCI) or AAL2 connection (CID)

Applied Standards. With PCE I board combinations with E1/DS1/J1 (Rx/Rx) monitor line interfaces you can monitor interfaces according to the following standards:

- ITU-T, Recommendation G.703, Physical/electrical characteristics of hierarchical digital interfaces, 10/1998
- ITU-T, Recommendation G.704, Synchronous frame structure used at 1544, 6312, 2048, 8448 and 44746 kbit/s hierarchical levels, 10/1998
- TTC, JT-G.703 (J1 specification)
- ITU-T, Recommendation G.775, Loss of Signal (LOS), Alarm Indication Signal (AIS) and Remote Defect Indication (RDI) defect detection and clearance criteria for PDH signals, 10/1998
- ITU-T, Recommendation I.431, Primary rate user-network interface - Layer 1 specification, 03/93
- TTC, JT-I.431 (J1 specification)
- ANSI, T1.403-1995, Network and Customer Installation Interfaces - DS1 Electrical Interface, 1995
- ANSI, T1.408-1990, Integrated Services Digital Network (ISDN) Primary Rate - Customer Installation Metallic Interfaces Layer 1 Specification, 09/1990
- ANSI, T1.231-1997, Digital Hierarchy Layer 1 In-Service Digital Transmission Performance Monitoring, 10/1997
- ITU-T, Recommendation G.823, The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy, 03/2000
- ITU-T, Recommendation G.804, ATM cell mapping into Plesiochronous Digital Hierarchy (PDH), 02/1998
- ITU-T, Recommendation I.432.1, B-ISDN user-network interface - Physical layer specification: General characteristics, 02/1999
- ITU-T, Recommendation I.432.3, B-ISDN user-network interfaces - Physical layer specification: 1544 kbit/s and 2048 kbit/s operation, 02/1999

- ITU-T, Recommendation I.361, B-ISDN ATM layer specification, 02/1999
- ANSI, T1.646-1995, Broadband ISDN Physical Layer Specification for User-Network Interfaces including DS1/ATM, 05/1995
- Bellcore, GR-1248-CORE, Generic Requirements for Operations of ATM Network Elements, Issue 3, 08/1996
- ITU-T, Recommendation I.363.2, B-ISDN Adaptation layer specification: Type 2 AAL, 09/1997
- ITU-T, Recommendation I.366.1, Segmentation and Reassembly Service Specific Sublayer for AAL Type 2, 09/1998
- ITU-T, Recommendation I.363.5, B-ISDN Adaptation layer specification: Type 5 AAL, 08/1996
- ATM Forum AF-PHY-086-001, Inverse Multiplexing for ATM, V1.1

Accessories for the E1/DS1/J1 (Rx/Rx) Electrical Line Interfaces

For the E1/DS1/J1 (Rx/Rx) line interface modules, the following cables and adapters are available:

- Adapter cable D-sub15 – D-sub9, 0.2 m, balanced, 120 Ω
- Monitoring cable D-sub15 – Bantam, 3m, balanced, 120 Ω
- Monitoring cable D-sub15 – Open ends, 3m, balanced, 120 Ω
- Monitoring cable D-sub15 –Coax 1.6/5.6 3m, unbalanced, 75 Ω
- Monitoring cable D-sub25 – Siemens connector, 3m, balanced, 120 Ω
- Monitoring RJ45 connector

NOTE. *For more information take a look into the WWW under Tektronix.com at our Cable and Accessory Guide or contact our local sales partner.*

Defining CPU Numbers

The following section describes how to define CPU numbers (VME bus addresses) if you work with a second Ethernet board consisting of a Power-PC board plus hooked up mezzanines. Only an experienced service technician should perform this setting procedure.

⚠ ***CAUTION.*** *The following steps must be performed at an ESD approved workplace. Electrostatic discharge can permanently destroy components that have to be temporarily removed from your device.*

In order to operate several Ethernet boards within one K1297, the default CPU numbers of the second (third, fourth) board have to be changed.

Before operating additional Ethernet boards, proceed as follows:

1. Check that the address is set correctly for each board. Typical addresses are as follows:

Table A–43: Ethernet boards: address settings

Board	Address
1st Ethernet board	07 (with 08 implicitly); no changing necessary
2nd Ethernet board	05 (with 06 implicitly)
3rd Ethernet board	03 (with 04 implicitly)

NOTE. *Before setting CPU numbers check that the new number is not used by another board. Set each CPU number only once.*

The CPU numbers being stored within NVRAM of the Ethernet board are an integral part of the CPU's bootline. You can modify this bootline as described in the following.

2. To check the used CPU numbers, open the K1297-G20 Status Window via the appropriate button in the toolbar.

   Write down the CPU numbers displayed in square brackets in order to identify which numbers are free for addressing.

   Not all displayed and existing CPU numbers are free for defining new CPU numbers. Additional restrictions are listed in the Caution statement below.

   CPU #7 is the currently installed Ethernet board.

3. Now you can change the default CPU number for example to #3 by entering the following command via *Start: Run:*

   `ntterm 7`

   This command will open a window that gives you basic access to the VxWorks operating system. Enter the command `bootChange` and press the return key until you see:

   `processor number : 7`

   Enter `3` on the same line and press the return key until the prompt (->) reappears.

CAUTION. *Due to hardware restrictions it is not possible to use odd numbers on a ETH-100 board if the number + 1 is used in the system. In other words, do not use #7 if there is a #8 CPU in the system.*

The same applies to the PC-Board CPU, which is CPU #9; #10 cannot be used for any board!

Example:
If there is no board with #3 or #4, you can use #3 or #4 for ETH-100.

Now you have changed the default CPU number. Therefore #7 and #8 are no longer in use and you may insert your new ETH-100 board, which will now become the new CPU #7.

Appendix B: Keyboards

For versions with separate keyboard

Your test was shipped with a Compact keyboard and a PS/2 Y adapter cable. Follow these steps to use the keyboard with the tester:

1. Plug the mouse and keyboard connectors from the Y adapter into the the keyboard.
2. Plug the Y adapter into the PS/2 interface, using the connector with the arrow sign. The PS/2 interface is located on the rear of the tester, on the CPU board.
3. If the keyboard does not work, unplug the Y adapter cable from the keyboard and swap the mouse connection with the keyboard connection.

NOTE. *See the User Manual (Model ML 4400, ML 4400 USB) which is enclosed with the keyboard for installation, operating, technical data, care and maintenance, troubleshooting, general advice and CE declaration of conformity.*

For versions with integrated keyboard

After the device is switched on, the keyboard LEDs light up twice; the keyboard is now ready for operation.

All keys are repeat-action keys; the character repeats automatically if you hold down the key.

The keyboard features several key groups and key rows with the following:

- Alphanumeric keys
- Function keys
- Cursor keys

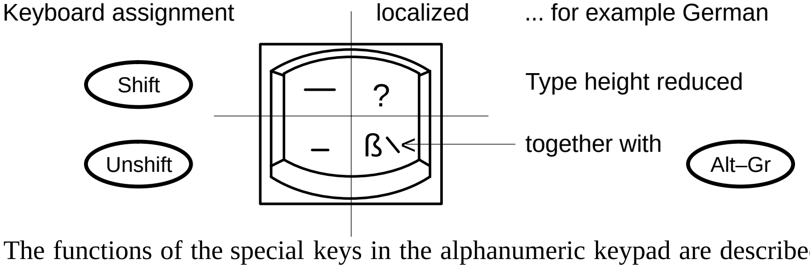
- Integrated numeric keypad (with K1297 Compact the numeric keys are part of the alphanumeric keypad)

The different key groups are described in detail on the following pages. Further information on language support, the trackball and how to connect an external mouse are also provided.

Alphanumeric Keypad

The largest keypad is the alphanumeric keypad with keys for letters, numbers and special characters. The character arrangement mainly corresponds to a normal typewriter keyboard. In addition there are some keys that have certain special functions.

The keyboard is international and labelled in localized form.



The functions of the special keys in the alphanumeric keypad are described in Table B-1.

The special keys in the alphanumeric keypad have the following functions:

Table B–1: Special keys

<table>
<tr><th>Key</th><th>Function</th></tr>
<tr><td>|<-
->|</td><td>The tabulators move the cursor to the left or right according to the tabulator positions.</td></tr>
<tr><td>CAPS
LOCK</td><td>If the caps lock key is pressed, an LED display lights up. Capital letters are used; all other characters remain normal. If you want to enter lowercase letters, you must press the SHIFT key.</td></tr>
<tr><td>CTRL</td><td>This control key is used only in combination with other keys; CTRL+ALT+DEL for example restarts the operating system. The online help describes situations in which CTRL is used.</td></tr>
<tr><td>Fn</td><td>This key activates the special function of a multi-labelled key. The special function, for example Num, is printed in rimmed form on the key.</td></tr>
<tr><td>ALT</td><td>This key is used only in combination with other keys: for example, you can enter the hex value of an ASCII character (as well as additional special characters) in combination with the numeric keypad.</td></tr>
<tr><td>ALT-GR</td><td>This key is used only in combination with other keys to generate further key codes.</td></tr>
<tr><td><-</td><td>The backspace key moves the cursor by one position to the left and deletes the character.</td></tr>
<tr><td><-/</td><td>The RETURN or ENTER key is mainly used to end a command line. This means the command entered is carried out after pressing this key.</td></tr>
<tr><td>PRINT</td><td>This key is used to print the current screen on a connected printer in real MS-DOS mode.</td></tr>
</table>

Table B–1: Special keys (Cont.)

Key	Function
PAUSE	This key causes the program session to pause in Command Prompt.
NUM	**K1297**: The numeric keypad switches from cursor control to numeric keys via this key; an LED lights up. Pressing the key again clears this function. **K1297 Compact**:: You have to press key Fn and key NUM first..

Function Keys

Twelve programmable function keys are arranged in the top row of the keyboard. The assignment of these keys depends on the software.

The key combination *CTRL+ALT+DEL* does not automatically reboot the PC. Instead a secure attention sequence (SAS) occurs which allows you to logoff, reboot, change the password, start the task manager, or lock the PC.

The following overview shows possible key combinations:

Table B–2: Function keys and key combinations

Keys	Function
CTRL+ALT+DEL	This key combination triggers a warm start.
Fn+<Tilde key>	This key combination switches the trackball on or off.

Cursor Keys

The following cursor keys are available:

Table B–3: Cursor keys

Key	Function
HOME	This key moves the cursor to the beginning (under MS-DOS and in some Windows applications).
PAGE	This key scrolls backwards and forwards.
END	This key moves the cursor to the end (under MS-DOS and in some Windows applications).
<Arrow keys>	These keys moves the cursor: up, down, left, right.

Numeric Keypad, Numeric Keys

To switch on the integrated numeric keys, press *Fn+Num*. Press any other key, to clear this function.

Language Support

The device is pre-configured with two selectable keyboard layouts:

- EN English (United States), Layout: US
- DE German (Standard), Layout: German, IBM

In the corner opposite of the *Start* button of the taskbar you either see *EN* or *DE* for the active keyboard layout.

The German IBM layout is different from the usual German PC keyboard layout. The *<CAPS-LOCK>* key only shifts the alphabetic character keys and no decimal digits or punctuation characters.

You can temporarily change the keyboard layout by pressing *<ALT>+<LEFT-SHIFT>*. To change the keyboard layout permanently, proceed as follows:

1. Click on *Start: Settings*.
2. Click on *Control Panel*.
3. Double-click on *Keyboard*.
4. Click on the tab *Input Locales*.
5. Select from the list and press *Set as Default*.

Trackball

The trackball is used to control the cursor and the menu. The cursor can be moved to any position on the screen by moving the trackball.

Characters or words are highlighted by pressing the left trackball key. The assignment of the right trackball key depends on the user program. Using the trackball, you can select objects, edit menus and trigger functions.

The trackball is covered by a housing that usually protects the ball and the transmission mechanism from dust. However, the ball should be cleaned at regular intervals. Proceed as follows:

1. Remove the cover from the ball housing by turning it counter-clockwise. You can use a pair of tweezers, for example, which you put into the holes on the ring. Then you can take the ball out of the housing.
2. Clean the ball with tap water and a mild detergent. Blow the remaining dust out of the ball housing and put the ball back in.
3. Then put the cover back on and tighten it.

Connecting an External Mouse

If you want to connect an external mouse (serial mouse) and use it instead of the built-in trackball, proceed as follows:

1. Shut down and switch off the device.
2. Connect the external mouse to the COM1 interface.
3. Switch on the device. The system restarts.

NOTE*. Do not change the mouse driver via the Control Panel applet. This could make the keyboard unusable.*

Deactivating an External Mouse

If you connected an external mouse and you want to use the trackball again, proceed as follows:

1. Shut down and switch off the device.
2. Disconnect the mouse from the serial port.
3. Restart the device.

Appendix C: Specifications

The following specifications list the technical data of the K1297 system unit, of the K1297 Compact system unit, and of the measurement unit.

A Certifications and Compliances section concludes this chapter.

System Unit: K1297

The K1297 Protocol Tester is a portable protocol analyzer with integrated color TFT color display and keyboard.

The K1297 consists of an AT compatible PC system and a VME bus system in a single housing. Various measurement interface modules can be plugged to the VME bus system. Up to four interface boards can be freely configured and run simultaneously.

Table C–1: Environmental conditions

Temperature range	Operating: 5°C to 40°C Non-operating: -20°C to +55°C
Relative humidity	Operating: up to 80 % below 30°C, derate to 45 % at 40°C, non-condensing Non-operating: up to 90 % below 30°C, derate to 60 % at 20°C, non-condensing
Altitude	Operating: 0 to 3000 m Non-operating:0 to 12 000 m

Table C–2: Dimensions

Width	400 mm
Height	321 mm
Depth	275 mm
Weight	Approximately 14 to 18 kg (depending on configuration level)

Table C–3: Power supply

Line adapter	Safety class 1 (protective grounding)
Line voltage	Rated range of use 100 .. 240 V, ± 10%
Line frequency	Rated range of use 50/60 Hz, -6% to +5%
Power consumption	Maximum value 650 VA

Table C–4: Hardware

Central computer	Intel Pentium CPU ≥ 133 MHz ≥ **64** MB RAM
Connections	PS2 keyboard interface Serial interface (COM1) USB 1.1 interface LPT interface VGA (external monitor) Ethernet (10BaseT,/100BaseTx), 4 USB 2.0 High–Speed interfaces Analog stereo output Analog stero input Analog mono input SCSI
Display	TFT (Thin Film Transistor) External screen interface
Mass memory	SCSI hard disk drive (≥ 2 GByte formatted total capacity, access time < 11ms or better) 3.5” floppy disk drive (1.44 MB formatted overall capacity) External CD-RW drive (option)
Keyboard	PS/2 compatible keyboard Trackball

Table C–5: System Software

System software	Operating system: Microsoft Windows XP Embedded Application system: Proprietary multi-tasking operating system based on VX-Works O/S-kernels

System Unit: K1297 Compact

The K1297 Compact Protocol Tester is a portable protocol analyzer with integrated TFT color display and keyboard.

The K1297 consists of an AT compatible PC system and a VME bus system in a single housing. Various measurement interface modules can be plugged to the VME bus system. Up to three interface boards can be freely configured and run simultaneously.

Table C–6: Environmental conditions

Temperature range	Operating: 5°C to 40°C Non-operating: -20°C to +55°C
Relative humidity	Operating: up to 80 % below 30°C, derate to 45 % at 40°C, non-condensing Non-operating: up to 90 % below 30°C, derate to 60 % at 20°C, non-condensing
Altitude	Operating: 0 to 3000 m Non-operating:0 to 12 000 m

Table C–7: Dimensions

Width	288 mm (without handle)
Height	344 mm (without handle)
Depth	190 mm (without handle)
Weight	8 to 10 kg (depending on equipment)

Table C–8: Power supply

Line adapter	Safety class 1 (protective grounding)
Line voltage	Rated range of use 100 .. 240 V, ± 10%
Line frequency	Rated range of use 50/60 Hz, -6% to +5%
Power consumption	Maximum value 460 VA

Table C–9: Hardware

Central computer	Intel Pentium CPU ≥ 133 MHz ≥ 64 MB RAM
Connections	PS2 keyboard interface Serial interface (COM1) USB 1.1 interface LPT interface VGA (external monitor) Ethernet (10BaseT,/100BaseTx), 4 USB 2.0 High–Speed interfaces Analog stereo output Analog stero input Analog mono input SCSI
Display	TFT (Thin Film Transistor) External screen interface
Mass memory	SCSI hard disk drive (≥ 2 GByte formatted total capacity, access time < 11ms or better) 3.5” floppy disk drive (1.44 MB formatted overall capacity) External CD-ROM drive (option)
Keyboard	PS/2 compatible keyboard Trackball

Table C–10: System software

System software	Operating system: Microsoft Windows XP Embedded Application system: Proprietary multi-tasking operating system based on VX-Works O/S-kernels

Measurement Unit

Table C–11: Measurement unit: hardware

VME-bus backplane	8 layers with automatic daisy chain 8 VME slots: slot 1 for system computer, slots 2 to 4 for application processors and extensions, slots 5 to 8 for interface modules
Application processor AP-4	Power PC 750, 350 MHz, 1 MB L 2 Cache, 64 MB RAM with the following connectors: 1 x RJ45 Serial 1 x RJ45 10-BaseT/100-BaseTx Ethernet
Application processor AP-4/256	Power PC 750, 350 MHz, 1 MB L 2 Cache, 256 MB RAM with the following connectors: 1 x RJ45 Serial 1 x RJ45 10-BaseT/100-BaseTx Ethernet
Interface modules	CPU 68EC040 (25 MHz) with up to 32 MByte RAM PRIME: two additional RISC processors 68360 (QUICC) for I/O tasks PRIMO: four additional RISC processors 68360 (QUICC) for I/O tasks
E1/DS1 Emulation board (PRIME)	Interface module for performing measurements on PCM 30 lines (2.048 Mbit/s) and PCM 24 lines (1.544 Mbit/s) with the following connectors: 4 x emulation/simulation or 2 x monitoring (duplex)
E1/DS1 Monitoring board (PRIMO)	Interface board for performing measurements on PCM 30 and PCM 24 lines with the following connectors: 4 x monitoring (duplex)
BAI S_0	Interface module for performing measurements on ISDN S_0 lines with the following connectors: 4 x emulation/simulation or 2 x monitoring (duplex)

Table C–11: Measurement unit: hardware (Cont.)

BAI U_{2B1Q}	Interface module for performing measurements on ISDN U_{2B1Q} lines with the following connectors: 4 x emulation/simulation or 2 x monitoring (duplex)
Ethernet	The Ethernet modules comply with the IEEE 802.3 for 10BaseT and 100BaseTx: ≥ 64 MB RAM 2 x emulation / simulation 2 x monitoring (duplex) or 4 x monitoring (half-duplex)
ATM PCE I	Board combination with one or two line interfaces for performing measurements on STM1 or E1/DS1/J1 lines with the following connectors: 4 x emulation/simulation or 2 x monitoring (duplex)

Table C–12: Application system software

Application system software	Menu Operator control of the K1297 Protocol Tester is supported by a dialog-driven command sequence, which comprises a structured menu system in Windows and a higher programming language. Commands can be entered via command lines, menu inputs or with programmable function keys. Protocol testing The K1297 provides all the tools required for passive monitoring and interactive protocol testing.
Operational features	
Report generation	Decodes of level/layer 1 to 7 by length: off, short, medium (several densities), complete; by code: hexadecimal, decimal, character (ASCII, EBCDIC), mnemonic Block or time: Split screen for separation of user/network side data
Time stamps	Transmit and receive data and signal state changes of control lines are provided with time stamps. Resolution: min. 1 μs, accuracy: min 125 μs
Data acquisition	Data signals can be acquired and passed on to three destinations at the same time: Capture buffer (configurable from 64 kByte to several MBytes), Monitor, Floppy or hard disk
Filter/trigger	Separate filters for screen issue, disk recording, Capture RAM; filters for interface events, frame events and trace messages; up to four independent triggers; triggering on interface events, frame events, time, full Capture RAM, full disk
Disk functions	Data recording in wrap and full mode; data playback; direction of data in capture RAM to disk and vice versa

Table C–12: Application system software (Cont.)

Simulation features	
Layer 1	Blue and yellow alarm; Framing bits, international bit, SI 1 / 2 bit, national bits, idle character; error generation (Bipolar violation, CRC error, Frame error, Multiframe error) not implemented yet
Layer 2	Establishment/release; Sending of frames with various settings; Frame discarding; Busy condition simulation
Layer 2 initialisation	Address, state variables, counters, window size, states, flags, timers
Address management	Simulation of identity request, identity assigned, identity denied, identity check request, identity remove, send XID frame
Message building system	SS#7 level 2 MTP and upwards, ISDN layer 3 Fully menu controlled creation and storage of frames and messages, user and application parts in message pools: editing in HEX and mnemonic form, pasting of messages from monitor to message pool, display of generated messages, renaming, deletion and insertion of messages in pool, auto and manual mode for information element sequencing
Level 3 link setup	Exchange of SS#7 SLTM/SLTA messages
Simulation principle	The SDL-style test manager utilizes the state machine concept (cf. CCITT Z.101 to 104, SDL) for protocol simulation and performing interactive tests with triggers and data filters. The elements of the state machine include among other things: Current state, actions to be executed, state changes, follow-up state
Test manager	Up to eight independent test managers per application; SDL style programming; Up to 256 states per test manager; Test manager status window with state, level 2/layer 2 address information and Layer 3 CR/PD information

Table C–12: Application system software (Cont.)

Simulation features	
Status windows (depending on application)	Layer 2 connection parameters; MDL error indication error code table; Commands for change of layer 2 variables; Contents of data fields
Link usage module (depending on application software)	Graphical and tabular representation over time: Up to four graphs in parallel, Freely assignable graphs, Graphs in count(s), length, percentage of count(s)/bytes, Scaling linear or logarithmic, Table for all frame/message types, Counts: latest, max, min, last 30 seconds, Adjustable measurement duration
Setup	Various items can be set up, saved and loaded again for example data capturing mode (full/wrap); interface: number of interface, port selection on interface, impedance (120 , 75 , high), framing format (PCM double framing, Multiframing with and without CRC4); line code (e.g. HDB3, AMI); bit inversion yes/no; time slot number; interface mode (user, network, drop & insert); type of layer 3 protocol (e.g. ITU-T, ETSI, ANSI, national, vendor specific); installation of TTCN environment and loading of executable test suites; editing of link names and colors
Print function	Printing of capture RAM contents, recording files, message pools; print function interfaces with MS-Windows print function
Data transfer rates	Depending on version: 8 kbit/s,16 kbit/s, 56 kbit/s, 64 kbit/s or multiples with internal or derived clocks
Error testing	Depending on version: CRC-4, CRC-16, VRC/LRC
Parities	Depending on version: Odd, even, none, ignore
Data codes	Depending on version: ASCII, EBCDIC, HEX, binary, raw data

Table C–12: Application system software (Cont.)

Simulation features	
Counters	Unlimited number of programmable counters (depending on RAM capacity)
Timers	128 programmable software timers, resolution 20ms
Self-test	The system software comprises extensive self-test programs that run automatically after the system has been switched on.

Certifications and Compliances

Table C–13: Certifications and compliances

Category	Standards or description	
EC Declaration of Conformity - EMC*	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:	
	EN 61326	EMC requirements for Class A electrical equipment for measurement, control and laboratory use.
	IEC 61000-4-2	Electrostatic discharge immunity (Performance Criterion B)
	IEC 61000-4-3	RF electromagnetic field immunity (Performance Criterion A)
	IEC 61000-4-4	Electrical fast transient / burst immunity (Performance Criterion B)
	IEC 61000-4-5	Power line surge immunity (Performance Criterion B)
	IEC 61000-4-6	Conducted RF immunity (Performance Criterion A)
	IEC 61000-4-11	Voltage dips and interruptions immunity (Performance Criterion B)
	EN 61000-3-2 EN 61000-3-3	AC power line harmonic emissions Flicker
Australia / New Zealand Declaration of Conformity - EMC	Complies with EMC provision of Radiocommunications Act per the following standard(s):	
	AS/NZS 2064.1/2	Industrial, Scientific, and Medical Equipment: 1992

Table C–13: Certifications and compliances (Cont.)

Category	Standards or description
EC Declaration of Conformity - Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 73/23/EEC as amended by 93/68/EEC EN 61010-1/A2: 1995 — Safety requirements for electrical equipment for measurement, control, and laboratory use
U.S. Nationally Recognized Testing Laboratory Listing	Only for devices with UL symbol on the back of the housing: UL 3111-1: Standard for electrical measuring and test equipment
Canadian Certification	Only for devices with UL symbol on the back of the housing: CAN/CSA C22.2 No. 1010.1: Safety requirements for electrical equipment for measurement, control and laboratory use
Installation (Over-voltage) Category	Overvoltage Category II (as defined in IEC 61010-1, Annex J) Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected.
Pollution Degree	Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only. Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
Equipment Type	Test and measuring

Table C–13: Certifications and compliances (Cont.)

Category	Standards or description
Safety Class	Class 1 (as defined in IEC 61010-1, Annex H) - grounded product
Laser Compliance	All lasers used in this product are in compliance with the applicable requirements of the following, and are Class I according to each: EN60825–1 IEC60825–1 U.S. CDRH Regulations

CAUTION. *To reduce the risk of fire, use only No. 26 AWG or larger telecommunications line cords for the K1297 Protocol Tester. Use only the telecommunication line cords designed and specified for the K1297.*

*** EMC Compliance was achieved under the following conditions:** Shielded cables on all external I/O ports; front panel screws properly tightened; conductive chassis rails of the boards connected to chassis ground; cable shields connected to chassis ground via metal shell connectors bonded to a conductive module front panel; all peripherals conformed.

For minimum RF emissions, it is essential that the conditions above be implemented. Failure to do so could compromise the EMC compliance of the equipment containing the board.

Ferrite sleeves on all headphone or headset cables. The ferrite sleeve with hinged plastic housing is included in the accessory box, in a plastic bag. It has to be mounted on the cable near the termination that is connected to the headphone interface. The cable has to be turned twice around the ferrite before closing the ferrite.

WARNING. *EN 55022: This is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.*

Appendix D: PC Board Network Installation (SmEth Adapter)

The following pages provide information on how to install the virtual Shared memory Ethernet (SmEth) adapter and to configure the IP network, which allows the IP connection of the interface boards.

The installation of the Protocol Tester software automatically includes the TCP/IP protocol stack. The TCP/IP protocol stack implements the network access.

The installation of the Protocol Tester software also includes automatically three virtual ethernet adapter. The virtual ethernet adapters allow the virtual ethernet connection between the PC board and any interface board.

One virtual ethernet adapter will be installed, which connects the interface board with CPU number 0 (AP-4); the other interface boards are connected via routing over this interface board.

The PC board and the interface board with CPU number 0 will be in one IP domain (192.168.12.0). The interface board with CPU number 0 will play the role of a router. Therefore, it will have two virtual interfaces (tq0, sm0).

The interface boards (including the one with CPU number 0) will be located in a second IP domain (192.168.13.0). This is the default configuration for the interface boards, saved in the file `C:\K1297\net.ini`.

NOTE. *Further information about the CPU numbers of the various boards you find in the* Getting Started *chapter, section* Setting the VME Bus Address.

Prerequisites

The virtual ethernet adapter is required for several back-to-back demo scenarios of the GPRS Packet Gateway emulation, the TTCN execution environment, and for the Remote Operation Package. Make sure the virtual ethernet adapter has been installed successfully before installing any other component which requires this adapter.

NOTE. *If you want to run loopback sample scenarios or several IP Gateway emulations with the K1297-G20 software at one time, you probably have to install more than three virtual ethernet adapters.*

Installation

To install the SmEth adapter, proceed as follows:

1. Close all applications.
2. Select *Start / Control Panel / Add Hardware*.

   The *Add Hardware Wizard* opens.

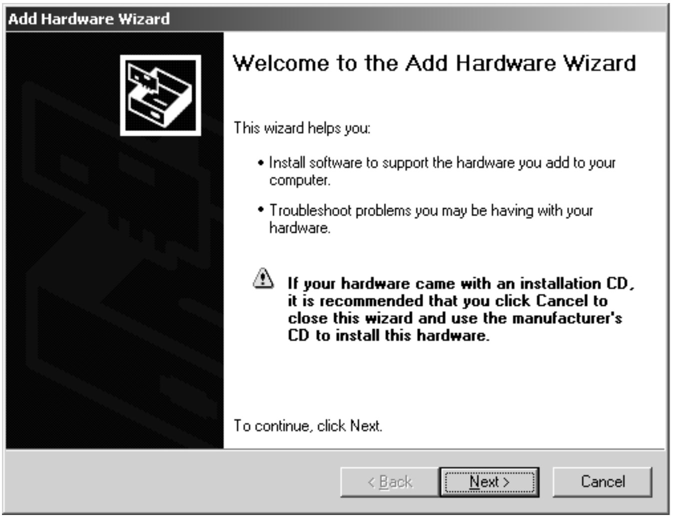


Figure D–1: Add Hardware Wizard, start page

To continue click *Next*.

3. In the next dialog box you will be asked “*Is the hardware connected?*” Answer “*Yes, I have already connected the hardware*” and click *Next*.

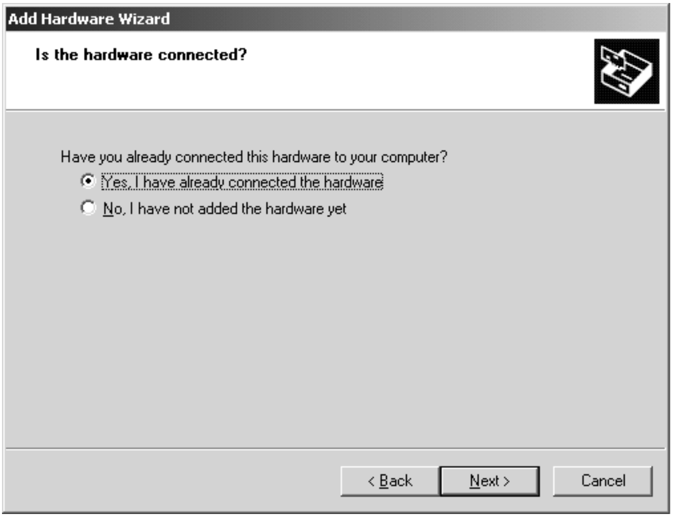


Figure D–2: Installing the SmEth adapter, step 3

4. The following dialog box lists all hardware that is already installed on your computer.

Select *Add a new hardware device* from the end of the list and click *Next*.

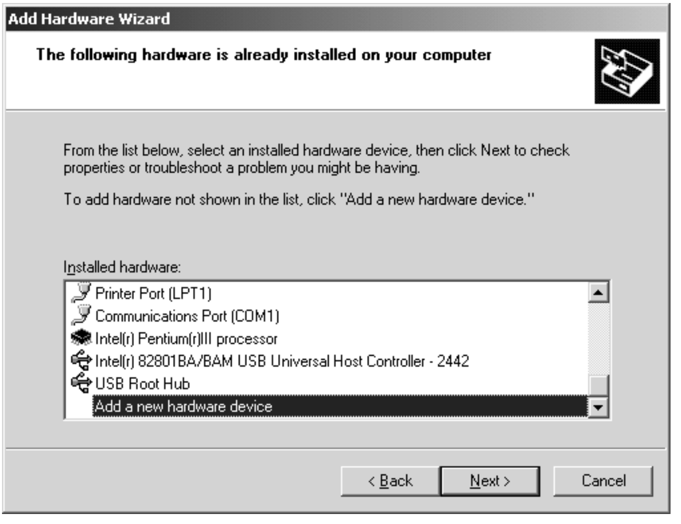


Figure D–3: Installing the SmEth adapter, step 4

5. In the next dialog box you will be asked *What do you want the wizard to do?*

Answer *Install the hardware that I manually selected from a list (Advanced)* and click *Next.*

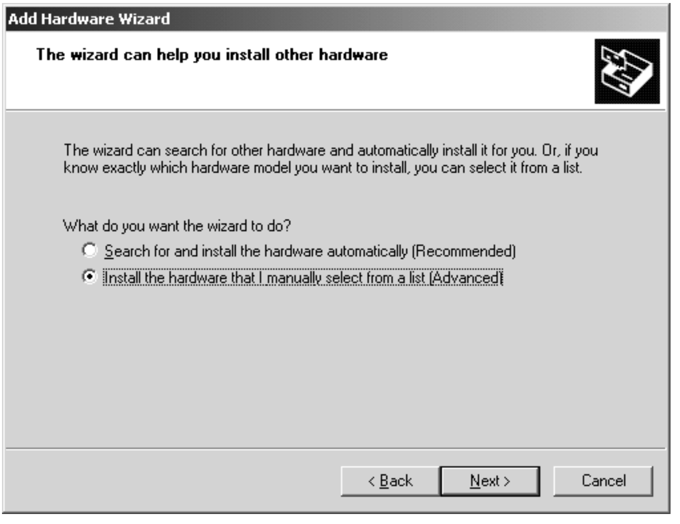


Figure D–4: Installing the SmEth adapter, step 5

6. In the following dialog box select *Network adapters* from the displayed list and click *Next*.

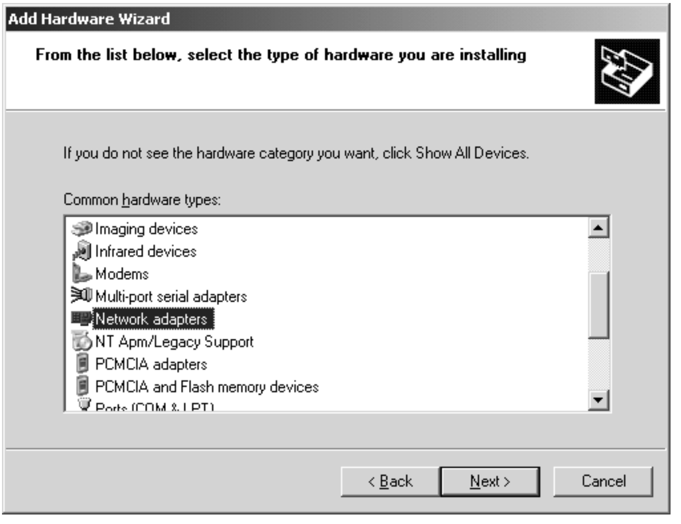


Figure D–5: Installing the SmEth adapter, step 6

7. In the following dialog box you can select the network adapter you want to install.

Select *Tektronix, Inc. TQ based backplane ethernet driver* and click *Next.*

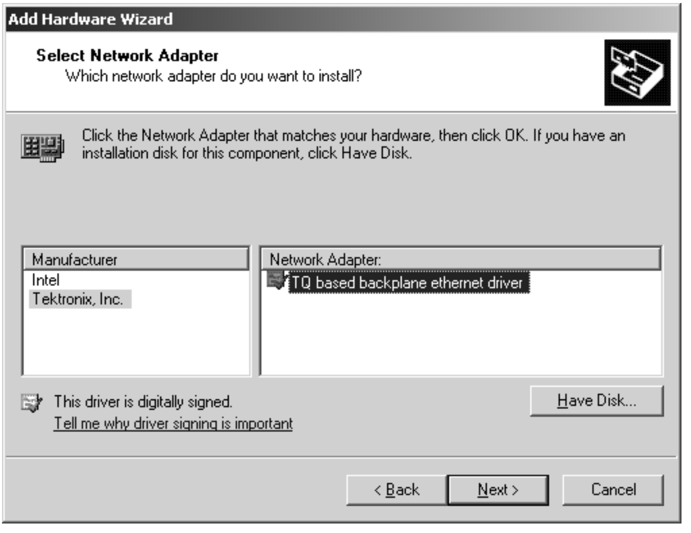


Figure D–6: Installing the SmEth adapter, step 7

8. Now the wizard is ready to install your hardware. Once again click Next to start the installation.

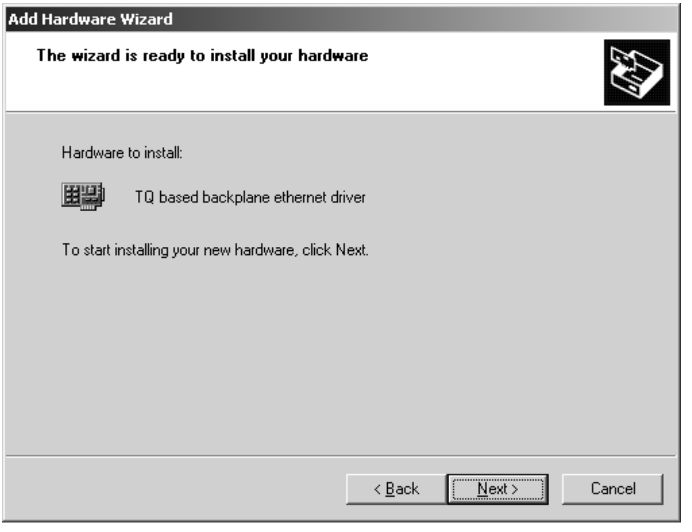


Figure D–7: Starting the installation

9. Click Finish to close the wizard.

Checking the Installation

To check if your installation succeeded, proceed as follows:

1. Select *Start / All Programs / Computer Management*.

The *Computer Management* window opens.

2. Open *Device Manager / Network adapters*. If your installation succeeded you will find here an entry: *TQ based backplane ethernet driver.*

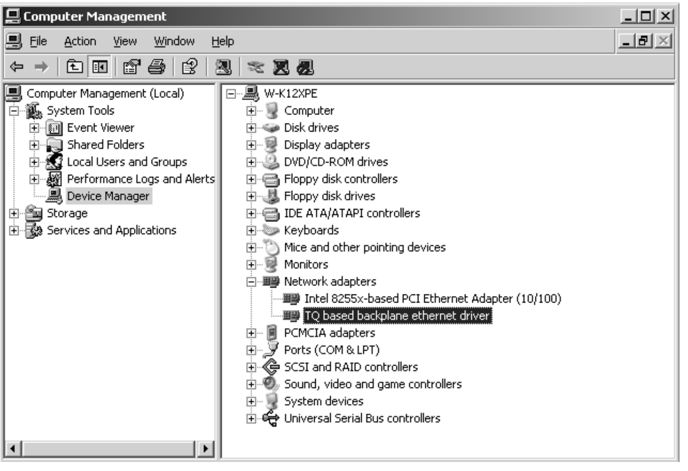


Figure D–8: Computer Management window

Configuring the SmEth Adapter

To configure the newly installed SmEth adapter, proceed as follows:

1. Select *TQ based backplane ethernet adapter* in the *Computer Management* window as shown in figure D–8.
2. Open the context menu by clicking the right mouse button and select *Properties*.

   The *TQ based backplane ethernet driver Properties* dialog box opens.
3. Select the *Advanced* tab to configure the selected SmEth adapter.

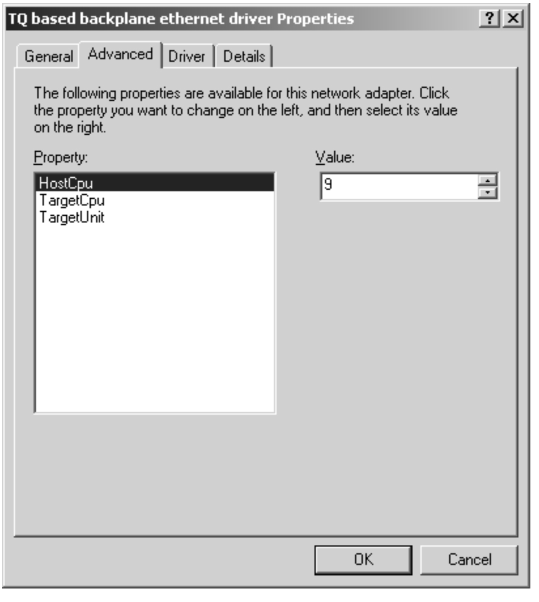


Figure D–9: Configuring the SmEth adapter

HostCpu defines the CPU number of the PC board. In the K1297 the CPU number for the PC board is always 9 (see *the* Getting Started *chapter, section* Setting the VME Bus Address*)*. Thus, always enter 9 as value for the *HostCpu*.

TargetCpu defines the CPU number of the measuring board of the internal IP Connection.

TargetUnit defines a user definable number between 0 and 255. The number has to be unique on the target CPU. It is meant as an identifier for the smeth adapter's peer process on the target CPU.

NOTE. *See the corresponding descriptions in the PKTGATE manual for the menu "pktgate.Activations.Bind".*

4. Configure the individual SmEth adapters according to the requirements of your application. Further information on the specific values will you find in the documentation accompanying the application.

   The following example lists the necessary values for typical K1297-G20 applications as Remote Operation / TMS and back-to-back demo scenarios of the GPRS Packet Gateway emulation. It lists the default settings configured upon delivery:

Table D–1: Example: SmEth Adapter Configuration

	Adapter 1	Adapter 2	Adapter 3
Host CPU	9	9	9
Target CPU	0 (usually AP-4 interface board)	1	1
Target Unit	0	1	2

Assigning IP Addresses

The K1297-G20 Protocol Tester has an internal IP network, that uses the class C networks 192.168.12.0 and 192.168.13.0. The first is used for the communication between the PC board and the AP board, the latter for the communication between the AP and all line interface boards.

To assign IP addresses to newly installed SmEth adapters, proceed as follows:

1. Select *Start / Control Panel / Network Connections.* The *Network Connections* dialog box opens.

   A list displays several *Local Area Connections*. Normally, the first Local Area Connection is the physical ethernet adapter for the PC and the following entries display the virtual SmEth adapters.

2. Pause with the cursor over one of the *Local Area Connection* entries. A ToolTip comes up telling you the name of the network connection.

   If the ToolTip displays *TQ based backplane ethernet driver* select the appropriate entry, open the context menu by clicking the right mouse button, and select *Properties*.

   The *Local Area Connection Properties* dialog box opens.

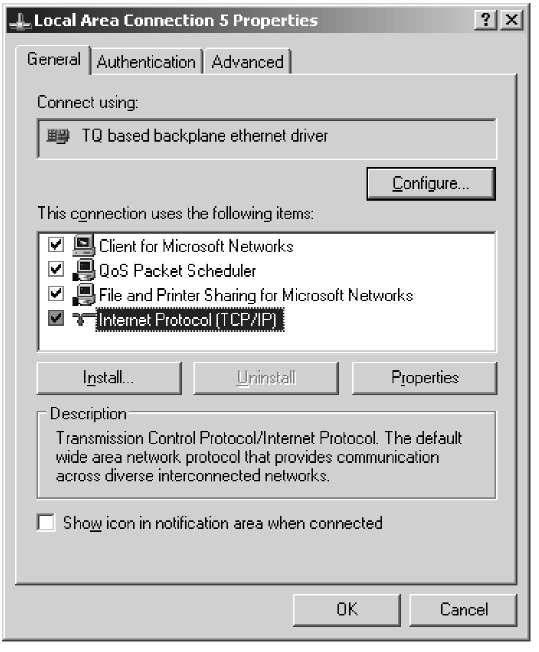


Figure D–10: Local Area Connection Properties dialog box

3. Select *Internet Protocol (TCP/IP)* and click the *Properties* button.

4. The *Internet Protocol (TCP/IP) Properties* dialog box for this connection opens. In this dialog box you can assign the IP addresses for the individual SmEth adapters.

The address is used to build a virtual point to point IP connection between PC board and a measuring board.

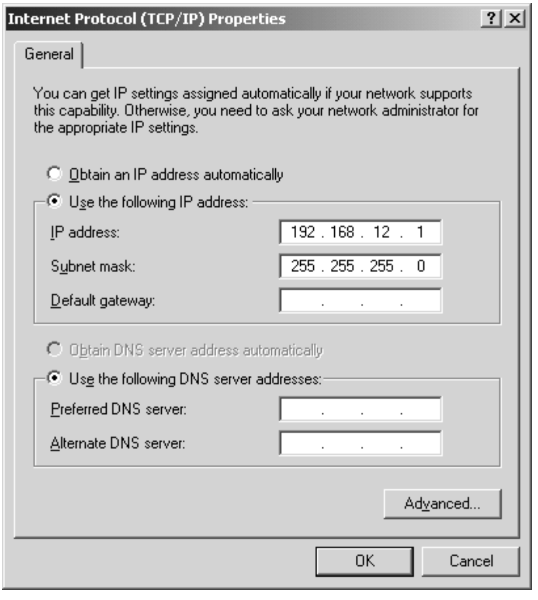


Figure D–11: Internet Protocol (TCP/IP) Properties dialog box

5. Select *Use the following IP address*.

6. Enter an IP address that is not yet assigned. For the first SmEth adapter enter: 192.168.12.1

Since 192.168.13.1 already assigned (see page D-1), this IP address can not be assigned anymore.

Enter for the second SmEth adapter 192.168.14.1, for the third one 192.168.15.1 and so on.

7. The subnet mask for the IP address specified is entered automatically. Do not change the subnet mask 255.255.255.0.

8. Confirm your settings with OK.

Checking the Network Installation. You can check the network installation as follows - provided that a) you have completed the system setup successfully, b) you have started the system, and c) the physical network connection is still established:

1. Use the `Command Prompt` to enter the route commands as displayed in the following window:

   ```
   route -p add 192.168.13.0 MASK 255.255.255.0 192.168.12.2 METRIC 1
   ```

   Check the two lines (using the command `find`) for the network addresses (IP domains) 192.168.12.0 and 192.168.13.0, which are now routed via the interface 192.168.12.1.

```
C:\>route -p add 192.168.13.0 MASK 255.255.255.0 192.168.12.2 METRIC 1

C:\>route print | find "192.168.12.0"
     192.168.12.0    255.255.255.0     192.168.12.1     192.168.12.1       1

C:\>route print | find "192.168.13.0"
     192.168.13.0    255.255.255.0     192.168.12.2     192.168.12.1       1
```

The `ping` command runs successfully only if the interface boards were booted and the K1297 application have been started.

```
C:\>ping 192.168.13.1

Pinging 192.168.13.1 with 32 bytes of data:

Reply from 192.168.13.1: bytes=32 time<10ms TTL=255
Reply from 192.168.13.1: bytes=32 time<10ms TTL=255
Reply from 192.168.13.1: bytes=32 time<10ms TTL=255
Reply from 192.168.13.1: bytes=32 time<10ms TTL=255
```

Appendix E: Windows XPe Troubleshooting

Preventive Measures

This Appendix describes how you can protect yourself against unexpected system failures and how you can deal with them.

The best preventive measure you can take is having a current backup. We recommend to backup your system on a regular basis as follows:

- Perform regular system backups for your Windows XPe configuration using the System Restore tool.
- Perform regular system backups for your K1297-G20 user data using the Backup tool.

System Restore

System Restore is a component of Windows XPe that you can use to restore your operating system to a previous state, if a problem occurs, without losing your personal user data.

NOTE. *System Restore is installed and activated at the factory. It needs at least 200 MB of disk space available to work properly.*

System Restore monitors changes to the system and automatically creates easily identified restore points. Restore points are stored states of your operating system that allow you to revert the system to a previous time.

Create restore points each time you make significant changes to your operating system, e.g. before and after installations of new or different device drivers or before and after software installations.

Creating Restore Points. Follow these steps to create restore points:

1. Exit all applications.
2. Select *Start / All Programs / Accessories / System Tools / System Restore.*

   The *System Restore Wizard opens.* Follow the instructions in the wizard.
3. Click *Create a restore point*, and then click **Next**.
4. In the *Restore point description* box, type a name to identify this restore point. System Restore automatically adds to this name the date and time that this restore point is created.
   - To finish creating this restore point, click **Create**.
   - To cancel restore point creation and return to the Welcome to System Restore screen, click **Back**.
   - To cancel restore point creation and exit the *System Restore Wizard*, click **Cancel**.

If you do not like the state of your computer after you restore it, you can undo the restoration or select another restore point. All successful restorations are reversible. All failed restorations are automatically reversed by System Restore.

NOTE. *The possible number of restore points depends on the available space on the partition where your operating system folder is located. If you do not have sufficient space available, System Restore is not activated.*

Restore the K1297-G20 by Restore Points. Follow the following steps to restore states of your operating system by restore points:

1. Exit all applications.
2. Access the *System Restore Wizard* via *Start / All Programs / Accessories / System Tools / System Restore.* Click *Restore my computer to an earlier time*, and then click **Next**.
3. Select the date when the restore point was created from the calendar in the *Select a Restore Point* dialog box. All of the restore points that were created on the selected date are listed by name in the list box to the right of the calendar. Click **Next**.
4. Confirm your selection in the *Confirm Restore Point Selection* dialog box and click **Next**.

   System Restore shuts down Windows and restores your K1297-G20 to the selected date and time.

   After the restoration Windows restarts using the settings from the date and time listed above.

Backup Tool

Windows XPe includes Backup, a tool that backups and restores your K1297-G20 user data.

We recommend to backup your K1297-G20 user data each time you make significant changes to your K1297-G20 software.

Backup the K1297-G20 User Data. To backup your K1297-G20 user data, proceed as follows:

1. Exit all applications.
2. Select *Start / All Programs / Accessories / System Tools / Backup.* The *Backup or Restore Wizard* opens.
3. Click **Next** to start configuring the backup process.
4. In the second wizard window (*Backup or Restore*), select *Backup Files and Settings* and click **Next**.
5. In the following wizard windows, select which folder, files and items you want to backup as well as type, destination, and name of the backup process.

   Follow the wizard instructions to define these settings.
6. At the end of the configuration, the backup process starts automatically. The *Backup Progress* dialog box opens and displays all information about this process.

Restore the K1297-G20 User Data. To restore your K1297-G20 user data, proceed as follows:

1. Exit all applications.
2. Select *Start / All Programs / Accessories / System Tools / Backup*. The *Backup or Restore Wizard* opens.
3. Click **Next** to start configuring the restore process.
4. In the second wizard window (*Backup or Restore*) select *Restore Files and Settings* and click **Next**.
5. In the following wizard windows, select which folder, files and items you want to restore as well as type, destination, and name of the restored process.

   Follow the wizard instructions to define these settings.
6. The last wizard window *(Completing the Backup or Restore Wizard*) lists all restore settings you have created.

   Specify additional restore options by clicking the *Advanced* button or close the wizard and start the restore process by clicking the *Finish* button.

   The *Restore Progress* dialog box opens and displays all information about this the restore process.

Repair Measures

NOTE. *For general troubleshooting tips read the Windows online help. To open the online help, click Start: Help and Support on the taskbar.*

Under rare circumstances, the K1297 may not start (boot). These circumstances include:

1. Installation of faulty third-party drivers

2. Erroneous changes in the Registry

3. Deleting or replacing system files by mistake

In these circumstances the Windows XPe boot process might crash with error messages, dark or blue screen.

Another problem occurs when the passwords of all accounts have been changed and have been forgotten. In this case the device starts, but does not log on automatically and no one can log on manually.

In all these instances, switch off your device and try to restart it. If Windows does not start again, carry out the Windows XPe installation repair process as described in the *Microsoft Windows XP Embedded Recovery Installation – Installation Notes*. The *Installation Notes* are shipped together with the Recovery CD.

Appendix F: Installing ATM Boards

When performing any service which requires internal access to the K1297 Protocol Tester, adhere to the following precautions to avoid damaging internal circuit boards and their components due to electrostatic discharge (ESD). Observe that any PCE I board installing must be performed only by Tektronix Service personnel.

CAUTION. *Many components within the chassis are susceptible to static-discharge damage. Service only in a static-free environment. Observe standard handling precautions for static-sensitive devices while servicing the K1297 Protocol Tester. Always wear a grounded wrist strap, or equivalent, while servicing the chassis.*

1. Minimize handling of static-sensitive circuit boards.
2. Transport and store ESD-sensitive circuit boards in ESD shielding boxes or bags with appropriate labels.
3. Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while handling these circuit boards. Do service of static-sensitive circuit boards only at a static-free work station.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Handle circuit boards by the edges when possible.
6. Do not slide the circuit boards over any surface.
7. Avoid handling circuit boards in areas that have a floor or work-surface covering capable of generating a static charge.

WARNING. *To avoid electric shock, always power off the chassis and disconnect the power cord before servicing the chassis.*

You can instal up to two 2 PCE-1 board combinations in your K1297 Protocol Tester.

CAUTION. *The usage of two sets of PCE-1 board combinations within one K1297 requires that the device's backplane has been prepared for this purpose.*

In case you wish to work with a second set of PCE I board combination only an experienced Tektronix service technician should perform this setting procedure.

Any installation must be performed at an ESD approved workplace. Electrostatic discharge can permanently destroy components that have to be temporarily removed from your device.

The following figure shows an example of a double ATM board combination.

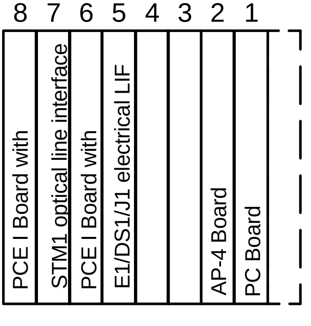


Figure F–1: Board combination (example)

CAUTION. *If the slots besides PCE I board combinations are not used, cover these empty slots with blank panels. Otherwise proper ventilation is not guaranteed.*

Installing PCE I Board Combinations

PCE I boards must be installed by qualified Tektronix service personnel or service personnel certified by Tektronix. For details, contact the Tektronix Service Support.

The Service Manual “K1297 Boards, PCE I Board Combinations” contains service information about mounting, installing and exchanging PCE I boards.

CAUTION. *Any installing of a PCE I board - this also includes the mounting of a PCE I board or a PCE I board exchange - must be performed by qualified Tektronix service personnel or service personnel certified by Tektronix.*

In addition to the General Safety and Service Safety aspects, specific precautions need to be observed; only specially trained service personnel are qualified to perform these.

Hardware Requirements

K1297 Protocol Tester with a PCE I board combination requires at least one AP-4 board.

Software Requirements

K1297 Protocol Tester with a PCE I board combination requires software version *K1297-G20 V2.0* or above.

Which Board into Which Slot?

PCE I boards and the slots for PCE I boards are marked with violet color.

Put only violet marked boards into violet marked slots.

CAUTION. *If you put a "wrong" board into a slot, you could damage the board and the instrument.*

Only slot 5 to 8 are suitable for ATM boards. Do not put PCE I board combinations into other slots.

Slots 7 and 8 are used by an installed PCE I board combination. Slots 5 and 6 can be prepared to use a second PCE I board combination or an ATM board combination.

Where to Install Line Interface Modules?

The line interface modules must be installed on the PCE I board according to specific rules.

In combinations with only one line interfaces module, this module is always installed on the left (lower) half of the PCE 1 board. Those LIFs are referred to as LIF A.

Line interfaces modules installed on the right (upper) half of the PCE I board are referred to as LIF B.

In mixed PCE I board combinations (one optical and one electrical LIF), the STM-1 module is always installed on the left (lower) half of the PCE I board. In those cases, the E1/DS1/J1 module is installed on the right (upper) half of the PCE I board.

There are no PCE I board combinations with a line interface module installed only on the right (upper) half of the PCE I board.

CAUTION. *If you install a line interface on a "wrong" place, you could damage the board and the instrument.*

The following table shows all possible LIF combinations:

Table F–1: Possible LIF Combinations

LIF A on the left (lower) half	LIF B on the right (upper) half
STM-1 optical TxRx	
STM-1 optical TxRx	STM-1 optical TxRx
STM-1 optical TxRx	STM-1 optical RxRx
STM-1 optical TxRx	E1/DS1/J1 electrical TxRx
STM-1 optical TxRx	E1/DS1/J1 electrical RxRx
STM-1 optical RxRx	
STM-1 optical RxRx	STM-1 optical RxRx
STM-1 optical RxRx	E1/DS1/J1 electrical TxRx
STM-1 optical RxRx	E1/DS1/J1 electrical RxRx
E1/DS1/J1 electrical TxRx	
E1/DS1/J1 electrical TxRx	E1/DS1/J1 electrical TxRx
E1/DS1/J1 electrical TxRx	E1/DS1/J1 electrical RxRx
E1/DS1/J1 electrical RxRx	
E1/DS1/J1 electrical RxRx	E1/DS1/J1 electrical RxRx

Place the line interface modules according to the following figures:

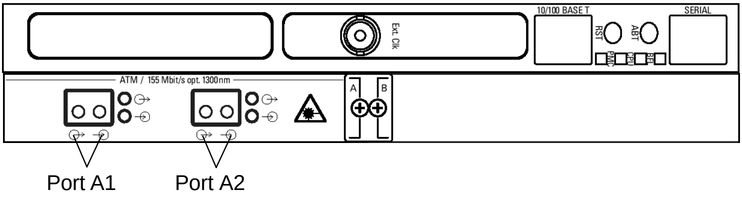


Figure F–2: One STM-1 (Tx/Rx) LIF

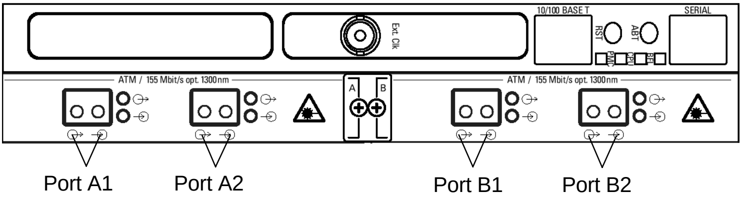


Figure F–3: Two STM-1 (Tx/Rx) LIFs

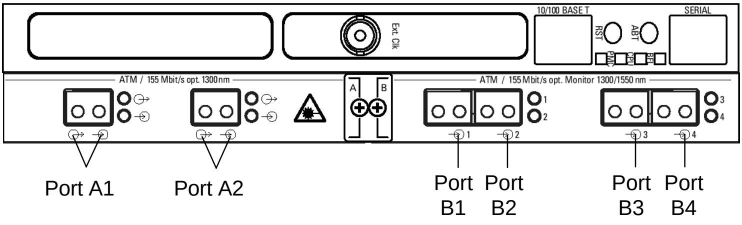


Figure F–4: One STM-1 (Tx/Rx) LIF and one STM-1 (Rx/Rx) LIF

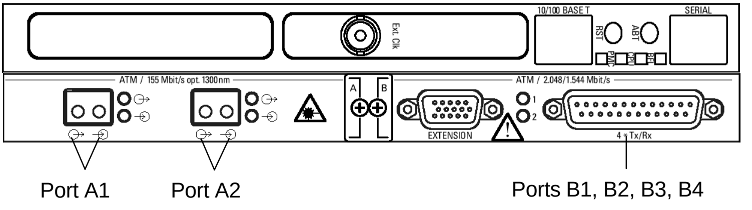


Figure F–5: One STM-1 (Tx/Rx) LIF and one E1/DS1/J1 (Tx/Rx) LIF.

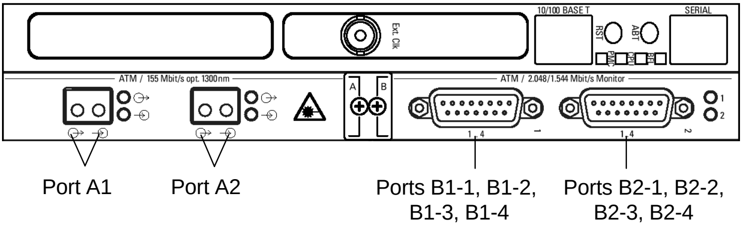


Figure F–6: One STM-1 (Tx/Rx) LIF and one E1/DS1/J1 (Rx/Rx) LIF.

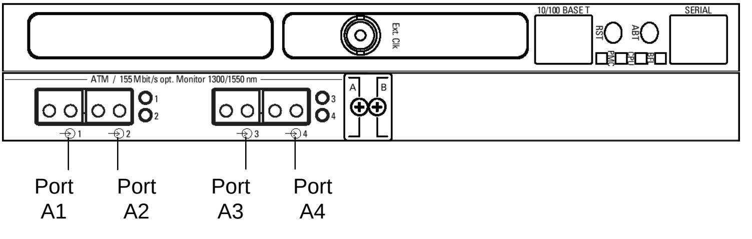


Figure F–7: One STM-1 (Rx/Rx) LIF

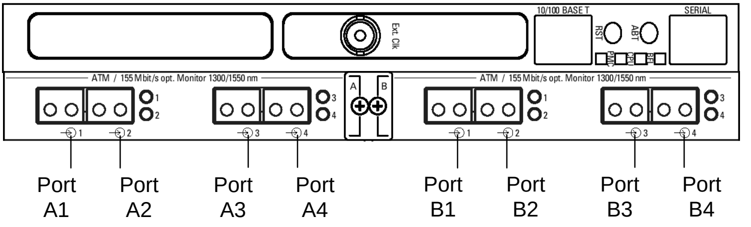


Figure F–8: Two STM-1 (Rx/Rx) LIFs

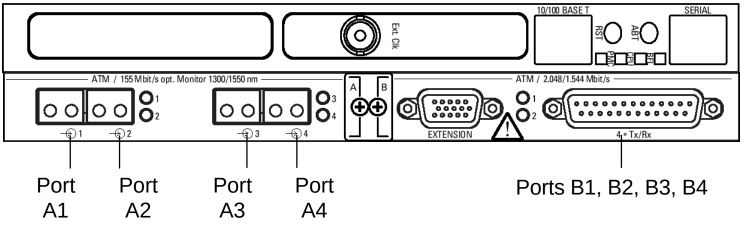


Figure F–9: One STM-1 (Rx/Rx) LIFs and one E1/DS1/J1 (Tx/Rx) LIF

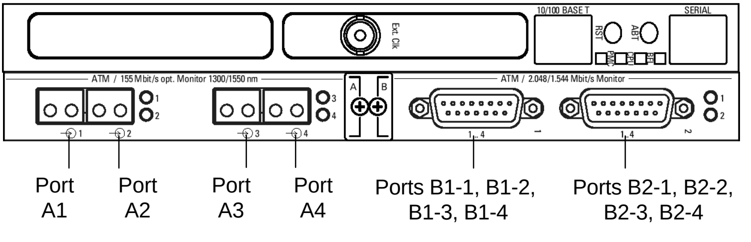


Figure F–10: One STM-1 (Rx/Rx) LIFs and one E1/DS1/J1 (Rx/Rx) LIF

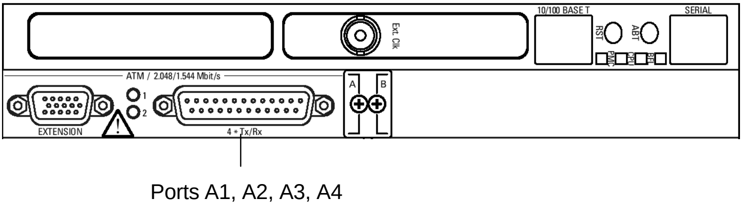


Figure F–11: One E1/DS1/J1 (Tx/Rx) LIF

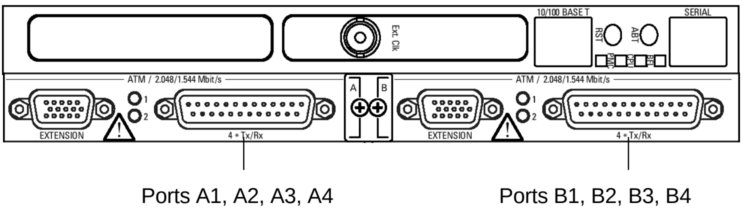


Figure F–12: Two E1/DS1/J1 (Tx/Rx) LIFs

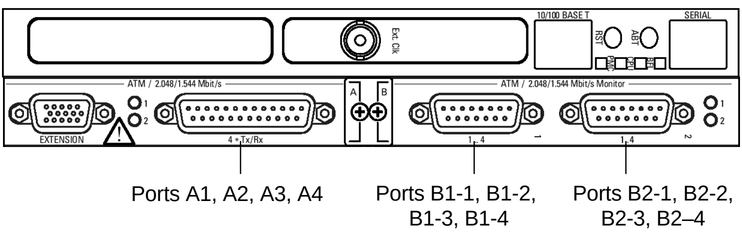


Figure F–13: One E1/DS1/J1 (Tx/Rx) LIF and one E1/DS1/J1 (Rx/Rx) LIF

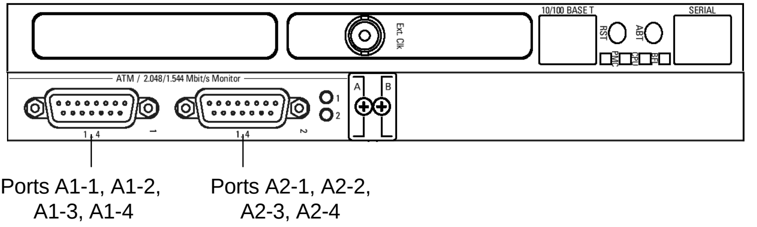


Figure F–14: One E1/DS1/J1 (Rx/Rx) LIF

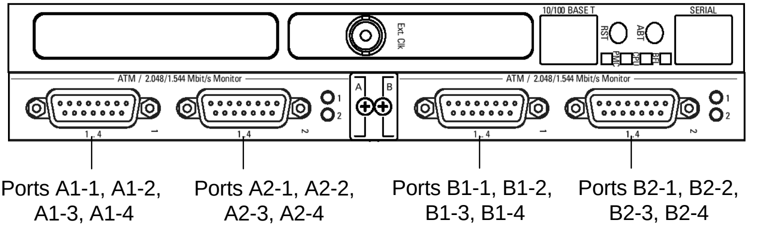


Figure F–15: Two E1/DS1/J1 (Rx/Rx) LIFs

Exchanging PCE I Line Interface Modules

The exchange of a PCE I line interface module consists of three major groups of working steps:

- Removing the PCE I board combination from the basic device
- Separating the line interface module from the host processor board
- Mounting a new line interface module onto the PCE I board

Removing the PCE I Board Combination. To remove the PCE I board combination proceed as follows:

1. Switch the device off and unplug the mains plug and all interface lines.
2. Remove the four mounting screws from the front panels of the PCE I board combination. The screws must be completely loosened.
3. Use your thumbs to simultaneously press outwards on the levers located beneath the screws.
4. Carefully pull out the PCE I board combination. Make sure that the spring strip on the long side of the module combination's cover is not being damaged. If the two springs located on the internal side of the module combination's front cover catch when removing the module, press the springs carefully back using an appropriate tool.
5. Then pull the PCE I board combination completely out of the device.

Separating the Line Interface Module from the PCE I Board. To separate the line interface module from the PCE I board, proceed as follows:

1. Place the PCE I board combination on your ESD work bench with the line interface module upward.
2. Remove the three screws that fix the line interface module on the PCE I board.
3. Remove the two screws that fix the front panel of the line interface module.
4. Lift the line interface module carefully upwards.

Mounting the New Line Interface Module onto the PCE I Board. To mount a new line interface module onto the PCE I board, proceed as follows:

1. Place the PCE I board onto the table with the protective foil side downward.
2. Make sure that the connector plug is mounted properly on the host processor board.
3. Carefully place the line interface module onto the PCE I board. Make sure that the four connectors on both boards smoothly fit together.
4. Carefully press boards together. Only use mounting screws as pressure points. Note, that one of the mounting screws is located beneath a mezzanine board.

CAUTION. *Putting pressure on the line interface modules can cause damage. Only use pressure points on the line interface module carrier board.*

5. Insert and tighten the three screws that fix the PCE I board on the line interface module and the two screws that fix the front panel of the line interface module.
6. Insert the PCE I board combination into the device.

CPU Numbers with PCE-1 Board Combinations

To operate two sets of PCE-1 boards within one K1297, the default CPU numbers of the second set have to be changed.

The following tables give an overview of the required CPU numbers for the usage PCE-1 board combinations in K1297 / K1297 Compact Protocol Testers:

Table F–2: PCE I board combinations in K1297 Protocol Testers

Board	CPU Numbers	Slots
1st PCE I board	3 (host processor board)	8/7
2nd PCE I board	5 (host processor board)	6/5

Table F–3: PCE I board combination in K1297 Compact Protocol Testers

Board	CPU Numbers	Slots
PCE I board	3 (host processor board)	4/5

Always, the CPU number pairs 3/4 and 5/6 are reserved for usage of ATM board combinations in the K1297 Protocol Tester.

The PCE I host processor board has address setting 3 upon delivery.

Setting CPU Numbers for a PCE-I Board Combination

To operate a second PCE-1 board combination within one K1297, the default CPU numbers (VME bus addresses) of the second combination have to be changed.

The CPU numbers being stored within the FlashPROM of the PCE-1 board are an integral part of the CPU's bootline. You can modify this bootline as follows.

1. Remove the installed PCE-1 board combination from slots 8 and 7 in the Protocol Tester.

2. Install the second PCE-1 board combination into slots 6 and 5 of your K1297.

   The first PCE-1 board combination must stay removed from the Protocol Tester.

3. Switch on the Protocol Tester. Watch for the *Status Window* of the K1297-G20 software. You should see boot messages for all installed boards.

   The CPU numbers 5 and 6 must not be found and existing.

4. Wait until the boot process is completed. Now you have to change the CPU numbers 3 and 4 into CPU numbers 5 and 6.

5. In order to change CPU #3 click the Windows XP *Start* button, and then click *Run*. Enter the following command:

   ```
   ntterm 3
   ```

   This command will open a window that gives you basic access to the vxWorks operating system. Enter the command `bootChange` and press the return key until you see:

   ```
   processor number : 3
   ```

   Enter `5` on the same line and press the return key.

   Press the return key until `bootChange` responds with:

   ```
   ->
   ```

6. In order to change CPU #4 , click the Windows XP *Start* button, and then click *Run*. Enter the following command:

   `ntterm 4`

   Proceed as described previously until you see:

   `processor number : 4`

   Enter `6` on the same line and press the return key until `bootChange` responds with:

   `->`

CAUTION. *Take extreme care not to modify any other bootline contents. Erroneous bootline contents can impact that the PCE-1 board combination does not boot anymore.*

You need a booted CPU in order to modify bootline contents. Otherwise you have to send the board combination to a Tektronix service location.

---

7. Shut down and switch off the Protocol Tester.

   Wait 30 seconds and switch the Protocol Tester on again.

   Verify that the K1297-G20 Status Window indicates the CPU numbers 5 and 6 instead of 3 and 4 for the PCE-1 board. Shut down the Protocol Tester again.

   Clearly mark the modified PCE-1 board combination on the front panel.

8. Install the PCE-1 board combination with CPU #3 and #4 into slot 7 and 8. Install the PCE-1 board combination with CPU #5 and #6 into VME slot 5 and 6.

   Fix all screws on the modules front cover.

9. Switch on your K1297 again. Watch for the K1297-G20 Status Window. You should see boot messages for both PCE-1 board combinations now.

Abbreviations

2G
Second Generation

3G
Third Generation

3GPP
Third Generation Partnership Project (of ETSI)

8PSK
Eight phase Shift Keying

A bis
Interface between BTS and BSC

A
Interface between BSS and GSM-NSS

AAL
ATM Adaptation Layer

AAL2
ATM Adaptation Layer Type 2

AAL5
ATM Adaptation Layer Type 5

AC
Authentication Center

ALCAP
Access Link Control Application Part

AMPS
Advanced Mobile Phone Service

AMR
Adaptive Multi-Rate (speech codec)

ANSI
American National Standards Institute

ANSI T1
Standards Committee T1 Telecommunication of the American National Standards Institute

ARIB/TTC
Association of Radio Industries and Business/Telecommunication Technology Committee

ASN.1
Abstract Syntax Notation One

ASP
Abstract Service Primitive

ATM
Asynchronous Transfer Mode

ATS
Abstract Test Suite

AuC
Authentication Center

BEC
Backward Error Correction

BHCA
Busy Hour Call Attempt(s)

BMC
Broadcast/Multicast Control

BSC
Base Station Controller

BSS
Base Station Subsystem

BSSAP
BSS Application Part

BSSGP
Base Station Subsystem GPRS Protocol

BTS
Base Transceiver Station

CAMEL
Customized Application for Mobile Enhanced Logic

CAP
CAMEL Application Part

CATT
China Academy of Telecommunication Technology

CBR
Constant Bit Rate (Data Stream)

CC
Call Control

CCITT
Comité Consultatif International Téléphonique et Télécommunication

CCS7
Common Control Signaling System No 7 (SS7)

CCU
Channel Codec Unit

CDMA
Code Division Multiple Access

CDMA2000
3rd Generation Code Division Multiple Access

CIC
Circuit Id Code

CID
Channel Identifier

CKSN
Ciphering Key Sequence Number

CM
Call Management Protocols, Connection Management

CN
Core Network

COS
Corporation for Open Systems, USA

CPCS
Common Part Convergence Sublayer

CRNC
Controlling RNC (Radio Network Controller)

CS
Circuit Switched

CS-CN
Circuit Switched Core Network

CSE
CAMEL Service Environment

CT
Conformance Test

CTR
Common Technical Regulation

CTS
Conformance Test Services. Project conducted by EU and European partners to achieve harmonized European tests.

D-AMPS
Digital AMPS

DCE
Data Communications Equipment

DCH
Dedicated Channel

DECT
Digital Enhanced Cordless Telephone

DIS
Draft International Standard

DL
Downlink

DLCI
Direct Link Connection Identifier

DNS
Domain Name Server

DoE
Demo of Equivalence. Harmonizing campaign between imple-mentations of test suites, usual for CTS.

DPC
Destination Point Code

DRNC
Drift Radio Network Controller

DRNS
Drift Radio Network Subsystem

DTE
Data Terminal Equipment

E1
2.048 kbps

EDGE
Enhanced Data Rates for GSM Evolution

EFR
Enhanced Full Rate (speech codec)

EIR
Equipment Identity Register

ESE
Emulation Scenario Editor
(also Emulation Stack Editor)

ESD
Electrostatic Discharge

ETR
ETSI Technical Report

ETS
Executable Test Suite

ETSI
European Telecommunication Standards Institute

FDD
Frequency Division Duplex

FDMA
Frequency Division Multiple Access

FEC
Forward Error Correction

FER
Frame Error Rate

FM
Fault Management

FM
Frequency Modulation

FORTH
Programming Language (FORTH Inc.)

FR
Frame Relay

Gb
Interface between BSS and SGSN

Gc
Interface between GGSN and HLR

Gd
Interface between SGSN and GMSC

Gf
Interface between SGSN and EIR

Gi
Interface between GGSN and external PDN

Gn
Interface between SGSN and GGSN

Gp
Interface between SGSN and GGSN of external PLMN

Gr
Interface between SGSN and HLR

Gs
Interface between SGSN and VMSC/VLR

GGSN
Gateway GPRS Support Node

GMM
GPRS Mobility Management (protocols)

GMSC
Gateway Mobile Service Switching Center

GMSK
Gaussian Minimum Shift Keying

GPRS
General Packet Radio Service

GSM
Global System for Mobile Communication

GSM-R
GSM Railway

gsmSCF
GSM Service Control Function

gsmSSF
GSM Service Switching Function

GSN
GPRS Support Node

GTP
GPRS Tunneling Protocol

GTP-C
GTP Control

GTP-U
GTP User

GTT
Global Title Translation

HLR
Home Location Register

HO/HoV
Handover

HR
Half Rate

HSCSD
High Speed Circuit Switched Data

HTTP
HyperText Transfer Protocol

ICO
Intermediate Circular Orbits

IETF
Internet Engineering Task Force

IMEI
International Mobile Equipment Identification

IMSI
International Mobile Subscriber Identity

IMT-2000
International Mobile Telecommunications 2000

IMUN
International Mobile User Number

IN
Intelligent Network

INAP
Intelligent Network Application Part

IP
Internet Protocol

IPv4
IP version 4

IPv6
IP version 6

IS
International Standard

IS-95
Interim Standard ’95

ISDN
Integrated Services Digital Network

ISO
International Standards Organization

ISP
Internet Service Provider

ISUP
ISDN User Part

ITU
International Telecommunication Union

ITU TS
International Telecommunication Union-Telecommunication Standards Section

ITUN
SS7 ISUP Tunneling

Iu
UTRAN Interface between RNC and CN

Iub
UTRAN Interface between Node B and RNC

Iu-CS
UTRAN Interface between RNC and the Circuit Switched Domain of the CN

Iu-PS
UTRAN Interface between RNC and the Packet Switched Domain of the CN

Iur
UTRAN Interface between two RNCs

IUT
Implementation Under Test

IWF
Interworking Function

kbps
Kilobits per Second

LEM
Local Emulation Manager

LLC
Logical Link Control

LT
Line Termination

LU
Location Update

MAC
Medium Access Control

MAP
Mobile Application Part

Mbps
Megabits Per Second

MBS
Message Building System

MC
Multi-Carrier

MC-CDMA
Multi-Carrier CDMA

MCE
Multi-protocol Encapsulation

MDTP
Multi Network Datagram Transmission Protocol

ME
Mobile Equipment

MM
Mobility Management (protocols)

MOC
Mobile Origination Call

MS
Mobile Station

MSC
Mobile Services Switching Center, Message Sequence Chart

MSISDN
Mobile Subscriber ISDN address

MSRN
Mobile Station Roaming Number

MSS
Mobile Satellite System

MT
Mobile Telephone

MTC
Mobile Terminating Call

MTP
Message Transfer Part

MTP3b
Message Transfer Part level 3 (broadband) for Q.2140

NAS
Non Access Stratum

NBAP
Node B Application Protocol

NE
Network Element

NMT
Nordic Mobile Telephony

NNI
Network-Node Interface

Node B
UMTS Base Station

NRT
Non-Real Time

NSS
Network Switching Subsystem

NS-VC
Network Service - Virtual Connection

NT
Network Termination

O&M
Operation and Maintenance

OAM
Operation, Administration, and Maintenance

OMC
Operation and Maintenance Center

OS
Operations System

OSA
Open Service Architecture

OSI
Open Systems Interconnection

OSS
Operation Subsystem

OSTC
Open Systems Test Consortium

PCO
Point of Control and Observation

PCR
Program Clock Reference

PCU
Packet Control Unit

PDC
Personal Digital Communication

PDCP
Packet Data Convergence Protocol

PDH
Plesiochronous Digital Hierarchy

PDN
Packet Data Network

PDP
Packet Data Protocol

PDU
Protocol Data Unit

PICS
Protocol Implementation Conformance Statement (ISO 9646). Here: Test Suite Parameter

PIXIT
Protocol Implementation eXtra Information for Testing (ISO 9646). Here: Test Suite Parameter

PLMN
Public Land Mobile Network

PMR
Private Mobile Radio

PS
Packet Switched

PS-CN
Public Switched Core Network

PSTN
Public Switched Telephone Network

QoS
Quality of Service (ATM Network Channels)

QPSK
Quadrature Phase Shift Keying (or, Quaternary Phase Shift Keying)

RAB
Radio Access Bearer

RAN
Radio Access Network

RANAP
Radio Access Network Application Part

RFC
Request for Comment

RLC
Radio Link Control

RLP
Radio Link Protocol

RNC
Radio Network Controller

RNS
Radio Network Subsystem

RNSAP
Radio Network Subsystem Application Part

RNTI
Radio Network Temporary Identity

RR
Radio Resource

RRC
Radio Resource Control

RRM
Radio Resource Management

RTT
Radio Transmission Technology

Rx
Receiver

SAAL
Signaling ATM Adaptation Layer

SAP
Service Access Point

SAPI
Service Access Point Identifier

SCCP
Signaling Connection Control Part

SCR
System Clock Reference

SCTP
Simple Control Transmission Protocol

SDH
Synchronous Digital Hierarchy

SDL
State Definition Language

SDO
Standard Developing Organization

SDU
Service Data Unit

SGSN
Serving GPRS Support Node

SIETEM
Test Manager for TTCN Environment

SIM
Subscriber Identity Module

SM
Session Management

SMS
Short Message Service

SNDCP
Subnetwork Dependent Convergence Protocol

SPC
Signaling Point Code

SPE
Signal Processing Equipment

SRNC
Serving Radio Network Controller

SRNS
Serving Radio Network Subsystem

SS#7
Signaling System No. 7. Also Common Channel Signaling System No. 7.; ITU Q.700 series

SSCOP
Service Specific Connection Oriented Protocol

SSF
Service Switching Function

SSN
Subsystem Number

SSP
Service Switching Point

SSS
Switching Subsystem

STC
Signaling Transport Converter

STM1
Synchronous Transport Module -Level 1

SUT
System Under Test

SW
Software

T1
1544 kbps

TACS
Total Access Communication System

TBF
Temporary Block Flow

TBI
Temporary Block Identifier

TBR
Technical Basis for Regulation

TC
Transcoder

TCAP
Transaction Capability Application Part

TCP
Transmission Control Protocol

TD-CDMA
Time Division-Code Division Multiple Access

TDD
Time Division Duplex

TDMA
Time Division Multiple Access

TD-SCDMA
Time Division - Synchronous CDMA

TE
Terminal Equipment

TEID
Tunneling Endpoint ID

TETRA
Terrestrial Trunked Radio Access

TIA
Telecommunications Industry Association

TID
Tunnel Identifier

TMSI
Temporary Mobile Station Identity

TN-CP
Transport Network-Control Plane

TPC
Transmission Power Control

TR
Termination

TRAU
Transcoder and Rate Adaptor Unit

TRX
Transceiver

TS
Technical Specification

TSCC
Test Scenario Control Center

TTA
Telecommunications Technology Association

TTCN
Tree and tabular combined Notation. ISO 9646-3, ITU X.292

TUP
Telephone User Part

Tx
Transmitter

UBR
Unspecified Bit Rate

U MSC
U MSC Mobile Switching Center (the integration of the MSC and the SGSN in one physical entity (UMTS+MSC =UMSC)

U MSC-CS
U MSC Circuit Switched

U MSC-PS
U MSC Packed Switched

U SIM UMTS
Subscriber Interface Module

U SSD
Unstructured Supplementary Service Data

UDP
User Datagram Protocol

UE
User Equipment

UICC
UMTS IC Card

UL
Uplink

Um
GSM Air Interface

UMTS
Universal Mobile Telecommunication System

UNC
Universal Naming Convention

UNI
User-Network Interface

UP
Uplink, User Part, User Plane

USF
Uplink State Flag

USIM
UMTS Subscriber Identity Module

UTRA
UMTS Terrestrial Radio Access

UTRAN
UMTS Terrestrial Radio Access Network

Uu
UMTS Air interface

UWC-136
Universal Wireless Communication

V5.1, V5.2, V.110
ITU Interfaces

VBR
Variable Bit Rate (data stream)

VC
Virtual Connection

VCI
Virtual Channel Identifier

VHE
Virtual Home Environment

VLR
Visitor Location Register

VMSC
Visited MSC

VPI
Virtual Path Identifier

WCDMA
Wideband CDMA, Wideband Code Division Multiple Access

WLL
Wireless Local Loop

X.25, X.75
ITU Interfaces