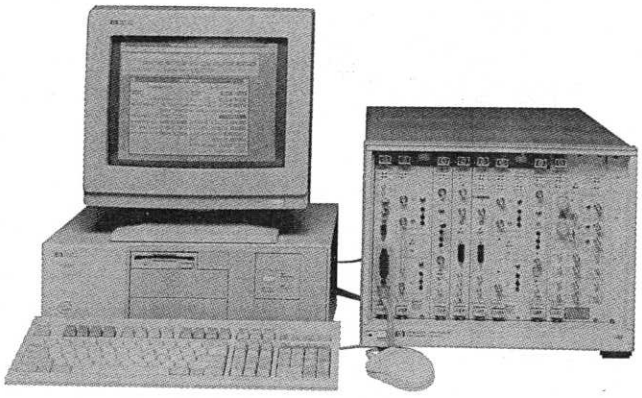
SONET/SDH TEST SETS

SONET/SDH Analyzers, Automated SONET/SDH Test Suites

HP 75000 Series 90, E1658A

- Supports both SONET and SDH standards
- Operates at 52-, 155-, 622-, and 2488-Mb/s line rates
- ATM payloads at 155- and 622-Mb/s
- Flexible modular architecture and software upgradability
- Embedded overhead and mapped payload testing
- Tributary test configurations



HP 75000 Series 90

DESIGNED FOR HP-IB SYSTEMS

HP Instrument Drivers

HP 75000 Series 90 SONET/SDH Analyzer

The HP 75000 Series 90 modular SONET/SDH analyzer meets the varied test requirements in development and manufacture of synchronous network equipment conforming to both SONET and SDH standards. Capable of operating at 51.84, 155.52, 622.08, and 2,488 Mb/s, the analyzer provides the functionality to rigorously test a wide range of network elements—including add-drop multiplexers, line-terminal multiplexers, digital cross-connects, and regenerators.

Based on industry-standard VXIbus hardware (see page 85 of this catalog), the HP 75000 Series 90 consists of a series of C-sized VXIbus modules and a PC user interface. Each module addresses a specific aspect of SONET/SDH testing. The modular architecture enables the Series 90 to be exactly tailored to match the application. Example configurations include 52/155-Mb/s analyzer; 52-/155-/622-Mb/s analyzer; and 52-/155-/622-/2488-Mb/s analyzer.

A full range of optical, coded electrical, and binary interfaces is provided for connection to equipment under test.

Applications

For telecom equipment manufacturers, the analyzer's real-time generation and analysis support in-depth testing in both development and production. The comprehensive test suite includes:

- Frame-alignment stress tests
- Payload mapping/demapping tests
- Pointer stress tests
- Pointer analysis
- Error performance monitoring (B1, B2, B3, BIP-2, FEBE)
- Alarm stress tests
- Clock-recovery stress tests
- Protection switching tests
- DCC access
- Line jitter and wander tests
- ATM cell measurements

Test applications requiring manual control of the analyzer are supported by a PC user interface. This powerful yet easy-to-use interface meets the needs of a wide range of applications—from in-depth R&D tests requiring access to any byte in the synchronous frame to manual production tests that need fast, repeatable measurements.

The HP 75000 Series 90 is fully programmable via HP-IB, enabling it to be integrated easily into production-line ATE systems. An automatic code generation facility simplifies the development of ATE software. Using this capability, software designed to control the analyzer's measurement hardware can be created quickly and accurately without reference to Series 90 programming manuals.

Specifications

Frame Formats: STS-1, STS-3, STS-3c, STS-12, STS-12c, STS-48 to ANSI T1.105 and TA-253; STM-1, STM-4, STM-4c, STM-16 to CCITT G.708

Mappings: DS1 (all VT1.5 modes) and DS3 to ANSI T1.105 and TA-253; 2 (all TU12 modes), 34, and 140 Mb/s to CCITT G.709; ATM cell streams to 622 Mb/s (to same ANSI/CCITT standards)

Test Interfaces:

Optical: 52, 155, 622 (1310 nm and 1550 nm), and 2488 Mb/s (1310 nm)

Coded electrical: 52 Mb/s (B3ZS) and 155 Mb/s (CMI)

Binary: 52, 155, 622, 2488 Mb/s (ECL, NRZ)

Measurements: Error count, ratio and seconds on mapped payload; B1, B2, B3, BIP-2, FEBE

Pointer Control: Set pointer to any value (with or without NDF); pointer movement sequences as T1X1.6 and CCITT G.783.

Jitter: Line jitter and wander tests at 52, 155, 622, and 2488 Mb/s

Ordering Information

	Price
HP 75000 Series 90 Modular SONET/SDH Analyzer (single, transmitter/receiver configuration)	from $35,000

Please contact your local Hewlett-Packard sales office for details.

HP E1658A Automated SONET/SDH Test Suites

NEW

The HP E1658A software delivers a formalized approach to SONET/SDH conformance testing. In conjunction with an enhanced HP 75000 Series 90 modular SONET/SDH analyzer, this new software application provides a rigorous and repeatable method of evaluating the functional operation of network elements against the industry standards.

Specifically designed for SONET/SDH conformance tests, the HP E1658A/Series 90 test station consists of:

- Measurement hardware containing all the controls necessary to support industry-accepted test methods
- A productive software environment that simplifies execution of complex tests and supports fast development of new tests
- 80 standard test libraries covering SONET/SDH functional and line jitter testing up to 2.5 Gb/s and all major mapping routes

The areas covered by the test libraries are listed below:

- Alarms
- Pointer processing
- Protection switching
- Overhead channel analysis
- Performance monitoring
- Payload mapping and demapping
- Line jitter and wander

The test station is controlled from an interactive, PC-based, graphical user interface. Using this, an operator can set up and execute repeatable, complex test sequences.

In addition to providing an efficient method of executing tests, the HP E1658A/Series 90 test station also provides a highly productive test development environment based on HP VEE—a graphical programming language. Using HP VEE, new tests can be created quickly and executed from within the HP E1658A software environment. These new tests can be based on Series 90 measurement hardware, or any other HP-IB-controllable instrument.

Ordering Information

	Price
HP E1658A Automated SONET/SDH Test Suites Software	$31,700

For the most current prices and product information, contact your local Hewlett-Packard sales office—see page 691.

- Sources and analyzers for testing SONET and SDH multiplexers and crossconnects
- Fanout and switching modules for testing SONET, SDH and ATM equipment
- Testing multiple channels from 1.5 to 155 Mb/s

HP 75000 Series 95

- Flexible, high-density, high-throughput configurations optimized for production test
- Easy system integration
- C-size VXI modules

HP 75000 Series 95 Family

The Series 95 is a family of powerful VXI components for building systems to test SONET, SDH and ATM network elements. It offers great flexibility and easy systemization, making it easier to complete test systems on time and within budget.

The Series 95 is ideal for production test where it provides functional tests (such as error and alarm tests) for boards, sub systems, and systems. Applications include board functional test, burn-in, system and integration test. It is also very useful in network element evaluation or undersea cable commissioning, where it is necessary to load or test multiple channels with realistic signals.

The Series 95 modules include telecom signal sources and analyzers, along with high-performance electrical and optical switches specifically designed to implement configurations needed for testing telecom network elements. These modules provide error and alarm tests for terminal and add-drop multiplexers and crossconnects. Jitter test capability is under development. Configurations can include other test equipment to provide parametric tests such as jitter and pulse mask. Series 95 modules may be used by themselves or in conjunction with other VXI modules, including the HP 75000 Series 90 modular telecom analyzer.

The Series 95 family is designed to work on the low-speed ports of network elements, covering rates from 1.5 Mb/s (DS-1) to 155 Mb/s (STS-3 and STM-1). It is ideal for multichannel applications, providing high density with low cost and "just enough" testing.

Here are some typical Series 95 applications:

- Test of three 32-channel daisy-chains of DS-1 ports of an OC-3 ADM
- Parallel test of a 3-channel card with adaptive DS-3/STS-1 inputs
- Fanout used in testing multiple ports of a 3/1 crossconnect
- Commissioning multiple adaptive 139 Mb/s or STM-1 channels of an undersea cable system

The Series 95 offers very great flexibility of test system configuration, providing many ways to balance size, throughput, test coverage and cost. The following table illustrates the capability available at various rates:

Electrical							
Rate	**Transceiver**	**Structured transceiver**	**Fanout**	**Daisy-chain switch**	**Test access switch**	**Mux/ selector switch**	**Other**
DS-1		E1686A	E1660A 32-way	E1550A 32-channel		E1550A 32-channel	
DS-3	E1685A quad	E1686A	E1664A 16-way	E1551A 12-channel	E1552A dual 3-channel	E1474A hex 4:1	E1553A dual 3-channel LBO
STS-1 electrical	E1685A quad		E1664A 16-way	E1551A 12-channel	E1552A dual 3-channel	E1474A hex 4:1	E1553A dual 3-channel LBO
STS-3/3c electrical	E1685B quad		E1664B 8-way	E1554A 8-channel	E1552A dual 3-channel	E1474A hex 4:1	
2 Mb/s unbalanced (E1)		E1686B	E1660B 32-way	E1551A 12-channel	E1552A dual 3-channel	E1474A hex 4:1	
2 Mb/s balanced (E1)		E1686B	E1660B 32-way	E1550A 32-channel		E1550A 32-channel	
8 Mb/s (E2)		E1686B		E1551A 12-channel	E1552A dual 3-channel	E1474A hex 4:1	
34 Mb/s (E3)		E1686B	TBA 8-way	E1551A 12-channel	E1552A dual 3-channel	E1474A hex 4:1	
139 Mb/s (E4)	E1685 quad	E1686B	E1664B 8-way	E1554A 8-channel	E1552A dual 3-channel	E1474A hex 4:1	
STM-1E	E1685B quad		E1664B 8-way	E1554A 8-channel	E1552A dual 3-channel	E1474A hex 4:1	

Optical							
Rate	**Transceiver**		**Mux/ selector switch**	**Mux / selector switch**	**Mux / selector switch**		
All rates up to 2.4 Gb/s			E4502A 17:1	E4503A dual 8:1	E4504A dual 4:1		
OC-3 OC-3c STM-1	E1685B + E1665A quad						

Functionality

Transceivers provide error and alarm generation and detection using pseudo-random payloads. A high-density, dual-rate transceiver provides four fully independent DS-3/STS-1 testers, while a structured transceiver provides a DS-1/DS-3 signal for testing crossconnect or similar devices. Similar modules provide quad 139 Mb/s/STM-1 or structured 2/8/34/139 Mb/s signals. Dual-rate fanout/switch modules provide multiple outputs from two inputs, with code and jitter transparency. Each output may be derived from either input for crossconnect routing testing, and each is delayed by a different amount to provide some decorrelation. Electrical switching modules allow the economic implementation of daisy-chain, channel-at-a-time, or fully parallel testing configurations at a variety of rates and with high signal-path integrity. Optical switches provide for optical tributaries or lineside tests. The fanout and switching modules are signal transparent and may be used for ATM applications.

Systemization

Series 95 modules are designed to run in a variety of software environments. Message-based modules are SCPI-compatible and register-based modules have downloadable D-SCPI drivers for use with an HP slot 0 command module. Software drivers for HP VEE are provided.

Ordering Information

Configurations vary widely depending on the test requirements. Please contact your local Hewlett-Packard Sales office for details.