New business calculator simplifies problem solving

The new HP Business Consultant Professional Calculator is the first in a new line of calculators capable of solving specialized equations without the need for programming. Designed for business professionals, it uses softkeys and built-in menus to make business problem solving easy. It features a new, simplified user interface, algebraic data entry, and built-in programs for finance, general business, statistics, summing and number lists, mathematics, and time and appointments.

Not only does the Business Consultant have a full range of built-in functions, but specialized equations can be cre-

ated and solved quickly and easily with HP's formula-solver capability.

Solve equations using your own words

The formula solver uses the calculator's menus and softkeys to solve specialized equations. It allows you to enter equations in words, such as "PROFIT = (PRICE − VARCOSTS) × UNITS − FIXED COST," using alphabetic keys. Then, using the numeric keys to type in the known values, you can solve for any unknown variable in the equation.

IN THIS ISSUE

HP introduces a new business calculator

The Business Consultant's four-line by 23-character display lets you view more information at one time. The information displayed requires less explanation since variable names and softkey labels appear on the screen. In addition, messages and user prompts appear on the display—to help you solve your problems correctly.

The ROM, information label, messages, prompts, softkey labels, and manual are available in English, French, Spanish, Italian, and German. Manuals are also available in Swedish, Danish, and Japanese.

Reference booklets for your applications

The Business Consultant provides customized solutions for individual applications. A series of eight application booklets provides simple instructions and application ideas. They are available to help you tap the power of the built-in functions and formula solver. These application books are available for direct sales, business finance, marketing, manufacturing, small business, personal investment, real estate, and banking applications.

The Business Consultant has separate alphabetic and numeric keyboards. When open, the calculator is 7.5 in × 6.25 in × 0.5 in and weighs 8 ounces. When closed, the Business Consultant can easily be held in one hand.

An invisible connection for quiet, thermal printing

To complement the Business Consultant, a cordless printer will be available later this fall. The new HP printer communicates with the calculator via an infrared light beam. Both the Business Consultant and the printer will be available through HP retail outlets.

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

Smaller, less expensive computer for workcell control applications

The HP Micro 16 is a compact, low-priced, industrially hardened, real-time computer for workcell control applications on the factory floor. It is the newest member of HP's family of A-Series automation engines. It consists of the HP A600+ processor installed in a smaller, more rugged package.

Hardened for reliable operation

The Micro 16 is hardened for reliable factory-floor operation and has a mean time between failures estimated at 9.6 years. The number of parts has been reduced from 350 (for the previous low-end A-Series, the Micro 26) to 60 for the HP Micro 16. With a simpler manufacturing design, there are fewer things to go wrong.

The HP Micro 16 can withstand temperatures ranging from 0 to 60°C, endure continuous shocks of up to 1.5g peak and infrequent shocks of up to 7g peak, and operate with input voltage levels from 86 to 140 V.

Broad communication capabilities

As a dedicated workcell controller, the HP Micro 16 communicates with and controls robots, programmable logic controllers, bar code readers, automatic storage and retrieval systems, vision systems, and machine tools by supporting both HP and value-added channel software packages.

In addition, the HP Micro 16 coordinates output with other workcell controllers, area-manager computers, and plant-level computers by supporting a wide variety of protocols for computer-to-computer communication. It supports 34 different types of interfaces and add-on products that allow you to connect industry standard protocols.

Workcell expansion without software changes

You can start with the Micro 16 workcell controller, which is based on the 0.4-MIPS (million instructions per second) HP A600+ CPU. As your needs grow, the workcell can be expanded to a 1.3-MIPS HP A900 without any software changes.

As a workcell controller, the Micro 16 can be configured with a variety of products to meet your data acquisition, report generation, alarm management, historical archiving,

Straight Card Cage Design

HP Micro 16 Angled Card Cage Design

Airflow Pattern
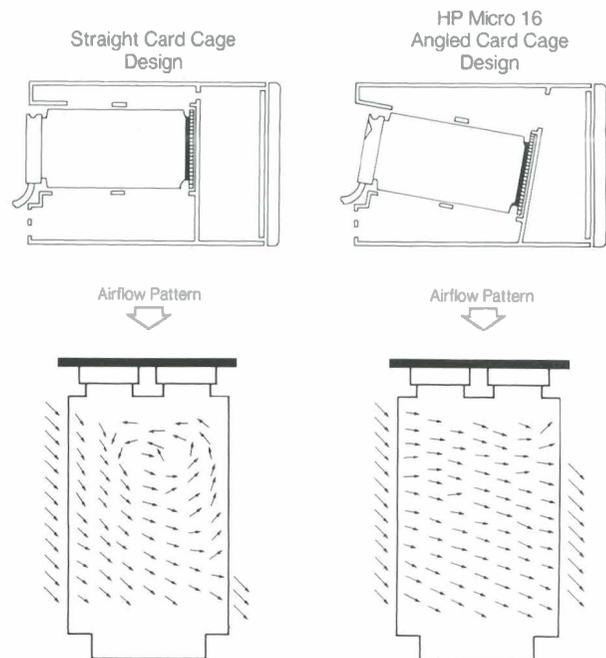
Airflow Pattern

Traditional straight cardcage design has an airflow pattern that creates hot spots. The HP Micro 16 angled cardcage design brings cool air in and circulates warm air out of the unit, creating near-perfect airflow and increasing reliability.

and communications needs.

A complete HP Micro 16 workcell control system includes a CPU with 1M bytes of error-correcting memory, IEEE 488 interface, 40-Mbyte disc, tape backup, terminal, cabinet, RTE-A operating system, and programmable controller software.

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

HP Computer Museum
www.hpmuseum.net

New multipoint extender adds flexibility to HP-IB systems

The new HP 37204A multipoint HP-IB extender adds a new dimension to IEEE 488 at considerably lower cost than previous bus extender products. It provides distance extension to the HP-IB interface, stretching the maximum distance from 2 meters per device to 1250 meters.

Networking capability

Multipoint is a major new feature. It allows remote sites
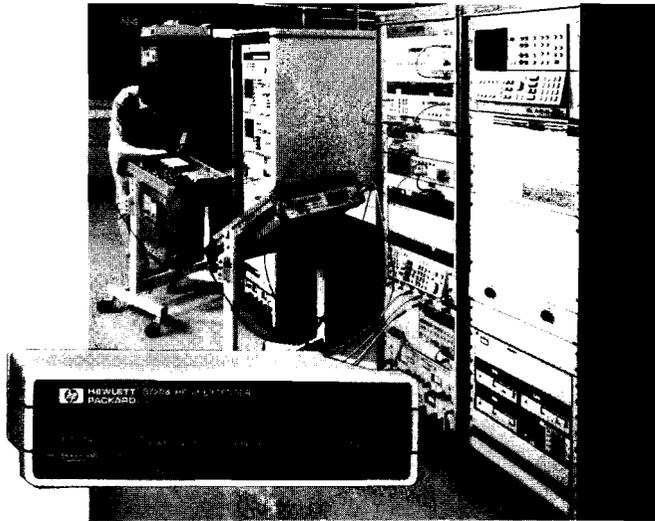
With the HP 37204A multipoint HP-IB extender, HP-IB test systems can be positioned with fewer cable length restrictions

to be daisy-chained together using only one HP 37204A at each site, making this product capable of creating an instrumentation LAN using only HP-IB devices. Previous extenders had to operate in pairs—so systems with multiple remote sites require nearly twice as many extenders. Another new feature is chain truncation. It allows the computer site to continue operating even if a remote fault or power failure causes serial communication to cease.

Easy to use

No software modifications are needed to extend a system. The HP 37204A can simply be dropped in. HP-IB bytes are converted into serial form for transmission over 75-ohm coaxial or fiber optic cable.

Valuable to many HP-IB applications

The HP 37204A can enhance the capabilities of HP-IB systems in a broad range of applications. For example, a number of ATE systems can be controlled from a remote computer, resulting in more efficient use of computer hardware. Printers and plotters dispersed throughout the office can all be controlled from a single HP-IB port—letting remote terminals continue normal operation even after you have initiated an output to an adjacent plotter or printer. Equipment can be located close to measurement points in data acquisition and control systems. The HP 37204A allows much greater speed and distance than RS-232-C. And since all communication is conducted on a single bus, the computer has tighter control over the coordinated activities of the system.

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

# High-speed numeric coprocessor for HP Vectra PC

The HP 82965A High-Speed Coprocessor is a fast 80287 numeric coprocessor module that increases the HP Vectra PC's numeric processing capabilities. You can install it yourself to increase the performance of CAD software.

The HP 82965A High-Speed Coprocessor consists of an Intel 80287 and associated circuitry to operate it at 8 MHz— 50% faster than the standard 5.33-MHz numeric coprocessor (HP 45987A). The matchbook-sized (3.8 × 6.1 cm) module plugs directly into the 40-pin coprocessor socket on Vectra's main circuit board. The HP 82965A adds over 50 numeric instructions to the 80286 (Vectra's main CPU) instruction set, making Vectra an excellent solution for high-performance numeric processing.

The new coprocessor has these features:
- Directly extends the 80286 instruction set with trigonometric, logarithmic, exponential, and arithmetic instructions for all data types
- Runs at 8 MHz
- Requires no system reconfiguration
- Floating-point, extended integer, and BCD data support
- High-performance 80-bit internal architecture
- 8087-compatible real address mode
- Protected virtual address mode.

Applications that have been written to take advantage of the standard numeric coprocessor (operated at 5.33 MHz on Vectra) will benefit from the higher speed of this module. Computer-aided design packages can experience faster regen-
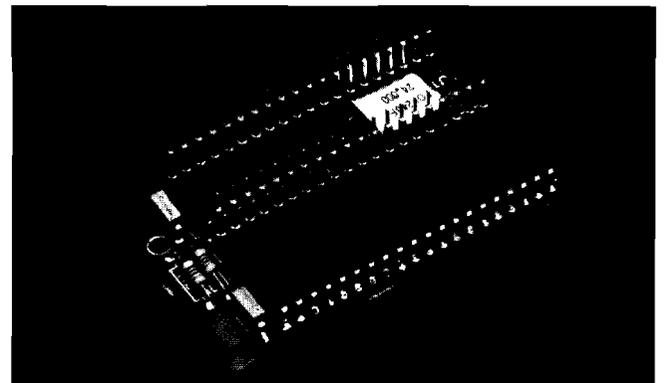
You can increase the Vectra's numeric processing capabilities with HP's new high-speed coprocessor.

eration of drawings and spreadsheets can be recomputed at faster speeds with the HP 82965A. AutoCAD®, VersaCAD®, and Anvil 1000MD® drawing regeneration speed increases 8 to 10% with the HP 82965A (compared to the standard 5.33 MHz coprocessor).

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

AutoCAD® is a registered trademark of Autodesk, Inc. VersaCAD® is a registered trademark of T & W Systems, Inc. Anvil 1000MD® is a registered trademark of MCS, Inc.

Wide-carriage personal printer offers quiet, dual-mode printing

The new HP 2227A QuietJet Plus Printer is designed for business professionals and other personal computer users who require a quiet, high-quality personal printer for word processing, spreadsheets, and graphics. The printer works with most computers and software.

Full-featured personal printing

The QuietJet Plus Printer provides 192-cps draft printing, 48-cps near-letter-quality (NLQ) printing, and compressed printing for cut sheets or continuous-feed paper up to 15 inches wide. Draft-quality, NLQ, and compressed print are all selectable via a convenient front panel. Other convenience features include paper-saving last-form tearoff and a true platen for easier manual cut-sheet paper feeding.

Six different print pitches, underline, bold, subscripts, and superscripts allow you to enhance, highlight, emphasize, or clarify as desired. Graphics capability, in three resolutions (96 × 96 dpi normal, 192 × 96 double density, and 192 × 192 quad density), is standard. As you need to expand, dealer-installable RAM and ROM can be added to accommodate downloadable fonts or custom character sets, for example.

Compact and convenient

Though small (20.75 in W × 8.7 in D × 4.76 in H), the QuietJet Plus can handle large tasks like spreadsheets. Dual I/O interfaces (RS-232-C serial and Centronics parallel) allow you to change the printer from one host to another as needed.

The HP QuietJet Plus Printer works quietly enough (48.5 dBA) to allow you to carry on a telephone conversation.

The combination printhead/ink cartridge is a disposable plastic reservoir of ink which allows for clean, easy replacement. A wiper cleans the printhead surface automatically.

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

Personal computer local area network upgraded

Version A.02.00 of the HP OfficeShare Network, Hewlett-Packard's personal computer local area network (LAN), provides faster file transfer from a PC server to both HP Touch-screen and HP Vectra PC (and compatible) workstations.

Depending on the application and network configuration, the upgrade will result in a transfer speed twice as fast as the original version. The revision also reduces the network software memory requirement of the server and workstations by 18K bytes.

Networking advantages

With the HP OfficeShare Network, you can share peripherals and information with other PC users on the network. This lowers your investment in office equipment and increases productivity. Instead of buying several printers and plotters, you can invest in a single, high-performance printer and plotter for the entire network. The same holds true for mass storage—and you can expand your storage to up to seven disc drives.

You can start with as many or as few users on the network as you need. Then, as your business and your needs expand, add more users by simply adding more nodes to the existing network. HP's special ThinLAN cables make the network easy to install and expand.

Installed base customers will receive the performance upgrade free of charge.

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

Comprehensive office bundles simplify automation

For many office environments, powerful stand-alone personal computer capability isn't enough. Office workers need to gather, manipulate, and communicate information. And easy, powerful access to the resources of a larger computer is important. Vectra 3000 and Vectra Office are new office bundles that satisfy these needs. They are easy to order, attractively priced, and preassembled for easy installation.

Vectra 3000 is a complete PC workstation to link to the HP 3000. IBM PC/AT compatibility lets it run thousands of off-the-shelf business applications. Connectivity to the HP 3000 provides access to powerful HP 3000-based programs. It comes bundled with DOS, AdvanceLink 2392 software, Vectra components, and monochrome or EGA video substems.

AdvanceLink 2392 is the bridge to the HP 3000. Besides access to the minicomputer's resources, you can run VT 100 terminal emulation, and even tap into public data bases such as Dow Jones. With AdvanceLink's powerful command language, you can automate and simplify communications tasks.

If you have a broad range of software needs, Vectra Office may be right for you. It combines Vectra 3000's power with an office software bundle featuring all the applications needed for an office workstation: word processing, spreadsheet, graphics, data management, and communications.

With Vectra Office, you have a choice of word processing software. Easy-to-use Executive MemoMaker is for professionals and managers who want to create polished reports that merge text and graphics. AdvanceWrite III offers full-function word processing for more sophisticated users.

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

HP Journal describes HP Precision Architecture

The August 1986 Hewlett-Packard Journal carries a series of engineering design articles detailing key technical accomplishments of the HP Precision Architecture development program. This development effort (known within HP as the Spectrum program) has resulted in a new system architecture and all hardware and software components necessary for an entirely new computer system family.

The August issue includes an overview of the processor and I/O architectures, a description of performance analysis methods, and a discussion of the simulator. Future issues will present papers describing hardware components, system software components, software engineering practices, and performance results.

*For a free copy of the August issue (English only), check **H** on the HP Reply Card. To have your name added to the mailing list for the HP Journal, check **I**. If you currently receive Measurement and Computation News, please attach your mailing label to the reply card.*

Components

Save design time and money with HP's new modular encoder

If you've got a high-volume application that may require designing your own motion encoder, consider HP's new HEDS-9000 optical incremental encoder. This new encoder module is versatile and can reduce manufacturing costs.

Get flexibility in design

The new HEDS-9000 Series module can operate with either a code wheel or a linear code strip. The code wheel can be in resolutions from 190 to 1,024 counts per rotation (CPR) and made from glass, plastic, or metal. You provide the code wheel or linear strip according to your performance requirements and cost. HP provides the encoder needed for the resolution you determine.

The module consists of a lensed LED source housed opposite a detector IC in a small C-shaped pacakge. When a code wheel passes between the LED source and the detector IC, two digital channel outputs provide information corresponding to the speed and direction of the motor shaft.

Save manufacturing time

Designed for high-volume applications, this module is extremely tolerant to mounting misalignment. A highly collimated light source created by the LED and lensing combination and a special photodetector array inside the the detector
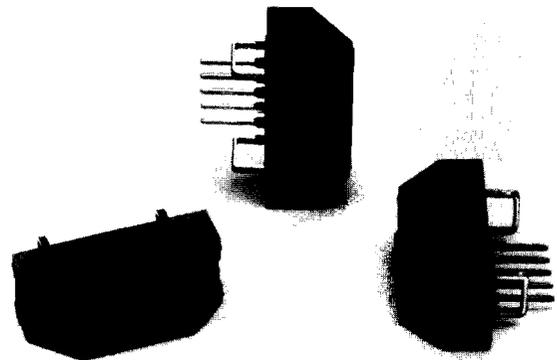
The HEDS-9000 is very tolerant to mounting misalignment.

IC allow high mounting tolerances. Reliability is improved because of the integration.

There's no signal adjustment required. The module is insensitive to radial and axial shaft eccentricities.

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

Reduce system software with HP's intelligent interface IC

HP's new HCTL-2000 can perform three functions: as a decoder for quadrature signals, as a 12-bit binary up/down counter, and as an 8-bit bus interface for either an encoder or a digital potentiometer. These time-intensive functions can now be shifted out of the microprocessor. You save on board space because the HCTL-2000 is in a 16-pin dual-in-line package (DIP).

The HCTL-2000 also provides LSTTL compatible tri-state output buffers and high noise immunity. Stable two-byte read operation is made possible with its 12-bit latch-and-inhibit logic.

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

The HCTL-2000 interfaces with microprocessors in closed-loop motion control systems.

Product note describes on-wafer device measurements to 26.5 GHz
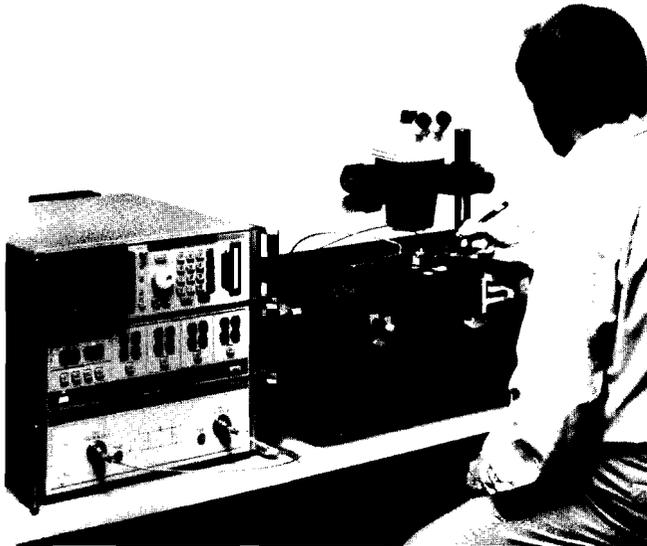
The HP 8510 Network Analyzer and Cascade Microtech wafer probe station permit characterization of microwave semiconductor wafers to 26.5 GHz.

High-frequency network measurements of silicon and GaAs devices and ICs are possible with the HP 8510 Network Analyzer system. A new product note, *On-Wafer Measurements Using the HP 8510 Network Analyzer and Cascade Microtech Wafer Probes*, describes a system that can be configured for making state-of-the-art measurements of your devices and ICs directly on-wafer.

This system overcomes the problem of how to connect the device to an RF measurement system. The Cascade Microtech wafer probes use a coplanar design to bring 50-Ω transmission line right to the bond pads of the device. By using calibration standards supplied with the probes, you can take advantage of the HP 8510's built-in error-correction capability and have a high degree of confidence in your measurement results. The product note details this aspect of system operation and provides examples of typical measurement results.

For a free copy of the product note, check L on the HP Reply Card.

New selection guide describes 24 signal sources from 10 kHz to 60 GHz

A new signal generator selection guide provides concise information on HP signal sources. The guide covers over 20 instruments from sources to sweepers to synthesized signal generators. You can easily determine which signal source meets your needs with application and specification comparisons and brief descriptions of each source.

For a free copy, check M on the HP Reply card.

Microwave synthesizers now offer more performance, lower price

New B versions of the HP 8340 Synthesized Sweeper (10 MHz to 26.5 GHz) and the HP 8341 Synthesized Sweeper (10 MHz to 20 GHz) are now available. Like the A versions, the new HP 8340B and HP 8341B provide excellent frequency resolution, modulation capabilities, and useful analog sweep. The B versions include important new modulation features. And for applications below 20 GHz, the price of the HP 8341B is substantially lower than its predecessor.

Both the HP 8340B and 8341B come with frequency modulation capability. And now they have an external leveling mode that provides leveled and calibrated output power at milli-meter-wave frequencies when using the HP 83550 Series milli-meter-wave source modules. These extend coverage to 60 GHz. Optionally available with the HP 8341B is a low harmonics option (Option 003). With this option, all harmonic and sub-harmonic products are below −50 dBc. This is especially useful in EW/ECM receiver testing or when making scalar network measurements.

The HP 8341B now comes with a 90-dB output attenuator, pulse modulator, and HP's best phase noise performance. The HP 8341B's price is 25% lower than an equivalently configured HP 8341A.

For more information, check N on the HP Reply Card.
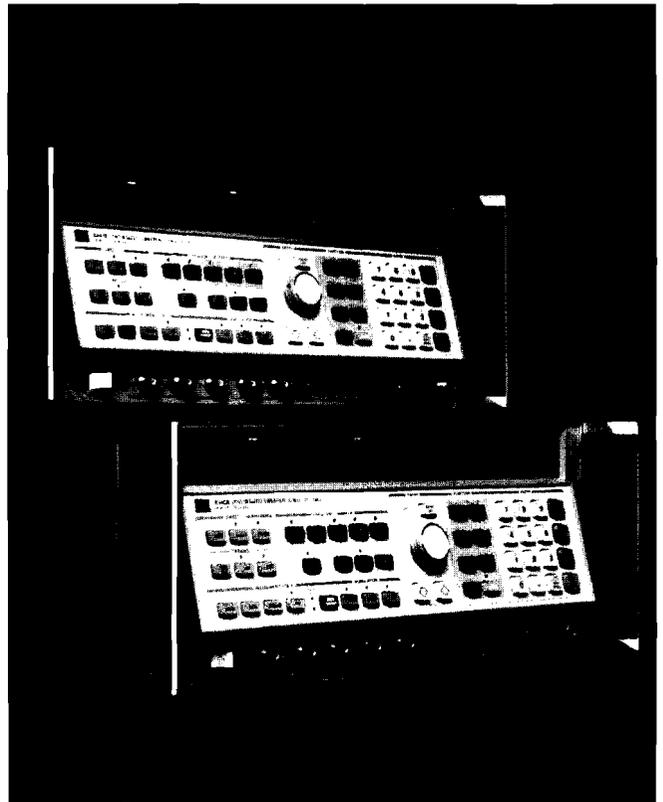
The HP 8340B and 8341B Synthesized Sweepers offer high performance as synthesized signal generators and as precision analog sweepers.

Enhanced CW microwave frequency counters offer improved sensitivity

Three new microwave frequency counters, the HP 5350B, HP 5351B, and HP 5352B, offer significant enhancements over the HP 5350A series with no price increase.

Both HP 5350 Series provide a complete feature set, optional low-aging-rate oscillators, and a low failure rate. The enhanced counters now offer:
- −40 dBm input sensitivity (HP 5350B/51B only)
- 60-millisecond acquisition time
- 1 GHz/second tracking speed
- 120 measurements/second system throughput via the HP-IB, HP's implementation of IEEE 488/IEC 625.

If you want better sensitivity and faster tracking speed, the enhanced CW microwave frequency counter may meet your needs.

Voltage-controlled oscillator (VCO) manufacturers requiring fast measurement throughput will find the counters' short acquisition time and fast tracking speed well-suited for monitoring VCO response to source tuning. In benchtop applications, the counters' liquid crystal display (LCD) will update measurement results rapidly to shorten evaluation time. In systems, these counters can deliver up to 100 measurements per second over the HP-IB in automatic mode (formerly 20) and 120 measurements per second in manual mode (formerly 80).

With sensitivity improved to −40 dBm (−30 dBm for the HP 5352B), these counters can measure weak signals accurately without using expensive, custom-designed microwave amplifiers and filters. They measure frequencies from 10 Hz to 20 GHz, 26.5 GHz, and 40 GHz, respectively, with resolution to better than 1 Hz. With direct input to 40 GHz, you can make measurements in the millimeter-wave range without mixers.

The HP 5350B/51B/52B counters are compatible with the HP 5350A series. The new counters have peak-to-peak FM tolerance up to 20 MHz, and you can set scales and offsets to calculate (scale factor) × (measured value) + (offset). For signals between 10 Hz and 525 MHz, measurements to 0.001 Hz resolution are attainable.

When incorporated in an automatic test system, the counters can serve as a message center for system operators. The programmable LCD display provides high-resolution, alphanumeric-display capabilities. If confidentiality of measurement results is important, you can turn off the LCD display with a keyboard lockout diagnostic.

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

HP's new laser interferometer improves system accuracy

The HP 10715A is a new differential interferometer that features a threefold system accuracy improvement over previous HP designs. The improved stability and accuracy will appeal to designers of precision metrology equipment. Applications are expected to include precision machining as well as integrated circuit lithography and wafer and mask inspection.

This high-stability optical component can be used in place of the HP 10706A Plane Mirror Interferometer. It is compatible with the HP 5527A Laser Position Transducer as well as with the older HP 5501A system.

Deadpath errors minimized

The design of the new HP 10715A directs both the measurement and reference beams through common paths to the measurement area, where the reference beam is reflected by a supplied reference mirror, while the measurement beam passes to the plane mirror on the stage. Deadpath is reduced to the thickness of the reference mirror and its mount (less than 1 cm). The resulting maximum deadpath error is ±200 angstroms, assuming automatic compensation is used in a 20 ±0.5° Celsius environment.

*For more information, check **P** on the HP Reply Card.*
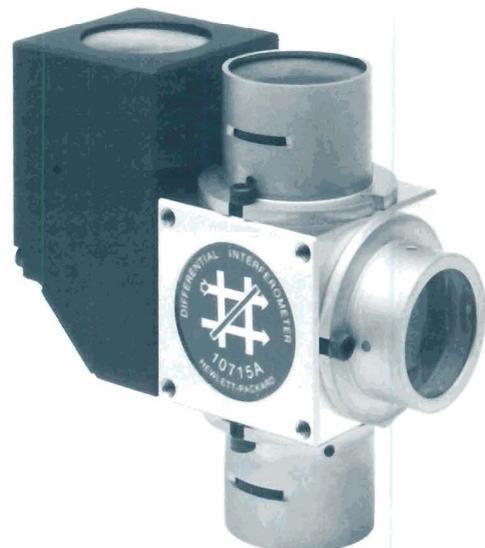
The new HP 10715A Differential Interferometer minimizes deadpath errors.

New courses can help you develop more cost-effective application software

Two new courses can help you develop and maintain custom application software for HP automated test and measurement systems more cost-effectively. These courses are part of a new support services program (Automated Test Implementation Services) which provides an education program, project services, and consulting services—so you get the most out of your Hewlett-Packard system.

These courses provide hands-on experience in applying new techniques to real-life instrument control applications. The structured analysis and structured design course is useful if you are involved in the analysis, development, implementation, or maintenance of application software—regardless of the programming language. The software architecture course is valuable if you are looking for a way to develop reusable software.

Structured analysis and design course

The structured analysis and design course explains a structured method for analyzing system requirements to enable a design to be created on paper. Data flow diagrams, control flow diagrams, mini-specs, and data dictionaries are used to model the software just as schematics, state transition diagrams, data sheets, and parts lists are used to model a hardware product. This lets you correct any errors during the design phase instead of the more expensive implementation phase. The resulting design documentation makes future support and enhancements easier and less expensive.

A key feature of HP's methodology is the control flow diagrams for modeling event sequencing, a critical issue in instrument control systems.

Software architecture course

The software architecture course features a set of guidelines for partitioning application software into reusable modules. The guidelines provide methods for implementing common software functions such as error management, instrument
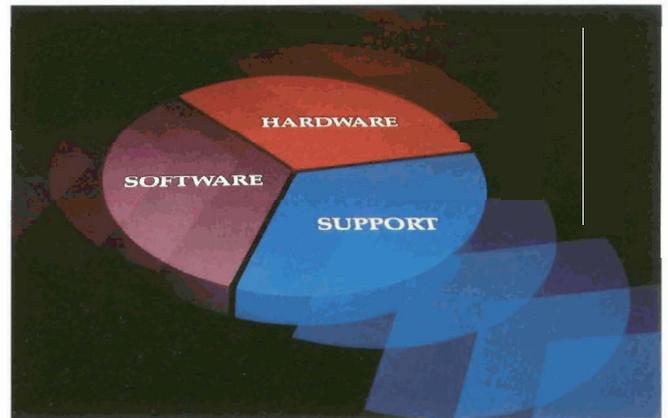
From training courses to consulting, HP offers services to help you successfully implement your HP 9000 based system.

address management, mass storage management, and data handling. The architecture is based on structured design principles and is implemented in HP 9000 Series 200/300 BASIC.

By using a standardized framework or architecture, you can develop application software independently in small, highly functional modules. This promotes reuse of code and lets you retain your individual programming style while remaining compatible with your software development team.

Once a library of modules is developed, time can be saved when implementing new applications by using the building block approach and simply connecting the right software modules. And when upgrading to a new instrument, only the instrument driver modules must be changed.

For more information, check Q on the HP Reply Card.

MEASUREMENT COMPUTATION news
product advances from Hewlett-Packard

New product information
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