MEASUREMENT COMPUTATION news
product advances from Hewlett-Packard
JULY/AUGUST 1986

HP Precision Architecture technical computer features UNIX operating system

A new high-performance computer for computer-aided engineering and design (CAE/CAD), computer-integrated manufacturing (CIM), and general technical applications extends the high end of the HP 9000 line. It uses industry-standard operating systems, networking, graphics, data base management, and languages. Based on HP Precision Architecture, it is the latest computer to be announced from HP's Spectrum program.

Model 840 extends family at high end

The new Model 840 joins the HP 9000 line of technical computers, which includes the Series 200, 300, and 500.

While maintaining compatibility with other HP 9000 models, Model 840 offers substantial performance increases over the previously most powerful Model 550. The Model 840 is a 4.5 MIPS processor, supporting up to 24 megabytes of main memory and delivering approximately two times the system throughput of the Model 550.

High performance is achieved through the implementation of the new HP Precision Architecture, based on a reduced instruction set computer (RISC) design.

(continued on page 2)

New technical computer

(continued from page 1)

Standard operating system for technical solutions

Like other HP 9000 computers, the Model 840 uses the HP-UX operating system, which adheres to AT&T's UNIX System V Interface Definition Issue I. HP-UX provides a high degree of compatibility across the HP 9000 computer line as well as compatibility with programs and applications that are developed under the System V Interface Definition on other vendor's computers. Typically only a recompile is needed to run applications on the Model 840.

HP-UX offers an excellent environment for software development. The operating software includes many programming languages (C, Pascal, and Fortran), a symbolic debugger for program development, assembly language, and device I/O library.

Expanded networking capabilities

With HP AdvanceNet local-area network (LAN) hardware and Network Services (NS), the new system fits easily into existing networks of HP 9000 systems. NS and LAN/9000 Series 800 supports HP's network file transfer and remote file access capability on the Ethernet or IEEE 802.3 local area network. This allows the Model 840 to act as a file server for the Series 300 workstations.

HP is adding support for the widely used Advanced Research Projects Agency (ARPA) and Berkeley UNIX 4.2 (BSD 4.2) networking services to the HP AdvanceNet strategy. ARPA/Berkeley will allow communication between Digital, Sun, other non-HP, and HP 9000 Series 300 and 800 computers.

New information management system

The Model 840 offers a new information management system that includes both a data base management system (DBMS) and tools to modify and improve data base applications. AllBase/HP-UX provides both a relational interface (HPSQL) and a network interface (Image). HPToday is a computer-assisted programming package that is useful in developing transaction-based data base applications.

For engineering, scientific, and manufacturing applications

In CIM, the Model 840's power and real-time capabilities make it ideal for area-manager applications. As the link between dedicated workcell processors and factory control systems, it can enhance computer-aided process planning, statistical quality analysis and reporting, and other sensitive plant-wide control tasks.

For CAE/CAD, the Model 840 operates as a high-performance software development computer, a workstation server or a centralized computer node for files, data bases, and peripherals. It delivers the power necessary to handle such high-level engineering functions as circuit simulation, finite element analysis, PC-board routing, image analysis, detailed statistical studies, software development, and general project management.

The HP 9000 Model 840 computer system includes the system processor, floating point coprocessor, 8M bytes of main memory, cabinet, power supply, CIO channel, access port card with 6-channel multiplexer, HP-IB interface, and a 16-user HP-UX with C compiler, symbolic debugger, assembler, device I/O Library, real-time package, and Port/HP-UX for porting RTE applications.

To meet the requirements of a minimum system, you also need a console terminal, system disc drive, and a cartridge or ½-inch tape drive.

UNIX is a trademark of AT&T Bell Laboratories.

For more information, check **A** *on the HP Reply Card.*

Use graphics to improve your presentations and reports

Graphics Gallery software for the HP Vectra and IBM personal computers lets you produce professional-quality graphics for business presentations and reports. Bold, full-color presentations help your audience understand your message and remember your conclusions.

Advanced graphics techniques are used in Graphics Gallery. For example, bold character fonts make the text look practically typeset. In addition to cross-hatch patterns for plotters, Graphics Gallery even creates patterned shades of grey for black and white printers and photocopiers.

Graphics Gallery software includes Charting Gallery and Drawing Gallery. You can create a pie or bar chart, add a special font and border, and make a full-color overhead transparency with an HP plotter. Lotus™ worksheet graphs can be transferred directly into Charting Gallery easily. Or you can use Drawing Gallery by itself to create graphics like text charts, organization charts, and process-flow diagrams. And any graphics you produce with Charting Gallery or Drawing Gallery can be merged with documents you have written using Executive MemoMaker.

Graphics Gallery software makes it easy to produce professional-quality graphics.

For more information, check **B** *on the HP Reply Card.*

Lotus™ is a trademark of Lotus Development Corporation.

First HP disc drive with controller cache

An enhancement to the high-end HP 7933H and HP 7935H Disc Drives adds extra performance for HP commercial and technical computer systems. The enhancement is a one-megabyte semiconductor cache memory placed in the controller of the 404-megabyte HP 7933/35 drives.

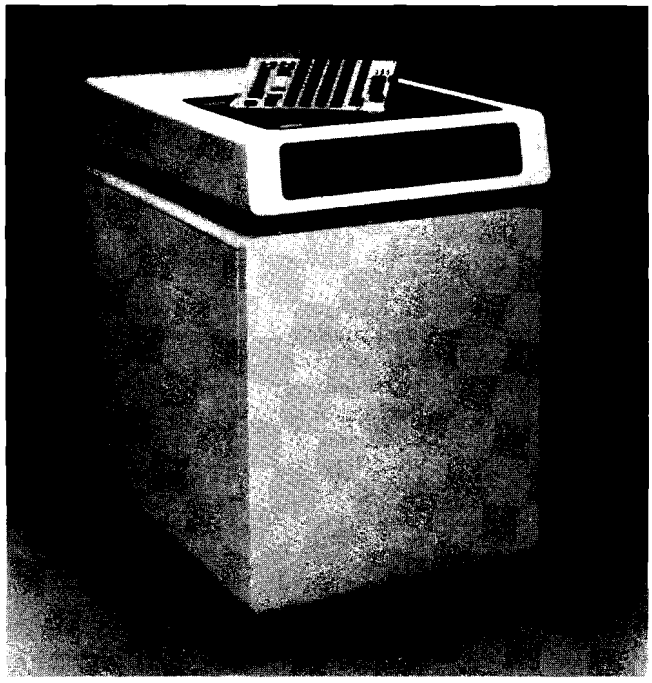
The function of the new controller cache is to store the most active data, reducing the number of reads from the disc surface. This results in faster access time. And since data is available in the controller cache, fewer mechanical movements are required. So you benefit from higher reliability and lower maintenance charges.

The implementation of the disc-controller cache is based on a commitment to intelligent peripherals. Since the introduction of the CS 80 family of disc drives in 1981, each HP disc drive has housed a microprocessor. The new disc-controller cache uses this microprocessor, along with additional enhanced firmware and one megabyte of RAM, to improve performance.

The HP 7933/35XP cache disc drives differ from other major industry offerings, which are based on a storage-controller concept. (A storage controller is a computer that has been designed or modified for I/O functions.) HP's disc cache provides performance benefits, but does not require the expense of an additional computer.

A field-upgrade kit for the HP 7933/35 installed base is available.

For more information, check **C** *on the HP Reply Card.*



New disc drives place one megabyte of memory in the controller. The result is faster access to data and increased system performance.

Technical office automation software improves engineering productivity

HP offers a variety of technical and CAD software to increase your design productivity. But you do more than design—you analyze data, communicate with team members, document, and make presentations. So HP also provides a variety of technical office automation products. These products now work on the HP 9000 Models 310 and 320.

Business and data graphics software

Graphics Editor is a general purpose drawing program for creating presentation-quality charts and diagrams, such as flowcharts, process-flow diagrams, organization charts, block diagrams, and text charts.

Data Grapher is a basic graphics toolkit that turns numbers into graphs and charts. Using Data Grapher you can plot functions, scattergrams, pie charts, and histograms.

Graphics Presentations allows you to create bar, pie, and line charts along with text. It features nine text sizes, four fonts, and line and circle drawing.

Math and statistics software

Statistics Library is composed of two parts. With Part I, you can do basic statistics and data manipulation including: statistical graphics, regression analysis, and nonlinear regression analysis. Part II includes analysis of variance methods and Monte Carlo simulation utilities.

Numerical Analysis provides commonly used numerical analysis routines including: root finders, integration, ordinary differential equations, linear algebraic systems, Eigen analysis, interpolation, and Fourier analysis.

Other office automation software

Text Editor is a general purpose word processor for creating reports, memos, and high-quality letters.

Project Management incorporates PERT, PCM, and MPM network analysis and produces GANTT chart output.

System requirements

Statistics Library (Parts I and II), Numerical Analysis, Text Editor, Graphic Presentations, and Project Management run on the HP 9000 Series 200 or 300 with BASIC 4.0. Graphics Editor and Data Grapher contain their own operating environment and do not require loading an operating system to run the software. The software packages do not require the HP 98546A Compatibility Mode Interface to run.

Updates and replacement media kits are available to update from the HP 9000 Series 200 version of these packages to the new Series 300 version.

For more information, check **D** *on the HP Reply Card.*

HP DesignCenter strengthens links between toolsets

HP DesignCenter is an integrated design environment for electrical, mechanical, and software engineers. It consists of systems, software, and support in computer-aided engineering, design, and manufacturing. The foundation of HP DesignCenter is the networked family of HP 9000 Series 300 technical workstations.

Recently, HP DesignCenter increased functionality and added new links to boost designer productivity and automate data communication between systems. Now, these systems and software packages can be linked together:

- HP Printed Circuit Design System is a new full-function CAD system that couples printed circuit board layout with schematic capture and simulation, manufacturing, and test. It contains numerous automatic and interactive tools for digital, analog, and mixed technologies. And it supports both through-hole and surface-mounted technologies as well as thick-film hybrid design.
- HP 64000-UX Microprocessor Development Environment optimizes code development with new software engineering tools for specifying complex software designs, plus language tools, emulators, and analyzers for 8-, 16-, and 32-bit microprocessors. The new HP 64000-UX architecture allows multiuser access to emulation and analysis systems.
- Alis™/HP-UX, fully integrates word processing with sketching graphics, data graphics, spreadsheets, and data bases. It also includes time management, personal calendar, and electronic mail.

HP-UX is HP's version of Bell System V UNIX operating system. Alis™ is a trademark of Applix, Inc.

For more information, check **E** *on the HP Reply Card.*

X.21 state simulator for network providers and equipment designers

The HP 18198A X.21 State Simulator is a high-performance testing and certification tool for X.21 circuit-switched networks and components (DTEs and DCEs). Suitable for use in R & D or by network providers, it consists of a special interface pod and an application program for the HP 4953A Protocol Analyzer with extended memory (Option 001). The simulator combines powerful data display formats, a protocol specific programming language, and wide data transfer protocol support to provide unequalled performance in its price range.

A wide variety of display formats is available. The data and state format lets you see both the DTE and DCE data circuits along with the associated control leads with the exact timing relationship between events—without resorting to tedious hexidecimal display formats. State level decode is the key to making the state simulator easy to use. One display format interprets the lead information and relates it directly to the CCITT X.21 specification. Another display simplifies data transfer testing by ignoring all the call control information and showing only the data of interest.

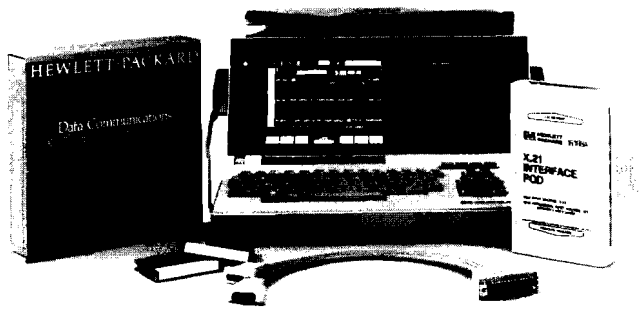
The X.21 protocol specific programming language allows writing monitor or simulation programs in the form of high-level state commands, lead transitions, or a combination of both.

The simulator supports all the synchronous protocols and data codes in the HP 4953A during the data transfer phase of the X.21 protocol and operates up to 64 kbits/s.

A companion product is the HP 18290A X.21 DTE Analysis Pac. In combination with the HP 4953A and HP 18198A, it forms a turnkey solution for X.21 DTE development and/or certification. The analysis pac is a comprehensive set of prewritten menus on tape that test and analyze an X.21 DTE for adherence to the X.21 protocol.

The HP 18154A X.21 Interface Kit for the HP 4953A Protocol Analyzer complements the state-oriented HP 18198A X.21 State Simulator. The interface kit's strengths lie in the detailed level 1 analysis of the X.21 physical interface and protocol. With the interface kit, you can see exactly what is happening on the interface without the state qualification present in the X.21 state simulator. The powerful data and state display shows the exact timing relationship between the T, C, R, and I leads. Illegal lead transitions and line glitches are quickly identified—without examining raw data in binary form.

The interface kit can monitor or simulate all phases of the X.21 protocol. It supports the two most common types of Level II protocols during data transfer, BSC and HDLC, in either ASCII or EBCDIC.



Easy-to-use X.21 testing solution lets you follow the CCITT specification or violate the protocol for margin and exception testing.

For more information, check **F** *on the HP Reply Card.*

HP Computer Museum
www.hpmuseum.net

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Display offers in-service technique for assessing digital radios

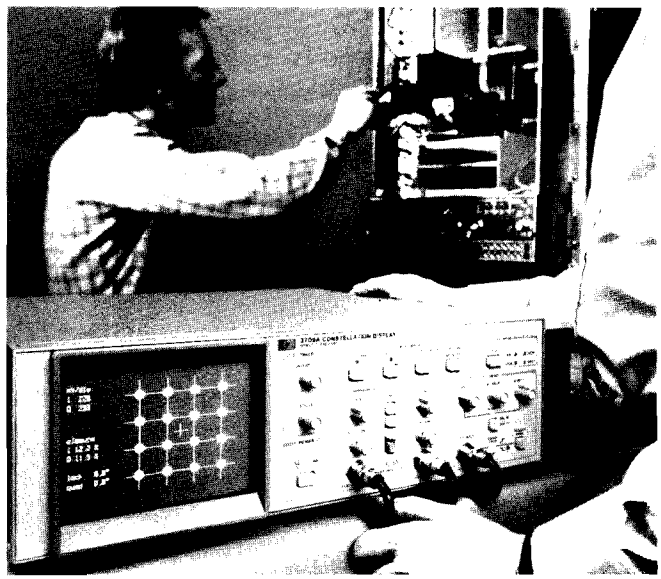
Designed principally for digital radio maintenance, the new HP 3709A Constellation Display enables operators to diagnose problems in-service by constellation pattern analysis. The new display is also important in digital radio design, manufacture, installation, and commissioning.

Analyzing constellation patterns used to require a relatively complicated and expensive sampling oscilloscope. With the introduction of the easy-to-use HP 3709A, constellation pattern analysis is now affordable and cost-effective.

Dedicated features of the HP 3709A include measurement of key constellation parameters (closure, lock angle error, and quadrature angle error) and the ability to print a formatted report of the constellation pattern and measurements on a ThinkJet printer. Measurement routines and graticules are provided for the most common modulation schemes: QPSK, 9PRS, 16QAM, 49PRS, and 64QAM.

And setting up the HP 3709A is easy! It connects to the I (in-phase), Q (quadrature), and symbol clock monitor points on the demodulator of the digital radio receiver. The HP 3709A is triggered from the symbol timing clock signal for any clock frequency between 1 and 80 MHz and has a time base that automatically provides an eye diagram with two eyes across the screen.

For more information, check **G** *on the HP Reply Card.*

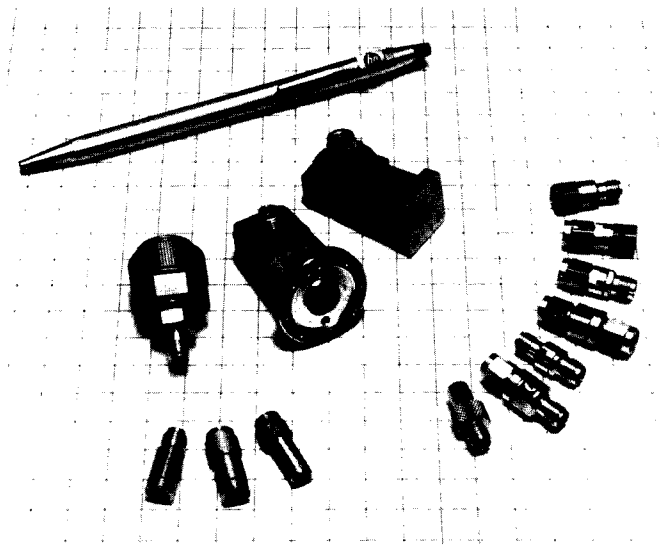


The new HP 3709A displays eye diagrams, constellation patterns, and constellation measurement parameters for digital radios with a baud rate between 1 and 80 megasymbols per second.

Coax connectors provide 50-GHz coverage for industry

Two leading connector manufacturers worked with Hewlett-Packard to develop the new 2.4-mm coax connector. It fills the need for a rugged, reliable, broadband connector with excellent performance.

The connector now permits microwave components and systems to operate in coax at frequencies from dc to 50 GHz, free from moding. The 2.4-mm connector interface was conceived by HP with further development and supporting products from Amphenol Products and M/A-COM Omni Spectra as well as HP.



HP's precision 2.4-mm coax adapters and calibration standards permit measurements in coax systems to 50 GHz.

Design goals for this connector included a rugged interface with excellent return-loss characteristics, very repeatable performance, and reasonable connector cost in system applications. By forgoing compatibility with existing conector types, a design was achieved that optimizes performance over the entire dc-to-50-GHz frequency range, not just at the higher frequencies.

Three totally compatible connector grades have been developed to permit best application fit. M/A-COM Omni Spectra offers the production-grade OS-50 series for use in components, cabling, and microstrip. The instrument-grade APC-2.4 series from Amphenol Products is intended for use with test and measurement equipment. The metrology-grade connector has been developed by HP for use on calibration standards.

The initial HP products for 2.4-mm applications include metrology-grade adapters (HP 11900) from 2.4-mm coax to 3.5-mm, 7-mm, and 2.92-mm (K-connector) coax, metrology-grade open and short circuits (HP 85140), plus instrument-grade 50-ohm loads (HP 85138A/B) and coax-to-waveguide adapters (HP R/Q 281) for the 26.5-to-40-GHz and 33-to-50-GHz waveguide bands. These adapters and standards allow existing instrumentation to make such measurements as network analysis, spectrum analysis, and power and frequency measurements in 2.4-mm coax to 50 GHz.

For more information, check **H** *on the HP Reply Card.*

Digital radio teaching tool now runs on HP Vectra computer

I*Q Tutor, the interactive training program for learning the principles of digital communications, now runs on the HP Vectra or IBM PC/AT computers.

The HP 11736A/B models a modern digital communications system signal chain from analog baseband through modulation, transmission, demodulation, and back to baseband. The program presents graphic results of the interactions of S/N ratio, bit-error rates, bandwidths, and filter characteristics. I*Q Tutor can give the beginning engineer or senior manager powerful insights into system performance.

For more information, check **I** *on the HP Reply Card.*

Read alphanumeric display from 18 meters

The new HDSP-4500 series alphanumeric display allows you to design bright and colorful messages for viewing up to 18 meters (60 feet) away. Uniform dot size and spacing of the 5 × 7 dot matrix font keep the appearance of your front-panel messages clean and attractive. Dual-in-line (DIP) packaging permits easy mounting on PC boards and in standard IC sockets.

For longer messages and graphics panels, the displays can be stacked end to end and side by side. The high-efficiency red color of the lighted dots and the grey color of the package help achieve optimum contrast and keep messages clear.

Electronic instruments, computer peripherals, point-of-sale terminals, weighing scales, and industrial electronics can all benefit from the use of these new displays.

For more information, check **J** *on the HP Reply Card.*

Waveform generator bridges the digital-analog gap

With the HP 8175A Digital Signal Generator and the new Option 002 Dual Arbitrary Waveform Generator, you can generate two arbitrary analog signals—each with a 10-bit amplitude resolution and a sample update rate of 50 MHz. These features provide easy simulation of real-life signals. Several conventional function generators, which would have to be interconnected to generate complex signals, can be replaced by one HP 8175A Option 002.

The HP 8175A Digital Signal Generator stimulates devices with parallel or serial digital patterns. This capability, combined with Option 002, makes the HP 8175A a versatile instrument for digital, analog, and combined applications.

Two analog output channels

Option 002 provides two synchronous output signals that can have totally different shapes and output levels to stimulate devices with two different analog inputs. Four channels are achieved by operating two HP 8175As in master/slave mode.

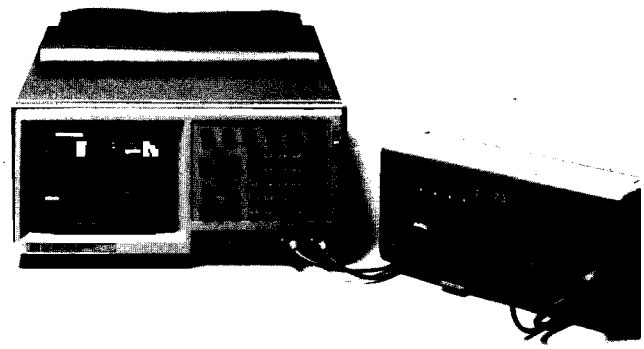
The outputs provide high output levels with 16V peak-to-peak voltages into 50Ω, or 32V peak-to-peak voltages into an open circuit. The instrument offers fourteen different output level ranges. Amplitude and offset can be separately set.

Digital and analog signals simultaneously

The HP 8175A/Option 002 combination can simultaneously deliver digital data on fourteen channels and analog signals on another output. Digital data and analog signals are synchronous but independent signals. Alternatively, two analog channels and their digital equivalents on 2 × 10 digital channels can be programmed for testing.

Comprehensive editing modes

A graphics editor and a 9-inch CRT make creation of waveforms easy. Waveforms can be created point-by-point or by defining a few characteristic points. The instrument interpolates linear or natural waveforms that incorporate the characteristic points. The built-in calculator lets you enter mathematically definable waveforms in their written form. Standard mathematical functions are available via softkeys. After calculation, the waveform can be immediately generated or modified with all editing capabilities.



The Dual Arbitrary Waveform Generator option makes the HP 8175A well-suited for stimulating devices with two synchronous level-independent signals.

Option 002 allows discrete voltage levels and durations from 20 ns to 9.99 seconds for each data point. If digital sample values of the analog signal are known, the digital pattern can be entered in binary, octal, decimal, or hexadecimal.

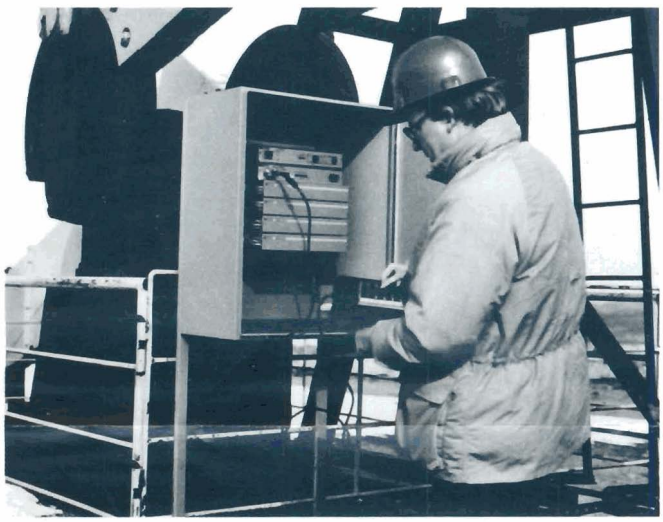
For more information, check **K** *on the HP Reply Card.*

New front end designed for harsh industrial environments

The new HP 48000 RTU Measurement and Control Unit is an industrial data-acquisition and control product designed specifically for remote applications in harsh environments.

In process industries, the HP 48000 can provide data acquisition and control in applications where traditional solutions have been too expensive or a forced fit. It will benefit applications such as plant wastewater treatment, batch process control, and boiler room monitoring and control. The HP 48000 is also targeted for use in the oil and gas production and the electrical utilities segments of the supervisory control and data acquisition (SCADA) market.

Because the HP 48000 has CMOS components,it can operate between −40°C and +65°C without the use of heaters or fans. Low energy-consuming CMOS parts also permit operation from solar-cell-charged batteries in remote areas.



For oil pump surveillance and control, the HP 48000 RTU Measurement and Control Unit program can be modified easily in the field.

Using a 16-bit Intel 80C86 microprocessor, the HP 48000 can perform extensive software signal conditioning and downloaded routines in a multitasking environment.

An extensive built-in data base lets you configure each input/output by selecting desired parameters for each function. A standard terminal or the HP 3081A Workstation Terminal can be used to configure the unit. Functions available include a PID algorithm, AGA gas-table calculations, and statistical analysis. For functions not in the data base, you can program the HP 48000 in an incrementally compiled BASIC language.

Metal enclosures reduce damage

The master controller, the 24-volt dc/ac power supply, and all I/O modules are housed in rugged metal enclosures. All configuring of the modules is accomplished via software.

As the intelligent front end of a SCADA or process application, the HP 48000 interfaces (through a data communications adapter) with a variety of host computers via an RS-232-C port. For a total solution, a variety of commercially available software packages run on HP 1000 or HP 9000 Series 200/300 computers, the HP Vectra PC, and DEC and IBM products.

Communicate over long distances

Thirty HP 48000 units can be multidropped from a twisted-pair wire over a distance of 1.2 kilometers. The use of available repeaters extends the number of units to 90 over a distance of 3.6 kilometers. A radio module and a private-line modem module are also available.

A minimum HP 48000 configuration consists of an HP 48001A three-slot backplane, HP 48010A Master Controller Module, HP 4803A Power Supply Module, an HP 48020A Configurable I/O Module.

For more information, check **L** *on the HP Reply Card.*

Enhanced cesium standard offers improved performance and reliability

By modernizing the design of Hewlett-Packard's 5061A cesium beam frequency standard, an improved B version offers higher performance and reliability.

Like its predecessor, the HP 5061B has a guaranteed accuracy of $\pm 4 \times 10^{-12}$. The new unit offers a 10-MHz output that allows calibration of 10-MHz devices without frequency multiplication or division. Also, a new option (003) increases the number of applications and the versatility of the instrument by adding a one-pulse-per-second tick output and an internal standby power supply.

All the factors that affect a cesium standard's performance are summed into a worst-case accuracy specification in which you can have confidence. The HP 5061B's accuracy ($\pm 4 \times 10^{-12}$) and long-term stability ($\pm 2 \times 10^{-12}$) are unmatched in any other commercially available cesium beam frequency standard.

Over 100 million field operating hours have proven the reliability of HP cesium beam frequency standards. Detailed analysis of in-warranty field performance demonstrates a mean-time-between-failures (MTBF) exceeding 100,000 hours. This implies that the average cesium standard will operate for over 12 years without failure.

HP provides full service and maintenance capabilities at five strategically located service centers worldwide.

For more information, check **M** *on the HP Reply Card.*

The accuracy and long-term stability of the HP 5061B are unmatched in any other commercially available cesium beam frequency standard.

New fiber optic test instruments cover multimode and single-mode applications at 1300 nm and 1550 nm

With the fiber optic market growing more than 30% per year, the need for accurate, reliable, and calibrated test instruments increases. Hewlett-Packard has developed five new fiber optic test instruments to satify this need.

Calibration flexibility

The HP 8152A Optical Average Power Meter is a very precise and flexible instrument. Together with the HP 81521B Optical Head, it covers multimode and single-mode applications from 850 to 1700 nm. All sensors are individually calibrated over their entire wavelength range.

The dynamic range is +3 to −80 dBm, with an accuracy of 0.15 dB between 0 dBm and −60 dBm.

Two independent optical inputs, A and B, plus the capability of ratio measurements (B/A), are very useful for measuring the insertion loss of passive optical components, determining the split ratio of a splitter, or eliminating instabilities of a source. The high-performance mode- and polarization-independent HP 81000BS Optical Power Splitter supports these applications.

The HP 8154B LED Source employs a 1300-nm LED that outputs −20 dBm. Continuous-wave, 270-Hz chopped light, or external-modulated square-wave signals (TTL-level) up to 1 MHz can be output.

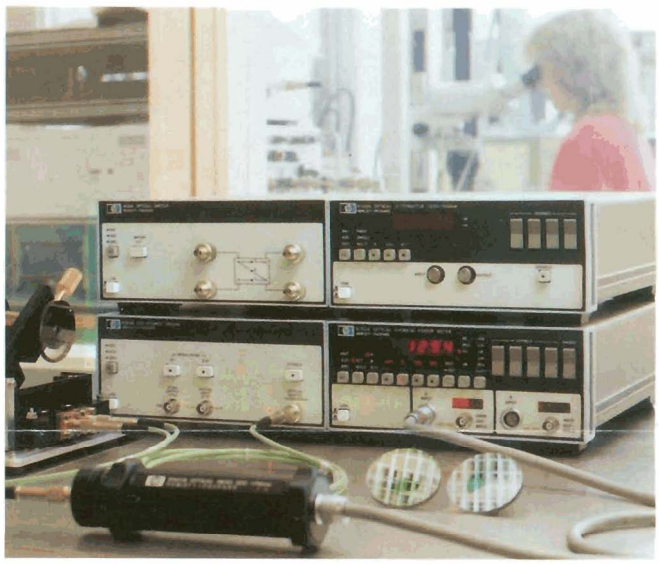
Suited for long-term testing

Excellent long-term stability of better than 0.02 dB within one hour and 0.3 dB over one year make the HP 8152A well-suited for long-term tests on optical connectors or on critical optical links.

The HP 8158B Optical Attenuator is a continuous attenuator with a 60-dB range and a resolution of 0.01 dB so you can determine the bit error rate of a system or the linearity of a receiver. The HP 8158B supports all fibers between 9 and 85 μm for multimode and single-mode applications, thanks to its advanced fiberless design. Each attenuator is calibrated at 1300 nm and 1550 nm and offers an accuracy of less than 0.4 dB excluding connectors.

The HP 8159A Optical Switch works around 850 and 1300 nm with a specified insertion loss of less than 3.5 dB and a crosstalk attenuation of better than 50 dB. It is an ideal tool whenever comparative or reference measurements must be performed.

For more information, check **N** *on the HP Reply Card.*



The new optical average power meter features two independent optical inputs and power ratio measurements.

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