

K1297-G20 User Manual



K1297 K1297 Compact Protocol Tester

C73000-B6076-C83-9

This document supports software version K1297-G20 V2.50 and above and the device types 7KK1200-B (K1297) and 7KK1200-P (K1297 Compact)



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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 IEC 825-1, 11.93.

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.

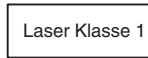
WARNING indicates an injury hazard not immediately accessible as you read the marking.

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



Electrostatically
Hazardous



Disconnect Power before
Opening the Instrument



Double
Insulated



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 NT 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.

In addition to the VME bus system, which takes the cards of the system processor, the application processor and the measurement interfaces, the K1297 operates a second bus system. The PC bus system offers the possibility to use various communication interfaces, such as an ISDN PC card for remote control or even other applications, such as a multimedia card.

Currently available are the following interface measurement boards and modules:

- E1/DS1
- ISDN BAI S₀ and BAI U_{2B1Q}
- V./X.
- DS0A
- Ethernet
- ATM boards for physical interfaces: E1/DS1, E3/DS3 and STM-1 optical/OC-3c

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 NT. This means its graphical user interface is modelled according to Windows standard, 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.

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 NT
- 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.

When working with the K1297-Classic software you have the full range of the application descriptions available as PDF online manuals on the K1297-Classic CD-ROM.

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).
- Microsoft Windows NT is described in the manual *Start Here. Basics and Installation. Microsoft Windows NT Workstation* supplied with the K1297. On the front cover it shows a Certificate of Authenticity for the Windows NT installation of the Protocol Tester.

Windows NT online help: Click in the taskbar on *Start: Help*. At the first time you start the Windows NT Help click on the *Find* tab and choose the option *Minimize Database*.

NOTE. *The Windows NT 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 NT troubleshooting section.

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

Text style	Description
<i>Courier</i>	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 our products are used in a standard configuration that has not been tested by Tektronix, we kindly ask you for your understanding should we need to refer you to the supplier for support.

Contacting Tektronix

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 13629 Berlin
 GERMANY

Web site www.tektronix.com

Technical support For hotline service support, call:

 +4930-386-22200 (8:00 a.m. - 6:00 p.m. GMT + 01:00)

 or
 1-800-833-9200 (This phone number is toll free in North
 America. After office hours, please leave a voice mail
 message. Outside North America, contact a Tektronix
 sales office or distributor; see the Tektronix web site for a
 list of offices.)

 Or fax:
 +4930-386-22546

 Or contact us by e-mail:
 mpt.hotline@tek.com



Technologies

This chapter gives you an overview of the most important application areas and applications of the Protocol Tester with the K1297-G20 software.

The Protocol Tester is a test device for analysis, simulation and emulation of data sequences.

Wherever new systems are under development, they need certifying in test laboratories, or components have to be integrated or tested in existing networks, there is an essential requirement for the K1297 Protocol Tester with its high-accuracy measurements and numerous applications.

Application Areas

The software applications support protocol testing in the following networks:

- Access networks
- Core networks (including ATM NNI)
- Mobile Radio networks

Mobile Networks

In cross-border, digital telephony both the internal network and the internetwork signaling are of crucial importance. The task of the K1297-G20 configured with one or more E1/DS1 interfaces is to ensure the ongoing quality of this signaling. An important factor here is not only that K1297-G20 allows you to thoroughly analyze all the protocols specified by GSM but that it can handle vendor-specific O&M messages on the A_{bis} interface. It enables you to process several 16 and/or 64 kbit/s signaling and data channels simultaneously and to simulate the bit rate adaption.

GSM. In accordance with GSM recommendations, the term PLMN (Public Land Mobile Network) is used as an abbreviation for a public communication network with radio transmission to and from possible roaming mobile subscribers. A PLMN offers high speech quality through digital transmission, interception proof by ciphering, protection against misuse, international roaming, access to all fixed and mobile networks, SS#7 signaling.

CDMA (Code-Division Multiple Access). CDMA is a coding scheme, used as a modulation technique, in which multiple channels are independently coded for transmission over a single wideband channel.

2.5G/3G Technology

The most important evolutionary step of GSM towards 3rd generation technology is GPRS. GPRS prepares and optimizes the Core Network for high data rate Packet Switching transmission - as does UMTS with UTRAN over the RAN - and is thus a prerequisite for the UMTS introduction.

GPRS. GPRS introduces Packet Switching into the GSM Core Network and allows direct access to Packet Data Networks (PDN). This enables high data rate PS transmission well beyond the 64 kbit/s limit of ISDN through the GSM CN, a necessity for UMTS data transmission rates of up to 2 Mbit/s.

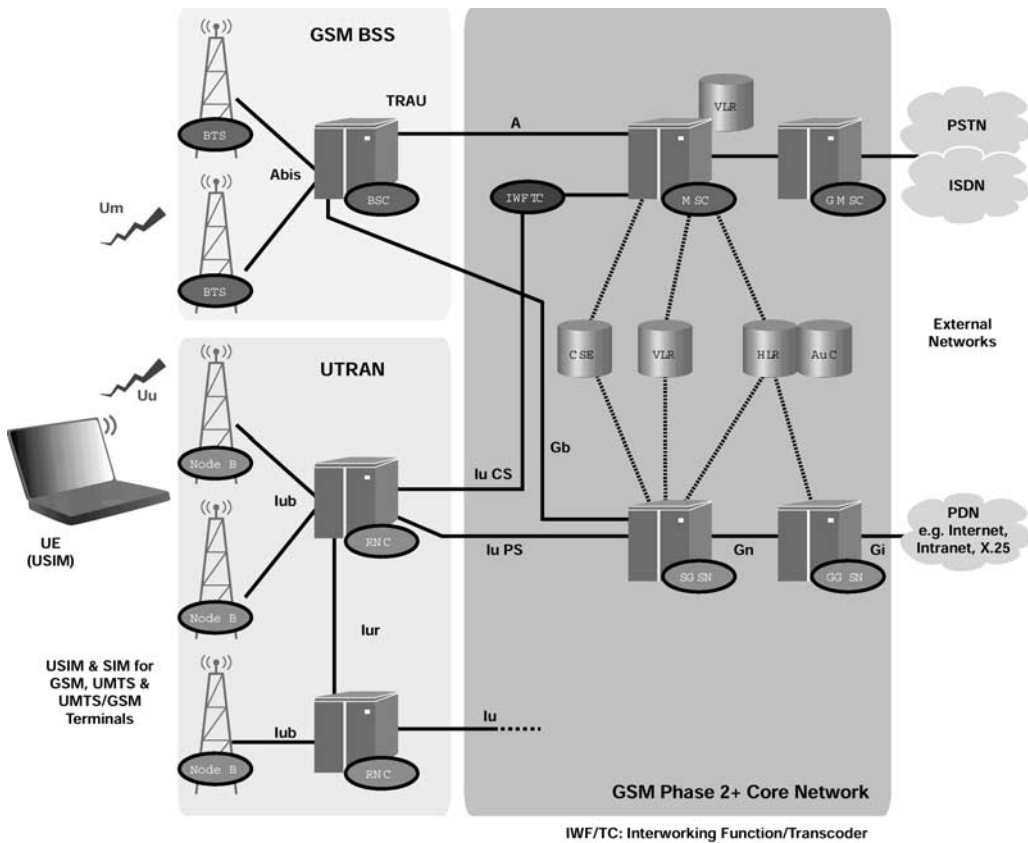
Two functional units extend the GSM NSS architecture for GPRS Packet Switching services: the Gateway GPRS Support Node (GGSN) and the Serving GPRS Support Node (SGSN).

When a user data packet arrives at the GGSN, it must be routed to the SGSN in the supply area where the subscriber is currently located. The packet is then delivered to the BSS for transmission via the air interface. Finally, the packet arrives at the mobile station, where higher level applications process the user data packet.

In addition to the GSM interfaces, 9 new interfaces are specified in GPRS. The GPRS reference model of the European Telecommunications Standards Institute (ETSI) shows the basic GSM and GPRS network elements and the interfaces specified between them.

UMTS. UMTS (Rel. '99) incorporates enhanced GSM Phase 2+ Core Networks with GPRS and CAMEL (Customized Applications for Mobile network Enhanced Logic).

In UMTS release 1 (Rel. '99), a new radio access network UTRAN (UMTS Terrestrial Radio Access Network) is introduced. UTRAN, the UMTS RAN, is connected via the Iu-Interface (Iu-PS for PS data / Iu-CS for CS data) to the GSM Phase 2+ CN.



GSM-only Mobile Stations (MS) will be connected to the network via the Um GSM radio interface. UMTS/GSM Dual-Mode User Equipment (UE) will be connected to the network via UMTS radio interface Uu at very high data rates (up to almost 2 Mbit/s).

Outside the UMTS service area, UMTS/GSM UE will be connected to the network at reduced data rates via the Um GSM air interface. Maximum data rates are 115 kbit/s for CS data by HSCSD (High Speed Circuit Switched Data), 171 kbit/s for PS data by GPRS and 553 kbit/s by EDGE (Enhanced Data Rates for the GSM Evolution). Handover between UMTS and GSM is supported, and handover between UMTS and other 3G systems (e.g. MC-CDMA) will be supported in order to achieve true worldwide access.

Access Networks

To date there are two types of access networks, V5.1 and V5.2. Other networks are under discussion for broadband ISDN. Whereas in the case of V5.1 up to three 64 kbit/s signaling channels can occur on one PCM30 link, in the case of V5.2 three 64 kbit/s signaling channels are to be processed on each of up to sixteen PCM30 links. In the various networks, (public, corporate, local), the protocol types employed vary as well.

Moreover, the signaling data rate in the B-ISDN is not a constant 16 or 64 kbit/s. It varies between a few kbit/s and several Mbit/s according to the volume of signaling. Instead of time slots channel IDs (VPI/VCI) are used as links. The K1297-G20 offers the relevant application programs for tests and, with its many parallel operating simulation and monitoring ports, also features signaling channels, which can be freely allocated.

ISDN

ISDN protocols are used between an ISDN handset/telephone (USER) and the ISDN core network (NET). Our software packages may be used for testing USER as well as NET. The protocol is usually transferred on the following physical interfaces:

- Basic Rate Interface/Access (BRI/BRA) offering two 64 Kbit/s bearer channels and a 16 Kbit/s D-channel for signaling. Tektronix offers physical interfaces for the S_0 and $U_k(2B1Q)$ reference points.
- Primary Rate Interface/Access (PRI/PRA) offering thirty 64 Kbit/s bearer channels and one 64 Kbit/s D-channel for signaling. Tektronix offers physical interfaces for the S_{2m} reference points with E1 or DS1 interfaces.

V5.1/V5.2

These are ETSI protocol families used between the core network and the access network. These interfaces support the transparent exchange of ISDN signaling information and provide protocols for support of analogue line interfaces. V5.2 in addition to V5.1 provides concentration and protections functions. Both protocols are usually transferred over E1 links. V5.1 is the abbreviation of “Signaling Protocols and Switching V interfaces at the digital Local Exchange (LE) V5.1 interface for the support of Access Network (AN), Version 5.1”. It conforms to ETSI prETS 300 324-1, October 1993.

Core Networks

The Core network comprises all backbone network elements without subscriber access. A core network applies technologies for:

- Narrowband (SS#7)
- Broadband (ATM NNI)

Both technologies and their appropriate applications are described in the following.

SS#7

SS#7 - Signaling System No. 7 - is a communication protocol which is responsible for the basic call control, when placing phone calls or receiving busy and ringing signals within the telephony network. It is the key technology for a large number of applications in switched circuit networks, such as ISDN, Intelligent Network (IN) and GSM, which use the SS#7 network as a backbone service in order to exchange their voice and data transmission services.

SS#7 is a common channel signaling system where the signaling information related to various user information channels is transferred in one separate signaling channel. It can be subdivided into four major parts:

- The MTP (Message Transfer Part) includes fast and error-free transmission of messages between exchanges (signaling points), routing of messages to their destination signaling point, distribution of messages to the appropriate user part within the destination signaling point, re-routing of messages in case of signaling network failures (such as breakdown of signaling links of signaling transfer points).
- The SCCP (Signaling Connection Control Part) comprises establishment and control of signaling connections, i.e. logical end-to-end connections between signaling points via the common channel signaling links, and the possibility of worldwide addressing for signaling points. SCCP features its own routing label, connection-oriented or connectionless message transfer, additional functions for transferring messages between exchanges and other signaling points (such as databases), combined with the MTP as Network Service Part (NSP).

- The ISDN user part takes care of the signaling functions for control of calls, for processing of services and facilities and for administration of circuits in ISDN (voice and non-voice applications), interfaces to MTP (and SCCP in case of ITR7-ISUP) for the transport of message signal units, bearer and supplementary services.
- The TCAP (Transaction Capabilities Application Part) provides end-to-end protocols between TC users, interfacing of SCCP and use of connectionless message transfer, provision of the means to exchange operations and replies via dialog. TCAP is subdivided into component sublayer and transaction sublayer.
- The INAP (Intelligent Network Application Part) is applied in Intelligent Networks. Intelligent network functions are increasingly being provided in existing or new networks. These include toll-free calling, televoting and the uniform network-wide telephone number.

ATM NNI

ATM (Asynchronous Transfer Mode) is a packet technology used for multiplexing and switching for broadband networks. Data is segmented and transmitted in fixed-length cells carrying control and payload information. The traffic control techniques are largely based on the procedures used in telecommunications networks: a “call” is associated with one source-destination pair, each node maintains “states” for each call, and at call set-up time resources are reserved based on a “contract” between the user and the network.

Applications

All testing activities are supported by the following generic applications:

Monitoring

Monitoring displays the messages on an communication interface in a readable format. With the K1297-G20 two main ways to present monitoring results are available:

- Statistics method: counts the occurrences of specific events such as overload situations, failures, tracing, etc.
- Online data analysis: received data can be filtered to focus on particular aspects of communication. (Show all TCP user data larger than 140 octets, for example.)

Further monitoring features are:

- Real time recording to RAM or/and Disk (Recording File) Filtering for Messages or Message field content
- Execute trigger actions upon special events
- Customize the display for each layer
- Choose display mode according the needs
- Playback from recording file
- With K1297-G20 software features such as the following are available:
 - Call trace
 - Various statistics
 - Protocol specific online help
 - Realtime playback of recording files

Simulation

Simulation enables the user to send messages and react on received messages. Messages may be sent directly on a communication channel or to an emulation for further processing.

A simulation is the representation or imitation of one process or system through the use of another. In a test environment, a simulator can be used to substitute a network element up to a particular part of the network. For instance, when testing an SGSN, the BSS behavior can be simulated by test equipment. Major applications for simulators include:

- Collecting information about a network element's dependability. Within the simulation, certain normal and abnormal situations can be created, and the NE's ability to cope with the simulated environment offers the operator and manufacturer an approximation of the unit's field characteristics. Simulations are also often used for conformance testing.
- Substitution for missing NEs or parts of a network during the development process of an entity. The simulation helps to approximate the item's ability to perform in a real life environment.
- Cost savings for the development of an entity. The strong and weak points of an entity can be identified early in the development process or before introducing it into a running network.

Further simulation features are:

- Simulation of multi different protocols in parallel
- Simulation on different interfaces and communication channels in parallel
- High level Message Building System in order to build Protocol Data Units on an mnemonic basis
- Message Sequence Chart (MSC) tool to define message flows with graphical tool support
- C-programming language to program simulations and emulations
- Generic access to all types of emulations

Emulation

An emulation represents a higher form of simulation. Here, the behavior of certain communication protocol layers is simulated automatically and in conformance with the protocols. This allows to focus on testing of higher layer protocols. The targets set for the emulation are usually similar to those of the simulation.

Further emulation features are:

- Free arrangement of protocol emulations in order to react on new protocol configurations
- Generic emulation configuration menu
- Emulations for L2 protocols
- Wide set of high layer emulations
- Generic call generation modules

K1297-G20 Specials

3G Technology: UMTS

Several different test configurations are or will be supported in the K1297-G20 for UMTS:

- The Simulation/Emulation of the CN and the UTRAN or RNC.

The device under test's environment can be simulated under both normal and abnormal conditions, and the dependability of its response can be measured. When the K1297 is the "peer entity" to the CN, it can simulate and emulate the UTRAN (including the UE) and/or the RNC alone.

Emulation is a higher form of simulation where the behaviors of selected layers of communication protocols are simulated automatically and in conformance with standards. For instance, the simulation of the Iu RANAP is based on an emulation of the corresponding lower layers. While the lower layers are defined to act as specified, the simulated layer can be used to deliberately add faults to test an element's ability to handle them.

- Active and passive monitoring are primary measurement tools. Monitoring for all UMTS interfaces will be supported. The manufacturer and the operator can evaluate network element performance. Statistical data can be retrieved that give the operator additional information about the load and type of traffic, such as BHCA's.
- Conformance testing verifies an item's conformant behavior. As standards are agreed upon, conformance test suites will be made available in software upgrades for the K1297-G20.

2.5G Technology: GPRS

G_n, G_p and G_i Interfaces. Using the G_n, G_p and G_i interfaces as an example, the following list offers an impression of the new and modified aspects related to monitoring, simulation, performance measurement and packet transfer:

- **Monitoring and Statistics:**

One new statistical "parameter" is the mean packet delay: in the SGSN, GGSN, and PCU network elements, packets are processed and encapsulation and de-capsulation, header modification and address translation takes place. In case of short-term congestion, packets can be buffered. The mean packet delay depends both on the processing power of the NE and on the subscribers' overall traffic behavior. These two factors determine the field characteristics of the NE. Given the mean packet delay at each network element, the overall mean delay between the operator's access points can be determined.

If the operator's network offers the QoS "Delay class 1", the operator must guarantee that the mean transfer delay between the two network access points is less than 0.5 seconds for Service Data Units of 128 octets. 95% of the SDUs must be transmitted in less than 1.5 seconds. Other GPRS QoS classes to be considered include reliability classes and throughput classes.

Other new statistical values include kilobytes per second, mean packet size, kilobytes per user, etc. There is a long list of statistics which can be compiled from packet switched networks. The K1297-G20 can provide these statistics.

- **Simulation:**

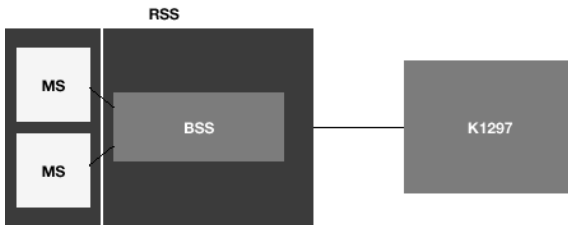
For GPRS, it is expected that a certain number of subscribers wants to download information from the Internet and/or their company's Intranet. For this group, the traffic behavior can be determined in advance: the average size of the files to be downloaded, the number of IP packets required to transmit files of this size; delay between packets, etc. Here "bursty" behavior can often be detected: several packets are sent very quickly one after the other, then there is a longer break before the next group of packets is transmitted. Given several subscriber traffic profiles, manufacturers and operators can use test equipment to

simulate this traffic behavior to gain an impression of the network element's field characteristics.

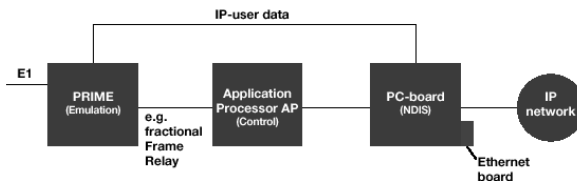
In simulation, the K1297-G20 represents one or several communication partners – in a protocol-conformant or an error simulation mode. All protocol layers from layer 2 can be set according to the OSI reference model. Test scripts can be created in the form of state machines using the test manager and run dynamically. The integrated Message Building System is a tool for creating messages interactively. Generated messages can also be dynamically modified during run time. Messages and message frames can be stored in a pool.

- **Packet Transfer and TCP Timing Problems:**
Subscriber mobility can cause problems with TCP connections. TCP connections are normally optimized during the transmission of data (for example, timer settings for retransmission of IP packets are optimized). If a GPRS mobile station moves from a cell where a data transmission rate of 100 kbps was possible to another cell where a data transmission rate of only 10 kbps is possible, the TCP timer will expire for packets which have not yet been transmitted over the air interface. This leads to an excessive amount of retransmitted TCP/IP packets.
- **Interworking between GSNs and the Packet Switched Backbone**
The interworking of GSNs with the GPRS IP based backbone must be tested to verify correct packet routing and addressing. Access to the DNS Server must also be verified. The DNS Server is responsible for mapping logical names to IP addresses. When provided with a logical name for an external packet data network (such as the Internet) the SGSN can retrieve the closest GGSN and its IP address from the DNS Server.

G_b Interface. Most new GPRS protocol layers can be found on the G_b interface. The following examples show test applications on the G_b interface: 1. In the first figure below, the K1297 emulates and simulates the GPRS core network solution (SGSN, GGSN, and register). The BSS is attached to the K1297. The Implementations Under Test are both the BSS and the mobile stations (MS).



The K1297 itself consists of three major components:



- The E1/DS1 Emulation Board (PRIME) provides the E1 interface to the BSS and G_b traffic is routed via this connection. The SGSN protocol stack facing the G_b interface is emulated on the PRIME board. This enables rapid processing of both incoming and outgoing data via this interface.
- The Application Processor (AP) controls the PC and PRIME boards. This component is responsible for directing the emulation, simulation scripts, monitor applications, and the ARP proxy.
- The Ethernet interface provides a means to connect the K1297 to an external packet data network. This is necessary if the K1297 is to

emulate and simulate the Network Switching Subsystem's packet switched domain. The Ethernet interface is handled by the PC board, on which an NDIS driver is installed.

To realize an Attach Request with a fixed IP address (of the GPRS mobile station), a default state for the signaling connection and one point-to-point connection must be defined first.

The next step is to realize the GPRS attach itself, which includes the BSSGP flow control and acknowledgement, and the realization of the Attach Request message on the GMM/SM layer.

When finally the Attach Complete message is sent to the mobile station, the attach was successful. To carry out this process, the K1297 user applies predefined messages in the K1297 in combination with specific values entered via changes in scripts, entries in tables, and by selecting menu options. Following the attach, the PDP context activation process begins with the PDP context request. If the subscriber uses a dynamic IP address, the IP address for this connection is generated by the K1297. (This is a GGSN task.) Furthermore, the QoS, Radio Status, etc. is determined given the entries in the tables, menus, etc. When the PDP Context Activation is accepted, data can be downloaded from a Web server.

G_r, G_f, G_c, G_d Interfaces. The interfaces carrying SS7 signaling information also require enhancements for GPRS operation. The highest layer Mobile Application Part (MAP) must be enlarged to support transmission of new GPRS subscriber profiles. The remaining layers - MTP, SCCP, and TCAP - require no modification, as they perform the same tasks as in GSM. For the MTP, SCCP, and TCAP layers, the monitoring, performance testing, simulation and emulation tools can be adopted from GSM. This is partially true for the MAP, as well. Yet a special focus lies on the functionality and dependability of the MAP, and GPRS-specific monitoring, emulation and/or simulation routines can be of help here: An SDL style test manager, integrated in the monitor functionality of the K1297, allows the system to react directly to certain events with user-defined actions. For example, statistical values are obtained by increasing a counter when certain SS7 IAM (Initial Address Messages) are received. Active monitoring is also possible and useful, for example, if a parallel connection between the measuring device and the transmission lines cannot be established.

Other Technologies

With the K1297-G20 the implementation under test can be stimulated actively and automatically by sending messages edited in a mnemonic way. Message flows on the lower protocol layers can comfortably be generated and executed.

You can generate test cases, simulations and use emulations. You can select between using layer 2 emulations, layer 3 emulations, terminal emulations or call generator. These simulations can be accomplished with the help of tools like MSC, Forth or C (option), which are provided on the K1297-G20. Terminal emulation and call generator can also be used without programming efforts.

Most standards of the International Telecommunication Union (ITU-T) and the European Telecommunication Standards Institute (ETSI) are supported as well as the American National Standards Institute (ANSI) and the Bell Communications Research (Bellcore) Standards.

In detail, the following protocols are offered:

Mobile Communication

The K1297-G20 mobile communication software furthermore supports SS#7, GSM Phase 1, GSM Phase 2, GSM Phase 2+, DCS 1800, CDMA, NMT 900.

ISDN D-Channel

- ITU-T Recommendation Q.931 (Simulation, monitoring)
- ETSI Recommendation ETS 300 102-1 (Emulation, simulation, monitoring)
- Bellcore NI-98 SR 4287, 4288 (Emulation)
- Bellcore NI-99 PRI: SR 4619 (Simulation, monitoring)
- Bellcore NI-99 BRI: SR 4620, (Simulation, monitoring)

ISDN PHI (Packet Handler Interface)

- ETSI Recommendation ETS 300 099 (Monitoring)

V5.1/V5.2

- ETSI Recommendations ETS 300 102-1, ETS 300 324-1, ETS 300 347-1 (Emulation, simulation, monitoring)
- ITU-T Recommendations ITU-T X.25, Q.933 (Simulation, monitoring)

V5.1/ISDN

- ETSI Recommendation ETS 300 125 (Emulation, simulation, monitoring)

Furthermore a large number of national country and vendor specific variants for these protocols are supported and offered.

Access ISDN Emulation

- DPNSS1 (Monitoring)

MTP Level 2 and 3

- ITU-T Recommendations Q. 700 - Q.704 (Emulation)
- ANSI/Bellcore T1.111 (Emulation)

SCCP

- ITU-T Recommendations Q.711 - Q.714 (Emulation)
- ANSI/Bellcore T1.112 (Emulation)
- ETSI Recommendations ETS 300 009 (Emulation)

ISUP

- ITU-T Recommendations Q.761 - Q.764 (Emulation)

TCAP

- ITU-T Recommendations Q.771 - Q.774 (Emulation)
- ANSI T.114 (Emulation)
- ETSI Recommendations ETS 300 287-1 (Emulation)

INAP

- ITU-T Recommendations Q.1218 (Monitoring)
- ETSI Recommendations ETS 300 374, 300 356-18/4 (Monitoring)
- ANSI TCAP + AIN0.1 TR-NRW-001285 (Monitoring)

Furthermore a large number of national country and vendor specific variants for these protocols are supported and offered.

NOTE. *A telecommunication network with Intelligent Network equipment uses the Intelligent Network Application Part (INAP) protocol. This protocol will be implemented to the SS#7 application software in a following software release.*

ATM

The ATM application software supports the signaling protocols as follows:

- Emulation of layer 2 (SSCOP)
- Emulation of layer 3 (B-MTP)
- Layer 4 to 7: SCCP (Emulation), TCAP, INAP (Monitoring)

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 NT.

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), two PC card slots (type II; also called PCMCIA cards), a 3.5" floppy disk drive and a removable keyboard with integrated trackball.



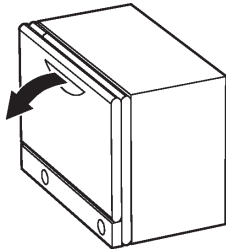
CAUTION. *To avoid equipment damage, do not insert foreign objects into the disk drive or the PC card slots.*

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

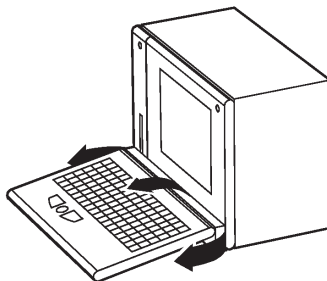
K1297: Setting-up the Device

Proceed as follows when setting up the device:

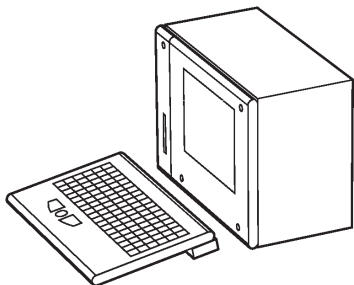
1. Pull the dark-gray release handle above the logo forward and fold the keyboard down.



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.

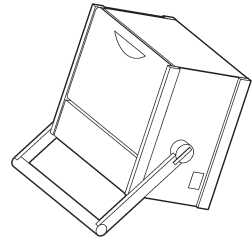
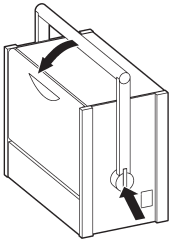
Make sure to always use two fuses of the proper fuse type and rating.

4. Close the fuse tray.

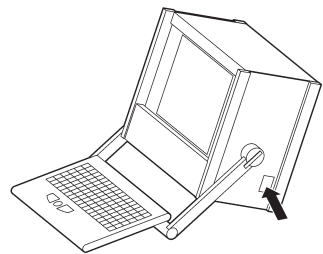
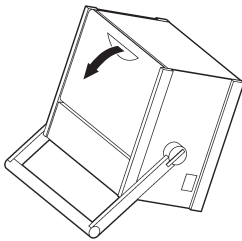
K1297 Compact: Setting-up the Device

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.



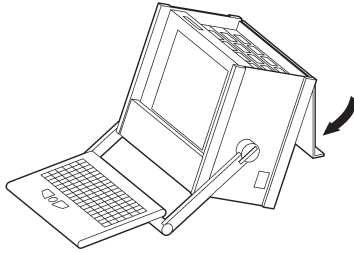
2. Pull the dark grey handle above the logo and lift the keyboard from the device.



The handle can now be used as keyboard rest.

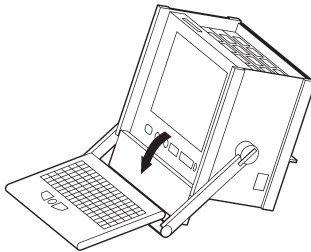
The mains connector and the ON/OFF switch are both located on the right side of the device. The fuses are located underneath the switch cover.

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 and two PC card slots are 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 \cup (top) and hard disk access \odot 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.

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 following CDs on your Protocol Tester:
 - Recording software Toast 5 lite from Roxio
 - Plextor Software Utilities (Plex Tools)
- If you like to write CDs with the CD-RW drive you need to install the delivered WinOnCD software. The required serial number can be found on the booklet that is supplied with this software. We recommend not to install the optional WinOnCD components:
 - Sample Artwork
 - Photo Album Backgrounds
 - Audio CD Title Database

NOTE. *The delivered WinOnCD 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 to Windows NT. Please contact the Tektronix hotline.*

- Before writing a CD, carefully study the WinOnCD Online Help. 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 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.*

With ATM equipment specific backplane adapters have to be installed additionally. Only qualified service personnel should perform these installation procedures. See Appendix F.

Setting the VME Bus Address

1. To check the used CPU numbers, start the Protocol Tester with no new boards installed.

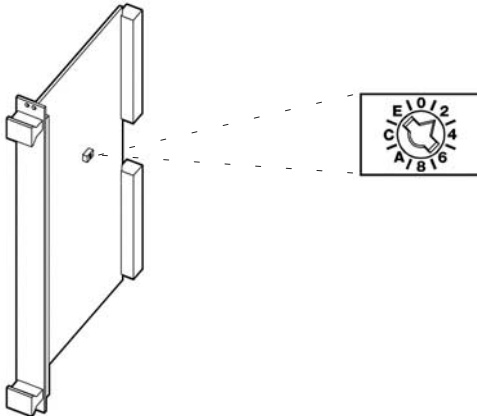
Watch for the blue screen during the Windows NT boot phase. Write down the CPU numbers displayed during boot in order to identify which numbers are free for addressing.

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. AP-1, S₀ - U_{2B1Q}, V./X, DS0A, 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, 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 change the CPU numbers of the PC board and the AP-4 board.*

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

Table 1: Setting the VME bus address

Board	CPU number	Slot
PC board	9	1
1 x AP board	0 (with lower switch of AP-1 to 'F')	2
1 x AP-1 board <u>plus</u> 1 x AP-4 board	2 (AP-1) 0 (AP-4)	2 (AP-1) 3 (AP-4)
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 ATM Power AAL board combinations have the address settings 3 and 4, 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
1 x AP board	0 (with lower switch of AP-1 to 'F')	2
1 x AP-1 board <u>plus</u> 1 x AP-4	2 (AP-1) 0 (AP-4)	2 (AP-1) 3 (AP-4)
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 ATM Power AAL board combinations have the address settings 3 and 4, 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, DS0A, BAI_{S0}, BAI_{U2B1Q}, V./X., Ethernet. Put green boards into green slots.
- RED stands for ATM Power-AAL board combinations: Put red boards into red slots. Refer to *Appendix F* for details on how to install Power-AAL boards.
- 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?

Board	Slot	GREEN	RED	BLUE	TRANSPARENT
GREEN		yes	no	no	no*
RED		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). If you operate the K1297 (K1297-G20) with an AP-1 and an AP-4 board installed, the AP-1 board must be inserted in slot 2 and the AP-4 board must be inserted in slot 3.
- 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 or Power-AAL combination. A second ATM board combination would have to be installed in slot 5 and 6.



CAUTION. *The ATM options require special backplane adapters. 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). If you operate the K1297 (K1297-G20) with an AP-1 and an AP-4 board installed, the AP-1 board must be inserted in slot 2 and the AP-4 board must be inserted in slot 3.
- 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 or Power-AAL combination.



CAUTION. *The ATM option requires a special backplane adapter. See Appendix F.*

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, BAI, DS0A, or V/X. 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 not 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.

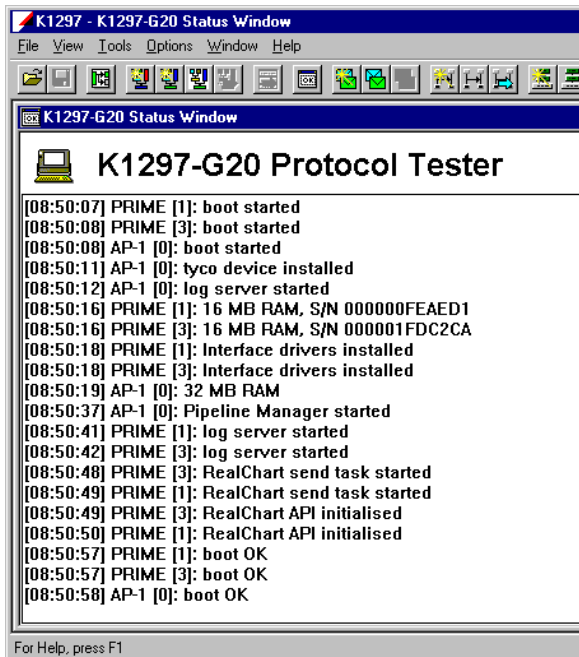
Switching on the Device

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/I.
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 from the Startup folder.

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.

NOTE. Please observe the security functions offered by Windows NT. If you start Windows NT for the first time, you are automatically logged in as administrator with the following information:

User name: User

Password: user

To improve data protection you can change the password directly after the first login. Information on how to proceed is given in the Windows NT online help under Start:Help, keyword "user manager" or "passwords".

When you first start the version 2.01 software after installation, the Flash-PROMs of your interface boards may be reprogrammed. 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.

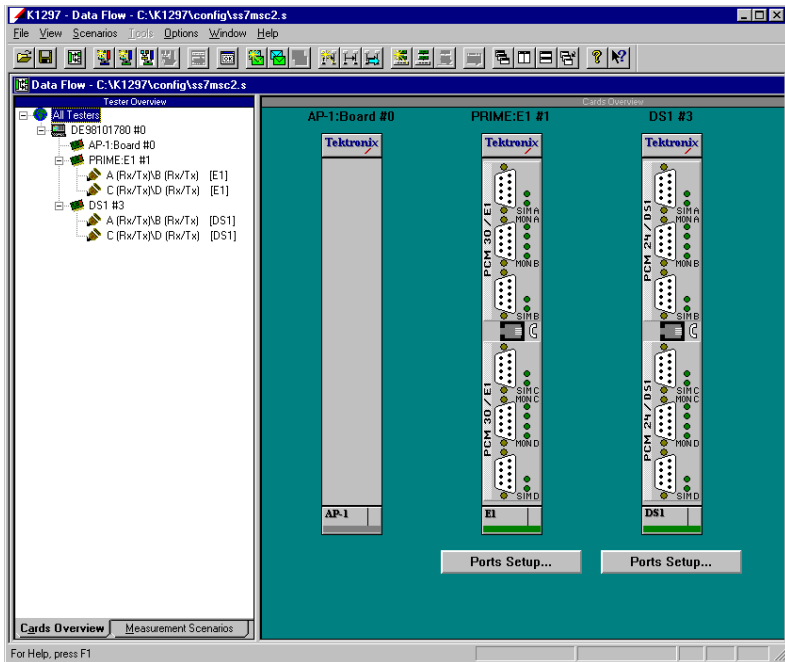
K1297-G20 Application

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*.

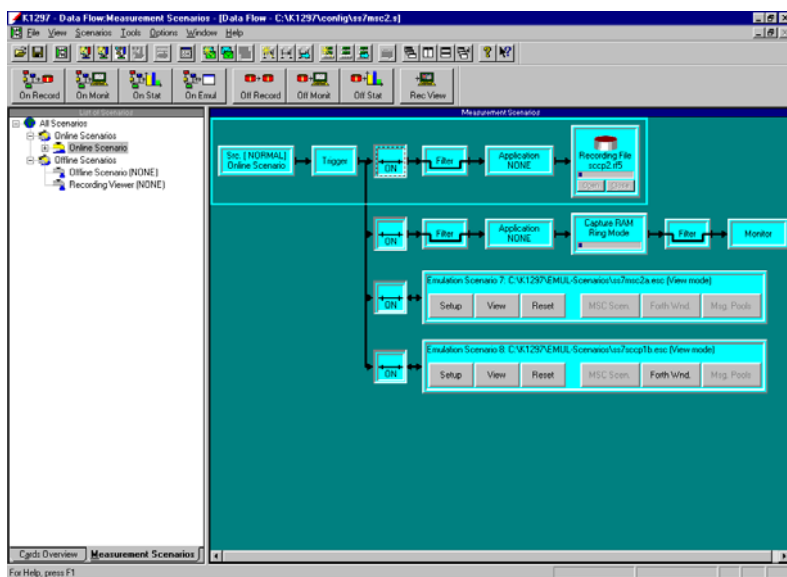
Cards Overview. The *Cards Overview* tab provides an overview of the connected interface modules. Here you can define the setup settings of modules and ports or change existing configuration settings. These are assigning symbolic names to the ports and defining frame types and line codes.



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 98
- Microsoft Windows 98-SE
- Microsoft Windows ME
- Microsoft Windows NT 4.0 SP5
- Microsoft Windows 2000

PC Configuration

The Protocol Tester is delivered completely configured. The following software components have already been pre-installed:

- Windows NT, Version 4.0 (Build 1381: Service Pack 5)
- Internet Explorer
- Acrobat Reader 4.0
- Software components for initializing the basic device
- Measurement applications as ordered

The hard disk is subdivided 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 download compatibility with K1297-Classic

Windows NT is delivered in the English version. Optional components (printers or network protocols for example) can be added with the help of Windows NT binaries which are available under `C:\SETUP.ETC\I386`.

Thus it is possible to add components without having the CD drive attached. The path is automatically set and has to be entered manually only in some special cases. However, sometimes a prompt comes up asking for the path.



CAUTION. *This Windows NT installation is incomparable with the standard Windows NT installation for PCs. Therefore, do not install a new Windows NT in case of failure.*

Automatic Logon, Preconfigured Accounts

Upon delivery the device is configured with the following account data:

Table 4: Account data

Username:	Password:
Administrator	(none, left blank)
Guest	(none, left blank)
Setup	setup
User	user

This pre-configuration of the device has been chosen for a stand-alone system without enhanced security requirements for ease of operation.

All accounts except *Guest* have an administrative privilege. The predefined *Guest* account should be used for part time guest connections over the network. The *Guest* account is activated in the device; in Windows NT it is disabled by default.

NOTE. *Do not set an individual password on the Guest account; instead disable it, if you want to meet enhanced security requirements.*

When connecting more than one Protocol Tester to a larger enterprise network, you should install individual user accounts and passwords on them. In this case good knowledge about the concept of user accounts and user groups in Windows NT is required. Be sure to define an individual password for the *Administrator* and *User* accounts.



CAUTION. *If you change the pre-configured User account, you should adapt the automatic logon too. Choose Start: Settings: Control Panel: Tweak UI: Network tab. The fulfillment of enhanced security requirements is your responsibility.*

Desktop Icons

The following predefined icons are built in to Windows NT on the desktop: *My Computer*, *Network Neighborhood*, *Inbox*, *Internet Explorer*, *Recycle Bin*, *My Briefcase*.

The use of the *Inbox* is currently not supported; this icon contains no functionality related to the use of the Protocol Tester. The Internet Explorer is pre-installed for offline reading of HTML documents.

Desktop Settings

Windows NT Explorer, *My Computer* and *Network Neighborhood* are configured with certain view options. Change these options only if you are accustomed to working with other preferences.

My Computer will browse a single window. Registered file extensions will not be hidden. Compressed files and folders will be displayed in varying colors.

Command Prompt

For those who are accustomed to working with the command prompt, the Windows NT command prompt can be started as follows:

1. Click on *Start: Programs: Command Prompt*

The command prompt that is started with this link is pre-configured with certain settings.

For all command prompts, the *path completion* feature is activated. The feature works with all paths and filenames: By repeating the *TAB* key you can scroll through all existing paths or filenames in the current directory.

NOTE. *To close the command prompt, type `exit` and press <ENTER>.*

Installing Printers

Two printer drivers are pre-installed. One of them is the Generic Text Printer, that enables your device to save files. Do not delete these printers. If you want to add others, proceed as follows:

1. Connect the printer or establish a network connection to the print server.
2. Make sure that the printer is operational.
3. Click on *Start: Settings: Printer*
4. Double-click on *Add Printer*
5. The Wizard will assist you during installation.
6. Select port LPT1 if the printer is connected directly with a parallel cable to the Protocol Tester.

Ethernet Connection and Remote Operation

If you want to operate the Protocol Tester in the ethernet, make sure that the ethernet cable is connected to the appropriate 10-BaseT or coaxial connector.

The pre-installed protocol is NetBEUI. NetBEUI is useful for small unsegmented networks.

To change the network settings proceed as follows:

1. Click with the right key on the *Network Neighbourhood* icon of the desktop.
2. Select *Properties* from the context menu.

To install other protocols click on the tab *Protocols* and then on the *Add* button.

If you want to configure TCP/IP in your local network, you need detailed information in order to set up the TCP/IP parameters. If you do not have this information, contact your network administrator.



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

The Protocol Tester can be remotely operated with the help of optional software.

If you use the remote operation features via a network, you can use the built-in network adapter of the Protocol Tester. No extra network card is required.

NOTE. *To ensure trouble-free operation of the remote operation features, no other application software may be installed on the clients. Tektronix does not provide support for problems resulting from additionally installed software.*

Security Requirements

Observe and follow the hints of the following Caution statement.



CAUTION. *To ensure rapid applicability and easy restart after power failure, your Protocol Tester is supplied with a standard user account and password upon delivery. This provides no particular security measures. Therefore, you should implement an access control for your Protocol Tester and limit access to a specific person subgroup in order to prevent misuse of your data by unauthorized persons.*

Network access:

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

Protocol Testers in an individual LAN:

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

Access via a company-wide Intranet:

If your Protocol Tester is being applied 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, you can, for example, implement additional security measures with the help of virtual private networks (VPNs).

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

You should implement these measures especially while applying the Remote Operation Packet or the Mobile Station Control Tool or when transferring files via a network.

Operating the K1297-G20 and K1297-Classic in Parallel

To operate the K1297-Classic software in parallel with the K1297-G20 software, follow these steps:

- Always start the K1297-G20 software first!
- The K1297-G20 software automatically reboots the measurement system before it starts up.
- You must close the K1297-Classic Protocol Tester Window before you can reboot the K1297-G20.

After a successful start of the K1297-G20 software, you can start the K1297-Classic applications as usual.

The following registry entry controls which software version is booted (first):

HKEY_LOCAL_MACHINE\SOFTWARE\Tektronix\DIO\BootPath

You can edit the registry using the REGEDIT.EXE. To operate the K1297-G20 and the K1297 classic software in parallel, enter the value:

c:\k1297

To operate only K1297 classic software, enter the value:

d:\v1.10\sys.

Reboot the system after changing the registry entry.



CAUTION. *Edit the registry carefully. Incorrect editing of the registry can cause serious problems. Refer to the Windows NT (R) online help for a detailed description of how to work with the REGEDIT.EXE program.*

Software Installation

Important Hints

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

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

Device-specific software keys protect the CD-ROM 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 CD versions 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 CD, 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 software products from different CD versions, 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 NT and therefore provides you with all possibilities offered by this industrial 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

3. 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.
4. Ensure that your boards meet the following memory requirements:
 - AP-4 board 32 MB RAM
 - AP-1 board 32 MB RAM
 - E1/DS1 monitoring boards 16 MB RAM
 - E1/DS1 simulation boards 32 MB RAM
 - BAI boards 8 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 NT, 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 (only for Windows NT based devices):

- 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 devices with AP-1 as board number 0, you must use an AP-1 EPROM. Version 6 is necessary. This new EPROM provides more shared memory.

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

5. Check your Microsoft NT Service Pack.

The K1297-G20 is delivered with Microsoft NT 4.0 Service Pack 5.

You will find the Service Pack 5 on your Tools CD in case you have to re-install it.

NOTE. *The K1297-G20 software does not support Service Pack 6 .*

Pre-Installation Checks for K1297-G20 PC Software. The K1297-G20 PC Development Environment is supported for Win NT 4.0 Service Pack 5 and Win 2000. 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 parallel port (LPT1) 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 parallel port (LPT1) 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 the optional external CD drive directly to your Protocol Tester or create an access to a network CD drive.

If you install the software from a CD network drive, do not browse the network neighborhood to access this location. Map the share containing the CD 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 CD into the CD drive. The *K1297-G20 Setup Guide* starts automatically.

Select *K1297-G20 Protocol Tester Software*.

If the installation does not start automatically, double-click *RunIntro.bat* from the CD 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:\WINNT\UNINSTALL.K12XX.INI.BAK to C:\WINNT\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 product CDs 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 from different CD versions 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 NT Task Manager to end the process `dio.exe`.
3. Rename the original K1297-G20 directory `C:\k1297` (for example, `c:\k1297.v111`), or move the directory to a different partition.
4. Rename the file `C:\WINNT\UNINSTALL.K12XX.INI` (for example, `C:\WINNT\UNINSTALL.K12XX.INI.v111`) 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:\winnt\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:\winnt\keyfile.txt.v111`).*

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

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

If you install the software from a CD network drive, do not browse the network neighborhood to access this location. Map the share containing the CD 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 CD into the CD drive. The *K1297-G20 Setup Guide* starts automatically.

Select *K1297-G20 Protocol Tester Software*.

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

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 72.

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:\WINNT\UNINSTALL.K12XX.INI` to `C:\WINNT\UNINSTALL.K12XX.INI.BAK`. 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.

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/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.

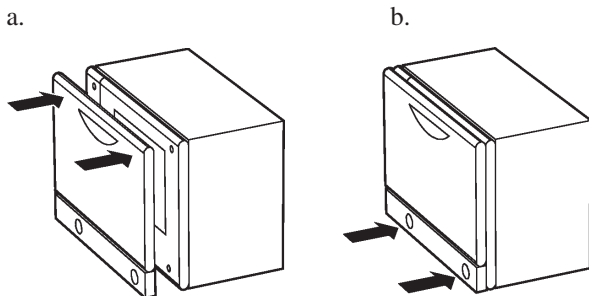
3. Reboot the system after removing has been terminated successfully.

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.

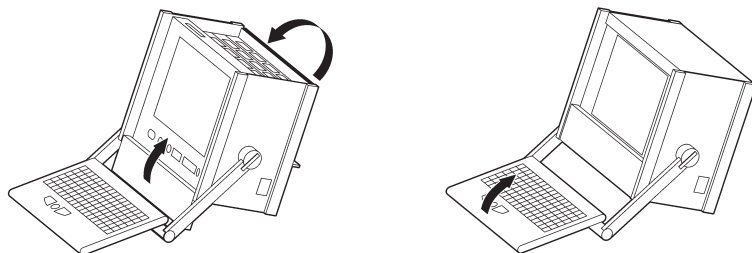
1. First put the keyboard into the holding pins which are located at the top of the monitor frame (a); then press the two locking buttons on the cable box until you hear them click (b).



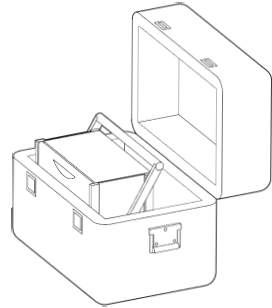
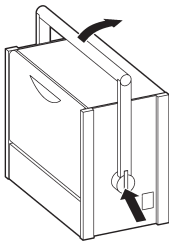
Use the optional transport case to transport the device over longer distances.

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 sent 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 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 1):

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

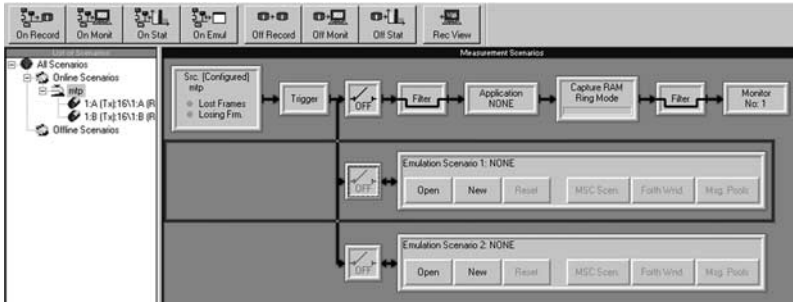


Figure 1: Online measurement scenario pipeline with configured data source (example)

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 2). This will open the Emulation Scenario Editor (ESE).



Figure 2: 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 3).
Refer to topic *Parameterizing Items* in the *Online Help* for further information.

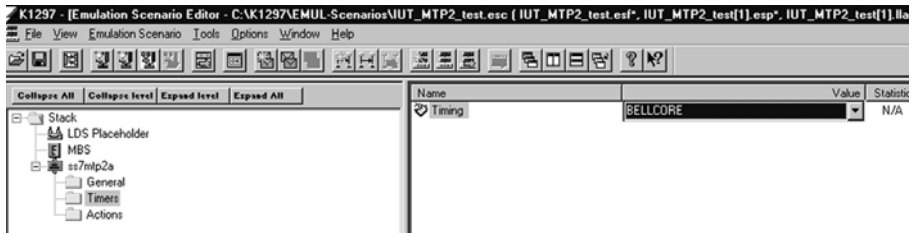


Figure 3: Parameterizing an emulation (example)

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 4).

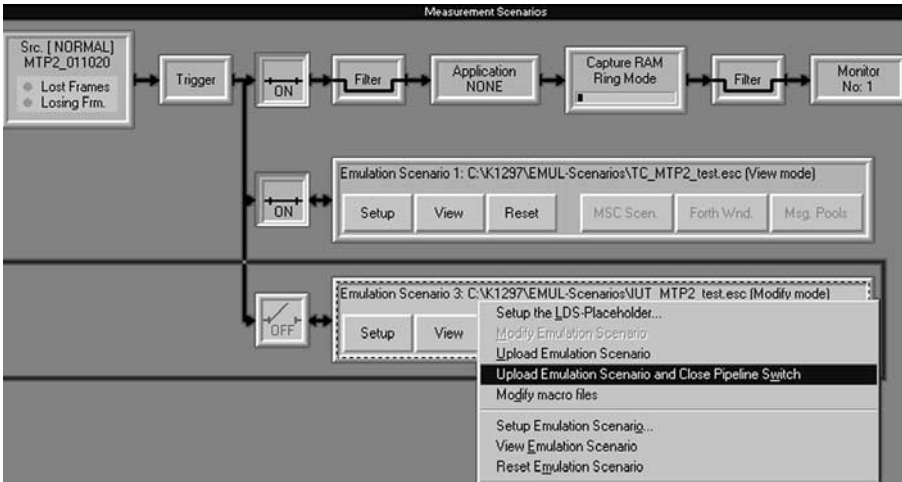


Figure 4: Context menu with *Upload Emulation Scenario and Close Pipeline Switch*

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 5).
 - c. Start the MTP layer 2 emulation of the Item under Test branch by selecting *Emergency* in the *Actions* menu.

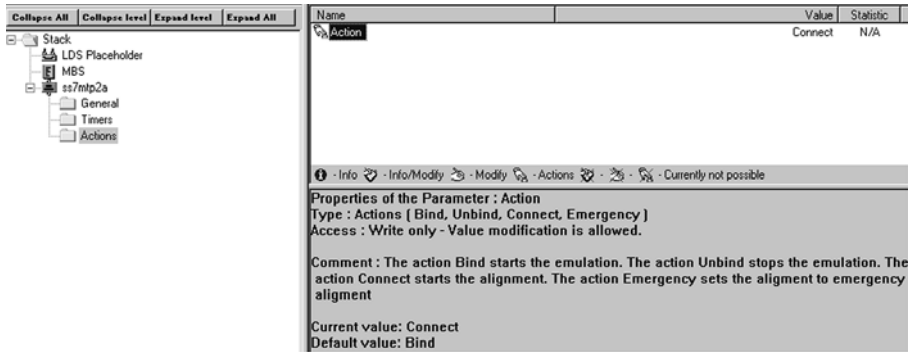


Figure 5: Starting the emulation using the *Connect* action

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 6). Refer to topic *Checking Emulation States* in the *Online Help* for further information.

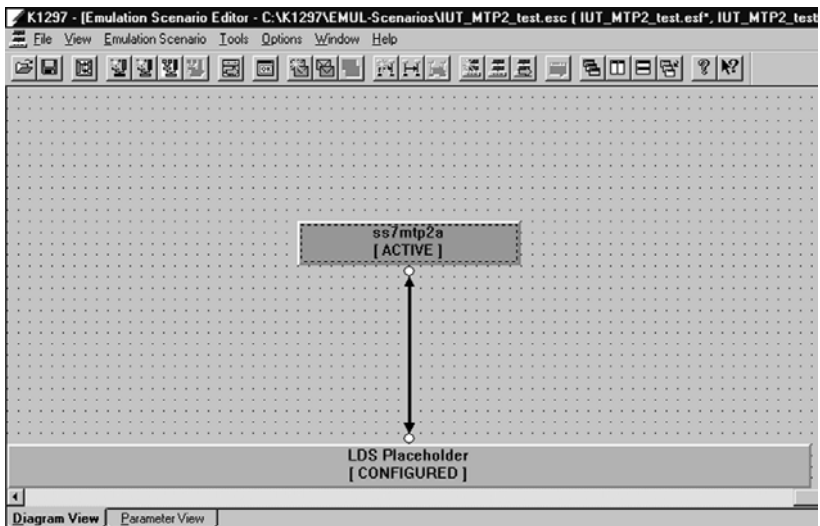


Figure 6: Emulation started and in the *ACTIVE* state

- Change to the *Monitor* window to view the measurement data (see figure 7).

Refer to topic *Monitor* in the *Online Help* for further information.

Src [NDFMIAL] MTP2_011020

- Lost Frames
- Losing Frm.

Trigger → ON → Filter → Application NONE → Capture RAM Ring Mode → Filter → Monitor No. 1

Long Time	From	2. Prot	2. HSG	3. Prot	3. HSG
9:26:14 AH,748,513	1:B (Tx):16	HTP-L2	LSSU-SIN		
9:26:14 AH,750,608	1:A (Rx):16	HTP-L2	LSSU-SIN		
9:26:15 AH,298,377	1:B (Rx):16	HTP-L2	LSSU-SIE		
9:26:15 AH,299,981	1:A (Rx):16	HTP-L2	LSSU-SIN		
9:26:15 AH,300,615	1:B (Tx):16	HTP-L2	FISU		
9:26:15 AH,301,599	1:A (Tx):16	HTP-L2	FISU		
9:26:15 AH,302,595	1:A (Rx):16	HTP-L2	FISU		
9:26:15 AH,303,737	1:B (Rx):16	HTP-L2	FISU		

BITHASK	ID Name	Comment or Value
9:26:15 AH,303,737 1:B (Rx):16	HTP-L2 FISU	
MTP Level 2 (HTP-L2) FISU (= Fill In Signal Unit)		
Fill In Signal Unit		
-111111	Backward Sequence Number	127
1-----	Backward Indicator Bit	1
-111111	Forward Sequence Number	127
1-----	Forward Indicator Bit	1
--000000	Length Indicator	0
00-----	Spare	0

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	FF	FF	00													

Figure 7: Monitor window displaying emulation data



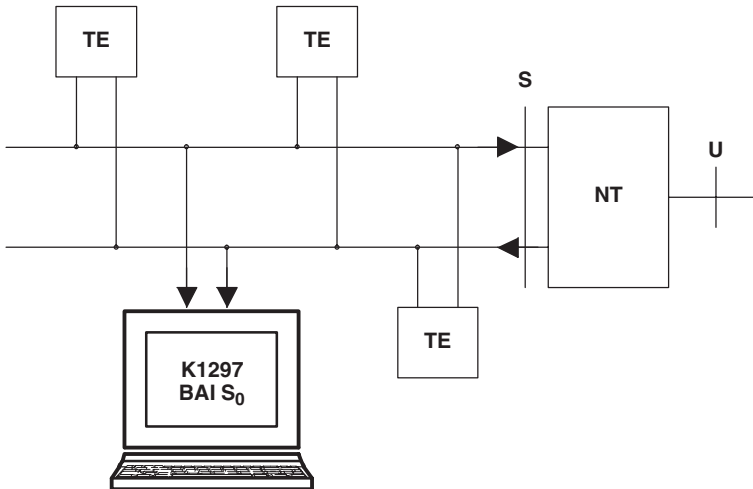
Operating Modes

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 S₀ 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.

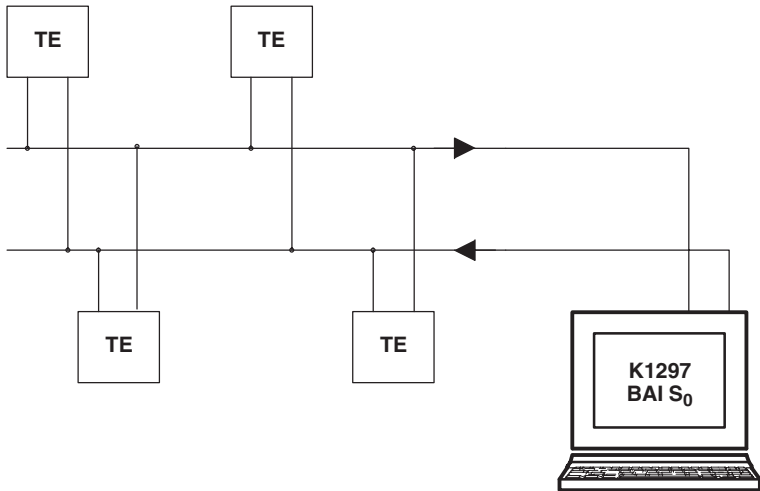


Headphones can be connected so that voice data can be monitored bidirectionally in B channels. For this purpose, two ARCOFIs (Audio Ringing Codec Filter) are on the interface which processes the voice signals accordingly.

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.

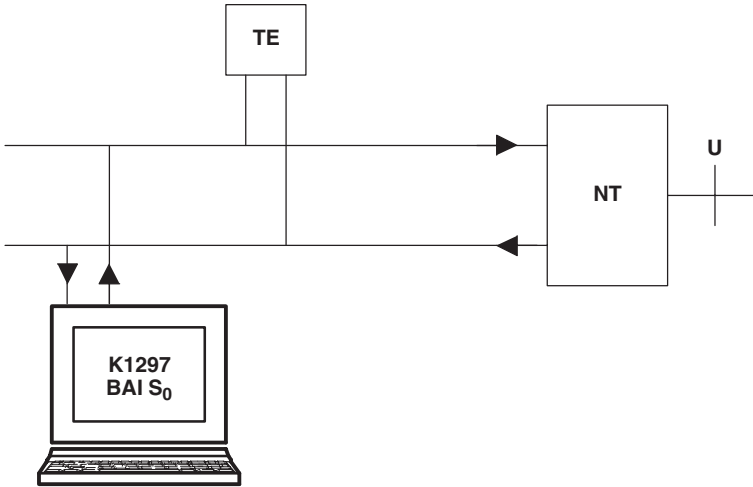


Handsets can be connected so that voice data can be processed bidirectionally in one B channel.

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 bidirectionally in one B channel.

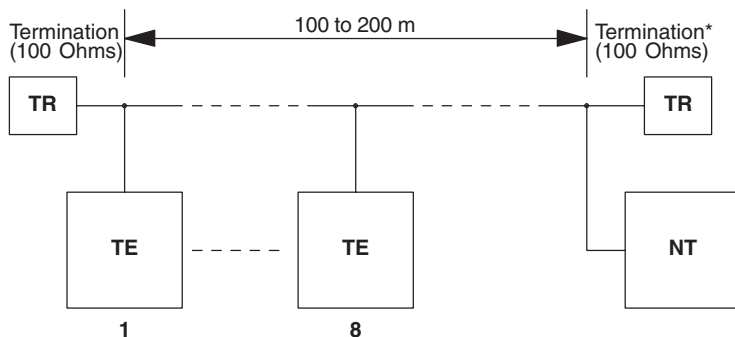
The clock pulses are derived from the signals of the TE receivers.

S₀ Interface: Configurations

Point-to-Multipoint (Passive Bus)

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

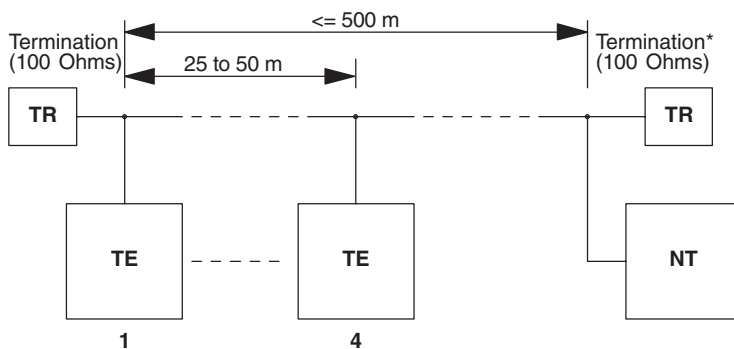
Short passive bus



Connecting cable < 10 m (TE)

Connecting cable < 3 m (NT)
* can be integrated in NT

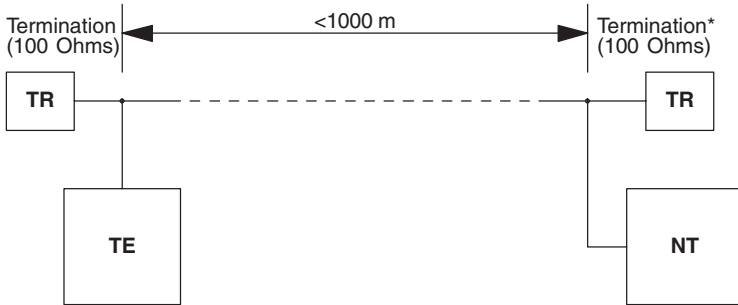
Extended passive bus



Connecting cable < 10 m (TE)

Connecting cable < 3 m (NT)
* can be integrated in NT

Point-to-Point



Connecting cable $< 10\text{ m}$ (TE)

Connecting cable $< 3\text{ m}$ (NT)

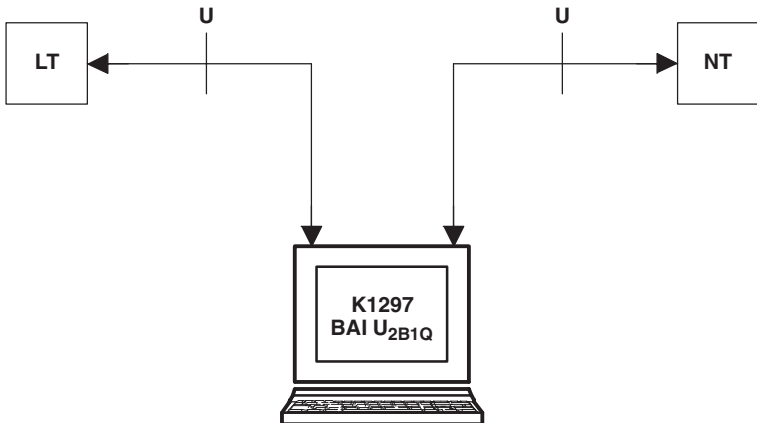
* can be integrated in NT

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.



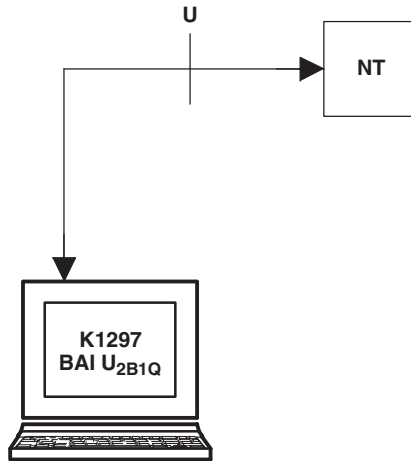
The clock pulses are derived from the LT and transferred to the NT.

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

You can connect headphones for monitoring bidirectionally 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.



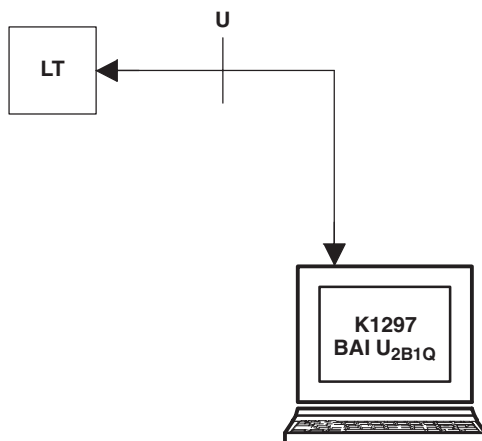
You can connect a telephone headset for conducting telephone conversations; an ARCOFI (Audio Ringing Codec Filter) on the interface processes the voice signals appropriately.

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 quarz 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.

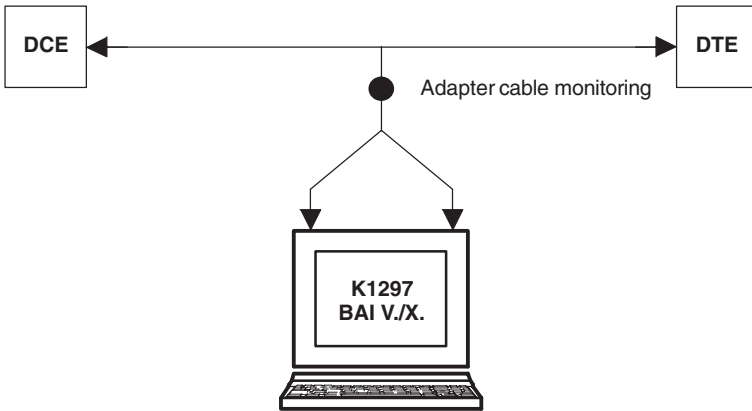
The clock pulses are derived from the signals of the NT receiver.

Measurements on the V./X. Interface

Monitoring

The interface lines are connected with the connection sockets “to DCE” and “to DTE” via an adapter cable. The adapter cable offered as an accessory meets the interface standard. The interface standard of the adapter cable used is recognized and the application is controlled accordingly. The plug of the adapter cable makes for a clear distinction between the connection sockets.

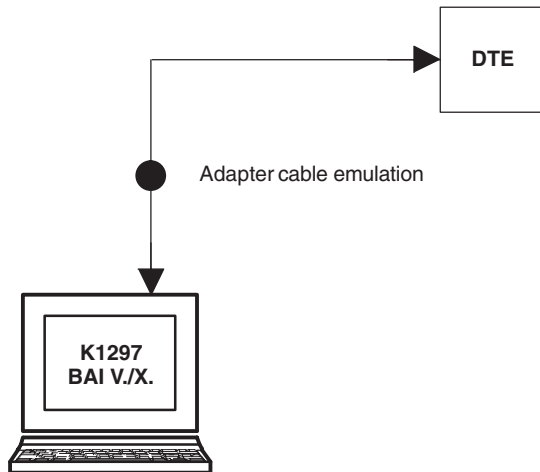
The interface signals are loaded with an input resistance of approximately 20 kOhms.



DCE Emulation

The terminal unit (DTE) is connected with the socket “to DTE” by means of an adapter cable. The adapter cable offered as an accessory meets the interface standard. The interface standard of the adapter cable used is recognized and the application is controlled accordingly.

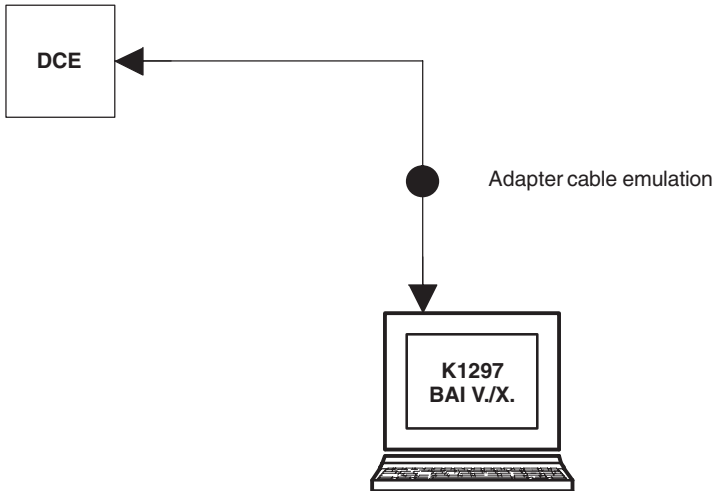
The interface signals are terminated in accordance with the interface standard.



DTE Emulation

The network (DCE) is connected to the socket “to DCE” via an adapter cable. The adapter cable offered as an accessory meets the interface standard. The interface standard of the adapter cable used is recognized and the application is controlled accordingly.

The interface signals are terminated in accordance with the interface standard.

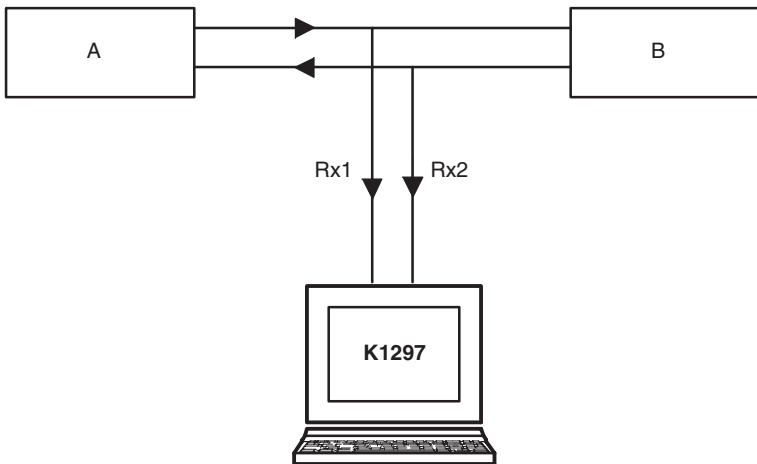


Measurements on the E1/DS1 Interface

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.

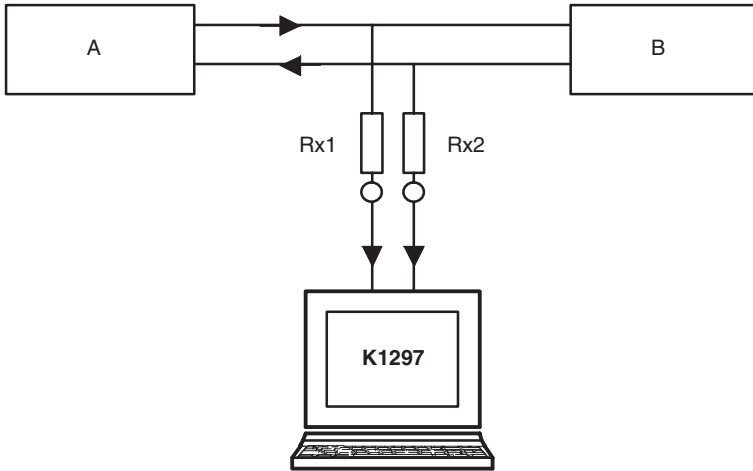
Passive Monitoring

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.



Passive Monitoring via Protected Monitor Socket

The electrical non-reactiveness is created by insertion resistances for passive monitoring via protected monitor socket. The line from the socket to the Protocol Tester as well as the tester input have the impedance of the wave resistance. A $1/f$ filter is required in the tester input.



Typical applications are PCM30 lines with SS7 signaling.

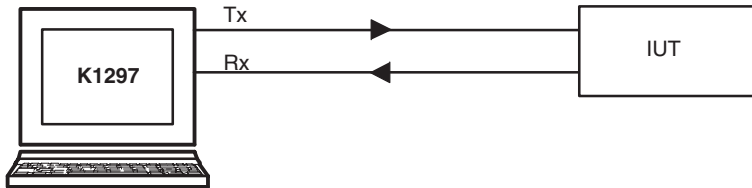
Active Monitoring on Lines in Duplex Operation

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

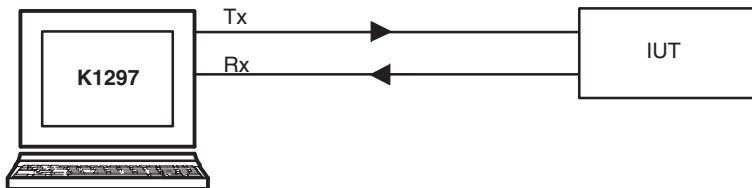
The Protocol Tester takes on the task of a communication partner, layer by layer. The protocol runs according to a program which is created by the user. Thus, you can perform even faulty protocol implementations.



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.

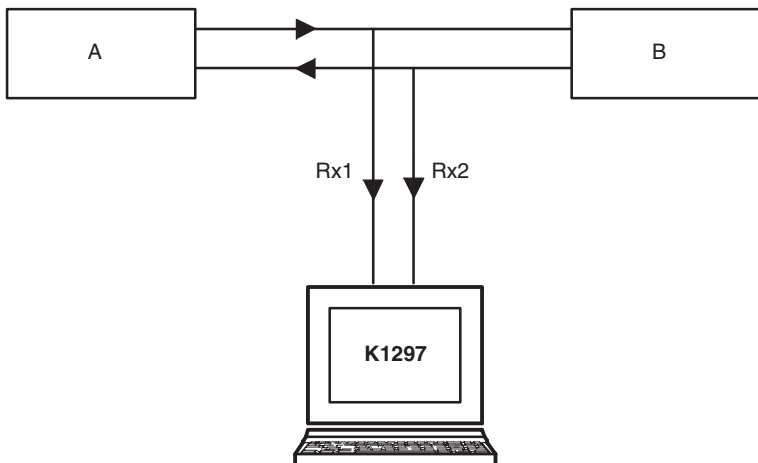
NOTE. The simulation and emulation on multiple links is possible. Up to 16 interfaces can be simulated in parallel.

Measurements on the DS0A 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.

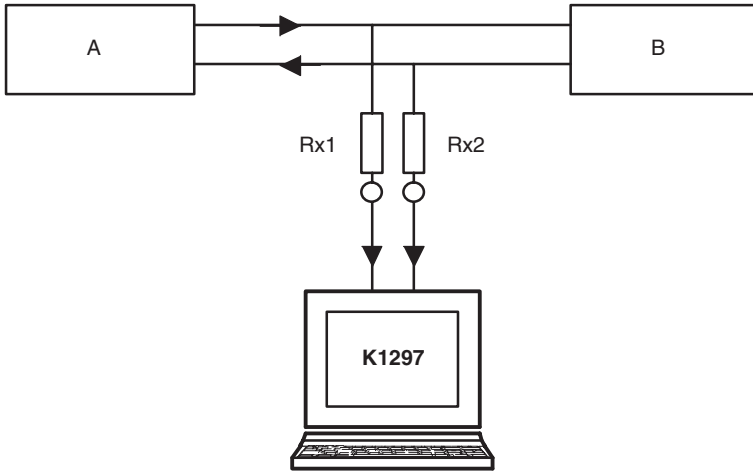
Passive Monitoring

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.



Passive Monitoring via Protected Monitor Socket

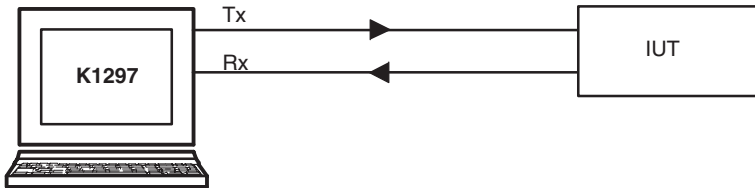
The electrical non-reactiveness is created by insertion resistances for passive monitoring via protected monitor socket. The line from the socket to the Protocol Tester as well as the tester input have the impedance of the wave resistance. A $1/f$ filter is required in the tester input.



Typical applications are PCM30 lines with SS7 signaling.

Simulation and Multi-Link Simulation

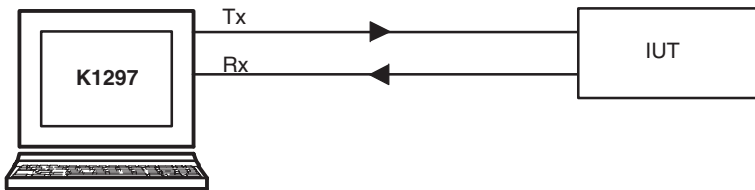
The Protocol Tester takes on the task of a communication partner, layer by layer. The protocol runs according to a program which is created by the user. Thus, you can perform even faulty protocol implementations.



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.



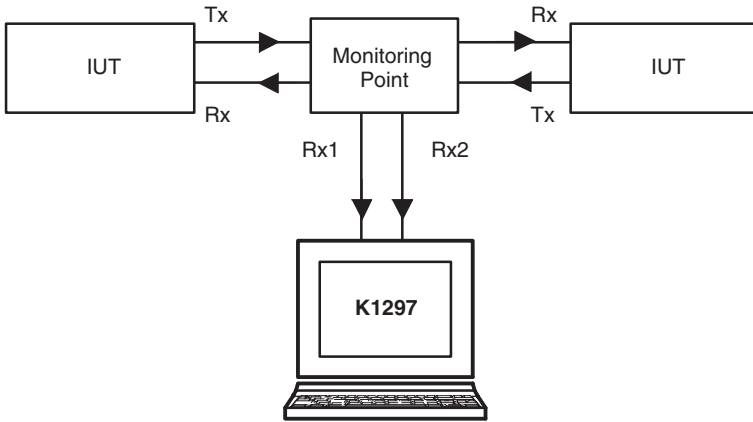
A typical application is the emulation of the lower layers to support the simulation of the overlying layer.

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.

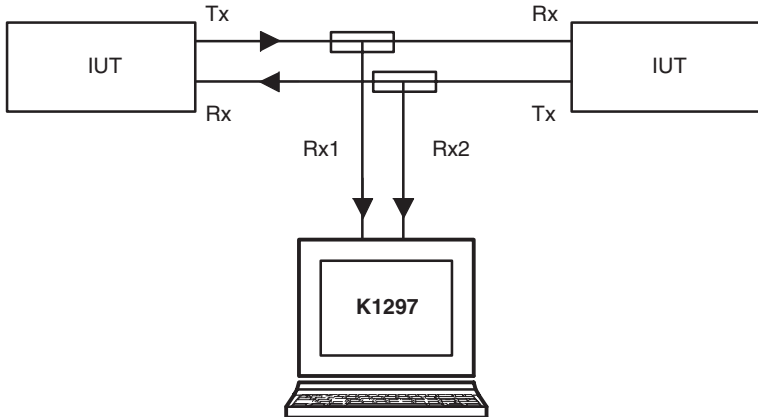


Monitoring points transmit optical signals either in singlemode signals or in multimode fashion. Depending on the transmission mode, you must select the required cable.

Make sure that the optical input power at the optical input ports of the K1297 and IUT complies with the specified Sensitivity value (see page A-88). 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:

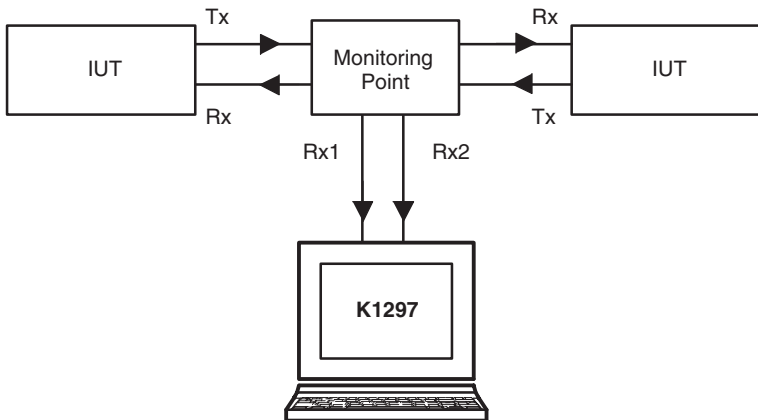
1. Connect the coupler input to the Tx port of your IUT.
2. Connect one coupler output to the regular Rx port of your IUT.
3. Connect the second coupler output to a free port of the optical STM-1 interface of your K1297.



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 K1297 and 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*.

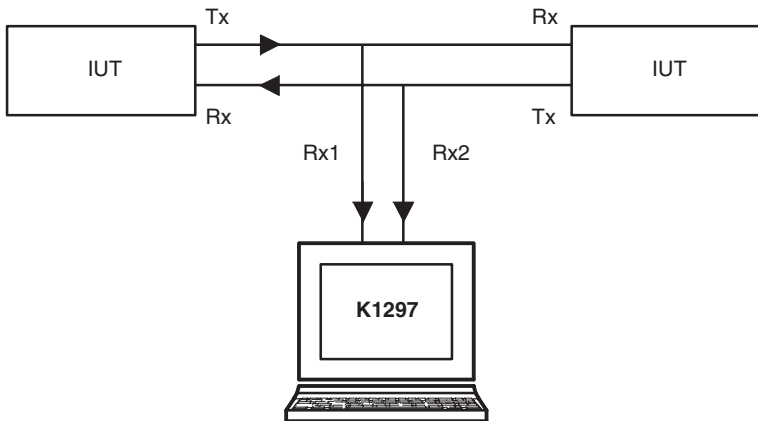
- Set the *Boost (Rx)* to the value that complies with the attenuation of the monitor point.

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.

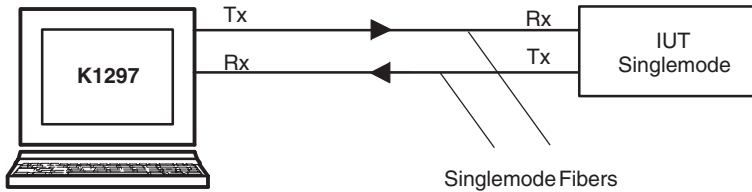
Simulation and Emulation with STM-1 Optical LIFs

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.

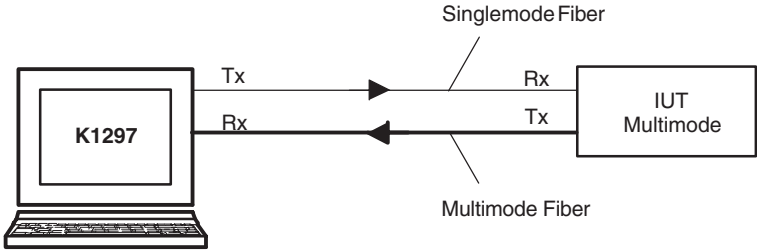
For emulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol is run automatically and always correctly, so it is not necessary to program the tester.

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

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

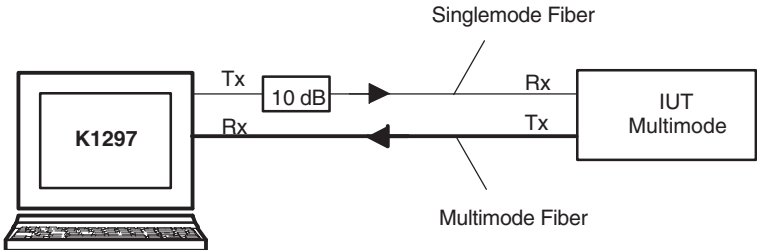


Simulation / Emulation with Multimode IUTs without Attenuator. To simulate / emulate connections to multimode IUTs, establish the connection between K1297 and IUT according to the following figure.



Simulation / Emulation with Multimode IUT 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 K1297 and IUT according to the following figure.



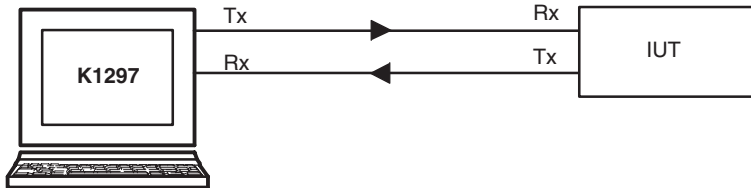
Simulation and Emulation with E1/DS1/J1 Electrical LIFs

For simulation, the Protocol Tester takes on the task of a communication partner, layer by layer. The protocol runs according to a measurement scenario 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 K1297 and 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 K1297 and IUT according to the following figure.

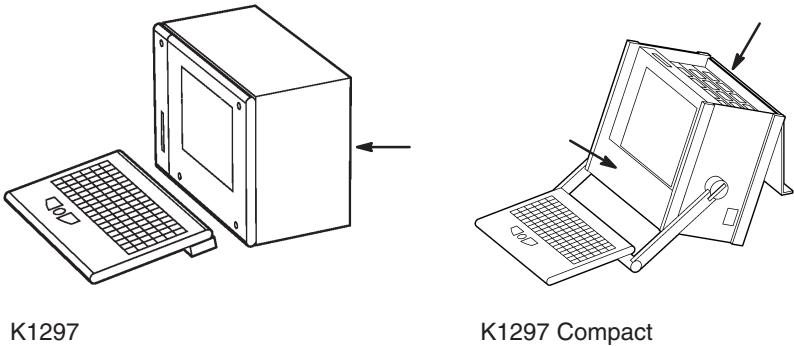


Appendix A: Interfaces

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

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

K1297 Compact. Interfaces are on the PC module 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.



→ 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, diskette and CD-RW 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-3 Board

The Pentium system processor on the PC board is mounted on a VME backplane.

The PC-3 board features the following characteristics:

- Flash EPROM (BIOS)
- VGA graphics card supports flat screen and external monitor
- Standard connections for AT peripherals (keyboard connections, parallel and serial interfaces, diskette drive)
- Ethernet (10Base-2) and twisted pair connections (10Base-T)
- VME bus interface
- Two PC card slots (PCMCIA cards) for type II

Reset. 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. There is an LED indicating the operating state of the hard disk (HD).

In addition, the K1297 operates with a PC backplane. This bus system offers the possibility to mount up to three ISA cards, such as an ISDN PC card for remote control or even for other applications, such as a multimedia card. The length of the additional cards is designed for two thirds of AT card format.

PC-4 Board / PC-5 Board

The Celeron system processor on the PC-4 or PC-5 board is mounted on a VME backplane. Depending on the display, the K1205 is equipped with either a PC-4 (for NEC displays) or a PC-5 board (for Hyundai displays).

Both boards feature the following characteristics:

- Flash EPROM (BIOS)
- VGA graphics card supports flat screen and external monitor
- Standard connections for AT peripherals (keyboard connections, parallel and serial interfaces, diskette drive)
- Ethernet, twisted pair connections (100BaseTx)
- VME bus interface
- Two PC-Card (PCMCIA) slots for type II
- Headphone sound port

Table A-1: Pin assignment for the USB interface

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

NOTE. *The USB interface on the board is not supported when using Windows NT.*

Reset. 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. There is also an LED indicating the operating state of the hard disk (HD) and an LED indicating network operation. In addition, the K1297 operates with a PC backplane. This bus system offers the possibility to mount up to three ISA cards, such as an ISDN PC card for remote control or even for other applications, such as a multimedia card. The length of the additional cards is designed for two thirds of AT card format.

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.

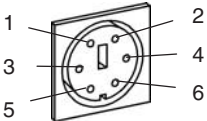


Table A-2: Pin assignment for the KEYBOARD interface (PS/2 interface)

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 module front panel.

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

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

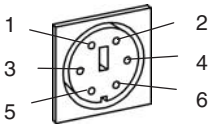


Table A-3: Pin assignment for interface KBD (PS/2 interface)

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 module front panel.

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

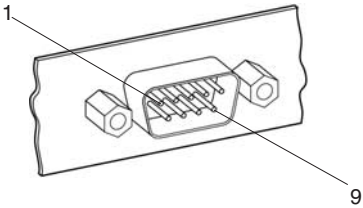


Table A-4: Pin assignment for interface COM1

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

Parallel Interface (LPT1)

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

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

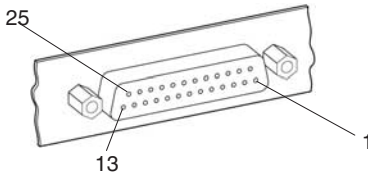


Table A-5: Pin assignment for interface LPT1

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 BNC Interface (10Base-2)

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

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

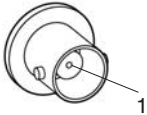


Table A-6: Pin assignment for interface 10Base-2

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

Ethernet Twisted Pair Interface (10Base-T)

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

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

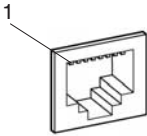


Table A-7: Pin assignment for interface 10Base-T

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 module front panel.

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

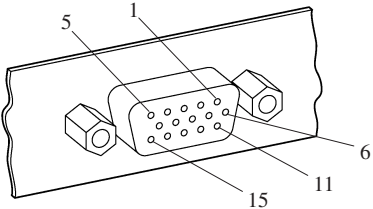


Table A-8: Pin assignment for interface VGA

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		

Serial Interface (COM2)

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

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

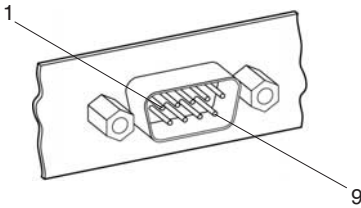


Table A-9: Pin assignment for interface COM2

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.

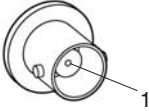


Table A-10: Pin assignment for interface CLK I/O

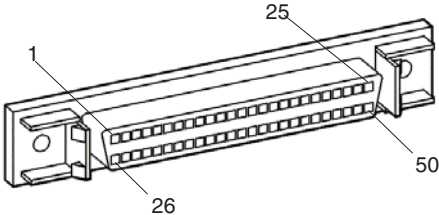
Pin	Assignment	Pin	Assignment
1	RxI/TxO	2	CDS (Signal ground)

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

PC Card Slots

K1297. Two PC card slots (for type II or PCMCIA cards) are part of the PC board and also on the rear of the device on the PC module front panel.

K1297 Compact. The PC card slots are underneath the top device cover.

You can connect modem or ISDN PC cards to the PC card slots for remote control of the K1205 or even portable data carriers using the appropriate plug.

NOTE. *The power input of the PC card must not exceed 600 mA (with +5 V) or 60 mA (with +12 V).*

Please read the documentation for the PC card and follow the card manufacturer's instructions.

Do not forcibly install or remove a PC card. To avoid equipment damage, do not insert foreign objects into the PC card slots.

AP-4 and AP-4/256 Board

The K1297-G20 application processor processes the data streams, which are output by the interface modules.

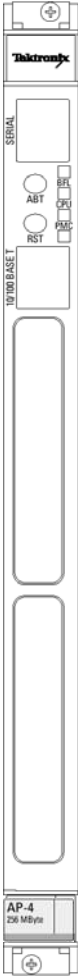


Figure A-1: AP-4, AP-4/256 Board

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.*



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

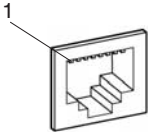


Table A-13: Pin assignment for the SERIAL interface

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

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

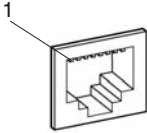


Table A-14: Pin assignment for the 10Base-T/100Base-T interface

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

AP-1 Board

The AP-1 board is the necessary prerequisite for working with the K1297-Classic applications. The application processor processes the data streams, which are output by the interface modules.



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.

A red status display is built into the front panel of the application processor. The status is displayed via program control.

The serial interface is used for self-test and service purposes. The table below gives you the pin assignment of this 6-pin V.24 RJ45 socket.

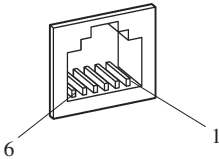


Table A-15: Pin assignment for the TEST Serial interface

Pin	Assignment	Pin	Assignment
1	RTS	4	Ground
2	TxD	5	RxD
3	Ground	6	CTS

The base address can be set with the rotary switch when installing the board.

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 “S₀ Simulation / Monitoring” with “TE A” or “TE M”, “MON A B” or “MON M N”, “TE/NT B” or “TE/NT N”; under “U_{2BIQ} 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.

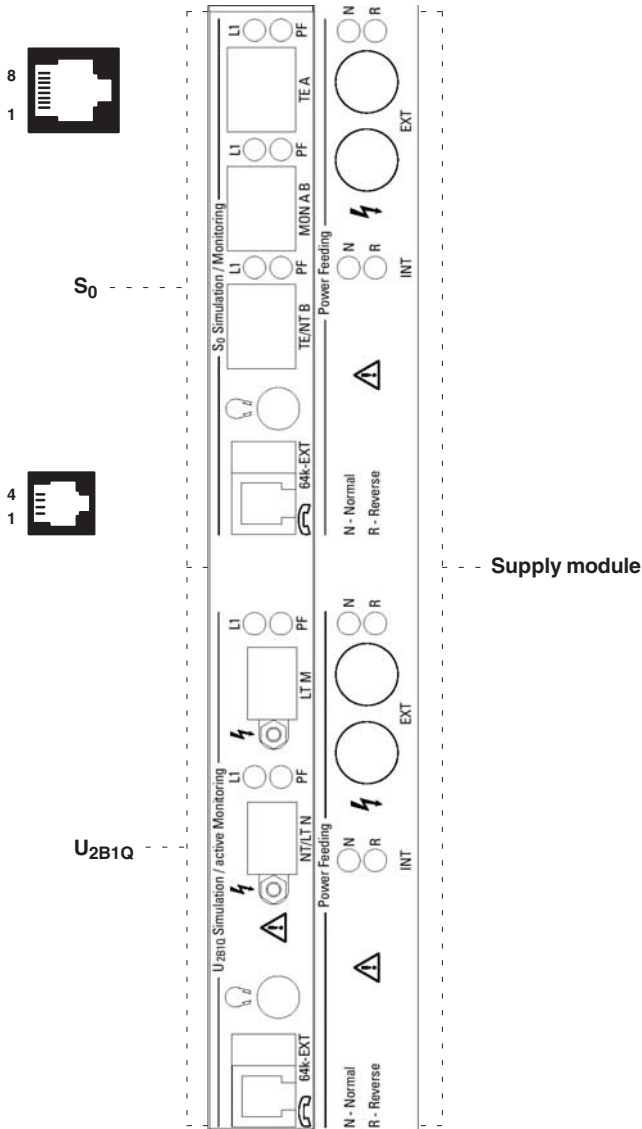


Figure A-2: BAI board with S₀ and U_{2B1Q} interface

BAI S₀ Interface Module

The S₀ 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 S₀ 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-16: Line status S₀ 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 S₀ 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 S₀ interface module have the following pin assignment:

Table A-17: 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-18: 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-19: 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-20: 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-21: Pin assignment for connectors LT A and LT M

Pin	Assignment	Pin	Assignment
1	TIP*	2	RING*

Table A-22: 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 implemented yet but is coming soon: a B channel can be monitored bidirectionally 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 S₀) 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.

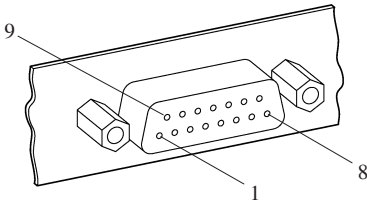


Figure A-3: B channel connection

Table A-23: 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-23: 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.

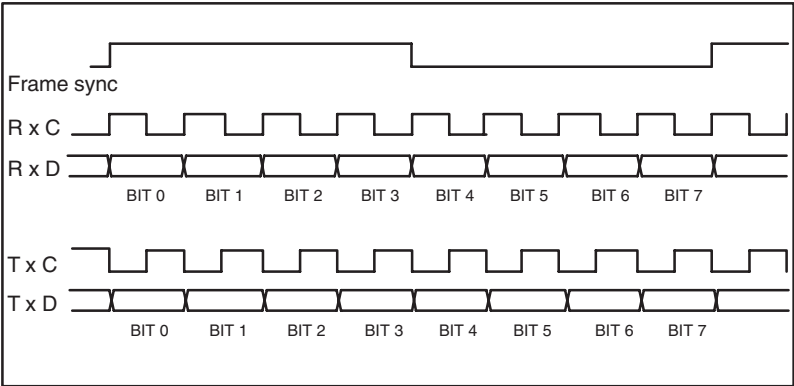


Figure A-4: Time diagrams

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-24: Pin assignment handset

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

V./X. Board

The V./X. interface module contains two socket connectors per V./X. interface for line connection, which are designated as follows:

- “to DCE”
- “to DTE”

The interface standards V.24, X.21 and V.35 are supported.

The connection to the various interfaces is made with a special adapter cable.

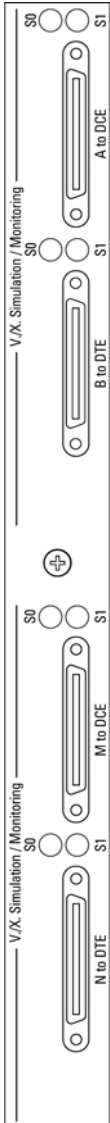


Figure A-5: V./X. board

Modes of Operation. The following modes of operation are available with the V./X. interface module:

1. To monitor lines with the V./X. interface module, proceed as follows:

Connect the interface lines to be monitored, using the monitor adapter cable appropriate for your interface standard, with the sockets labelled “to DCE” and “to DTE”.

1. To carry out a DCE emulation, connect your terminal unit, using the adapter cable appropriate for your interface standard, with the socket labelled “to DTE”.
2. To carry out a DTE emulation, connect the network, using the adapter appropriate for your interface standard, with the socket labelled “to DCE”.

The DCE and DTE emulation modes of operation can be executed at the same time, however each mode needs its own application (such as X.25 emulation).

Each terminal socket is equipped with two LEDs for displaying the line status. Each of the line connectors labelled “to DTE” and “to DCE” are assigned two LEDs. These display the line status as shown in the following table.

Table A-25: Line status: V./X. interface module

S0	S1	Meaning
on	on	While booting: Reset of the interface
off	off	After booting: Port not in operation
alternating with S1	alternating with S0	Port initialized. No adapter cable connected (operational state)
on	off	Port initialized. Adapter cable connected (operational state)
on	on	Port initialized. Data traffic is possible (operational state) as follows: Case 1: With V.35 or V.24 cable to DTE and receiver ready, if line status Data Terminal Ready was reached Case 2: With V.35 or V.24 cable to DCE and receiver ready, if line status Data Set Ready was reached Case 3: With X.21 cable to DTE and receiver ready, if line status Control was reached Case 4: With X.21 cable to DCE and receiver ready, if line status Indication was reached

Adapter Cable Interfaces

V.35 Monitor

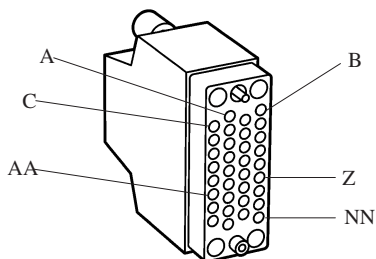


Table A-26: V.35 Monitor

Pin	Assignment	Pin	Assignment
A	101 Cable shield (connected with the connector housing)	V	115 Rx Clk A (IN) ---X
B	102 Signal ground	W	113 Tx ext clk B (IN)
C	105 RTS (IN)	X	115 Rx Clk B (IN)
D	106 CTS (IN)	Y	114 Tx Clk A (IN) ---AA
E	107 DSR (IN)	Z	Not connected
F	109 carrier detect (IN)	AA	114 Tx Clk B (IN)
H	108 DTR (IN)	BB	Not connected
J	125 ring detect (IN)	CC	Not connected
K	Not connected	DD	Not connected
L	Not connected	EE	Not connected
M	Not connected	FF	Not connected
N	Not connected	HH	Not connected

Table A-26: V.35 Monitor (Cont.)

Pin	Assignment	Pin	Assignment
P	103 send data A (IN) ---S	JJ	Not connected
R	104 Rx data A (IN) ---T	KK	Not connected
S	103 send data B (IN)	LL	Not connected
T	104 Rx data B (IN)	MM	Not connected
U	113 Tx ext clk A (IN) ---W	NN	Not connected

---n Reference to a symmetrical pair

V.35 to DCE

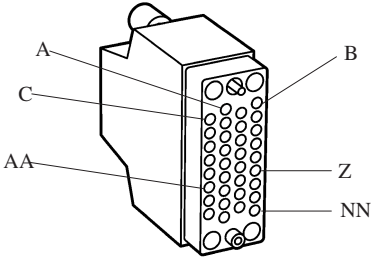


Table A-27: V.35 to DCE

Pin	Assignment	Pin	Assignment
A	101 Cable shield (connected with the connector housing)	V	115 Rx Clk A (IN) ---X
B	102 Signal ground	W	113 Tx ext clk B (OUT)
C	105 RTS (OUT)	X	115 Rx Clk B (IN)
D	106 CTS (IN)	Y	114 Tx Clk A (IN) ---AA
E	107 DSR (IN)	Z	Not connected
F	109 carrier detect (IN)	AA	114 Tx Clk B (IN)
H	108 DTR (OUT)	BB	Not connected
J	125 ring detect (IN)	CC	Not connected
K	Not connected	DD	Not connected
L	Not connected	EE	Not connected
M	Not connected	FF	Not connected
N	Not connected	HH	Not connected
P	103 send data A (OUT) ---S	JJ	Not connected

Table A-27: V.35 to DCE (Cont.)

Pin	Assignment	Pin	Assignment
R	104 Rx data A (IN) ---T	KK	Not connected
S	103 send data B (OUT)	LL	Not connected
T	104 Rx data B (IN)	MM	Not connected
U	113 Tx ext clk A (OUT) ---W	NN	Not connected

---n Reference to a symmetrical pair

V.35 to DTE

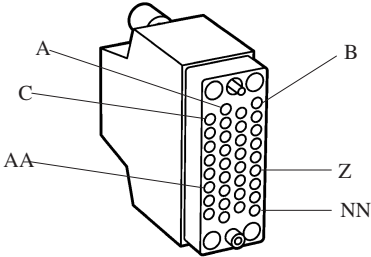


Table A-28: V.35 to DTE

Pin	Assignment	Pin	Assignment
A	101 Cable shield (connected with the connector housing)	V	115 Rx Clk A (OUT) ---X
B	102 Signal ground	W	113 Tx ext clk B (IN)
C	105 RTS (IN)	X	115 Rx Clk B (OUT)
D	106 CTS (OUT)	Y	114 Tx Clk A (OUT) ---AA
E	107 DSR (OUT)	Z	Not connected
F	109 carrier detect (OUT)	AA	114 Tx Clk B (OUT)
H	108 DTR (IN)	BB	Not connected
J	125 ring detect (OUT)	CC	Not connected
K	Not connected	DD	Not connected
L	Not connected	EE	Not connected
M	Not connected	FF	Not connected
N	Not connected	HH	Not connected
P	103 send data A (IN) ---S	JJ	Not connected

Table A-28: V.35 to DTE (Cont.)

Pin	Assignment	Pin	Assignment
R	104 Rx data A (OUT) ---T	KK	Not connected
S	103 send data B (IN)	LL	Not connected
T	104 Rx data B (OUT)	MM	Not connected
U	113 Tx ext clk A (IN) ---W	NN	Not connected

---n Reference to a symmetrical pair

X.21 Monitor

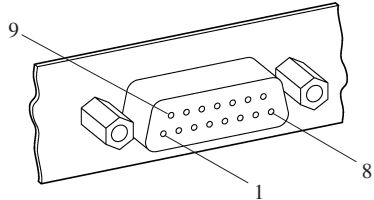


Table A-29: X.21 Monitor

Pin	Assignment	Pin	Assignment
1	Cable shield (connected with the connector housing)	9	B lead (IN)
2	T Tx data A (IN) ---9	10	B lead (IN)
3	C Control A (IN) ---10	11	B lead (IN)
4	R Rx data A (IN) ---11	12	B lead (IN)
5	I indic. A (IN) ---12	13	B lead (IN)
6	S Tx clk A (IN) ---13	14	Not connected
7	Not connected	15	Not connected
8	G-Signal ground		

---n Reference to a symmetrical pair

X.21 to DCE

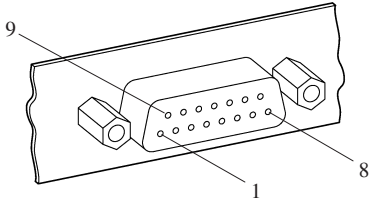


Table A-30: X.21 to DCE

Pin	Assignment	Pin	Assignment
1	Cable shield (connected with the connector housing)	9	B lead (OUT)
2	T Tx data A (OUT) ---9	10	B lead (OUT)
3	C Control A (OUT) ---10	11	B lead (IN)
4	R Rx data A (IN) ---11	12	B lead (IN)
5	I indic. A (IN) ---12	13	B lead (IN)
6	S Tx clk A (IN) ---13	14	Not connected
7	Not connected ---14	15	Not connected
8	G-Signal ground		

---n Reference to a symmetrical pair

X.21 to DTE

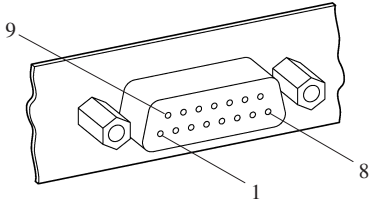


Table A-31: X.21 to DTE

Pin	Assignment	Pin	Assignment
1	Cable shield (connected with the connector housing)	9	B lead (IN)
2	T Tx data A (IN) ---9	10	B lead (IN)
3	C Control A (IN) ---10	11	B lead (OUT)
4	R Rx data A (OUT) ---11	12	B lead (OUT)
5	I indic. A (OUT) ---12	13	B lead (OUT)
6	S Tx clk A (OUT) ---13	14	Not connected
7	Not connected	15	Not connected
8	G-Signal ground		

---n Reference to a symmetrical pair

V.24 Monitor

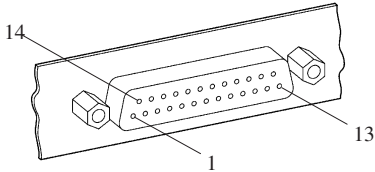


Table A-32: V.24 Monitor

Pin	Assignment	Pin	Assignment
1	Cable shield (connected with the connector housing)	14	Not connected
2	103 send data (IN)	15	114 send data clk (IN)
3	104 receive data (IN)	16	Not connected
4	105 request to send (IN)	17	115 rec data clk (IN)
5	106 clear to send (IN)	18	141 local loopback (IN)
6	107 data set ready (IN)	19	Not connected
7	102 signal ground	20	108 data term ready (IN)
8	109 carrier detect (IN)	21	110 signal quality detect (IN)
9	Not connected	22	125 ring indicate (IN)
10	Not connected	23	111 clk select (IN)
11	116 select DCE STDBY (IN)	24	113 ext. clock (IN)
12	Not connected	25	142 test indicator (IN)
13	Not connected		

V.24 to DCE

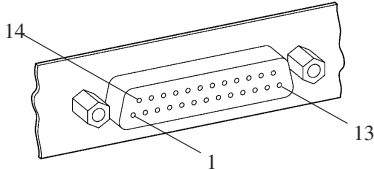


Table A-33: V.24 to DCE

Pin	Assignment	Pin	Assignment
1	Cable shield (connected with the connector housing)	14	Not connected
2	103 send data (OUT)	15	114 send data clk (IN)
3	104 receive data (IN)	16	Not connected
4	105 request to send (OUT)	17	115 rec data clk (IN)
5	106 clear to send (IN)	18	141 local loopback (OUT)
6	107 data set ready (IN)	19	Not connected (OUT)
7	102 signal ground	20	108 data term ready (OUT)
8	109 carrier detect (IN)	21	110 signal quality detect (IN)
9	Not connected	22	125 ring indicate (IN)
10	Not connected	23	111 clk select (OUT)
11	116 select DCE STDBY (OUT)	24	113 ext. clock (OUT)
12	Not connected	25	142 test indicator (OUT)
13	Not connected		

V.24 to DTE

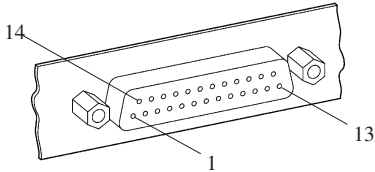


Table A-34: V.24 to DTE

Pin	Assignment	Pin	Assignment
1	Cable shield (connected with the connector housing)	14	Not connected
2	103 send data (IN)	15	114 send data clk (OUT)
3	104 receive data (OUT)	16	Not connected
4	105 request to send (IN)	17	115 rec data clk (OUT)
5	106 clear to send (OUT)	18	141 local loopback (IN)
6	107 data set ready (OUT)	19	Not connected
7	102 signal ground	20	108 data term ready (IN)
8	109 carrier detect (OUT)	21	110 signal quality detect (OUT)
9	Not connected	22	125 ring indicate (OUT)
10	Not connected	23	111 clk select (IN)
11	116 select DCE STDBY (IN)	24	113 ext. clock (IN)
12	Not connected	25	142 test indicator (IN)
13	Not connected		

E1/DS1 Emulation Board

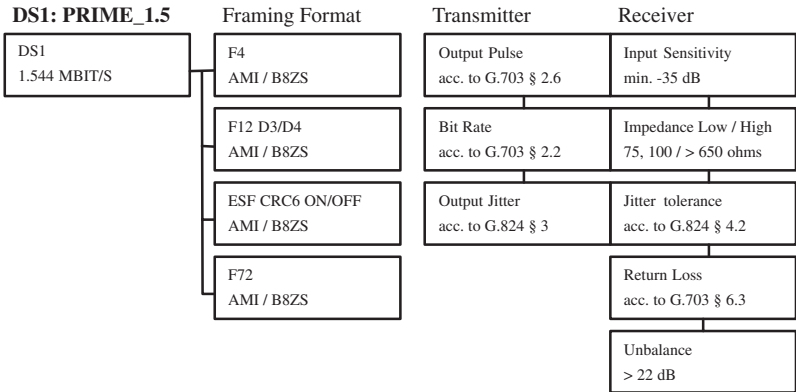
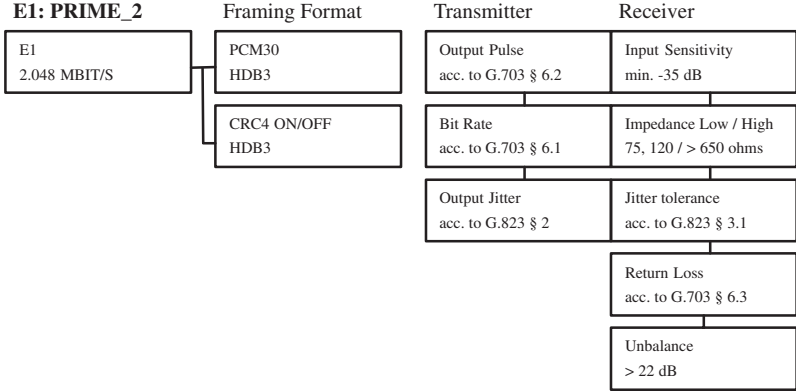
Simulations and emulations on PCM sections can be carried out via the available E1 and DS1 emulation modules (PRIME modules: Primary Rate Monitor and Emulation).

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:



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 $Z=120 \Omega$
- 1.6/5.6 plug with coax cable with $Z=75 \Omega$. A 1.6/5.6 adapter on BNC makes the connection of the cable to BNC sockets possible.
- 3-pin with $Z=120 \Omega$
- Bantam with $Z=110 \Omega$

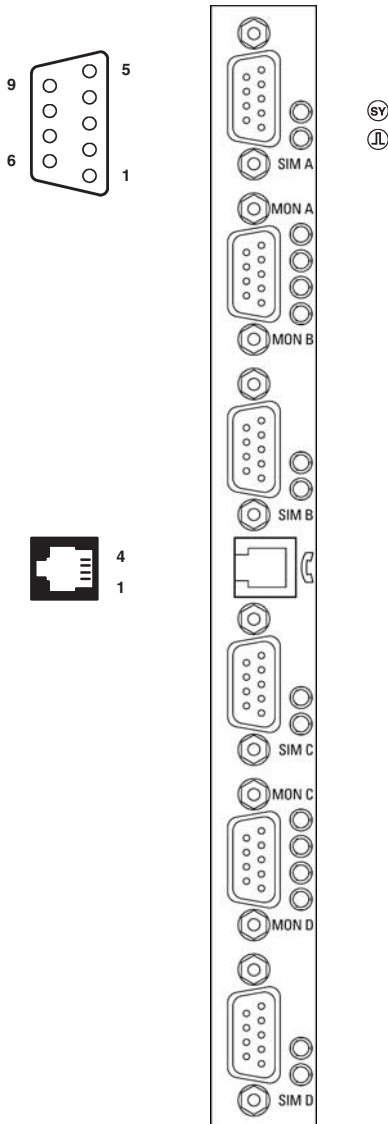


Figure A-6: E1/DS1 emulation board (PRIME)

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

Table A-35: 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-36: 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 bidirectionally in one B channel.



Table A-37: 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:

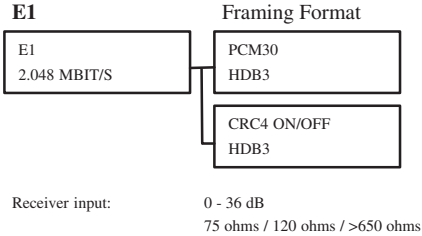
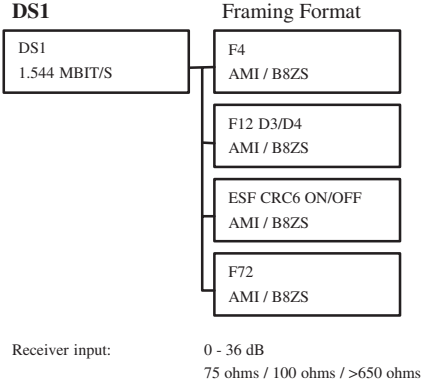
- 
Synchronous: Receive frame recognized, if LED is on.
- 
Signal ok: Receive signal recognized, if LED is on.

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:



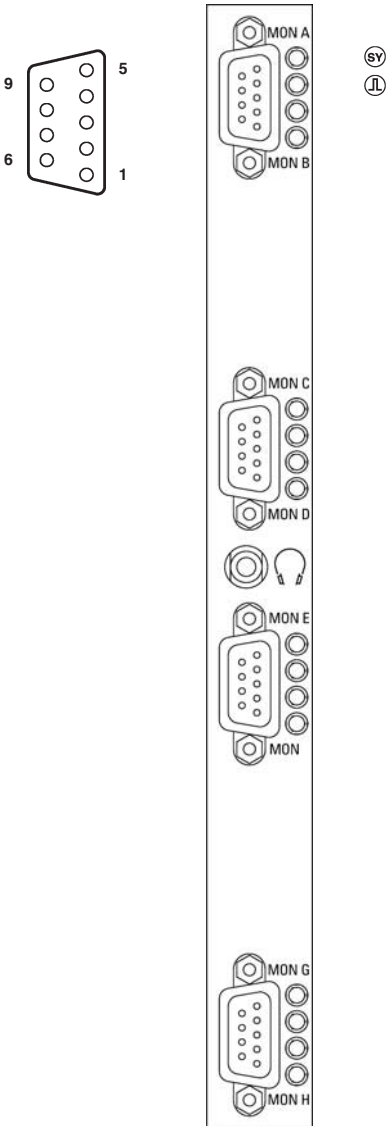


Figure A-7: E1/DS1 monitoring board (PRIMO)



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

Table A-38: 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:

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

DS0A Board

With the DS0A board you can monitor and simulate interfaces according to the Bellcore Standard “Digital Signal Zero 'A' (DS-0A 64kbit/s) Systems Interconnection” (Bellcore Technical Reference TR TSY-000458).

Each DS0A board can monitor or simulate up to 4 DS0A interfaces with their corresponding Rx and Tx lines.

NOTE. *Note: EN60950, IEC 950, UL 1950: The interface boards are designed for connecting to a telecommunication network (TNV-1 circuits) and for application in an area where the nominal AC MAINS SUPPLY voltage does not exceed 130 V; the appropriate interfaces are provided.*

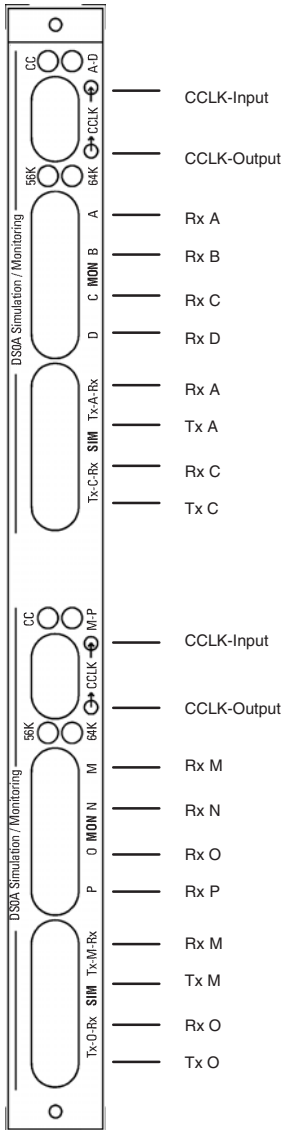


Figure A-8: DS0A board

The connection to the various interfaces is established via cables with bantam jacks. These cables are delivered as accessoires.

Each DS0A board is divided into two halves. Each half of a DS0A has four LEDs, two for group Clock (CC), two for group Data (A-D/M-O).

Table A-39: Clock status: DS0A interface module

Clock CC	Data	Meaning
on	on	After booting: Reset of the interface
blinking	off	CC-Clock synchronization configured, but not ok
off	blinking	Data synchronization configured, but not ok
on	off	CC-Clock synchronization ok
off	on	Data Clock synchronization ok
off	off	Port not active

Table A-40: Data status: DS0A interface module

Data 56K	64K	Meaning
on	on	After booting: Reset of the interface
on	off	Ready to receive 56 Kbit data
off	on	Ready to receive 64 Kbit data
off	off	Port not active

Clock Modes

When using the DS0A interface in the monitoring or simulation user mode it is required to select the right clock mode. All inputs of one half are using the same clock. You can either provide composite clock input on a module half or you can let the board generate its own clock:

1. Using the composite clock (CCLK) input:

You can use composite clock (CCLK) from the central switch. Connect the composite clock signal to the input CCLK_IN. You can choose between termination or high impedance of the input.

If further DS0A interfaces have to be synchronized with CCLK you have to connect the CCLK_Output of the first interface to the CCLK_input of the next interface.

The bit position (8-bit data stream) of CCLK input and output can be edited via the GUI.

2. Using no clock input in the monitoring mode or in the simulation user mode:

In this mode the clock is derived from the data stream.

In the monitoring mode, the clock can be synchronized from port A to D and from port M to P. In the simulation user mode the clock can be synchronized from port A or C and M or O.

The port can be edited via the GUI. The selected port has to be connected.

- At a data rate of 64 Kbit/s the clock can be derived in any cases.
- At a data rate of 56 Kbit/s the clock can only be derived from data if the data stream contains 'FISUs' as e.g. in SS#7 data streams. In this special case, synchronizing can last up to 10 seconds.

3. Using no clock input in the simulation network mode:

When using the DS0A interface in the simulation or emulation network mode the board generates its own clock.

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 10 BaseT and 100 BaseTx. Both full duplex and half duplex modes are supported.

Due to performance reasons, an AP board and a E1/DS1 or a S₀ - 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.*

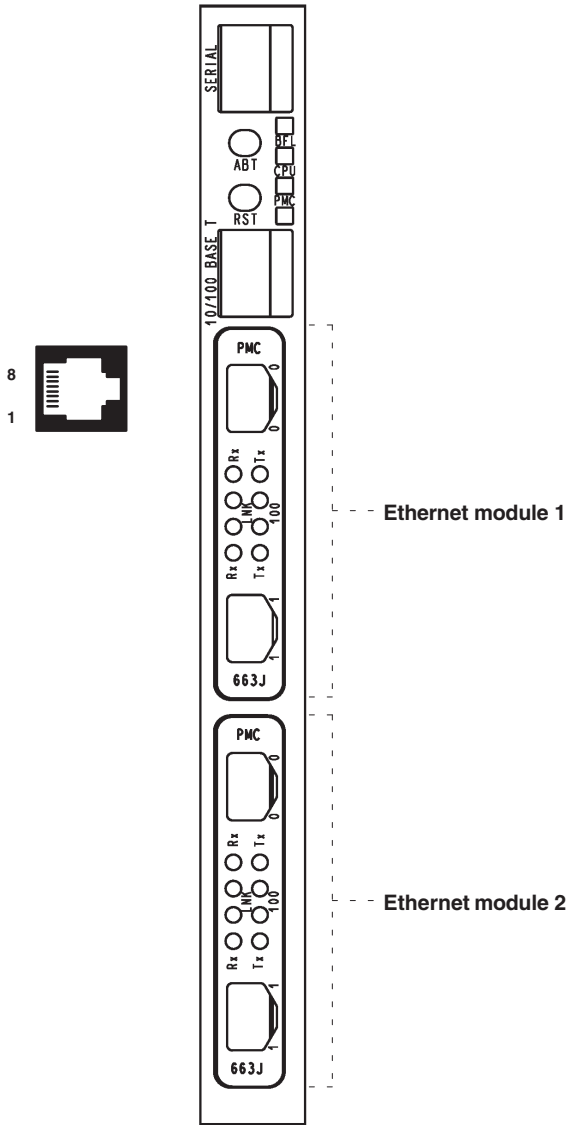


Figure A-9: ETH board with two Ethernet PCI mezzanine modules

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

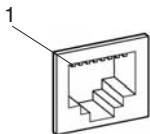


Table A-41: Pin assignment for the SERIAL interface

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

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

Table A-42: 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.

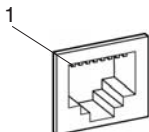


Table A-43: Front Panel I/O Pin Assignment

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.

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-44: 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. Start the Protocol Tester with no new boards installed.

Watch for the blue screen during the Windows NT boot phase. Write down the CPU numbers displayed during boot 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. Wait until the booting process is completed.
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.

ATM Boards: PCE I Board Combinations

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

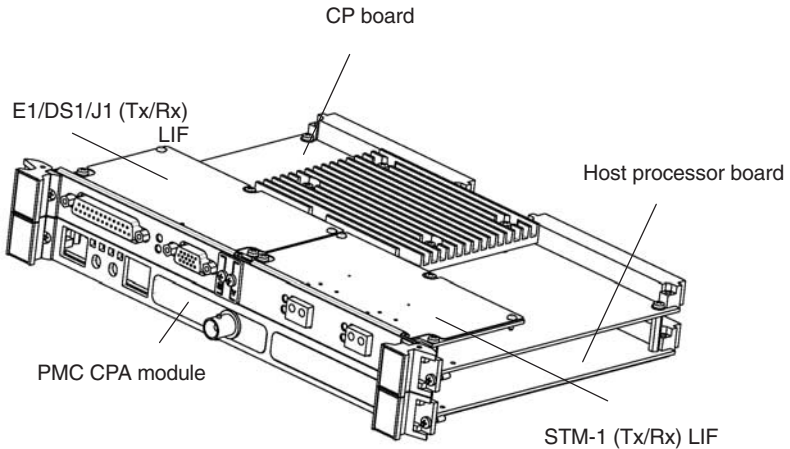


Figure A-10: ATM PCE I board combination

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 are fully synchronizeable 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-45: 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

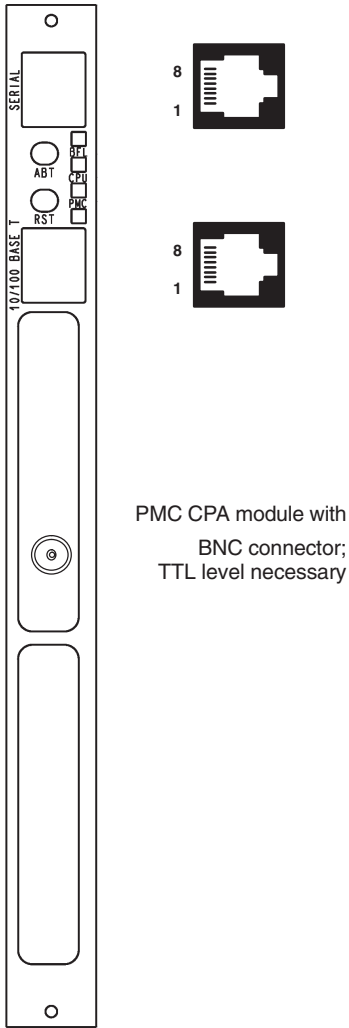


Figure A-11: Host Processor Board

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

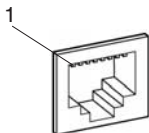


Table A-46: Pin assignment for the SERIAL interface

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

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 10Base-T/100Base-T connector is provided on the front panel (for future use, not yet supported).

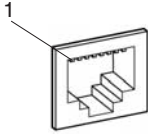


Table A-47: Pin assignment for the 10Base-T/100Base-T interface

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.

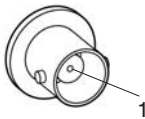


Table A-48: Pin assignment for BNC connector

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 \pm 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)

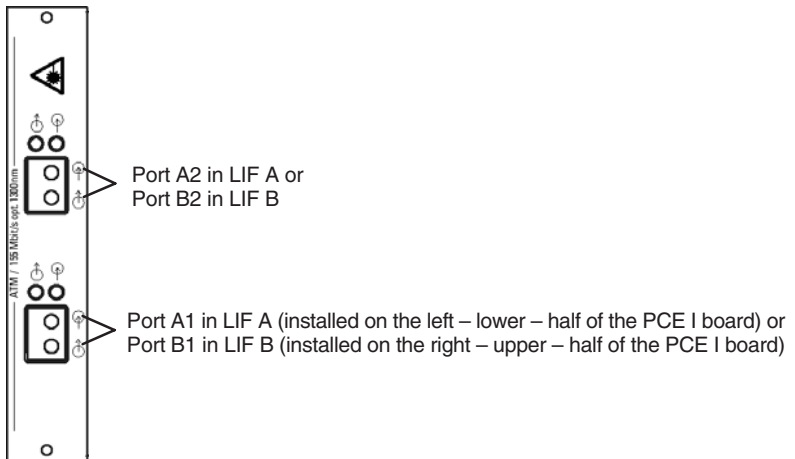


Figure A-12: Front panel of the STM-1 (Tx/Rx) optical line interface

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 kilometres.

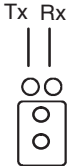


WARNING. *Never look into the end of a fibreglass cable or a fibre which could be connected to a laser source. Laser radiation can damage your eyes because it is invisible and your pupils do not contract instinctively as with normal bright light. If you think your eyes have been exposed to laser radiation,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



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 \pm 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)

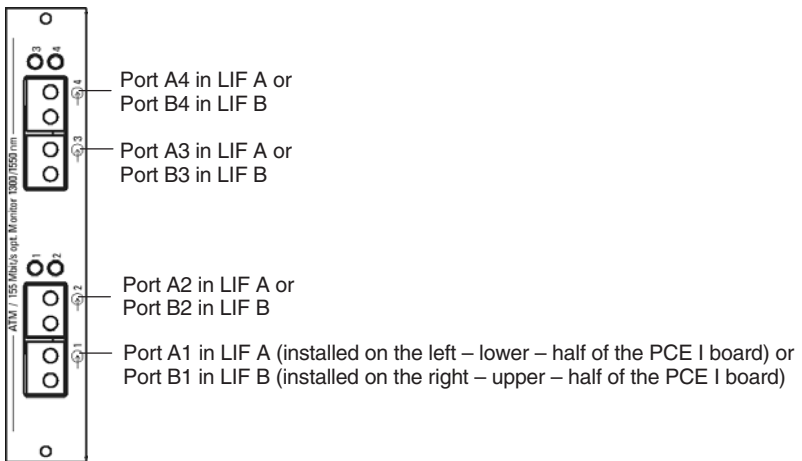


Figure A-13: Front panel of the STM-1 (Rx/Rx) optical line interface

Each STM-1 (Rx/Rx) optical line interface provides 4 Rx ports for monitoring 2 bidirectional lines. Each Rx port is part of duplex LC connector.

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

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

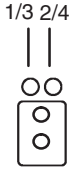


WARNING. *Never look into the end of a fibreglass cable or a fibre which could be connected to a laser source. Laser radiation can damage your eyes because it is invisible and your pupils do not contract instinctively as with normal bright light. If you think your eyes have been exposed to laser radiation,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

For the STM-1 (Tx/Rx) and STM-1 (Rx/Rx) line interface modules the following cables and adapters you can order 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

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

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

- 2.048 Mbps \pm 20 ppm (E1), 1.544 Mbps \pm 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

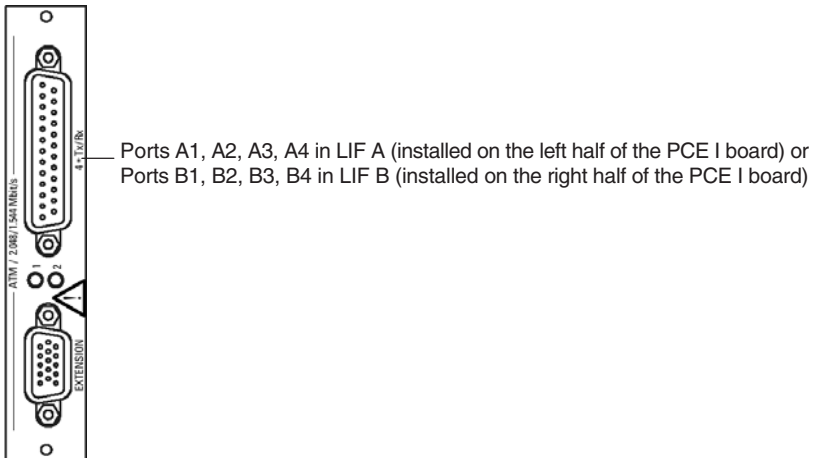


Figure A-14: Front panel of the E1/DS1/J1 (Tx/Rx) line interface

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:

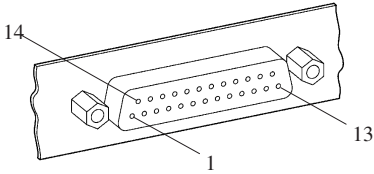
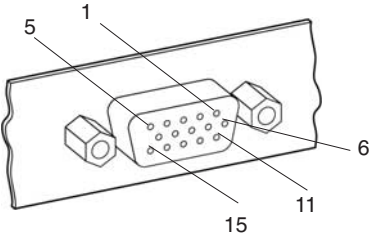


Table A-49: 25-pin D-sub connector

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-50: 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, VBRrt, 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 \pm 20 ppm (E1), 1.544 Mbps \pm 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)

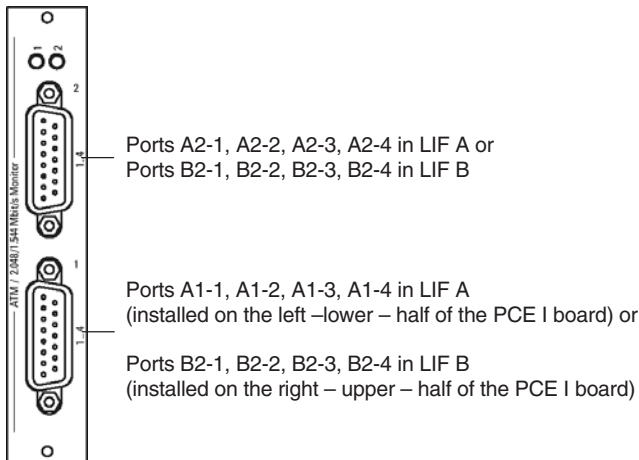


Figure A-15: Front panel of the E1/DS1/J1 (Rx/Rx) electrical line interface

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:

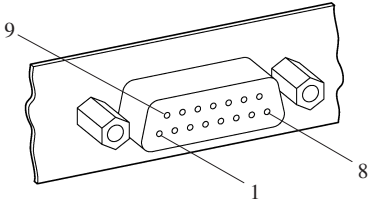


Table A-51: Pin Assignment for the 15-pin D-sub Connector

Pin	Assignment	Pin	Assignment
1		9	
2	Rx 2 (Tip)	10	Rx 2 (Ring)
3	Rx 1 (Tip)	11	Rx 1 (Ring)
4		12	
5		13	Rx 3 (Tip)
6	Rx 3 (Ring)	14	Rx 4 (Tip)
7	Rx 4 (Ring)	15	
8			

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-52: LED Status: E1/DS1/J1 (Rx/Rx) Line Interface Module

State indication	LED 1	LED 2
After power up	orange	orange
Initialization	orange	orange /shortely 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.

ATM Boards: Power-AAL Board Combinations

ATM Power-AAL board combinations consist of:

- Power-AAL board
- One or two slim line interface modules

The ATM slim line interface board (with up to two mezzanine modules) are firmly mounted together with the Power-AAL board.

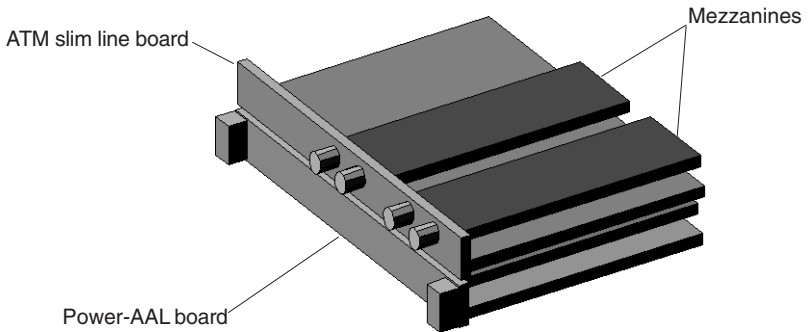


Figure A-16: ATM Power-AAL board combination

General Features

Power-AAL board combinations provide the following features:

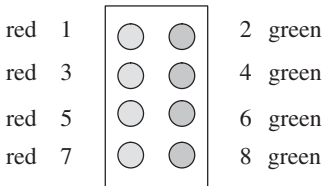
- Supporting ATM Modes for User-Network Interface (UNI) and Network-Node Interface (NNI)
- Up to 4096 ATM virtual circuits links (VPI/VCI) for Tx or Rx.
- Online AAL5 CPCS processing up to maximum link bandwidth (depending of SDU size)
- AAL0 support for send and receive raw ATM cells.
- Online processing of ATM AAL type 2 connections (CID's) with I-366.1 SSSAR sub-layer at a maximum data rate at CPS layer of up to 500 Kbit/s per ATM interface.
- ATM service categories UBR and CBR for Tx with support of appropriate source traffic descriptors (parameters), CBR: PCR per virtual circuit, UBR : optional PCR for entire ATM interface. The minimum adjustable PCR is 10 kBit/s.
- Automatic handling of ATM OAM Fault Management (FM) cells with emulation of OAM/FM functions for a terminating ATM interface.

Power-AAL Board

The Power-AAL board provides the following features:

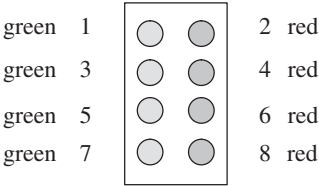
- Hardware-supported AAL segmentation and reassembly functions
- ATM for up to 155.52 Mbit/s
- 16 MB onboard packet memory
- Cell-based input/output via the VME P2 connector

There are three LED sets on the front of the Power-AAL board. The uppermost is dedicated to common system information. The LEDs have the following meaning when used in combination with Slim Line modules:



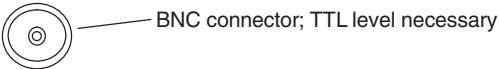
- | | |
|---|---|
| 1 | General error |
| 2 | System operational |
| 3 | Not used |
| 4 | Not used |
| 5 | Not used |
| 6 | Blinking: system is running properly (alternating with 8) |
| 7 | Not used |
| 8 | Blinking: system is running properly (alternating with 6) |

The lower two sets of LEDs are dedicated to the AAL channels. The LEDs have the following meaning when used in combination with Slim Line modules:



- 1 Tx AALx-Cells sent
- 2 Not used
- 3 Rx AALx-Cell received
- 4 Rx AALx-PDU errors , blinking: unknown cells
- 5 Tx ATM-Cells sent via UTOPIA
- 6 No Tx ATM-Cells sent via UTOPIA
- 7 Rx ATM-Cells received, cell delineation ok
- 8 Loss of cell delineation (LOCD);
blinking: HEC errors received

For an external clock a TTL signal is necessary:



NOTE. This feature will be supported by the software from one of the next releases on.

Slim Line Interface Boards (Modules)

The following interface connections are available:

- E1/DS1: 1.5/2 Mbit/s; 9-pin D-Sub connector
- E3/DS3: 34/45 MBit/s; BNC connector
- STM-1/SONET OC-3cc: 155 Mbit/s, optical; FC/PC connector

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.*

E1/DS1: 2/1.5 Mbit/s Slim Line Interface (9-pin D-Sub)

The E1/DS1/J1 electrical interface with connectors for twisted pair or coaxial lines is assembled on a mezzanine PMC card and provides the following features:

- 1.544 Mbit/s \pm 50 ppm (DS1), 2.048 Mbit/s \pm 20 ppm (E1)
- 75 Ω asymmetrical and 100 Ω (DS-1), 120 Ω (E1)
- ITU-T G.703 electrical (120 Ω symmetrical cable)
- AMI or B8ZS (DS1), HDB3 line coding (E1)
- Framing: ETS 300 337 (G.804)
- ATM cell layer adaptation functions according to ITU I 432.1 and I 432.3 and ANSI 1.646-1995

NOTE. *K1297 Compact only: For reasons of EMC compliance an EMI filter is placed on the COM2 interface.*

Accessories. The following accessories are available:

- 3 x 1 cable: 1.6/5.6 coax connector to 9-pin D-Sub, 75 Ω ; Bantam to 9-pin D-Sub, 120 Ω ; open end to 9-pin D-Sub, 120 Ω

The following connectors are available: 9-pin D-Sub connectors, four lines (75, 100, 120 Ω , switchable).

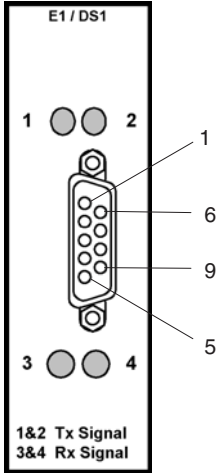


Table A-53: Pin assignment

Pin	Assignment	Pin	Assignment
1	Rx+ (Input to Module)	6	Rx- (input to module)
2	Ground/Not connected	7	Not connected
3	Ground	8	Not connected
4	Ground	9	Tx+ (module output)
5	Tx- (module output)		

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

- 1 Valid Tx signals
- 2 No signal
- 3 Valid Rx signals
- 4 No signal

E3/DS3: 34/45 MBit/s BNC Slim Line Interface

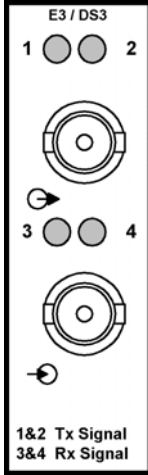
The E3/DS3 electrical interface which connectors for BNC coaxial lines is assembled on a mezzanine PMC card and provides the following features:

- 34.368 Mbit/s \pm 20 ppm (E3), 44.736 Mbit/s \pm 20 ppm (DS3)
- ITU-TS G.703 electrical (twin 75 Ω coaxial cables)
- Framing to ITU-TS G.751 or to ITU-T G.832
- PLCP supported (ITU-TS G.751/E3 and ANSI T1.646/DS3)
- ATM cell layer adaptation functions according to ITU I 432.1 and G 804 and ANSI 1.646-1995

Accessories. The following accessories are available:

- 3 coaxial cables, 75 Ω
- 1 power splitter, resistive, 75 Ω

The following connectors are available: Coax BNC (75 Ω) for lines. If a RG-59B cable is used, usually 135 metres will be achieved.



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

- | | |
|---|------------------|
| 1 | Valid Tx signals |
| 2 | No signal |
| 3 | Valid Rx signals |
| 4 | No signal |

STM-1/SONET OC-3c: 155 Mbit/s, Optical, FC/PC Slim Line Interface

The SDH STM-1 optical interface is assembled on a mezzanine PMC card and provides the following features:

- 155.520 Mbit/s \pm 20 ppm
- ITU G.957-S1.1 optical (twin FC-PC cables)
- ITU G.708
- SDH (SONET) section, line and path overhead processing
- ATM cell layer adaptation functions according to ITU I 432.1 and I 432.2 and ANSI 1.646-1995
- Rx 62.5 μ m fiber, sensitivity -6 to -36 dbm, 1200-1570 nm (single and multimode)
- Tx 8 μ m fiber, single mode, sensitivity - 2,5 dbm, 1310 nm

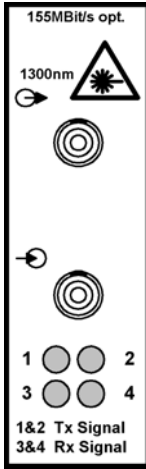


CAUTION. *Observe ESD safety regulations because otherwise wrong measurement results could occur.*

Accessories. The following accessories are available:

- 1 optical attenuator 10 dB (\pm 2) single mode, FC/PC to FC-PC
- 3 fiber optical cables, 2 meters, single mode (yellow, 2x) and 50/125 micron multi mode (orange, 1x), FC/PC to FC-PC
- 3 x 2 fiber optical adapters, single mode, FC/PC to SC-PC and FC/PC to ST and FC/PC to DIN

The following connectors are available: FC/PC for line (ST, SC possible with adapter). Achievable distances depend on the fiber cable quality. With a good cable, you may reach up to 15 kilometres.



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

- | | |
|---|------------------|
| 1 | Valid Tx signals |
| 2 | No signal |
| 3 | Valid Rx signals |
| 4 | No signal |



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. The optical output's radiation power corresponds to the laser class in accordance with IEC 825-1, 11.93.*

Available Standards. With Power-AAL board combinations you can monitor and simulate interfaces according to the following standards:

- ITU-T, Recommendation I.361, B-ISDN ATM layer specification, 02/1999
- ANSI, T1.627-1993, Broadband ISDN ATM Layer Functionality and Specification, 07/1993
- 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.610, B-ISDN Operation and Maintenance Principles and Functions, 02/1999
- 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, Traffic Management Specification V4.1, af-tm-0121.000, 04/1996



Appendix B: Keyboards

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:

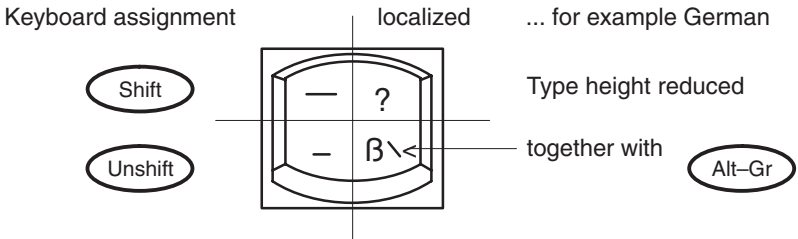
- Alphanumeric keys
- Function keys
- Cursor keys
- Integrated numeric keypad (with K1297 Compact the numeric keys are part of the alphanumeric keypad)

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

Key	Function
<- ->	The tabulators move the cursor to the left or right according to the tabulator positions.
CAPS LOCK	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.
CTRL	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.
Fn	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.
ALT	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.
ALT-GR	This key is used only in combination with other keys to generate further key codes.
< -	The backspace key moves the cursor by one position to the left and deletes the character.
< - /	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.
PRINT	This key is used to print the current screen on a connected printer in real MS-DOS mode.

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 *F_n+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.

After starting Windows NT, a window is opened titled:

*.....New Hardware found
Searching for drivers*

A bit later the following dialog appears:

*System Settings change
Do you want to restart your computer now?
Yes / No*

4. Select *Yes*.

The system restarts.

PC-3 board only: During this restart you can switch off the trackball, proceed as described in section *Switching the Trackball Off or On*.

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. **PC-3 board only:** Switch the device on and make sure that the trackball is enabled in the PC BIOS as described below (section *Switching the Trackball Off or On*). If you forget this step, there will be no pointing device at the next start of Windows NT; press `<CTRL>+<ALT>+<Delete>` on the keyboard and select *Shut down* to repeat the cycle.
4. Restart the device.

At the next start of Windows NT the following warning message appears:

*Service Control Manager
At least one service or driver failed during
system startup. Use event viewer to examine the
event log for details.*

5. Click *OK*.
6. In order to follow this warning, do the following:

*Start...
Settings...
Control Panel...
Devices*

7. Scroll down the list until you see:

Serial Mouse Driver



CAUTION. *Follow the instructions and be careful when selecting the appropriate entry from the devices applet of the control panel. Selecting the wrong entry can make the device unusable.*

8. Select the *Startup* Button. Then select *Disabled* from the list of radio buttons.
9. Select *OK* and ignore the following warning by selecting *Yes*. Select *Close*.

Switching the Trackball Off or On (PC-3 Board only)



CAUTION. *In the following you find descriptions on how to change certain parameters of the PC BIOS of the Protocol Tester if you are using a PC-3 board). Follow the instructions and do not change other parameters in the PC BIOS as the device might become unusable or the performance might degrade. If you have opened a menu that is not described here, press the <ESC> key immediately in order to leave the menu.*

If you want to switch off the trackball so that only the external mouse is functional, you must change the PC BIOS.

Change the PC BIOS as follows (the procedure can also be used to switch the trackball on again):

1. Switch on the device. A blue framed screen appears with a title that starts with:

Power Bios

2. Press <CTRL>+<ALT>+<ESC> as fast as possible.

A window appears titled Award Software International, Inc. Power BIOS 1.00 Setup

3. Now use the <CURSOR DOWN> key in order to move to the menu item called *Peripherals*
4. Press the <ENTER> Key. Press the <TAB> key until the value for the *PS/2 Mouse* item is highlighted.
5. Use the <CURSOR-DOWN> key to change to select the appropriate value:

Enabled

Disabled

6. Press <ENTER>, <ESC> and <ENTER> to save the change. The device will restart.

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

Ambient temperature	23°C with $\geq \pm 5\%$ (with 55% humidity)
Operating range	4°C to 40°C (less than 85% humidity, without condensation)
Transportation/storage	-20°C to +55°C
Barometric pressure	101.3 kPa (1013 mbar)
Altitude	4300 m, maximum operating
Working range	up to 2200 m: 70 to 106 kPa (700 to 1060 mbar)
Limit range of operation	up to 4300 m: 53.3 to 106.0 kPa (533 to 1060 mbar)
Pollution degree	Pollution degree 2 (as defined in IEC 1010-1) Note - Rated for indoor use only

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, $\pm 10\%$
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	2 x serial 1 x parallel (Centronics) Keyboard SCSI VGA (external monitor) With Pentium Processor PC card: Ethernet (10Base-2, 10Base-T) With Celeron Processor PC card: Ethernet (10BaseT,/100BaseTx), USB
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: Windows NT 4.0 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

Ambient temperature	+23°C with $\geq \pm 5\%$ (with 55% humidity)
Operating range	+4°C to +40°C (less than 85% humidity, without condensation)
Transportation/storage	-20°C to +55°C
Barometric pressure	101.3 kPa (1013 mbar)
Altitude	4300 m, maximum operating
Working range	up to 2200 m: 70 to 106 kPa (700 to 1060 mbar)
Limit range of operation	up to 4300 m: 53.3 to 106 kPa (533 to 1060 mbar)
Pollution degree	Pollution degree 2 (as defined in IEC 1010-1) Note - Rated for indoor use only

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, $\pm 10\%$
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 \geq 133 MHz \geq 64 MB RAM
Connections	2 x serial 1 x parallel (Centronics) Keyboard SCSI VGA (external monitor) With Pentium Processor PC card: Ethernet (10Base-2, 10Base-T) With Celeron Processor PC card: Ethernet (10BaseT/100BaseTx), USB
Display	TFT (Thin Film Transistor) External screen interface
Mass memory	SCSI hard disk drive (\geq 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: Windows NT 4.0 Application system: Proprietary multi-tasking operating system based on VX-Works O/S-kernels
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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-1	CPU 68040 (33 MHz) with 32 MByte RAM for K1297-Classic applications Connections: 1 x serial (V.24, RJ45)
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)

Table C–11: Measurement unit: hardware (Cont.)

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)
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)
V/X	Interface board for performing measurements on V.24, X.21 or V.35 lines with the following connectors: 4 x emulation/simulation or 2 x monitoring (duplex)
DS0A	Interface module for performing measurements according to the Bellcore Standard “Digital Signal Zero ‘A’ (DS-0A 64kbit/s) Systems Interconnection” (Bellcore Technical Reference TR TSY-000458): 4 x emulation/simulation 4 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 Power-AAL	Board combination with two line interfaces for performing measurements on E1/DS1, E3/DS3 or STM1 lines with the following connectors: 4 x emulation/simulation or 2 x monitoring (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	<p>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.</p> <p>Protocol testing The K1297 provides all the tools required for passive monitoring and interactive protocol testing.</p>
Operational features	
Report generation	<p>Decodes of level/layer 1 to 7 by length: off, short, medium (several densities), complete; by code: hexadecimal, decimal, character (ASCII, EBCDIC), mnemonic</p> <p>Block or time: Split screen for separation of user/network side data</p>
Time stamps	Transmit and receive data and signal state changes of control lines are provided with time stamps. Resolution: min. 1 μ s, accuracy: min 125 μ s
Data acquisition	<p>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</p>
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 mnemonical 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, Multiframeing 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*	<p data-bbox="453 427 1013 539">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:</p> <table data-bbox="453 560 1013 1086"> <tr> <td data-bbox="453 560 655 587">EN 61326</td> <td data-bbox="666 560 1013 644">EMC requirements for Class A electrical equipment for measurement, control and laboratory use.</td> </tr> <tr> <td data-bbox="501 665 640 692">IEC 61000-4-2</td> <td data-bbox="666 665 1013 719">Electrostatic discharge immunity (Performance Criterion B)</td> </tr> <tr> <td data-bbox="501 724 640 751">IEC 61000-4-3</td> <td data-bbox="666 724 1013 778">RF electromagnetic field immunity (Performance Criterion A)</td> </tr> <tr> <td data-bbox="501 783 640 810">IEC 61000-4-4</td> <td data-bbox="666 783 1013 868">Electrical fast transient / burst immunity (Performance Criterion B)</td> </tr> <tr> <td data-bbox="501 873 640 900">IEC 61000-4-5</td> <td data-bbox="666 873 1013 927">Power line surge immunity (Performance Criterion B)</td> </tr> <tr> <td data-bbox="501 932 640 959">IEC 61000-4-6</td> <td data-bbox="666 932 1013 986">Conducted RF immunity (Performance Criterion A)</td> </tr> <tr> <td data-bbox="501 991 640 1018">IEC 61000-4-11</td> <td data-bbox="666 991 1013 1045">Voltage dips and interruptions immunity (Performance Criterion B)</td> </tr> <tr> <td data-bbox="453 1054 583 1082">EN 61000-3-2</td> <td data-bbox="666 1054 1013 1082">AC power line harmonic emissions</td> </tr> </table>	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	AC power line harmonic emissions
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	AC power line harmonic emissions																
Australia / New Zealand Declaration of Conformity - EMC	<p data-bbox="453 1109 1013 1163">Complies with EMC provision of Radiocommunications Act per the following standard(s):</p> <table data-bbox="453 1184 1013 1238"> <tr> <td data-bbox="453 1184 655 1211">AS/NZS 2064.1/2</td> <td data-bbox="666 1184 1013 1238">Industrial, Scientific, and Medical Equipment: 1992</td> </tr> </table>	AS/NZS 2064.1/2	Industrial, Scientific, and Medical Equipment: 1992														
AS/NZS 2064.1/2	Industrial, Scientific, and Medical Equipment: 1992																
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits.																

Table C–13: Certifications and compliances (Cont.)

Category	Standards or description
EC Declaration of Conformity - Low Voltage	<p>Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:</p> <p>Low Voltage Directive 73/23/EEC as amended by 93/68/EEC</p> <p>EN 61010-1/A2: 1995 Safety requirements for electrical equipment for measurement, control, and laboratory use</p>
U.S. Nationally Recognized Testing Laboratory Listing	<p>Only for devices with UL symbol on the back of the housing:</p> <p>UL 3111.1-1: Standard for electrical measuring and test equipment</p>
Canadian Certification	<p>Only for devices with UL symbol on the back of the housing:</p> <p>CAN/CSA C22.2 No. 1010.1: Safety requirements for electrical equipment for measurement, control and laboratory use</p>
Installation (Over-voltage) Category	<p>Overvoltage Category II (as defined in IEC 61010-1, Annex J)</p> <p>Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected.</p>
Pollution Degree	<p>Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.</p> <p>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.</p>
Equipment Type	Test and measuring
Safety Class	Class 1 (as defined in IEC 61010-1, Annex H) - grounded product

*** 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

The following pages provide information on how to install the virtual ethernet adapter (SmEth) and to configure the IP network, which allows the IP connection of the interface boards.

NOTE. *The description is provided for the PC-3 board, which includes the Novell NE2000 adapter, and the PC-4/PC-5 board, which includes the Intel DC21X41 adapter.*

The installation of the Protocol Tester software does not automatically include the TCP/IP protocol stack or the virtual ethernet adapter. They have to be installed manually. The TCP/IP protocol stack implements the network access. The virtual ethernet adapter allows 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-1 or 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, it can be changed in the files C:\K1297\net.ini (K1297-G20) and D:\V1.10\sys\net.ini (K1297-Classic).

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

K1297-G20. The virtual ethernet adapter is required for 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. You need access to the CD, which includes the virtual ethernet adapter.

K1297-Classic. The virtual ethernet adapter is required for the IP Gateway emulation of the Load Application package. After the system software setup you find the virtual ethernet adapter under the following path: `d:\v1.10\sys\pc-1\smeth`. Install it from this location.

NOTE. *If you want to run loopback sample scenarios or several IP Gateway emulations with the K1297-Classic software at one time, you have to install several virtual ethernet adapters. You will find further information on this specific case in the accompanying release notes.*

The installation of the virtual ethernet adapter requires the TCP/IP protocol. Ask your network administrator, if you already work with TCP/IP. In this case you can skip the following pages and directly proceed to the *Installation of the Virtual Ethernet Adapter (SmEth)* section.

To work with the network installation, you furthermore need a physical ethernet connection to your LAN.

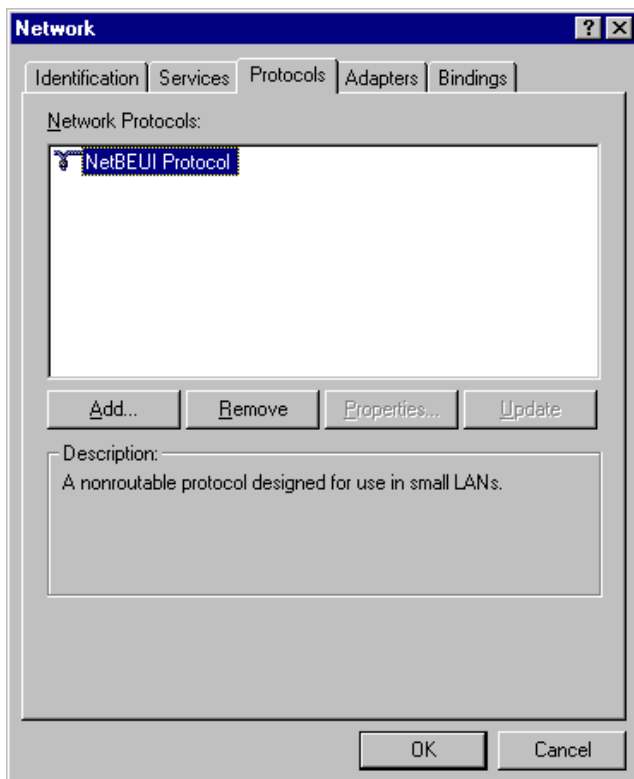
Installation of the TCP/IP Protocol

To install the TCP/IP protocol, proceed as follows:

1. Close all applications.
2. Right-click on the Network Neighborhood icon and select Properties.

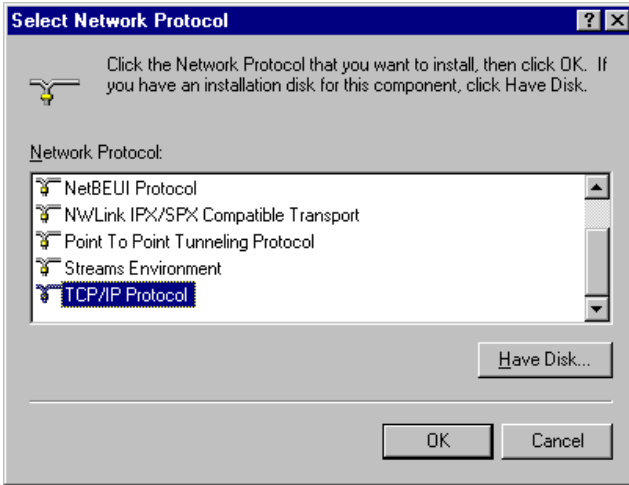
3. Select the Protocols tab in the Network dialog box.

Click the Add . . . button.

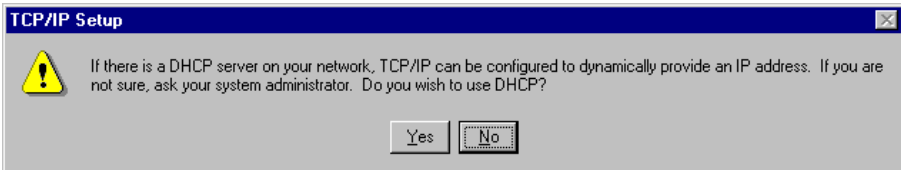


4. The Select Network Protocol box appears.

Select TCP/IP Protocol and press OK.



5. A warning concerning DHCP (a server for automatic IP assignment) appears.



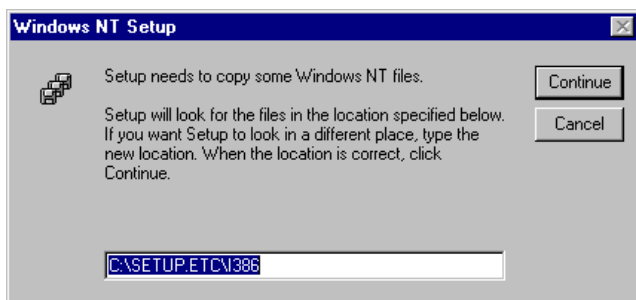
If there is a DHCP server on your network, click on Yes.

If there is no DHCP server on your network, click on No.

6. The Windows NT Setup dialog appears.

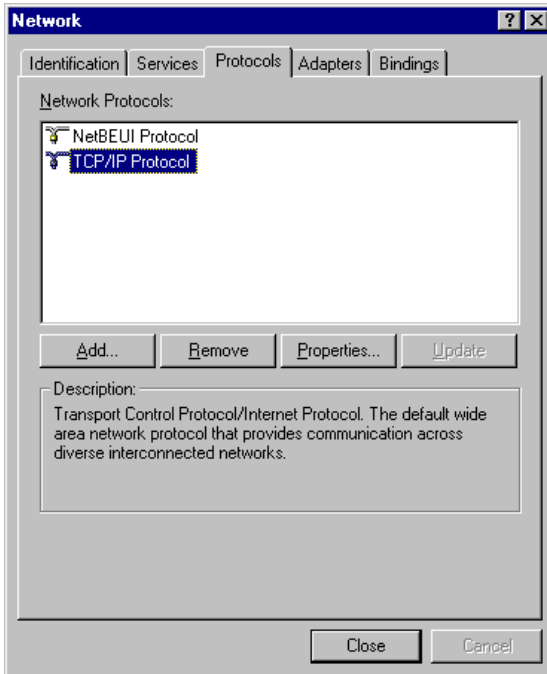
Make sure that specified location is set correctly to the path shown in the picture below or to <CD drive>:\I386

Press Continue.



7. The TCP/IP Protocol appears on the list.

Click on **Close**.



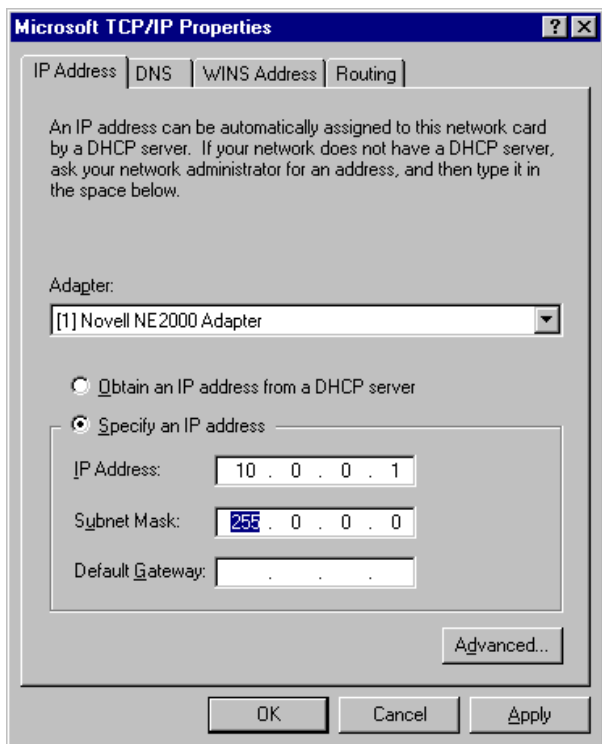
If there is a DHCP server on your network and you answered the TCP/IP Setup warning concerning DHCP use (see further above) with **Yes**, the installation of the TCP/IP protocol is now completed. You will be asked to restart the system. Answer with **Yes** to restart the system.

If there is no DHCP server on your network, you have to proceed with the next step.

Without DHCP Server. Only if you have no DHCP server on your network:

8. The IP Address tab appears. Enter an IP address and a Subnet Mask. Ask your network administrator for an address, the subnet mask entry, and for further details if necessary.

The picture below shows the IP Address tab for PC-3 board with sample entries. For the PC-4/PC-5 board the Adapters list box will show “Intel EB143 21143 based 10/100 mpbs Evaluation board”.



Press OK. You will then be asked to restart the system. Answer with Yes to restart the system.

Installation of the Virtual Ethernet Adapter (SmEth)

To install the virtual ethernet adapter, proceed as follows:

1. Close all applications.
2. Right-click on the Network Neighborhood icon and select Properties.
3. Select the Adapters tab in the Network dialog box.

Click the Add . . . button.

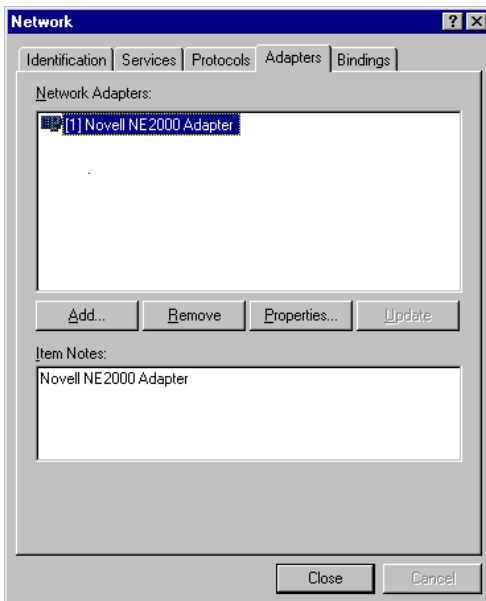


Figure D-1: Display for PC-3

Below you find the Network Adapters tab for the PC-4/PC-5 case.

Click the Add . . . button.

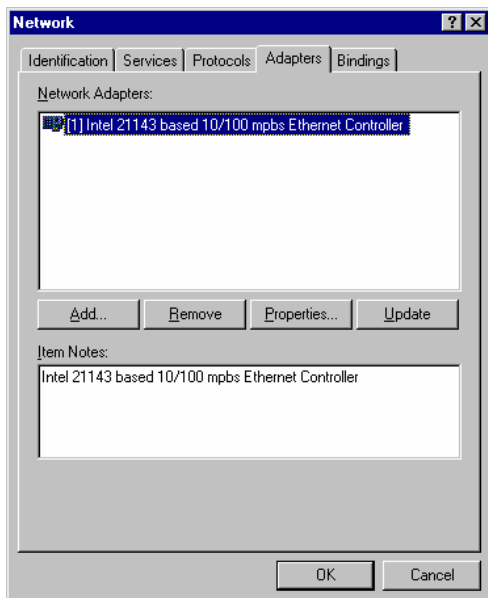
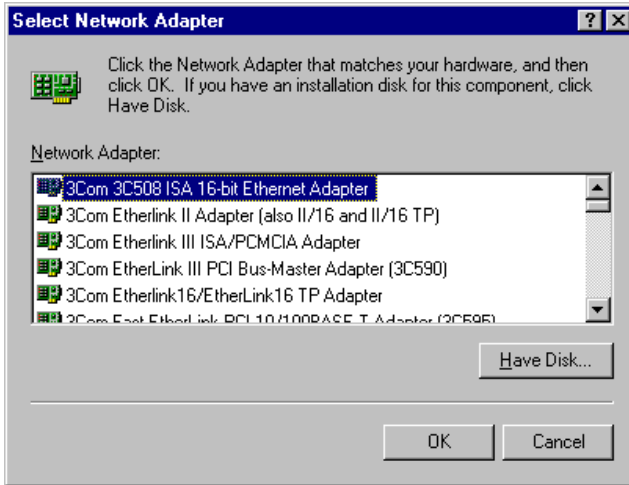


Figure D-2: Display for PC-4/PC-5

4. The Select Network Adapter window appears.

Since the SmEth driver is not yet listed, click Have Disk...



5. The Insert Disk dialog appears.

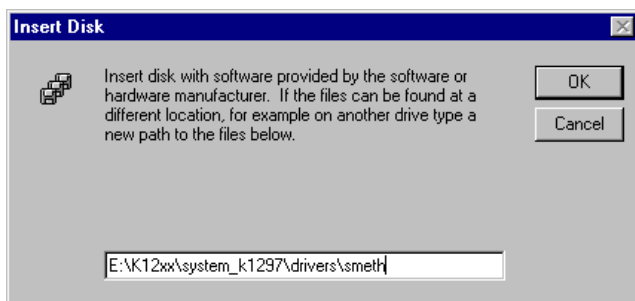
With K1297-G20 enter the SmEth path

```
<CD drive>:\K12xx\system_k1297\drivers\smeth
```

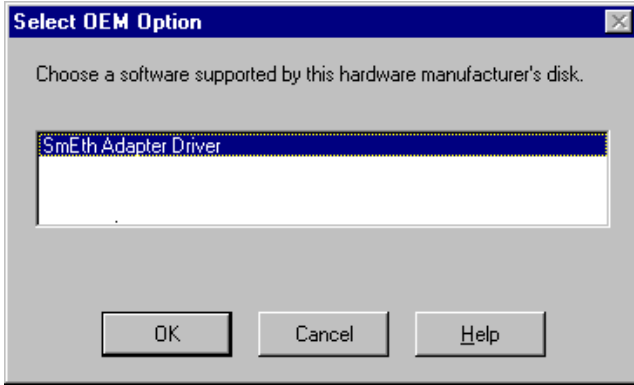
With K1297-Classic enter the SmEth path

```
d:\v1.10\sys\pc-1\smeth
```

Press OK to confirm.

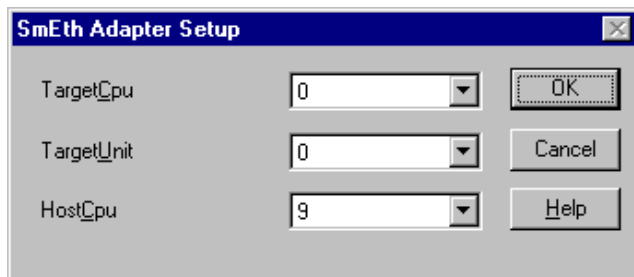


6. Select the SmEth Adapter Driver and press OK. This will start an installation procedure.

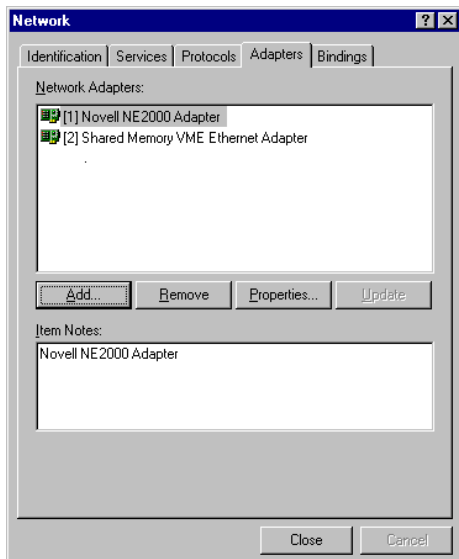


7. The SmEth Adapter Setup window appears.

You can use the default values and press OK.



The SmEth driver is now installed. The Network Adapters dialog will show now the Shared Memory VME Ethernet Adapter (example below for PC-3). Click on Close.



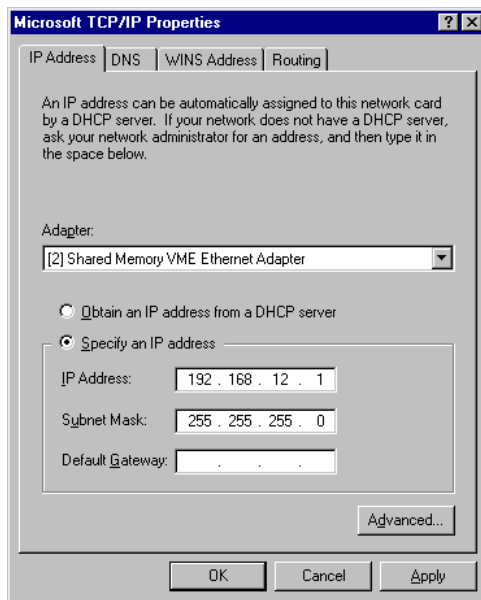
8. The IP Address tab appears.

Select the adapter from the list box:

[2] Shared Memory VME Ethernet Adapter

Insert the IP address (192.168.12.1) and the subnet mask (255.255.255.0). The address is used to build a virtual point to point IP connection between PC board and the board with CPU number 0 (usually the AP-1 or AP-4 interface board).

Press OK.



You will be asked to restart the system. Answer with Yes to restart the system.

Checking the 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 NT Troubleshooting

The following pages describe how to repair or reinstall a damaged Windows NT installation on the K1297. For general troubleshooting tips read the Windows NT help. To do this:

1. Click on *Start: Help*.

Emergency Repair Disk (ERD)

With the K1297 you will find an individual Emergency Repair Disk (ERD) which contains the state of the device at the time of production. With this Emergency Repair Disk you can reproduce the user accounts and the driver configuration that existed when the device was produced. The reproduction of the user accounts is necessary if the passwords have been lost (after being changed).

Please keep the Emergency Repair Disk in a safe place. Do not overwrite the original Emergency Repair Disk that you received with the K1297.

You should create a new Emergency Repair Disk whenever you change the user accounts or install new or different device drivers (“Devices”). You can update this Emergency Repair Disk whenever your system is stable. Read Windows NT help for more information.

Repair

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 NT boot process might crash with a “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 the Windows NT installation repair process must be carried out.

NOTE. Do not carry out the repair process before you have made sure that there is no other troubleshooting method!

You should have basic knowledge about PC based devices. Before you begin you should read the complete description of the repair process.

Prerequisites, Required Parts

Passwords Lost. If the passwords are lost, no one can log on to Windows NT. The following is required:

- *Setup Disk 1* and *Setup Disk 3* of the Windows NT package
- *Setup Disk 2 (Service Pack) english*
- *Symbios Drivers for Windows NT*
- *Emergency Repair Disk (ERD)*

Other Damages. For the repair of other damages the following is needed in addition:

- A SCSI CD drive to be attached to the SCSI interface of the K1297
- Windows NT CD-ROM

Starting the Repair

Passwords Lost. Start as follows:

1. Switch off the K1297.
2. Insert *Setup Disk 1* to the diskette drive of the K1297.
3. Switch on the K1297 and wait for the K1297 to boot from that disk.

Other Damages. Start as follows:

1. Switch off the K1297.
2. Connect the CD drive to the SCSI interface of the K1297.
3. Switch on the CD drive.
4. Insert the *Microsoft Windows NT Workstation* CD into the CD drive.
5. Insert *Setup Disk 1* to the diskette drive of the K1297.
6. Switch on the K1297.
7. Watch the BIOS boot process and check whether the CD drive is displayed in addition to the hard disk drive.

If not, switch off K1297 and the CD drive. Check the SCSI connection and the CD drive (address jumper or the like) and start again.

8. Wait for the K1297 to boot from the disk.

Continuation of the Repair

1. When you are prompted to insert *Setup Disk 2*, use instead:
Setup Disk 2 (Service Pack) english.

Press <ENTER>.

2. After a while the *Welcome to Setup* screen appears.

Select option *R* (repair).

3. In the next screen you are asked to select which parts of the installation should be checked. By default all options are selected. Usually you should not perform such a procedure. If only the passwords have been lost, then select only:

Inspect registry files

The options

Inspect startup environment

Inspect boot sector

are required only if the system does not start up. That means the system stops with a black screen or exits with certain messages (...ntldr not found...).

The option

Verify Windows NT system files

is required only if system files have been deleted or changed by mistake. Under these circumstances the system is usually unstable with unpredictable errors.

4. Move the highlighted line down and press <ENTER>.
5. In the next screen select *S* to skip mass storage detection.
6. In the next screen you will see <none> to indicate that no mass storage driver has been loaded. Select *S* for *Specifying Additional Device*.
7. In the next screen press <ENTER> for *Other (requires...)*.

8. Now you are asked to insert the following disk:
Manufacturer-supplied hardware support disk
9. Insert the disk labeled *Symbios Drivers for Windows NT* and press <ENTER>.
10. In the next screen you will see a list containing one item: *Symbios Logic PCI (53c8XX)*.
11. Press <ENTER>; the driver will be loaded.
12. In the next screen you will see:
Setup has recognized... Symbios Logic PCI...
13. Press <ENTER>.
14. Insert *Setup Disk 3* when prompted.
15. In the next screen you will be asked whether you have an Emergency Repair Disk.
16. Press <ENTER> to affirm. You will then be prompted to insert a disk labeled:
Windows NT-Emergency Repair Disk
If you have created a new Emergency Repair Disk on your own, this will probably be labeled differently. Insert the Emergency Repair Disk and follow the instructions.
17. Repair Options
You will be prompted with a screen that contains a couple of choices. Most problems will be solved by selecting *SYSTEM* and *SECURITY*. If the **passwords have been lost**, select *SECURITY* only. Make your choice and then select <CONTINUE>.
18. If the repair option *Verify Windows NT system files* has been selected, you will be prompted with the fact that *ntldr* is not the original file. Select *A* to repair all files.
19. Wait until you are prompted with:
Setup has completed repairs and follow the instructions.

20. Now the K1297 should be able to boot. There may be a warning that the system could not log you on. In this case enter the User Name *Administrator* in the logon dialog and leave the password field empty. Or if you had changed the password before creating the Emergency Repair Disk use the appropriate password.
21. If that does not work, try the whole repair process again, but in the step labeled *Repair Options* select all options.
22. If the repair option *Verify Windows NT system files* has been selected, then do the following after logging on:

If the K1297 main program or other programs start automatically after logon has completed, close these programs and reapply the NT Service Pack as delivered on the *Tools CD*.

Changing the Boot Sequence



CAUTION. This section tells how to change certain parameters of the PC BIOS of the Protocol Tester. Follow the instructions and do not change other parameters in the PC BIOS because the device might become unusable or the performance might degrade. If you have opened a menu that is not described here, press the <ESC> key immediately in order to leave the menu.

PC-3: How to Change the Boot Sequence in the PC BIOS

As a protection against certain computer viruses (boot sector viruses) the boot sequence in the PC BIOS has been changed so that the device will not start from a floppy disk.

Under certain circumstances, however, it may be necessary to start from a floppy disk. For example it becomes necessary if you want to repair a damaged Windows NT installation.

In order to start from a floppy disk, proceed as the follows:

1. Switch on the device.

A screen with a blue frame appears. Its title starts with *Power Bios*.

2. Press <CTRL>+<ALT>+<ESC> as fast as possible.

A window appears titled *Award Software International, Inc. Power BIOS 1.00 Setup*

3. Use the <CURSOR DOWN> key in order to move to the menu item called: *Boot Features*.
4. Press the <ENTER> key. Use the <CURSOR UP> or <CURSOR DOWN> keys to select the desired feature.
5. To protect against boot sector viruses, use C: , A:
6. To be able to boot from floppy disk, use A: , C:
7. Press <ENTER> when you have selected the desired option. Then press <ESC> and <ENTER> to save the change. The device will be restarted.

PC-4/PC-5 Board: How to Change the Boot Sequence in the PC BIOS

As a protection against certain computer viruses (boot sector viruses) the boot sequence in the PC BIOS has been changed so that the device will not start from a floppy disk.

Under certain circumstances, however, it may be necessary to start from a floppy disk. For example it becomes necessary if you want to repair a damaged Windows NT installation.

Proceed as the follows:

1. Switch on the device.

A black screen titled *Award Modular Bios* appears.

2. Press to perform the PC BIOS.

A window appears titled as follows (first line might be slightly different):

CMOS SETUP UTILITY .

3. Use the <CURSOR DOWN> key in order to move to the menu item called: *BIOS Features Setup*. Confirm with <ENTER>.
4. Use the <CURSOR DOWN> key in order to move to the menu item called: *Boot Sequence*. Use the <PAGE UP> or <PAGE DOWN> keys to select the desired feature:

To start from hard disk, select:

C, A, SCSI

To start from floppy disk, select:

A, C, SCSI

5. To quit the *BIOS Features Setup*, press <ESC>. To take over the changed settings, press <F10> for *Save & Exit Setup*.
6. Confirm the *SAVE to CMOS and EXIT* dialog with *Y*. The device will be restarted.

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 static-sensitive circuit boards in their static protected containers or on a metal rail. Label any package that contains static-sensitive boards.
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.*

Possible Combinations

The following combinations with ATM boards are possible:

- Two PCE I board combinations
- PCE I board combination + Power-AAL board combination
- Two Power-AAL board combinations



CAUTION. *The usage of two sets of broadband boards within one K1297 requires that the device's backplane has been prepared for this purpose.*

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.

In case you wish to work with a second set of PCE I board combinations only an experienced Tektronix service technician should perform this setting procedure.

The following figure shows an example of a double ATM board combination.

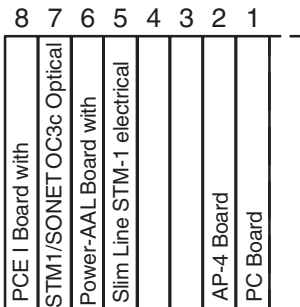


Figure F-1: Board combination (example)



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 board installings must be performed 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 or Power-AAL 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 I 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:

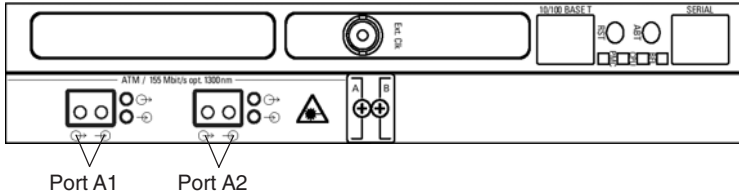


Figure F-2: One STM-1 (Tx/Rx) LIF

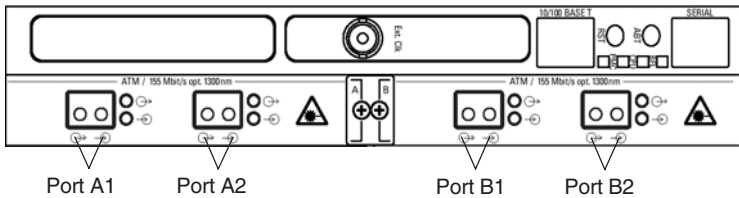


Figure F-3: Two STM-1 (Tx/Rx) LIFs

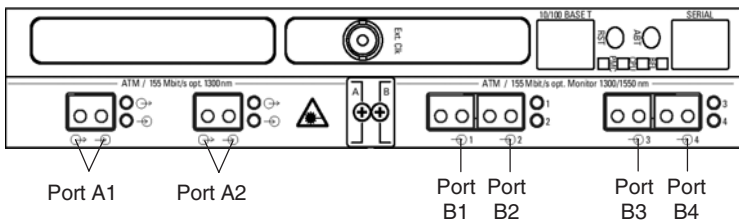


Figure F-4: One STM-1 (Tx/Rx) LIF and one STM-1 (Rx/Rx) LIF

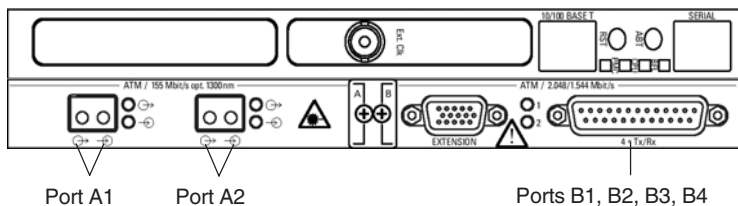


Figure F-5: One STM-1 (Tx/Rx) LIF and one E1/DS1/J1 (Tx/Rx) LIF.

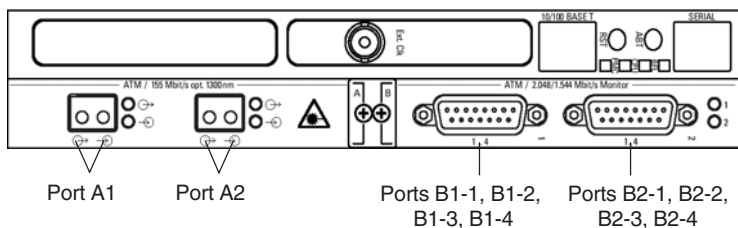


Figure F-6: One STM-1 (Tx/Rx) LIF and one E1/DS1/J1 (Rx/Rx) LIF.

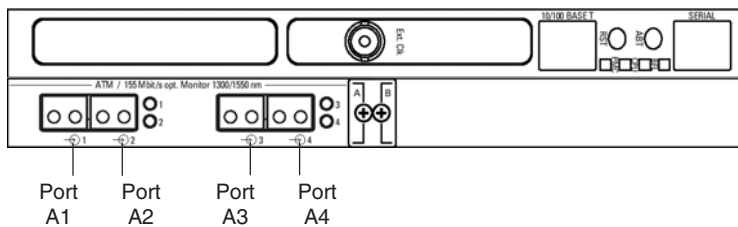


Figure F-7: One STM-1 (Rx/Rx) LIF

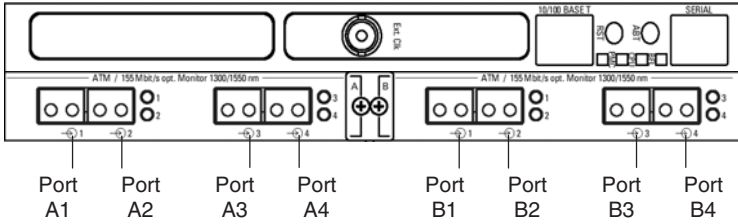


Figure F-8: Two STM-1 (Rx/Rx) LIFs

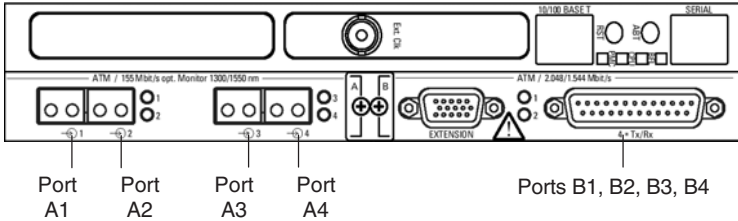


Figure F-9: One STM-1 (Rx/Rx) LIFs and one E1/DS1/J1 (Tx/Rx) LIF

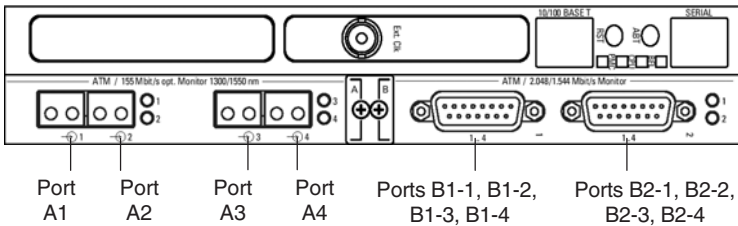
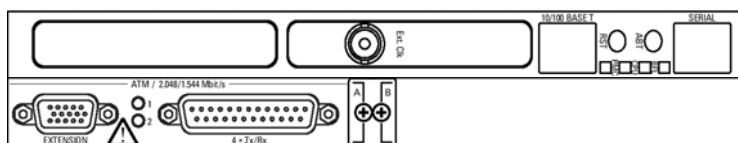
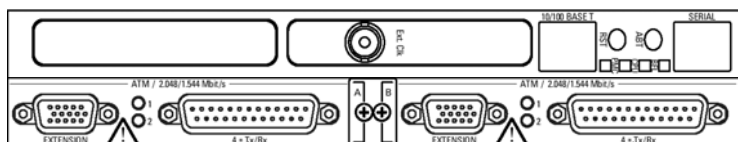


Figure F-10: One STM-1 (Rx/Rx) LIFs and one E1/DS1/J1 (Rx/Rx) LIF



Ports A1, A2, A3, A4

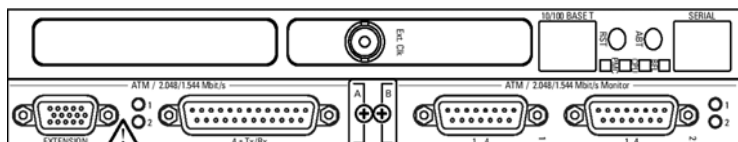
Figure F-11: One E1/DS1/J1 (Tx/Rx) LIF



Ports A1, A2, A3, A4

Ports B1, B2, B3, B4

Figure F-12: Two E1/DS1/J1 (Tx/Rx) LIFs



Ports A1, A2, A3, A4

Ports B1-1, B1-2,
B1-3, B1-4

Ports B2-1, B2-2,
B2-3, B2-4

Figure F-13: One E1/DS1/J1 (Tx/Rx) LIF and one E1/DS1/J1 (Rx/Rx) LIF

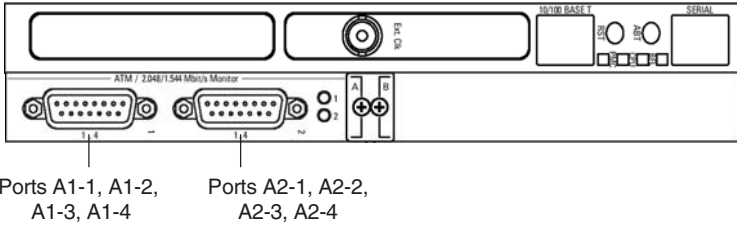


Figure F-14: One E1/DS1/J1 (Rx/Rx) LIF

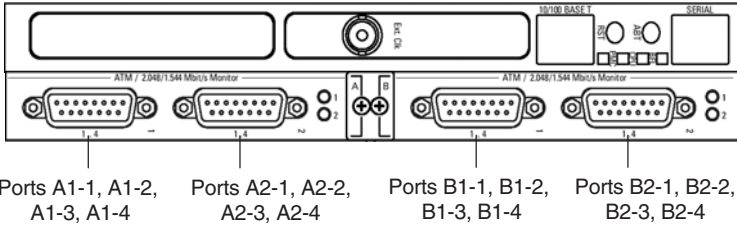


Figure F-15: Two E1/DS1/J1 (Rx/Rx) LIFs

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.

Installing Power-AAL Board Combinations

For monitoring purposes the K1297 Protocol Tester can be equipped with a double Power-AAL combination.

This section provides procedures for mounting and installing a Power-AAL combination on your *K1297 Protocol Tester* for broadband monitoring purposes. .



CAUTION. *Any installing of a Power-AAL board - this also includes the mounting of a Power-AAL board or a Power-AAL 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 double Power-AAL combination requires software version K1297-G20 V1.11 or above.

If you use software version *K1297-G20 V1.10* with K1297-G20 Patch V1.10.01 or above, it is also possible to run a double Power-AAL combination. For further information or to acquire the software patch, contact Tektronix technical support under mpt.hotline@tek.com.

Which Board into Which Slot

Power-AAL board combinations and the slots for these boards are marked with red color.

1. Put only red marked boards into red marked slots.

In benchtop devices, slots 7 and 8 are used by an installed Power-AAL combination. Slots 5 and 6 can be prepared with an additional P2 backplane adapter to use a second Power-AAL board combination.

In compact devices, slots 4 and 5 are used by an installed Power AAL combination.



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

In benchtop devices, only slot 5 to 8 are suitable for broadband boards. Do not put a double Power-AAL combination into other slots. In compact devices, only slot 4 and 5 are suitable for broadband boards.

Possible Combinations

You can combine any two of the following Power-AAL combinations or choose two of the same kind:

- Power-AAL with E1/DS1 electrical interface
- Power-AAL with E3/DS3 electrical interface
- Power-AAL with STM-1/SONET OC-3c optical interface

A K1297 Protocol Tester with a double Power-AAL always requires an additional AP-4 board. The following figure shows examples of double board combinations.

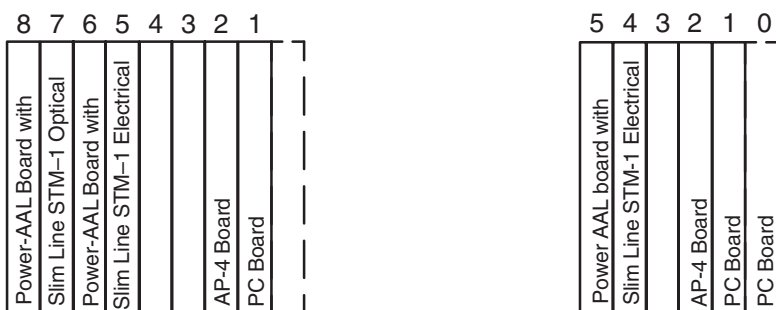


Figure F-16: Board combination (examples)



CAUTION. A double Power-AAL combination always requires an AP-4 board.

In benchtop devices, use slot 2 for the AP-4 board. Only use slot 3 for the AP-4 board if an additional AP-1 board is used in slot 2.

Do not use an E1/DS1 or an ETHERNET board together with an AP-1/AP-4 combination.

In compact devices, use slot 1 for the AP-4 board.

You can install further boards into the remaining slots. The following combinations are possible for benchtop devices:

- Two Power-AALboard combinations + AP-4 board + ETHERNET board
- Two Power-AAL board combinations + AP-4 board + E1/DS1 board
- Two Power-AAL board combinations + AP-1 board + AP-4 board



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. The optical output's radiation power corresponds to the laser class 1 in accordance with IEC 825-1, 11.93.*

Mounting and installing a Power-AAL combination consists of three major groups of working steps:

- Preparing the slots for the Power-AAL combination
- Connecting the backplane adapter
- Setting the CPU numbers for the Power-AAL combination

Preparing the Slots for the Power-AAL Board

To prepare the slots for the Power-AAL combination, proceed as follows:

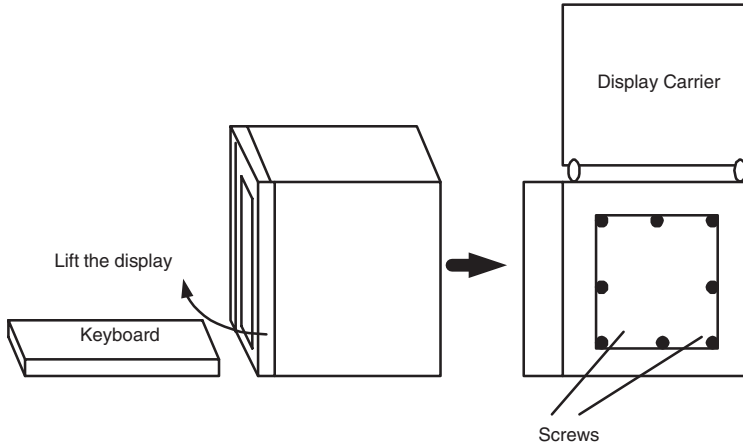
1. Make sure the device is switched off and the mains plug is disconnected. Disconnect all existing interface lines because high voltages may occur on the relevant sockets.
2. Remove the cover of slots, if the slots are empty.
If the slots are already in use, remove modules from slots:
 - a. Remove the two mounting screws from the module's front cover. The screws must be completely loosened.
 - b. Use your thumbs to simultaneously press outwards on the levers located beneath the screws.
 - c. Carefully pull out the interface board. Make sure that the spring strip on the long side of the module cover is not being damaged. If the two springs located on the internal side of the module's front cover catch when removing the module, press the springs carefully back using an appropriate tool.
 - d. Then pull the module completely out of the device.

Connecting the Backplane Adapter

The Power-AAL must be connected to the Slim Line board via an additional P2 backplane adapter, which is part of the Power-AAL combination delivery. This adapter is mounted on the P2 connectors of the corresponding boards.

Connecting the Backplane Adapter for Benchtop Devices. To connect the P2 backplane adapter, proceed as follows:

1. Lift the display. Remove the 8 screws that attach the metal cover.



2. Connect the Power-AAL and the Slim Line board interfaces with the help of the backplane adapter. Press the backplane adapter tightly on to the two lower P2 connectors.

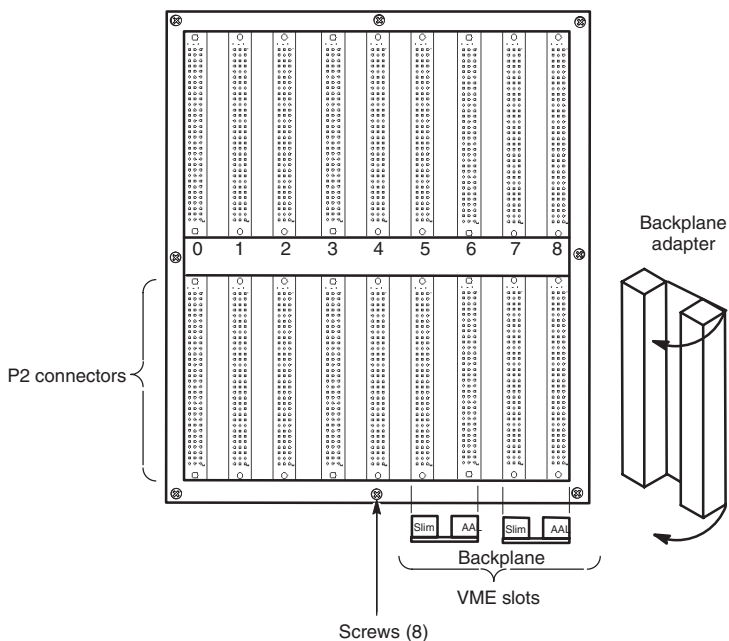


Figure F-17: Backplane, Backplane Adapter, and P2 Connectors

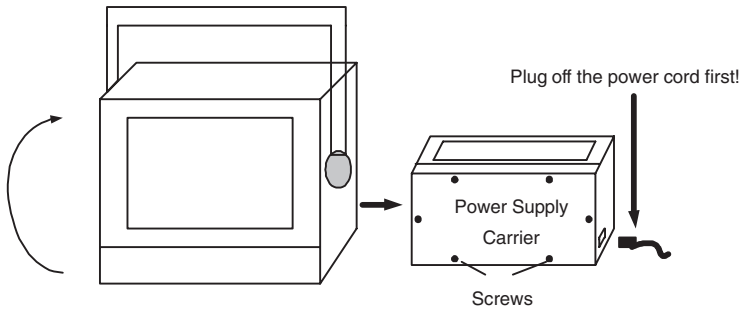


CAUTION. If your K1297 Protocol Tester is equipped with a 4-slot backplane adapter, you have to remove this wide backplane adapter, first. Refer to chapter Getting Started, section Installing Modules.

3. Reinstall the metal cover and the 8 screws.

Connecting the Backplane Adapter for Compact Devices. To connect the P2 backplane adapter, proceed as follows:

1. Put the K1297 on its back. Lift the power supply carrier. Loosen the 6 screws that attach the power supply carrier.



2. Connect the second Power-AAL and the Slim Line board interfaces with the help of the backplane adapter. Press the backplane adapter tightly on to the two lower P2 connectors.

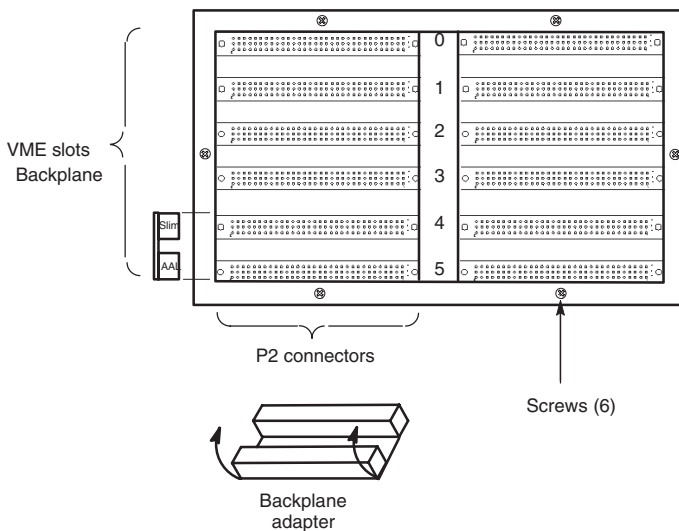


Figure F-18: Backplane, Backplane Adapter, and P2 Connectors



CAUTION. *If your K1297 Protocol Tester is equipped with a 4-slot backplane adapter, you have to remove this wide backplane adapter, first. Refer to chapter Getting Started, section Installing Modules.*

3. Reinstall the power supply carrier and the 6 screws.

Setting CPU Numbers for a Second Power-AAL Combination

In order to operate a double Power-AAL 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 Power AAL board are an integral part of the CPU's bootline. You can modify this bootline as follows.

1. Remove the installed Power-AAL combination from slots 7 and 8 in the Protocol Tester.

Check whether the FlashPROMs write protect jumper on the new Power-AAL combination is in place to make sure that the FlashPROM is writeable. The write protect jumper can be found when you look from below to the Power-AAL combination as shown in the following figure.

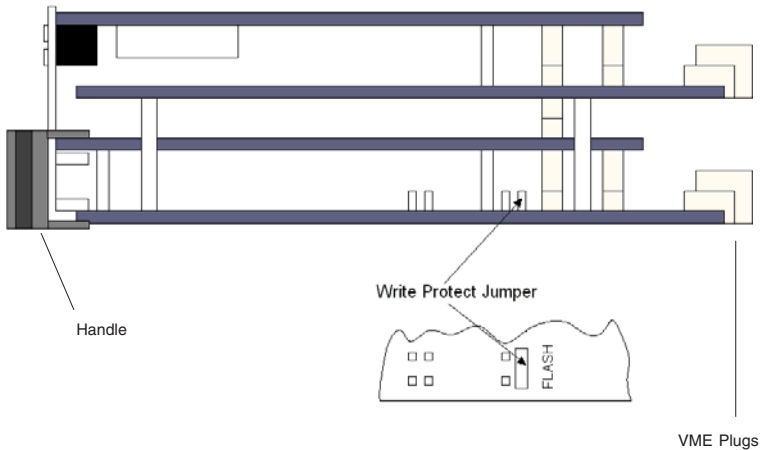


Figure F-19: Write Protect Jumper

2. Install the second Power-AAL combination into slots 6 and 5 of your K1297.

The first Power-AAL combination must stay removed from the Protocol Tester.

3. Switch on the Protocol Tester. Watch for the blue screen during the Windows NT boot phase. You should see boot messages of at least four CPUs.

Example:

```
CPU #0 E17 found.  
CPU #3 found.  
CPU #4 found.  
CPU #9 E138 found.
```

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 NT *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:

```
manufacturer: 89  
device: a6  
block erase done  
value = 0 = 0x0
```

```
->
```

6. In order to change CPU #4 , click the Windows NT *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:

```
manufacturer: 89  
device: a6  
block erase done  
value = 0 = 0x0
```

```
->
```



CAUTION. *Take extreme care not to modify any other bootline contents. Erroneous bootline contents can impact that the Power-AAL combination does not boot anymore.*

You need a booted CPU in order to modify bootline contents. Otherwise you have to send the Power AAL 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 blue screen during the Windows NT boot phase will indicate the CPU numbers 5 and 6 instead of 3 and 4. Wait until the boot process is finished and shut down the Protocol Tester again.

Clearly mark the modified Power-AAL combination on the front panel.

NOTE. *Setting the CPU number to 3 and 4 instead of 5 and 6 will bring the Power-AAL combination back to its original state.*

8. Install the Power-AAL combination with CPU #3 and #4 into slot 7 and 8. Install the Power-AAL 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 blue screen during the Windows NT boot phase. You should see boot messages of at least six CPUs now.

Example:

```
CPU #0 E17 found.  
CPU #3 found.  
CPU #4 found.  
CPU #5 found.  
CPU #6 found.  
CPU #9 E138 found.
```

Exchanging ATM Slim Line Boards

The exchange of an ATM Slim Line board consists of three major groups of working steps:

- Removing the Power-AAL combination from the basic device
- Separating ATM Slim Line board from the Power-AAL board
- Mounting a new ATM Slim Line Board onto the Power-AAL board

Removing the Power-AAL Combination. To remove the Power-AAL 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 Power-AAL combination's front cover. 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 Power-AAL 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 Power-AAL combination completely out of the device.

Separating ATM Slim Line and Power-AAL Board. To separate the ATM Slim Line board from the Power-AAL board, proceed as follows:

1. Place the Power-AAL combination on your ESD work bench with the ATM Slim Line board downward.
2. Remove the two screws holding the protective foil that covers Power-AAL board.
3. Lift up the protective foil.
4. Remove the five screws that fix the Power-AAL board on the ATM Slim Line board.
5. Lift the Power-AAL board carefully near screwholes.
6. Make sure that the connector plug stays on the Power-AAL board.

Mounting the ATM Slim Line Board onto Power-AAL Board. To mount a new ATM Slim Line board onto a Power-AAL board, proceed as follows:

1. Place the Power-AAL board onto the table with the protective foil side downward.
2. Make sure that the connector plug is mounted properly on the Power-AAL board.
3. Carefully place the ATM Slim Line board onto the Power-AAL 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 mezzanine boards can cause damage. Only use pressure points on the ATM Slim Line carrier board.*

5. Turn the Power-AAL combination upside down. Insert and tighten the five screws that fix the Power-AAL board on the ATM Slim Line board.
6. Fix the protective foil that covers Power-AAL board with two screws.

NOTE. *A detailed description on how to exchange ATM slim line boards can you find in the Mounting Instructions "K1297 Boards: Exchanging ATM Slim Line Boards" (C73000-T6074-C91, available on request).*

Overview: CPU Numbers with ATM Board Combinations

The following tables list how the CPU numbers (VME bus addresses) must be set if you work with a second set of ATM board combinations consisting of a Power-AAL board combination or a PCE I board combination.

In order to operate two sets of ATM boards within one K1297, the default CPU numbers of the second set have to be changed.



CAUTION. *The usage of two sets of broadband boards within one K1297 requires that the devices backplane has been prepared for this purpose.*

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 case you wish to work with a second set of PCE I board combinations only an experienced Tektronix service technician should perform this setting procedure.

K1297

The following tables give an overview of the required CPU numbers for ATM board combinations for the K1297 Protocol Tester:

Table F-2: K1297 with one or two PCE I board combinations

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: K1297 with one PCE I and one Power-AAL board combination

Board	CPU Numbers	Slots
PCE I board	3 (host processor board)	8/7
Power-AAL board	5 (CPU 1), 6 (CPU 2)	6/5

Table F-4: K1297 with one or two Power-AAL board combinations

Board	CPU Numbers	Slots
1st Power-AAL board	3 (CPU 1), 4 (CPU 2)	8/7
2nd Power-AAL board	5 (CPU 1), 6 (CPU 2)	6/5

Always, the CPU number pairs 3/4 and 5/6 are reserved for usage of ATM board combinations in the K1297 Protocol Tester.

K1297 Compact

The following tables give an overview of the required CPU numbers for ATM board combinations for the K1297 Compact Protocol Tester:

Table F-5: K1297 Compact with one PCE I board combination

Board	CPU Numbers	Slots
PCE I board	3 (host processor board)	4/5

Table F-6: K1297 Compact with one Power-AAL board combination

Board	CPU Numbers	Slots
Power-AAL board	3 (CPU 1), 4 (CPU 2)	4/5

The ATM Power AAL board combinations have the address settings 3 and 4, the PCE I host processor board has address setting 3 upon delivery.

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 implementations 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)

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

SIEMEM

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

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