K1297 and K1205 Protocol Testers

▶ **Features & Benefits**

Protocol Monitoring, Simulation and Emulation (K1297) or Monitoring Only (K1205) in a Single Cost-effective Unit for Development, Operation and Maintenance Applications

Directly Address UMTS, GPRS, GSM, CDMA and Other Mobile, Core and Access Networks with More than 700 Protocols – No Need for Separate Test Equipment

Adaptable – Selection of Protocols and Network Interface Modules Configurable for Current and Future Specific Testing Needs

Powerful – Simultaneous Multi-layer Protocol Measurements at Multiple Different Interfaces – Support Interworking Tests, Valuable Tools for Identifying the Sources of Problems

Simple, Intuitive Environment for Operators, Flexible Programming Tools for Advanced Users, Covers All Needs with Low Risk of Errors
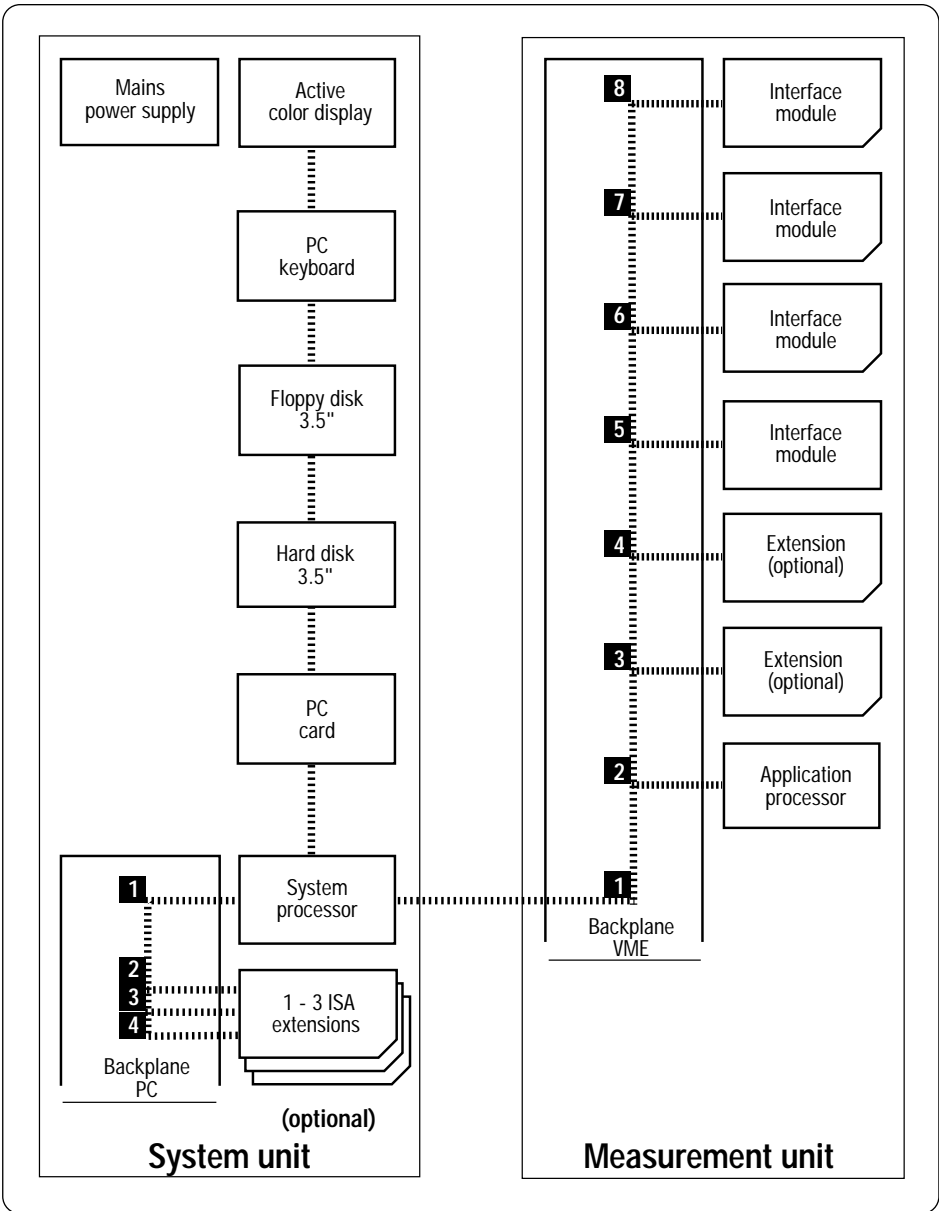
Flexible, Comprehensive Protocol Testing

The K1297 and K1205 Protocol Testers provide very flexible modular hardware and software platforms for monitoring, simulating and emulating network traffic. A selection of interface modules and software packages allow testing of most interfaces in mobile, core and access networks. The K1205 provides monitoring only; the K1297 performs monitoring, simulation and emulation, including network element emulation and interdependence testing.

Architecture Supports High Performance, Configurability

The K1297 and K1205 Protocol Testers use an efficient hardware architecture that separates the user- and data-handling functions from the measurement applications and incorporates dedicated processors and communication controllers in each section.

▶ **Applications**

For Manufacturers of Communication Systems and Components
– Functional Testing from Development to Operation
– Integration/Testing of New Products
– System and Conformance Tests
– Monitoring for Error Analysis
– Functional Testing to Reproduce Error Situations

For Private and Public Network Operators
– Acceptance and Conformance Tests
– Monitoring Networks for Error Detection and Analysis in the Field
– Functional Testing to Reproduce Error Situations
– Assessing Interoperability of Services Through the Different Access and Core Technologies such as UMTS, GPRS, GSM, CDMA, ISDN, SS7, IN and IP
– Network Element Emulation, for example, HLR
– Interworking and End-to-End Testing

Tektronix

Enabling Innovation

K1297 and K1205 Protocol Testers

System unit

Mains power supply	Active color display
	PC keyboard
	Floppy disk 3.5"
	Hard disk 3.5"
	PC card
1	System processor
2 **3** **4**	1 - 3 ISA extensions

Backplane PC

(optional)

Measurement unit

8 Interface module

7 Interface module

6 Interface module

5 Interface module

4 Extension (optional)

3 Extension (optional)

2 Application processor

1 Backplane VME

▶ *Example of a K1297 Protocol Tester with system unit and measurement units for narrowband.*

The compact K1297/K1205 utilizes a VME bus system with 5 (portable) or 8 (benchtop) slots that enable a broad variety of configuration options, as well as the ability to expand as needs grow.

Slot 1 contains a Pentium PC System Processor, with an external XVGA connection, SCSI interface, Ethernet connection for 10Base-2 and 10Base-T, as well as two serial ports and one parallel port. In addition to the system processor (PC) and application processor (AP) cards, the VME backplane also accommodates an assortment of test interface cards.

K1297/K1205 standard versions are equipped with a high-contrast XVGA-compatible color TFT display keyboard, floppy and hard disk drives. The built-in Ethernet adapter makes the K1297/K1205 available for remote control use in a network, while the PCMCIA slot also accepts various communication interfaces (e.g., a modem card to enable optional remote operation via telephone lines).

A Wide Array of Measurement and Test Interface Boards

The K1297 and K1205 are specifically designed to offer the user exceptional flexibility and expandability for monitoring applications. The 4 or 7 measurement slots, respectively, enable a broad variety of configuration options, as well as the ability to expand as needs grow.

The K1297/K1205 may be equipped with measurement boards for monitoring, simulation and emulation applications. Available test hardware includes VME bus cards for DS1 (PCM24), E1 (PCM30), modules for narrowband ISDN with S_0 and/or U_{2B1Q} interfaces for broadband ATM and V./X. for X.21/V.24/V.35 and a 100 Mb/s Ethernet board.

Monitoring Applications To Verify Performance and Troubleshoot Problems (K1205 and K1297)

Powerful, Yet Easy-to-Use Monitoring Tools For:

▶ Network Monitoring and Analysis of UMTS, GPRS, GSM900, DCS1800, PCS1900, CDMA, SS7, IP, ISDN D-Channel and V5.X Protocols

▶ Interworking Measurements

▶ In-service error detection for GPRS Interfaces

▶ Detection of all activities in the core network

▶ Verification of protocol implementation (for manufacturers)

Whether used to setup test hardware and software, connect to Pulse Code Modulation (PCM) sections (E1/DS1) or narrowband ISDN sections or for protocol recognition and link selection, the K1297 and K1205 Protocol Testers are easy to get up and running.

When connected to PCM sections, an automatic configuration function determines the correct signaling channels and framing – all active signaling channels are available, and may be displayed either simultaneously or separately. In the graphical display of the complete channel assignment, users can see at a glance which time slot is currently occupied and where signaling is occurring. By simply pressing a key, data from a specified connection is selected and displayed. Sophisticated filters can be used to reduce the received data to the desired essential results.

The K1297/K1205 Protocol Tester provides several display formats. Message components are decoded online, interpreted and issued in mnemonic form as well as binary or hexadecimal. Special search functions enable the targeting of any message components, such as call tracing with a subscriber number or an IMSI/TMSI (International/Temporary Mobile Subscriber Identification).

Besides the provided protocol stacks, a powerful, graphical protocol stack editor allows users to easily compile the required protocols for each application out of the more than 700 protocols available.

Some Examples of Monitoring Applications

As network complexity has grown, it has become more important to monitor different interfaces simultaneously. The K1297/K1205 Protocol Tester is able to analyze GPRS traffic and monitor several different interfaces (such as G_b, G_s, A and A_{bis}) at the same time. It displays all the traffic in one window and offers zoom and filtering tools to reduce the amount of data and generate statistics.

Simultaneous decoding of multiple protocols. The Protocol Tester monitors gateways from national to international networks, as well as those from the fixed network to the mobile wireless network.

Simultaneous monitoring of all full-duplex signaling links between two switching modes. The functionality, performance and through-switching time of the switching center with input and output link sets are analyzed, regardless of each link set's configuration. The signaling load (Erlang value) of individual signaling links can be measured and displayed directly.
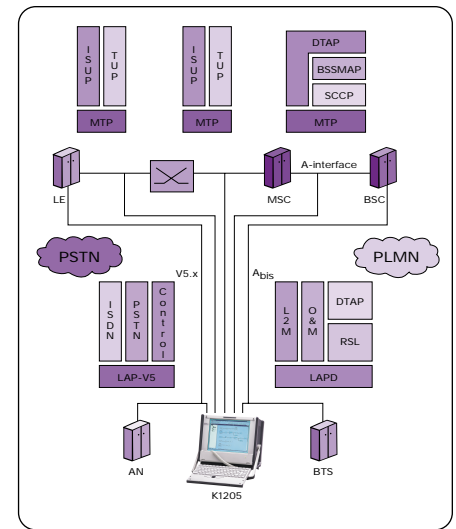
▶ *Figure 1. Example of protocol stacks and links.*

Converging Networks. As data and voice networks converge, the need to monitor their characteristics simultaneously has become mandatory.

Interworking. The K1297 and K1205 Protocol Testers are also well suited for interworking measurements, due to its compatibility with a broad range of protocols and its ability to monitor with different protocol stacks on different links (see Figure 1). The resulting data decoded with different protocol stacks can be displayed in a common window.

Record Play Back

Each K1205 and K1297 offers offline analysis with the same features as are available online, for example, filter, call trace and statistics. This record play back with analysis is also available for use on a PC.

K1297 and K1205 Protocol Testers

Simulation and Emulation Applications To Assess System Performance Under Controlled Conditions (K1297-G20)

Tools for Functional, System and Conformance Testing

The K1297-G20 Protocol Tester combines simulation and emulation tools, such as test suites and traffic generation, with the monitoring capabilities of the K1205 Protocol Tester to address functional testing applications. The K1297-G20 Protocol Tester is a comprehensive, configurable platform for intrusive and non-intrusive protocol testing and analysis in communication networks, especially in mobile networks. Its open, flexible architecture adapts the Protocol Tester to most measurement challenges and makes it easy to configure and operate.

Test generation capabilities provide the means to simulate specific protocol layers and emulate all underlying layers automatically, or even to emulate the full function of network elements. The K1297-G20 features the ability to generate traffic on almost all interfaces and to mix technologies in one test scenario, a vital advantage in interworking and interoperability testing for the optimization of resources.

Simulation and Emulation Application Examples

Predefined message flows. The K1297-G20 is able to send an individual message or handle a predefined message flow, such as conformance tests or individually developed test cases.

Layer Emulation. The K1297-G20 provides the functionality of a specific protocol layer which behaves as the corresponding function in a network element.

Functional Tests. The K1297-G20 offers flexible protocol configuration mechanisms and a wide selection of programming and scripting tools, which allows test case definition on an abstract level as well as on a detailed protocol level.

Conformance Tests. A variety of different conformance tests can be executed, configured and controlled via the TTCN execution environment. The TTCN development environment supports the creation of custom conformance tests as well as the modification of existing conformance tests issued by standardization organizations.

Interoperability Tests. In today's telecommunication world, proof of interoperability of services through the different access and core technologies such as ISDN, GSM, UMTS, SS7, IN and IP is essential. The K1297-G20 offers an open platform that allows the free combination of all supported technologies and protocols in one test scenario. This saves time creating interoperability test suites or protocol converters involving different protocol families in one test/emulation.

Network Element Emulation. In the early development phase and in the beginning of trial phases, hardware versions of network elements are not always available or affordable. The K1297-G20 can replace missing network functionality by emulating individual interfaces of network elements such as an HLR or SGSN, or even whole portions of the network such as GGSN and the Internet. With its wide set of pre-developed network element emulations and a flexible configuration, the K1297-G20 substantially shortens time to market/operation in a continuously changing environment.

▶ Characteristics

Physical Characteristics (Base Unit)

PORTABLE UNIT

Dimensions*1	mm	in.
Height	290	11.4
Width	370	14.6
Depth	200	7.9
Weight	**kg**	**lbs.**
Net (approx.)	9 to 12*2	19 to 26*2

BENCHTOP UNIT

Dimensions*1	mm	in.
Height	320	12.6
Width	410	16.1
Depth	300	11.8
Weight	**kg**	**lbs.**
Net (approx.)	16 to 20*2	35 to 44*2

*1 Keyboard attached; without carrying handle.

*2 Depending on number of equipped Interface Boards.

Power Supply

Line Adapter – Safety class I (protective grounding).

Line Voltage –
Rated Range of Use: 100 V/240 V ±10%. Automatic changeover.
Line Frequency – Rated Range of Use: 50/60 Hz, –6% to +5%.
Power Consumption – Maximum Value: 460 VA.

Environmental Characteristics

Ambient Temperature –
Reference Value: 23 °C ±5% (73 °F 5%).
Rated Range of Use: 4 °C to 40 °C (39 °F to 104 °F).
Limit Range for Storage and Transportation: –20 °C to +55 °C (–4 °F to +131 °F) at 85% relative humidity.

Barometric Pressure, Altitude –
Reference Value: 101.3 kPa (1013 mbar).
Rated Range of Use I: 70.0 to 106.0 kPa (up to 2200 m) (700 to 1060 mbar).
Limit Range of Operation: 53.3 to 106.0 kPa (up to 4300 m) (533 to 1060 mbar).

Safety – UL3111-1, CSA1010.1, EN61010-1, IEC61010-1.

Measurement Modules

E1/DS1 Interface Board (PRIMO)
The PRIMO VME bus card contains four monitoring only interfaces, configured by the basic software to be DS1 or E1. The interfaces connect to transmission lines via DB9 connectors and matching adapter cables. The PRIMO board allows connection to protected or unprotected monitoring points and the software selects either high-impedance or low-impedance inputs. With six PRIMO modules installed (benchtop model), the K1297/K1205 is capable of simultaneously monitoring 24 interfaces with 48 (full duplex) time slots.

E1/DS1 Monitoring/Simulation Boards (PRIME)
PRIME modules are available for two transmission rates, 1.554 Mb/s and 2.048 Mb/s. Four simulation sockets are provided – each containing a transmitter and receiver for PCM signals. For monitoring, a receiver from each of the two adjacent simulation sockets is combined on a single socket.
Each board has the ability to:

▶ Simulate on four ports (no monitoring)

▶ Simulate on two ports and monitor on one

▶ Monitor on two ports

Ethernet Board
The Ethernet board is equipped with two modules for special applications such as GPRS G_n/G_i. The modules comply with the IEEE 802.3 for 10Base-T and 100Base-T; and both full duplex and half duplex modes are supported.

V/X Board
The V/X board is used for measurements on V24, X21 and V35 interfaces. Monitoring, DCE Emulation and DTE Emulation modes of operation are available with the V/X interface module.

ISDN Boards (BAI)
The BAI board is required for measurements on ISDN lines and connections. The board consists of two sections – each may be equipped as an S_0 or U_k (U_{2B1Q}) interface, that contains two ports for simulation or one for monitoring.

K1297 and K1205 Protocol Testers

Broadband (ATM) Boards

PCE I AAL Board
The main component of PCE I boards is the host processor board. The PCE I board can be equipped with one or two line interface boards.

PCE I STM-1/SONET OC-3: 155 Mb/s, Optical, LC Duplex Slim Line Interface

▶ ITU G.957-S1.1 optical ITU G.708

▶ SDH (SONET) section

▶ Two Rx, 1200 to 1600 nm (single- and multi-mode)

▶ Two Tx, single-mode, 1310 nm, typical

PCE I E1/T1 Line Interface

▶ E1/T1 switchable

▶ Four Rx, four Tx

Software Characteristics

Operating System – Windows NT 4.0.

Application Software

▶ Context-sensitive online help

▶ All tools required for passive monitoring and interactive protocol testing are provided

▶ Automatic Configuration: Searches the signaling channels in the connected PCM sections automatically

▶ Unlimited monitoring links and a license for one simulation/emulation link are included in the base units

Software Tools for the Development of Test Cases/Emulations

The **Emulation Scenario Editor (ESE)** is the main control center for intrusive test configuration and execution. Its Diagram View offers a very flexible and easy-to-use process to configure the K1297-G20 hardware according to a given protocol stack and test configuration. It also offers Parameter View to configure the individual simulations/emulations and to trigger actions in the software modules. The Test Scenario Control Center (TSCC) configures customized arrangements of parameters for specific applications. Large libraries of sample configurations of standard configurations and test applications are provided for both ESE and TSCC.

The **Message Building System (MBS)** allows the creation of message templates that will be sent or be compared graphically with received messages. Users are able to select and combine protocol elements to define messages, with the aid of protocol specific information that is presented graphically. The result is a message pool that can be used by the various test case development tools. For interactive testing, as well as for individual error intrusion, messages defined in a message pool can be directly sent via/to a layer emulation. This feature is important in the design and integration of new implementations.

The **Message Sequence Chart (MSC)** supports the full range of test scenarios from the very simple to the most complex. This development tool defines test sequences in an intuitive and graphic way by placing messages, timers, loops and other elements in a self-documenting message flow chart. The messages are simply selected from a message pool and dragged to the proper position in the flow chart.

FORTH Script Interpreter is a language that supports iterative interactive test script development. Commands are executed instantly as they are typed and they can be combined into complex state machines.

The **C-Programming language** supports direct programming of complex emulations or test scenarios in a familiar programming language and is commonly used during system integration and test. **SDL Development** tools may be used as a front end for the C-Programming language to implement emulations in a graphical format.

Tree and Tabular Combined Notation (TTCN) is an abstract test language that is often used by standardization organizations to describe conformance tests. Two products based on the DANET TTCN Toolbox are used to generate, compile and execute TTCN test suites – the **TTCN Development Environment** and the **TTCN Execution Environment.**

Software Tools for the Development of Automatic Test Programs

Remote Operation. The Tektronix Remote Operation Package features the Test Synchronization Protocol 1+ (TSP1+) and CORBA (Common Object Request Broker Architecture). It contains primitives and messages to remotely manage a complete test session.

Test Management System for Test Automation. With the Test Management System users can assemble their own test suites for local or remote automated and/or regression testing. The stand-alone graphical user interface can be operated from any Windows PC, and the communication with the K1297-G20 is established via a TCP connection. Change management is provided to fulfill ISO9000 requirements.

PC Development Environment. Physical measurement equipment is capital intensive and frequently in use, so it is important to have a tool that allows you to develop test programs without using the actual test hardware. The K1297-G20 Offline Development Environment offers:

▶ Test case development (MBS, MSC, C, TTCN, FORTH)

▶ Test configuration (offline parameter of ESE and TSCC)

▶ Playback (decode, filter, monitoring applications) of trace files as if they were live

▶ Analysis of test automation log files

▶ Use of offline optimization tools

K1297 and K1205 Protocol Testers

Our most up-to-date product information is available at:
www.tektronix.com

CE

Tektronix

Enabling Innovation