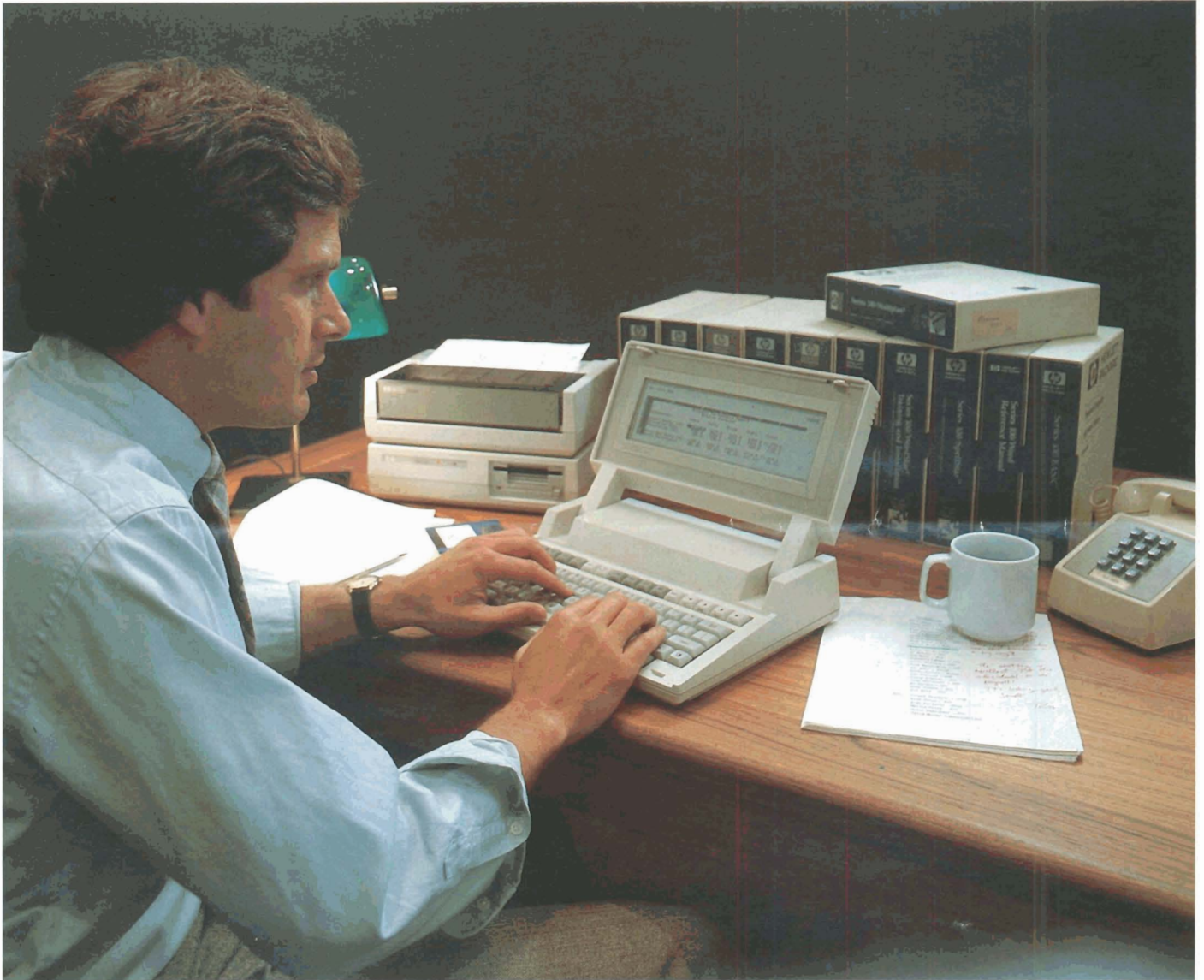# MEASUREMENT COMPUTATION news

product advances from Hewlett-Packard

SEPTEMBER/OCTOBER 1984

HP's portable partners form traveling computer system

If you need a truly portable computer system to suit your on-the-go professional lifestyle, Hewlett-Packard's new line of portable computer products may be just what you're looking for. By combining the Portable Computer, the ThinkJet Printer, and the HP 9114A Portable Disc Drive, you can have a traveling system that weighs less than 21 pounds. Now you can have the mobility of a small-sized, lightweight system without sacrificing computing power.

With these new portable partners, you can literally take your system with you wherever you go, whether it's down the hall to a colleague's office, across town to visit a client, home for an evening or weekend, or even across or out of the country on a business trip. This system also communicates with desktop systems such as the HP 150 Personal Computer or the IBM PC (and compatible) computers. All three of these portable, compact products can be either battery-operated or plugged into ac current.

For more specific information on each product, please turn the page.

Portable computer features built-in software, large user memory, and compatibility with desktop computers

No bigger than a three-ring binder, The Portable Computer from Hewlett-Packard offers powerful computing capabilities in a small package. This new computer features the MS™-DOS operating system, built-in software and modem, large user memory with an electronic-disc feature, and compatibility with desktop computers.

The Portable has a flip-up, 16-line-by-80-column liquid crystal display that offers 128×480-pixel, bit-mapped graphics capability. Its keyboard is compatible with that of the HP 150 Personal Computer, eliminating the need to learn a new layout. A real-time system clock helps you track appointments or organize and locate files by name or time and date. It even has an alarm for wake-up calls.

Large permanent and user memory

The Portable's 348K-byte ROM contains the operating system, easily accessed help screens, and the following built-in software:

Personal Applications Manager (P.A.M.). Shielding you from complex computer syntax, this main menu lets you start using The Portable within seconds just by pressing any key and selecting the desired program.

1-2-3™ from Lotus™. This best-selling package lets you switch from spreadsheet analysis to information management to graphics without having to load additional programs or data.

MemoMaker. This WordStar®-compatible word processor eliminates the need to learn special command sequences.

■ Terminal emulation/communications. When used with the built-in modem or the serial-communication port, this package lets you communicate with and share files with other computers.

A 300-baud-rate, direct-connect modem provides access to other computers and information services simply by plugging the phone cord into the back of The Portable.

You can store additional programs or data in The Portable's 272K-byte, nonvolatile RAM. Part of this memory can serve as a high-speed, solid-state disc drive, called an electronic disc, which stores and retrieves information more than six times faster than conventional flexible disc media.

An optional plug-in card, The Portable-Desktop Link (PDL),

The Portable, a battery-powered personal computer from Hewlett-Packard, weighs nine pounds and measures $13 \times 10 \times 3$ inches. It has built-in software packages and a screen with 16 lines by 80 characters.

enables The Portable to communicate with the HP 150 and the IBM PC (and compatible) computers. The HP 82973A PDL includes an HP-IL (Hewlett-Packard Interface Loop) interface and software that lets The Portable communicate with the IBM PC and access its peripheral devices, as well as enabling the IBM PC to access HP-IL devices.

Using the HP 45463A PDL, you could load a spreadsheet from an HP 150 into The Portable, take it home to work on at night, and load the revised spreadsheet back into the HP 150 the next day. You can also use the built-in RS-232-C serial interface to hardwire The Portable to other computers or connect it to higher-speed, external modems or other RS-232-C-based peripherals such as letter-quality printers.

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

Battery-powered disc drive expands storage and software capabilities of portable computing system

Boasting 710 kbytes of formatted capacity on a 3½-inch flexible disc, the new HP 9114A Portable Disc Drive makes an excellent partner for The Portable Computer. This new disc drive's large capacity results from its ability to read from and write to both sides of the disc. When used with The Portable, the HP 9114A provides access to a wide range of software, including programs such as Multiplan®, dBASE II™, and WordStar®.

Powered by a sealed dry cell battery, the HP 9114A runs for an average of eight hours before it needs recharging, which takes about five hours. You can continue to use the disc drive while the battery is recharging, since prolonged ac

power use will not harm the battery. An automatic power-up/power-down feature reduces power consumption during inactive periods and automatically reactivates the drive when you need it, prolonging battery life. HP's standard reliability features have been incorporated into the HP 9114A, including the media monitor, which alerts you to replace discs before they wear out.

Compatibility features

Data stored on the HP 9114A discs in single-sided format can be read by the HP 150 Personal Computer, allowing convenient data exchange between HP's portable and personal

computer lines. Communication with an IBM PC can be achieved by connecting the HP 9114A directly to the IBM PC using the HP 82973A Portable-Desktop Link, which lets the IBM PC interact with the HP 9114A as if it were an IBM disc drive. These compatibility features allow you to move data files among The Portable, the HP 150, and the IBM PC on 3½-inch discs. The HP 9114A also supports HP Series 40 Handheld Calculators and HP Series 70 Handheld Computers.

A lightweight addition to your portable computing system, the HP 9114A weighs 5½ pounds and measures 8 × 11½ × 3 inches.

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

Multiplan® is a U.S. registered trademark of Microsoft Corporation.
dBASE II™ is a U.S. trademark of Ashton-Tate.
WordStar® is a U.S. registered trademark of MicroPro International Corporation
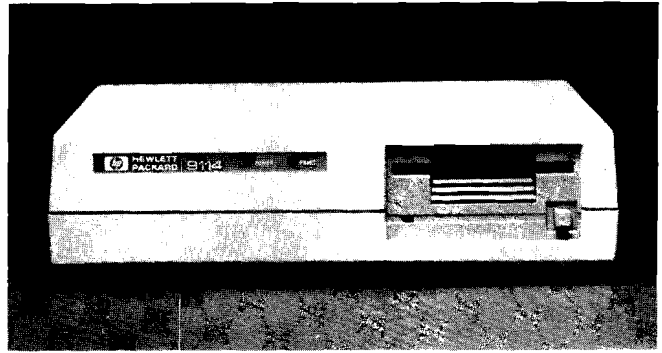
Quiet portable printer features ink-jet printhead

An excellent companion for other portable computing products from Hewlett-Packard, the ThinkJet Printer offers quiet, clean printing at fast operating speeds. This compact printer features a new ink-jet printing system with a printhead and ink supply combined into one disposable cartridge. Because each fresh supply of ink includes a new printhead, the printing is always crisp and clean.

Since the printhead never touches the paper, the ThinkJet printer is noticeably quieter than most printers, operating at less than 50 dBA. The printhead literally paints the characters on the paper by spraying the ink through 12 microscopic nozzles. The printhead skims across the paper at 150 characters per second—about 1,300 words per minute. Print quality is enhanced by its 11 × 12-dot character matrix.

You may use either fanfold paper or single sheets. The best print quality results from HP's ink-jet paper, available from HP or authorized dealers. A pin-feed mechanism adjusts to fit either 8½ × 11-inch or size A4 paper.

Compatible with many personal computers

The ThinkJet printer can be ordered with any of three connections to your computer. The HP 2225A has an HP-IB (IEEE 488) interface for HP computers and instruments, and the HP 2225B uses an HP-IL interface for HP calculators and portable computers. For non-HP personal computers, including the IBM PC, the Apple II, and models from Compaq and Texas Instruments, you can order the HP 2225C, which has a Centronics parallel interface.

The HP 2225B can operate as a portable printer, using a NiCad rechargeable battery pack that prints up to 200 pages of normal type with one charge. You can also use this printer with the charger plugged into an ac outlet.

Graphics resolution for the ThinkJet printer can be either 96 × 96 or 192 × 96 dots per inch. The printer uses standard raster or column graphics.

The ThinkJet printer prints in Danish, Dutch, English, Finnish, French, German, Italian, Norwegian, Portuguese, Spanish, and Swedish languages. With the Centronics interface on the HP 2225C, you also get six ISO character sets. You can shift easily into four different print pitches and select boldface or underlining without slowing down the print speed.

Measuring 11.5 × 8.1 × 3.5 inches, the ThinkJet printers range in weight from 5.5 to 7.5 lb.
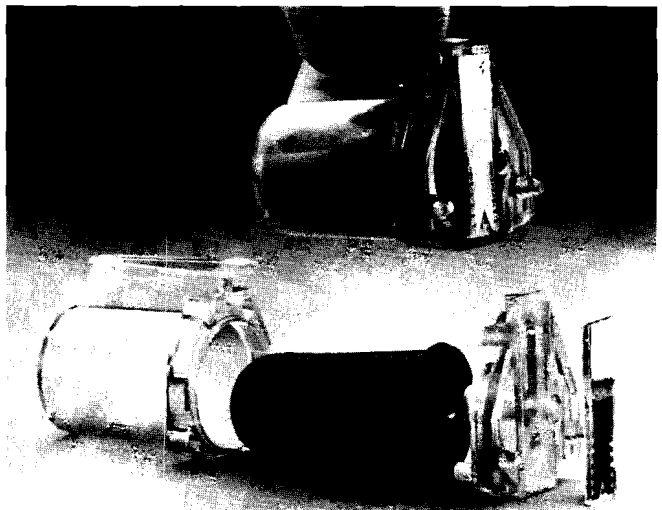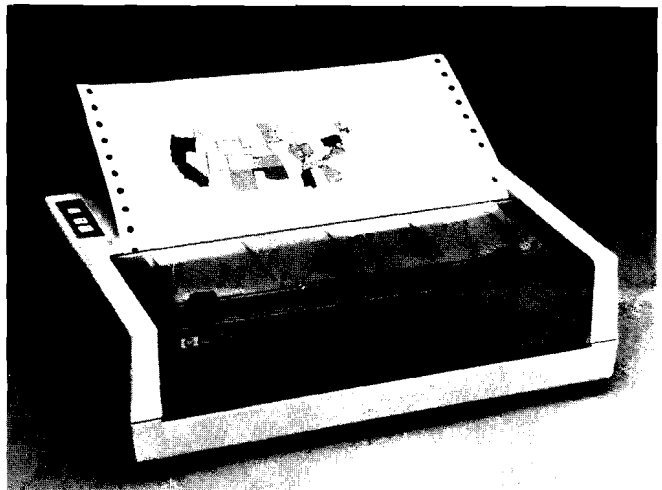
For more information, check **C** *on the HP Reply Card.*

Two new engineering workstations offer modularity and graphics capabilities

Two new models have been added to the HP 9000 Series 200 Computer family. The HP 9000 Models 217 and 237 Engineering Workstations offer more capabilities, larger displays, better graphics, and modularity—all at lower prices than for existing models. These new models are compatible with a variety of peripheral devices.

The Model 217 for engineering tasks

The Model 217 is a 16/32-bit modular workstation featuring an 8-MHz MC68010 processor with memory management hardware that can run either high-performance HP BASIC or HP Pascal. The ergonomically designed 14-inch green phosphor monitor has a tilt/swivel base and offers a display capability of 25 lines × 80 characters, 24.90-kHz horizontal scanning frequency, and 512 × 390-pixel resolution. This new workstation has an internal memory capacity of 4M bytes, four backplane slots for I/O enhancements, and built-in interfaces for HP-IB (IEEE 488), RS-232-C, and HP-HIL (Human Interface Link).* These features make the Model 217 ideal for many engineering and software development tasks.

High-quality graphics with the Model 237

For more demanding design tasks, especially those requiring high-quality display graphics, the Model 237 offers a wide range of features in a powerful, stand-alone workstation. Its 17-inch, noninterlaced, bit-mapped monochrome display connects directly into the system bus. Sharp, clear images result from the workstation's 1024 × 768-pixel resolution. Its 60-Hz refresh rate helps eliminate flicker.

You can move quickly through design analysis and complex computations, thanks to the Model 237's 16/32-bit MC68000 processor, which has a 12.5-MHz clock rate, memory management hardware, and cache memory. The optional floating-point math hardware boosts system performance by a factor of three for many floating-point calculations. Sixteen backplane slots provide extensive memory and I/O capabilities.

As with the Model 217, you have a choice of two language systems for the Model 237. HP BASIC offers more than 60 graphics commands for simplified creation of powerful design programs. The other choice is HP Pascal, which gives you the advantages of a compiled language and graphics support in a modular program development environment.

Both offer HP-HIL keyboard

The HP-HIL keyboard, common to both the Models 217 and 237, is available in 18 local-language versions, including Katakana, most European languages, and Canadian English and French. A mouse is also available as a standard feature on the Model 237 and as an option on the Model 217.

Since both the Models 217 and 237 are modular devices, you can configure your own system and change it to meet your needs. Components that you don't use regularly can be arranged in an optional taboret that fits conveniently under a desk or table.
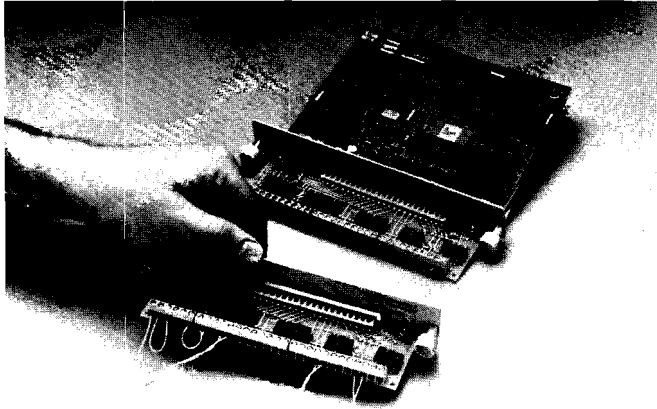
*For more information, check **D** on the HP Reply Card.*

*HP-HIL provides a low-cost means of daisy chaining human interface devices such as the HP-HIL keyboard or mouse
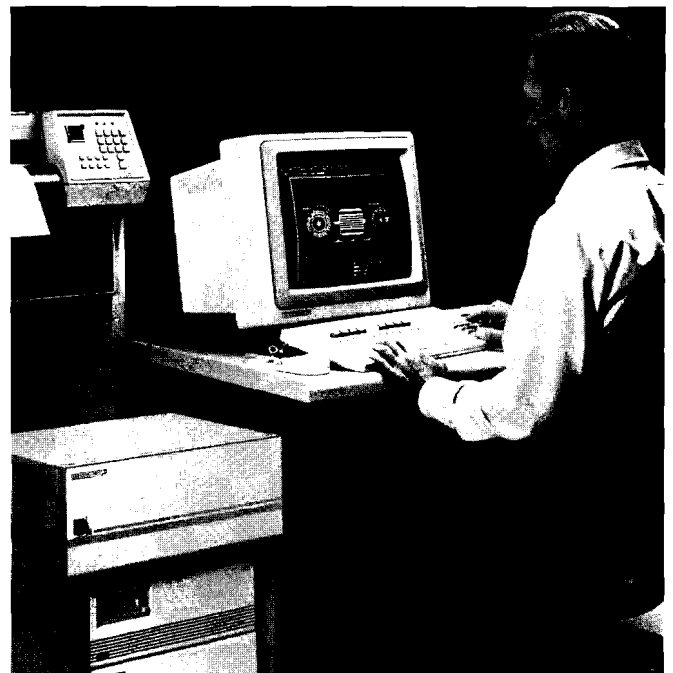
Low-cost analog input interface provides easy data acquisition with desktop computer

A new easy-to-use data acquisition tool is now available for the HP 9000 Series 200 Computers. The HP 98640A Analog Input Interface is low in cost, plugs directly into the computer's backplane, and reads 55,000 samples per second. This direct I/O interface offers seven input channels. An eighth channel can be used either as a reference to correct for offset errors or as another input channel when not needed as a reference.

The standard HP 98640A interface package consists of the analog-to-digital (ADC) board, a screw termination assembly, a test hood assembly, and a hardware manual. You can field-wire devices directly to the screw termination assembly, which is then easily fastened to the ADC board, eliminating the need for a cable. When ready for a different application, you simply unscrew the assembly from the board and attach another assembly wired to other devices or use the diagnostic test hood.

The HP 98640A accommodates four ranges of input voltage levels: $+10V$ to $-10V$, $+1.25V$ to $-1.25V$, $+156$ mV to -156 mV, and $+19.5$ mV to -19.5 mV. It features 13-bit resolution to ensure accuracy down to the microvolt level. External triggering and internal pacing allow custom pacing and triggering.

Temperature measurement can be made by using a thermocouple reference junction, a solid-state linear sensor, an RTD, or a current-loop transmitter. Detailed instructions and recommendations can be found in the hardware manual.

The HP 98645A Measurement Library provides a set of subroutines for use with the HP 98640A. This software package gives you easy programming access to the board from either a BASIC or a Pascal environment. Routines are available for a variety of tasks, including calibrating for various offsets, taking sequential or random readings, setting up selected pacing rates, and establishing gain ranges for particular channels. You can select either the 3½-inch or the 5¼-inch flexible disc format as a no-cost option.

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

HP TechWriter brings pictures and words together

HP TechWriter, a new document editor for the HP 9000 Series 200 Computers, allows you to include graphics illustrations within the text. HP TechWriter eliminates the need for cut-and-paste methods, showing text and graphics together on the screen as they will actually appear in your document. It can help you document software and engineering tasks and illustrate reports and memos.

The HP TechWriter software package includes a document editor, a picture processor, a lister, and a Pascal environment for stand-alone operations.

Key features of the document editor include graphics with text, insert/delete/find/replace text, word wrap, justified left and right margins, selection of areas not to be printed, table of contents, and paging control.

The picture processor accepts pictures from any graphics or user program capable of producing plot files from Pascal 2.1/3.0 or BASIC 3.0. The processed picture can then be displayed in a document. HP TechWriter supports plot files from many Series 200 software packages, including HP Graphics Presentation/200, HP EGS/200, and HP Statistics Library/200.
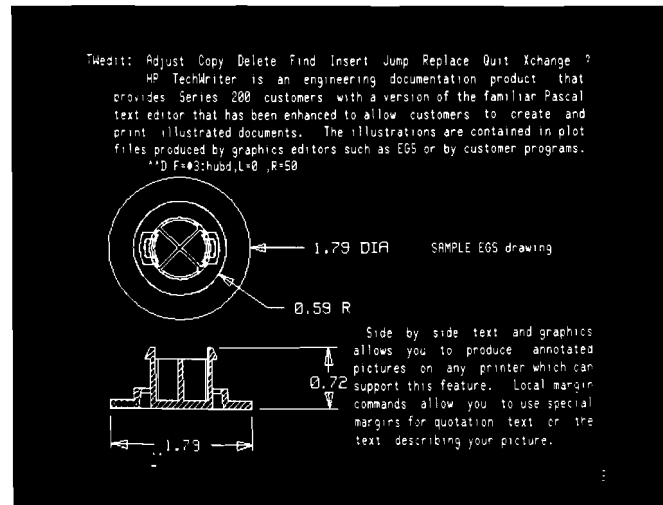
The lister component lets you list up to 50 document files, making it useful for large documents that need to be broken up into sections. These file packages can then be independently stored, retrieved, edited, and stored again.

The Pascal 3.0 environment for stand-alone operations provides filer and media initialization functions, along with the capability to execute your graphics program.

Because the HP TechWriter's security scheme locks the software to a specific computer, it will run only on Series 200 systems having an ID PROM. It does not currently operate on the new Model 237. Upgrades are available for other Series 200 systems.

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

Bar code capability added to HP personal computer and display terminal

Bar code reading capability is available for the HP 150 Personal Computer and the HP 2392A Display Terminal with the use of the new HP 92915A Bar Code Reader. The HP 92915A consists of a bar code wand attached to a decoder pod by a coiled cable. The decoder pod is connected in series with the terminal's keyboard cable and is powered through it, making the HP 92915A ready to use whenever the power is on. Since the keyboard remains active, you can mix bar code and keyboard entries in the same application and see all the data displayed on the screen.

The bar code wand features a replaceable sapphire tip capable of scanning a variety of code densities. Suitable for use in office or light industrial environments, the wand is resistant to dust, shock, and humidity. The HP 92915A's standard resolution is 0.0075 in.

A selection switch on the wand lets you verify data integrity and choose the type of code you want to read. The HP 92915A can decode the 3 of 9, the Interleaved 2 of 5, the UPC/EAN/JAN, and both the CODABAR and CODABAR ABC codes.

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

# Multicolor bar graph improves communication and requires small space
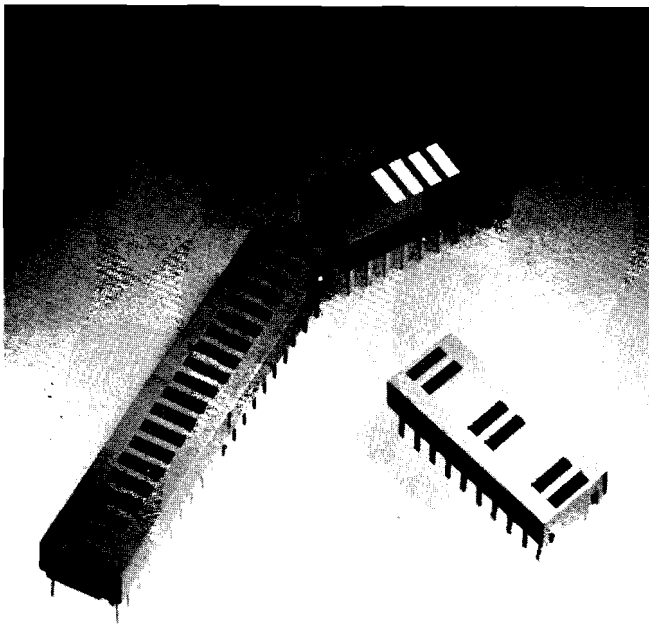
Two new members of Hewlett-Packard's family of LED 10-element bar graphs arrays, the HDSP-4832 and the HDSP-4836 Multicolor Bar Graph Arrays, allow you to pack more analog information into a smaller space than was formerly possible. HP's 10-element arrays feature large, easily recognizable segments in a low-profile package that is end-stackable for longer array lengths. With these two new arrays, you can now choose to have adjacent segments in different colors, selecting either high-efficiency red, yellow, or high-performance green.

With these new multicolor bar graphs, you can use a single device to communicate a number of messages, according to which segments are lighted at any one time. High on-off contrast between adjacent segments makes viewing easy. By using these bar graph arrays, you can also eliminate the problems in alignment and matching of color intensities that are often associated with discrete LEDs.

The HDSP-4832 Multicolor Bar Graph Array has three segments of high-efficiency red, four yellow, and three green, in that order. The HDSP-4836 has two segments of high-efficiency red, yellow, green, yellow, and high-efficiency red, in that order. Both arrays are available from authorized HP components distributors. Custom color combinations are available with minimum delivery requirements. Contact your local distributor or HP sales office for details.

For more information, check **H** *on the HP Reply Card.*
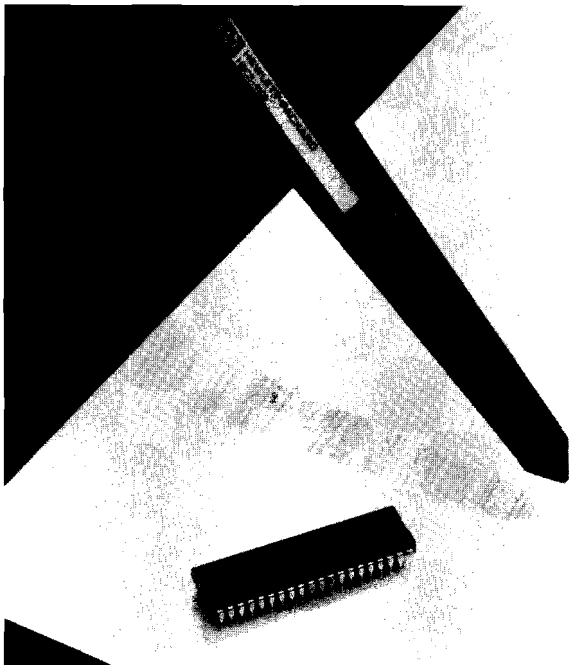
Bar code decoder IC and sapphire-tip wands add bar code capabilities

Hewlett-Packard's new bar code decoder IC and sapphire-tip wand product set, the HBCR-1000 Series Component Bar Code Reader, lets you add bar code capability easily and economically. With the decoder IC, you can avoid costly, time-consuming software development.

The decoder IC supports four commonly used codes: the 3 of 9, the Extended 3 of 9, the Interleaved 2 of 5, and the UPC/EAN/JAN. If more than one standard code is enabled, the reader will automatically recognize the code being scanned.

Both parallel and serial ASCII interfaces are available, making the decoder IC easy to use with most microprocessors. It eliminates the need for a peripheral decoding box.

The decoder IC has been designed to operate with HP's new sapphire-tip wands, the HBCS-2000 Series and the HBCS-4000 Series (see following article).

For more information, check 1 on the HP Reply Card.

Sapphire-tip wands for industrial and commercial use

Two new families of Hewlett-Packard bar code wands feature tough, replaceable, sealed sapphire ball tips for superior wear resistance and protection from clogging when exposed to dirt and debris. Encased in rugged lightweight aluminum for heavy industrial environments, the HBCS-4300 and the HBCS-4500 Industrial Bar Code Wands provide excellent first-read rates for all commonly used bar code formats. For light industrial or commercial applications, you can select one of the HBCS-2000 Series Bar Code Wands, with polycarbonate cases.

Both families feature rugged construction, a variety of resolutions, and a standard digital TTL interface. All models offer excellent reading performance at scanning angles up to 45 degrees. These wands all feature a photodetector IC and precision aspheric optics in their optical sensors. The sensor and on-board digitizing circuitry convert optical information into a logic-level pulse-width presentation of the bars and spaces.

Features of the HBCS-4000 Series

The HBCS-4300 wand contains a 700-nm visible red LED. The HBCS-4500 contains an 820-nm infrared LED. With a nominal spot size of 0.19 mm, the HBCS-4300 reads a general range of bar codes. The HBCS-4500 has a nominal spot size of 0.13 mm for reading very high-density codes. Both have an integral shield for maximum immunity to electromagnetic interference, electrostatic discharge, and ground loops.

Features of the HBCS-2000 Series

The HBCS-2200/2300 wands have a nominal 0.19-mm visible red spot for reading a general range of bar codes. For very high-resolution bar codes, the HBCS-2400/2500 wands contain an infrared source with a nominal spot size of 0.13 mm. The HBCS-2200/2400 wands have a push-to-read switch to minimize power consumption in a battery-operated system.

For more information, check 1 on the HP Reply Card.

... construction, a standard ... performance at scan-

Signal generator offers accurate, repeatable output and improved modulation

The new HP 8656B Synthesized Signal Generator, HP's lowest-cost HP-IB-programmable model, expands the capabilities of its predecessor by adding many new features. Like its predecessor, the HP 8656A, this new generator provides frequency coverage of 100 kHz to 990 MHz, an output range of +13 dBm to −127 dBm with 0.1 dB resolution, flexible AM/FM, and 50W reverse-power protection. Its new features

Economy, reliability ...

include higher switching speeds, a long-life attenuator, a new dc-coupled FM for digital squelch testing, improved spectral purity, and adjustable phase for characterization of phase-sensitive devices.

This powerful combination of features makes the HP 8656B well suited for in-channel receiver testing. With residual FM less than 7 Hz rms and improved phase noise, the HP 8656B handles in-channel tests on AM, FM, and SSB receivers. It also provides 10-Hz resolution over its entire frequency range, facilitating SSB receiver testing, setting narrow channel spacings, and pinpointing RF characteristics of filters.

ATE systems can achieve accurate, repeatable output levels with the HP 8656B, thanks to its new long-life attenuator, its 150-ms frequency switching speed, and its ±1.0-dB absolute level accuracy. To compensate for system cable losses, the HP 8656B offers amplitude offset capabilities that let you see the level actually delivered to the device under test.

Flexible modulation for multitone testing

For radios with digital unsquelching tones, the HP 8656B offers extremely stable dcFM, virtually eliminating droop and sag. The signal generator's exceptional stability and center frequency accuracy also eliminate the need to retune it while in the dcFM mode. Simultaneous AM and FM with both internal and external modulating tones provide the flexibility to do rejection testing.

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

Automated system now available for microwave phase noise measurement
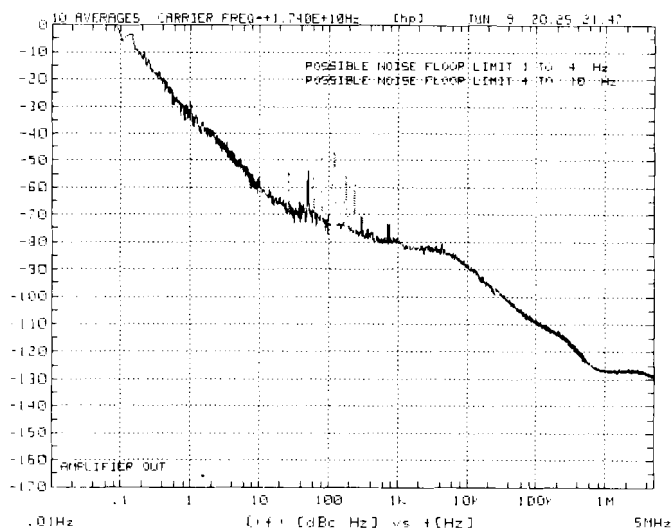
With the new HP 11740A Microwave Phase Noise Measurement System, you can make high-accuracy measurements of microwave source phase noise more easily on carriers from 5 MHz to 18 GHz. Combining the HP 11729B Carrier Noise Test Set and either the HP 8662A or the HP 8663A Synthesized Signal Generator with the HP 3047A Spectrum Analyzer System, this new HP system offers an automated solution to complex measurement problems.

Using an extensive software library, the HP 11740A can self-calibrate, establish phase lock, and process and display the baseband noise signal. The software is designed to operate with the HP 9000 Model 236 Computer as the system controller.

As microwave systems require higher performance from local oscillators and transmitter exciters, the HP 11740A's automated measurement capabilities can give you the speed and accuracy you need on a routine basis. The absolute system noise floor is fully specified. For example, when you make a measurement at 18 GHz, the noise floor at a 1-kHz offset is specified at −92 dBc/Hz (typically −97 dBc/Hz).

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

New option adds output power to frequency-doubled generators

A new option for the portable HP 8683D (2.3 to 13 GHz) and HP 8684D (5.4 to 18 GHz) Cavity-Tuned Signal Generators offers an internal postamplifier that provides 10 mW output in the frequency-doubled band, as well as in the standard band. This extra power is especially useful for testing longer cable runs to antennas or when higher power is needed for LO substitution. To order these higher-power units, specify Option 001 for either model.

The HP 8683/84D generators provide high-performance AM, FM, and pulse modulation. Both include a pulse generator that has a 10-Hz-to-1-MHz repetition rate, 100-ns-to-100-ms pulse width, and 50-ns-to-100-ms delay. In the doubled bands their doubled FM deviation of ±10 MHz at a dc-to-10-MHz rate makes them useful for satellite video applications.

At 18 kg (39 lb) these generators serve portable applications such as remote communications or flight-line testing. Cavity tuning provides a stable signal with low broadband noise floor and low nonharmonic spurious signals (below -80 dBc).

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

Option 001 ... 10-mW output power ... as well as in the standard ...

Newest protocol analyzer offers unattended remote operation and high performance

Expanding Hewlett-Packard's family of protocol analyzers is the new HP 4953A Protocol Analyzer. Solutions for identifying and eliminating data communication problems, from product development to installation and maintenance, are available according to user needs. Besides the common family features, such as high-resolution displays and transportability of data files and test setups, the HP 4953A makes its own contributions to the data communications test field. Its key features include unattended remote control, monitoring of bit-oriented protocols to 256 kbps, full triggering capability up to 72 kbps, softkey-driven cursor timing measurements without programming, and additional protocols built into the ROM, as well as the capacity for user-definable protocols.

An operator must be in attendance for the remote test sequences on the HP 4951A and the HP 4955A. But with the HP 4953A you can give commands to download a test to another HP 4953A, execute the measurements, and automatically upload the results from the other unit, even if it is unattended. In fact, the HP 4953A provides a separate RS-232-C/V.24 connector for unattended remote control of up to 16 instruments. Separate ports allow concurrent remote testing and monitoring without having to switch data links.

With their extensive use of softkeys, HP's protocol analyzers lead you quickly and easily through setup and test menus. The HP 4953A supports X.75, DDCMP, and X.25 as built-in protocols, as well as the other major protocols (BSC, SDLC, HDLC, Char Async/Sync). The HP 4953A's buffer memory of 64K bytes stores data, timing information, and lead status. You can increase this memory with a 256K-byte option. The standard storage tape adds another 512K bytes to store data

for later analysis. Actual data storage is increased by the HP 4953A's ability to eliminate line idles without sacrificing timing information.

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

An ... HP 4953A Protocol Analyzer ... data-terminal equipment ... to spot errors ... can also verify ... your network.

Two-channel synthesizer provides two signal sources in one instrument

Hewlett-Packard's new HP 3326A Two-Channel Synthesizer provides two separate sources in the dc-to-13-MHz range, offering either two independent signals, two signals related in phase or frequency, or one combined complex signal.

The HP 3326A eliminates the need for several instruments and a complex custom system by combining two independent synthesizers, flexible modulation, and control circuitry into a single instrument.

Two independent synthesizers, channels A and B, form the core of the HP 3326A. Each channel produces sine and square waves from dc to 13 MHz with independent control of amplitude and dc offset. Using these two sources as a starting point, the HP 3326A can generate high-performance signals for two-phase, two-tone, complex-signal, or ATE applications.

The HP 3326A provides programmable, calibrated, and adjustable phase characteristics for two-phase or multiphase signals, with phase offsets determined by the user. Once you set the desired frequency, you can offset the two signals up to ±720 degrees with 0.01-degree resolution. An internal phase calibrator provides accuracy of ±0.2 degrees below 100 kHz. The calibrated two-phase capability makes it easy to generate multiphase signals using a few front-panel keystrokes.

Precision two-tone signals can be generated either on separate channels or combined on one channel. Tracking frequency offset, internal signal combining, and amplitude control capabilities make possible −80 dBc harmonic distortion for signals below 100 kHz.

The HP 3326A is especially useful for a broad range of special-purpose source needs. In the pulse mode, the two channels are complementary pulse signals with 15-ns rise/fall times. Pulse widths are adjustable with an accuracy of better than 1% of the period. Flexible sweep formats make sweeps much easier to use. No external modulation is needed to simulate a wide range of signals, since the HP 3326A's channel A can be modulated internally by channel B.
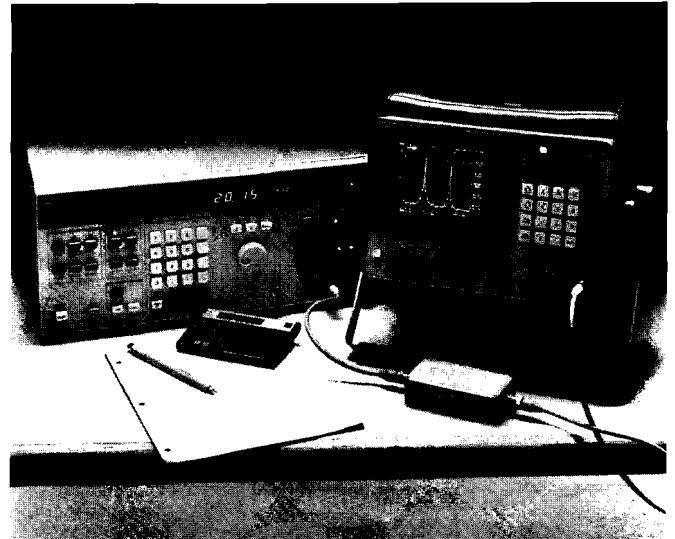
Other key features

Several other features offered by the HP 3326A make it a versatile, high-performance instrument.
- Amplitude can be set at 1 mVp-p to 10Vp-p in units of dBm (50 Ω), dBV, volts p-p, or volts rms
- Selectable dc offset up to ±5V
- Two sweep modes: linear sweep from start to stop frequencies, or discrete sweep of up to 63 frequencies
- Nonvolatile memory stores up to 10 front-panel setups or up to 63 discrete sweep elements
- Complete HP-IB programmability of front-panel settings with easy-to-read programming codes.
- Options available for high-stability frequency reference, high voltage (40Vp-p below 1 MHz), and rear-panel signal outputs for automatic test systems.

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

HP offers "how to" newsletter for service technicians

Bench Briefs, a free bimonthly publication, is your private line to Hewlett-Packard customer service. It is offered to technicians doing repair, calibration, incoming inspection, and system configuration of HP electronic instruments. It is particularly useful to service managers who want to plan training programs for their staff members.

This attractive eight-page bulletin contains customer service training schedules, service tips, instrument modifications, new methods of testing, and new tools that simplify service and troubleshooting. *Bench Briefs* is full of practical information such as HP-IB programming hints for selected instruments, printed circuit board rework, repair, and cleaning, and information on electrostatic discharge (ESD), as well as factory recommendations for updating or modifying HP products.

To receive a free subscription, contact your local HP sales office.

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

Optical receiver offers calibrated optoelectrical conversion over a large frequency range

The newest member of Hewlett-Packard's family of fiber optic test instruments is the HP 81519A Optical Receiver. This new receiver is a linear transducer that converts optical signals into their electrical equivalents with a conversion gain of −1V/mW (inverting) and an input swing of 1 mW.

This instrument is designed as a front-end interface to conventional electronic test equipment, which means that instruments such as spectrum analyzers or digital voltmeters can be used for measurements in the optical domain at low incremental cost. When it functions as a general-purpose receiving device in data acquisition or signal processing applications, the HP 81519A's low distortion level ensures minimum degradation of optical input signals during conversion.

The HP 81519A offers a large demodulation frequency band from dc to 400 MHz, coupled with excellent flatness and an intrinsic rise time of less than 1.1 ns. These capabilities make it an ideal analog test and measurement tool in the design, manufacturing, and maintenance of fiber optic devices.

Employing a PIN diode as the receiver element, the HP 81519A is calibrated for 850 nm and can be operated in the wavelength range from 550 nm to 950 nm. Actual transducer gain is indicated by the characteristic curve on the top cover.

When used with supplementary equipment, this receiver performs accurate measurements in either the time or the frequency domain, including pulse response or bandwidth measurements. By connecting the receiver to an oscilloscope, for example, you can observe the light input signal, making signal evaluation easier.

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

You can use the new HP 81519A Optical Receiver in designing, manufacturing, and maintaining fiber optic devices.
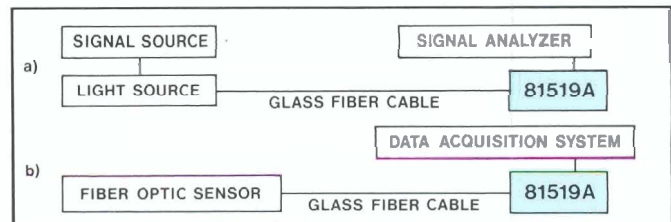
The HP 81519A Optical Receiver can operate either as a front-end interface to conventional test equipment (a) or as a precision interface to measurement or process control systems (b).

New HP 3000 computer for the office

conditioning, since the Series 37 can operate in a wide range of temperatures. Quieter than most typewriters, the Series 37 computer plugs into an ordinary wall socket.

The entry-level model of the Series 37 has 512K bytes of main memory, a 55M-byte disc, and a cartridge tape backup system, all of which can be contained in a compact cabinet that fits under a table. You can expand the system to the larger Series 37XE, which has 2M bytes of main memory and 2,100M bytes of disc storage. It supports up to 28 terminals. With standard upgrades, your system can grow into larger HP 3000 models, the largest of which supports up to 400 terminals. The Series 37 systems can communicate with other HP 3000 systems and with IBM mainframes.

Simpler system backup

With the HP 3000 Series 37, you no longer need highly skilled professionals to perform the system backup. Backup for an entire 55M-byte disc is handled by a single 67M-byte cartridge tape. This cartridge system eliminates the need for a costly, time-consuming flexible-disc backup system, which requires the management of a large disc library. The Series 37 hardware allows the MPE operating system to perform system backup automatically and to check for data integrity.

System backup can be performed without supervision during nonbusiness hours.

Other key features

Another important feature of the Series 37 system is its delivery of the appropriate application screen to each user at the beginning of each day's operations. This means that user training time is decreased and productivity is increased. Most system operations can be performed by clerical personnel during the normal workday or even automatically during off-work hours.

Like other HP 3000 models, the Series 37 has a remote support feature that lets HP support engineers diagnose system problems by telephone in a matter of minutes. This fast response increases system uptime and lowers maintenance costs.

During a power failure the system memory is maintained by a battery backup capability. Your application resumes operation exactly where it was interrupted. The rechargeable batteries provide up to 15 minutes of backup during power failures.

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

The new HP 3000 Series 37 offers low-cost system computing capabilities for branch office, departmental, and small business applications. This series features an operating system and software programs that are compatible with other HP 3000 systems.

New HP 3000 computer brings low-cost computing to the office

The newest member of the HP 3000 Business Computer System is the HP 3000 Series 37 Office Computer. It features complete compatibility with the MPE operating system, high-level language support, software programs, and utilities of other HP 3000 systems. Through innovative implementation of the new VLSI technology, the Series 37 has fewer parts, lower power consumption, and smaller space requirements than existing models. You can install small configurations yourself and run them in a carpeted room without special air

HEWLETT-PACKARD AUSTRALIA Pty. Ltd.,
ADELAIDE: 153 Greenhill Rd , **Parkside**, S.A , 5063,
Tel 272-5911, Telex 82536
BRISBANE: 10 Payne Rd , **The Gap**, Queensland,
4061, Tel 30-4133, Telex 42133
CANBERRA: 121 Wollongong St , **Fyshwick**, A C T 2609,
Tel 80-4244, Telex: 62650
MELBOURNE: 31-41 Joseph Street, **Blackburn**, Victoria
3130, Tel 895-2895, Telex. 31-024

PERTH: 261 Stirling Highway, **Claremont**, W.A , 6010,
Tel 383-2188, Telex 93859
SYDNEY: 17-23 Talavera Rd., P O Box 308,
North Ryde N.S.W 2113, Tel 887-1611, Telex 21561

HEWLETT-PACKARD NEW ZEALAND LTD.
AUCKLAND: P.O Box 26-189, 5 Owens Road,
Epsom, **Auckland**, Tel 687-159
WELLINGTON: 4-12 Cruickshank St , Kilbirnie,
P O Box 9443, Courtenay Place, **Wellington** 3,
Tel 877-199

HEWLETT PACKARD

Printed in Holland

00465B