MEASUREMENT COMPUTATION news

product advances from Hewlett-Packard

MAY/JUNE 1986

Surprisingly affordable high-performance RF network analyzer

An integrated RF network analyzer, the HP 8753A, brings a new era to RF design and manufacturing: high-performance network measurements from 300 kHz to 3 GHz at a remarkably low price. The HP 8753A measures the vector transmission and reflection responses of RF components, circuits, and systems. The low price of the instrument, its high performance, and the increased productivity it can bring make the HP 8753A an outstanding measurement value.

Built into the HP 8753A is a swept, synthesized source with 1-Hz frequency resolution, and a 100-dB dynamic range, three-channel receiver that has ±0.05-dB dynamic accuracy

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Surprisingly affordable RF network analyzer

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over a 50-dB range. To improve measurement accuracy, the HP 8753A offers vector accuracy enhancement that uses known standards to calculate and remove residual errors from the measurement system.

A time domain transform option (Option 010) allows characterization of devices as a function of time and distance. The transform calculates the equivalent step or impulse response of the test network in both transmission and reflection. It can be used, for example, to locate responses in cables as a function of distance, or to view the spurious time responses of surface acoustic wave (SAW) devices. Time-domain gating can be used to isolate the response of the network of interest from the responses of other measurement path elements such as connectors, adapters, and fixtures.

Built-in automation

The HP 8753A incorporates many productivity tools that once required a computer. PASS/FAIL limit testing lets you define test band limits and get pass/fail results as you measure and adjust. The arbitrary frequency sweep mode lets you define the exact frequencies or sweep segments at which your device is to be tested, giving you faster measurements while maintaining full error-corrected performance. Direct printing and plotting capabilities document your measurements, and external disc drive access stores instrument states and measured data for archiving and faster set-ups.

HP offers an extensive family of 50-ohm accessories (300 kHz to 3 GHz) and 75-ohm accessories (300 kHz to 2 GHz) to meet your measurement needs. The accessories include power splitters for simple transmission measurements, one-port test sets for simultaneous transmission and reflection measurements, and s-parameter test sets for automatic characterization of two-port devices.

Low cost of ownership

The HP 8753A is not only more affordable than previous RF network analyzers, but also easier to maintain. Its high-reliability design minimizes the number of repairs needed, and extensive self-diagnostics support a modular repair strategy that has a mean time to repair of only two hours. Reflecting this, HP offers an option for two additional years of return-to-HP support, which combines with the 1-year warranty to give you a total of 3 years of return-to-HP support. On-site service is also available in most areas to maximize instrument uptime for time-critical applications.

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

Three application notes for dc-to-50-MHz arbitrary waveform synthesizer

The HP 8770S Arbitrary Waveform Synthesizer offers powerful new measuring technology to a variety of business sectors. The dc-to-50-MHz waveforms are created using the interactive HP 11775A Waveform Generation Software. Since the signal output is controlled by software, the mathematically derived signals can easily be matched by the user to the exact requirements of the tests. Three new application notes are available to describe specific measurement areas.

Application Note 314-1, "Receiver Testing with the HP 8770S," covers simulation of video and baseband signals of typical receivers for IF and RF testing.

"Synthesizing Magnetic Disc Read and Servo Signals with the HP 8770S" (AN 314-2) details creation of real-life signals with controlled amounts of noise, distortion, missing and extra bits, jitter, and servo anomalies.

"Television Signal Simulation with the HP 8770S" (AN 314-3) shows how to create ideal and nonideal signals for an NTC-7 composite signal. Since television receivers have low tolerance for signal gain and phase distortions, the ability to control nonideal effects precisely is very important. Users of PAL, SECAM, and other formats can use similar waveform construction techniques.

For a free copy of Application Note 314-1, check **B** *on the HP Reply Card. For AN 314-2, check* **C** *on the Reply Card. Check* **D** *for a copy of AN 314-3.*

Network analyzer extended to 100 GHz

Developments within the last two years have enabled engineers working at millimeter-wave frequencies to make critical reflection, transmission, and group delay measurements in the 26.5-to-60-GHz frequency range. These measurements can be made on devices, components, and systems with impressive accuracy, large dynamic range, and relative ease.

Now the millimeter-wave measurement capabilities of the HP 8510 Network Analyzer have been extended. The necessary signal sources, waveguide test sets, and calibration standards for 50 to 75 GHz in WR-15 (V-band) and for 90 to 100 GHz in WR-10 (W-band) waveguide have been developed. Error-corrected measurements with 75 dB or more dynamic range can be made quickly and with high confidence.

A new data sheet provides information about all of the HP 8510 millimeter-wave systems from 26.5 to 100 GHz. Product Note 8510-1A describes how to configure and operate the HP 8510 millimeter-wave system.

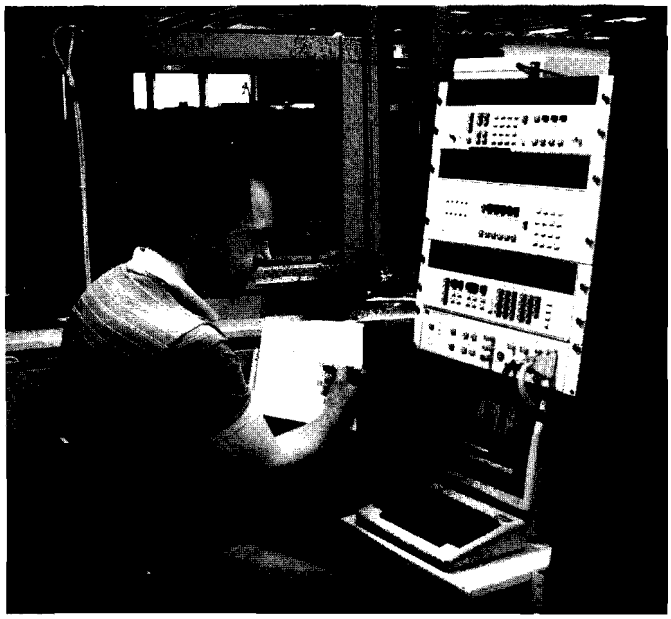
For a free copy of the data sheet and product note, check **E** *on the HP Reply Card.*

Test radios in minutes with new software package

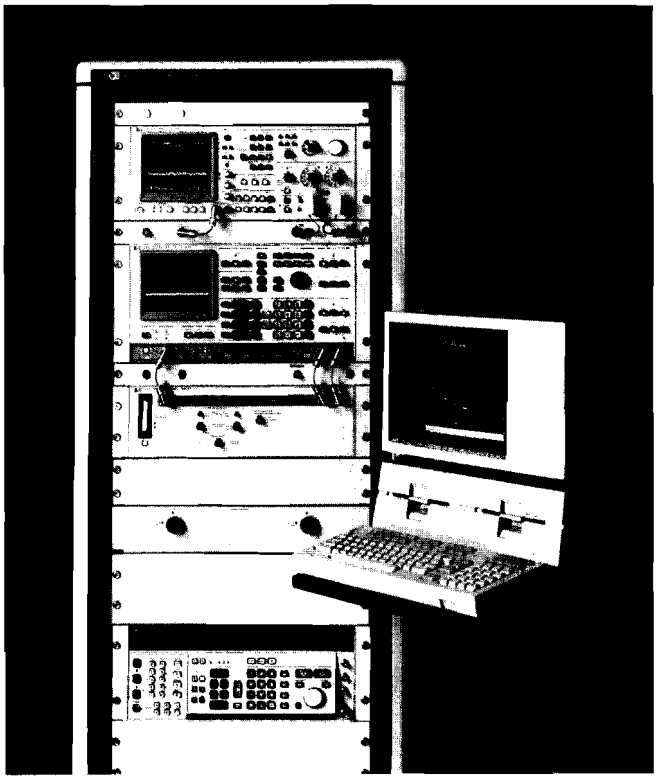
A new HP software package quickly and thoroughly tests radios with multiple channels, CTCSS, and digital squelch. It provides a comprehensive selection of tests and the flexibility to select only the ones you need. The HP 11805A software package is well-suited for production, maintenance, and R&D. All parameters, including serial numbers, can be entered with a bar code reader, making it easy to test many different types of radios. Its bar code reader and speed are valuable in production testing. For a service shop, the Pass/Fail format makes checking out repaired radios a fast and simple task. Measurements with high accuracy and repeatability assure complete evaluation of designs.

The HP 11805A Transceiver Test Software Package consists of a softkey-driven user interface program and a series of test packages written in BASIC language for the HP 9000 Series 200 and 300 Computers. The hardware for making the measurements can either be the HP 8953A Transceiver Test Set, the HP 8957S Cellular Test Set, or the HP 8955A RF Test System. The basic instruments are the HP 8903B Audio Analyzer, the HP 8656B Signal Generator, the HP 8901B Modulation Analyzer, and an interface.

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



The fast, easy-to-use HP 11805 Transceiver Test Software Package can be used with the HP 8953 Transceiver Test System.



Upgraded software for the HP 3047A and 11740A systems provides faster phase noise measurements.

New software and mailing list for phase noise measurement applications

Determining the phase noise of high-stability sources has never been easier or faster, thanks to improvements in the HP 3047A and 11740A Phase Noise Measurement Systems. These systems offer the lowest-noise, highest-accuracy method of automatically measuring the phase noise and spurious signals of 5-MHz to 18-GHz carriers over an offset frequency range of 0.02 Hz to 40 MHz.

The latest software update for the HP 3047A and 11740A systems allows the HP 9000 Series 300 Computer to run the extensive measurement program. With a Series 300 Computer running the HP 3047A or 11740A software, the calibration and data processing portions of the measurement process are much faster. This results in a significant decrease in overall test time.

Also, Hewlett-Packard has started a new mailing list for people who work with low-phase-noise signals. It is an excellent way to receive the latest information on the generation and measurement of low-phase-noise signals. Information on technical applications, new products, and product enhancements will be mailed periodically.

For more information on the HP 3047A and 11740A systems, check **G** *on the HP Reply Card. To add your name to the HP Phase Noise Mailing List, check* **H** *on the HP Reply Card.*

Digitizing oscilloscopes simplify analog design, digital design, and system integration

Two new digitizing oscilloscopes, the HP 54201A and HP 54201D, expand Hewlett-Packard's offerings in the low-cost, multipurpose digitizing oscilloscope line. Both instruments offer excellent price/performance values to designers and engineers.

Measurement performance throughout the design cycle

With a 300-MHz bandwidth and ±200-ps timing accuracy, the HP 54201A/D can assist a project team from product concept through manufacturing evaluation. The most important features include:

- built-in automatic measurements
- pretrigger viewing (i.e., negative time display)
- time and voltage cursor measurements
- versatile display and store modes
- one-button hard-copy output to HP printers and plotters
- storage and recall of up to four front-panel setups
- four non-volatile waveform storage memories
- setup aids such as automatic waveform scaling
- waveform math capabilities (e.g., channel 1 ± channel 2).

Capture single-shot transients as narrow as 10 nanoseconds

The HP 54201A/D's 50-MHz single-shot bandwidth is useful to designers of digital and analog systems who must deal with transient fault conditions. Transients as narrow as 10 ns can be captured easily, stored in waveform memory, and analyzed using a variety of built-in automatic measurement functions and time and voltage cursors.

The new HP 54201A/D can assist a project team from product concept through manufacturing evaluation.

Logic analyzer triggering extends oscilloscope use

The increased use of microprocessors in today's electronic products has made state triggering a high priority for designers. The HP 54201D excels in making digital/digital and digital/analog circuit and system measurements.

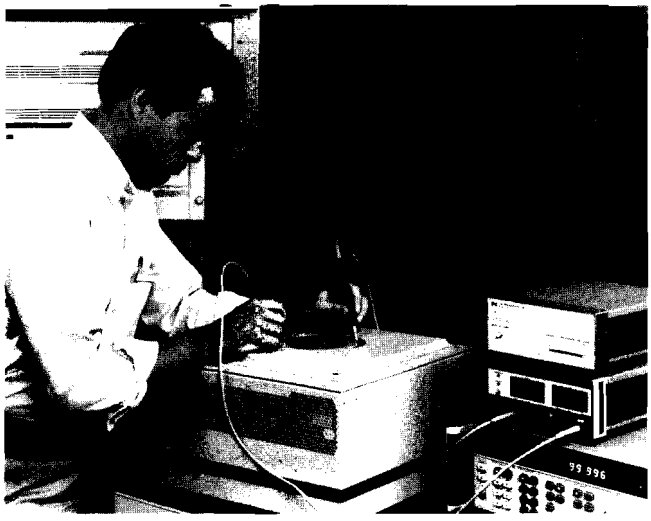
The HP 54201D's triggering features include:

- 27-channel-wide state trigger for triggering on microprocessor operations
- triggering on specific routines with four user-definable sequence terms
- missing-bit and extra-bit detection that allow the user to trigger on an imperfection in a serial data stream.

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

Time-interval calibrator offers 100-ps accuracy

A new time-interval calibrator from Hewlett-Packard Company, the HP JO6-59992A, when used with the HP 5370B Universal Time Interval Counter, offers measurements accurate to better than 100 ps. In addition, these measurements are traceable to the National Bureau of Standards.



When calibrated with the HP J06-59992A Time Interval Calibrator (top right), the HP 5370B Time Interval Counter can characterize the timing accuracy of an IC tester at the test head to better than 100 ps accuracy.

Digital IC-tester manufacturers, as well as their customers, now will be able to calibrate and verify their tester's timing.

In R&D, prototype device timing can be tightly characterized to optimize performance and identify critical timing issues. Manufacturers of high-density, computer disc drives will find that the improved accuracy brings more precise testing. Calibration laboratories also will be interested in this high accuracy.

The time-interval calibrator reduces systematic uncertainties from the HP 5370B. This reduction, combined with averaging techniques in the HP 5370B that reduce random errors, can improve the accuracy of time-interval measurements to better than 100 ps.

The calibration procedure may be automated. An example software listing is supplied with the operating information. This automated operation, combined with better than 5,000 measurements per second with the HP 5370B, provides an easy-to-use, high-throughput solution for precise timing measurements.

The technique for calibrating the HP 5370B using the HP J06-59992A Time Interval Calibrator is explained in detail in Product Note 5370B-2.

For more information on the calibrator and a free copy of the product note, check **J** *on the HP Reply Card.*

New brochure clarifies selection of digitizing oscilloscopes

A new brochure is available from Hewlett-Packard that describes the company's extensive line of digitizing oscilloscopes.

Nine products are described to help you select the digitizing oscilloscope best suited to solving your particular measurement problem. Selection is further simplified by reading the tutorial on choosing the right scope for your application and by checking the specification summary on the back of the brochure.

This full-color, 14-page digitizing oscilloscope brochure also includes a prepaid reply card enabling you to order data sheets, application notes, and other supporting materials.

For a free copy of the brochure, check **K** *on the HP Reply Card.*

Components

Read ultra-bright lamps in sunlight

Three new ultra-bright lamps provide improved brightness over conventional hermetic LED lamps, good on-off contrast, and high axial intensity.

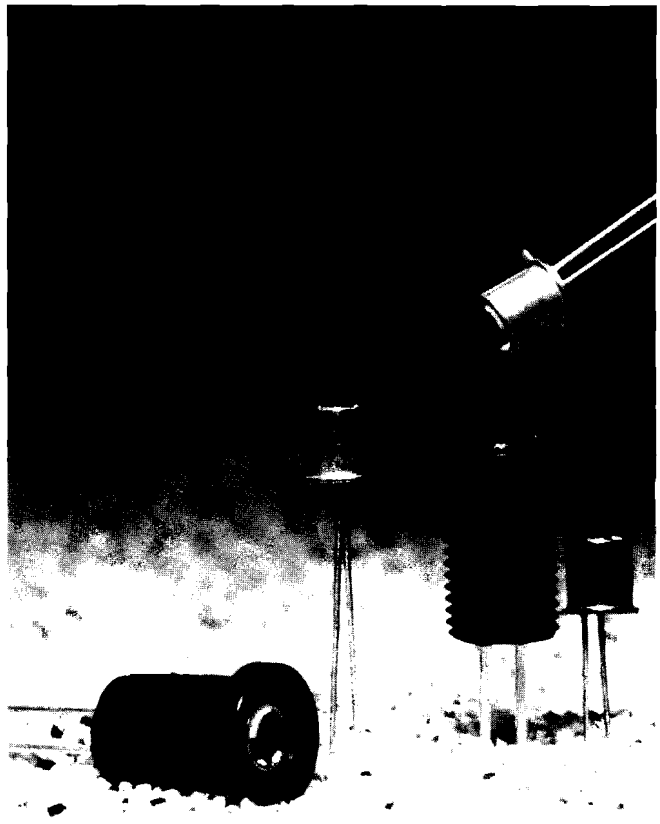
Typical applications for the HLMP-036X, HLMP-046X, and HLMP-056X families include use as keyboard indicators, lighted switches, and light-pipe sources. They also can be used to backlight front panels and for direct viewing.

Specially developed for use in bright sunlight applications, these solid-state lamps come in high-efficiency red, yellow, and green. All are available in a panel-mountable fixture.

At 25°C, power dissipation for the three lamp families is 120 mW, dc forward current is 35 mA, and peak forward current is 60 mA. Typical axial luminous intensity at that temperature, with I_f at 25 mA, is 50 mcd. The dominant wavelength of the HLMP-036X family is 626 nm. For the HLMP-046X family it is 585 nm, and for the HLMP-056X family, 570 nm.

These new lamps are all plug-compatible with existing HP hermetic lamps. Lamps that have undergone high-reliability testing are also available. Screenings for the high-reliability versions conform to the JAN equivalent quality conformance inspection (QCI) or to the JANTX equivalent tests similar to MIL-S-19500.

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



These new ultra-bright lamp families are readable in direct sunlight.

Improved common-mode immunity with new hermetic optocoupler

A new 16-pin dual-channel, hermetic, line-receiver optocoupler family provides guaranteed common-mode transient immunity of ±1,000 V/microsecond. It is available either as a standard product (HCPL-1930) or with full MIL-STD- 883 Class Level B Testing (HCPL-1931). Both products are specified over the full military temperature range of −55°C to +125°C.

An input-current regulator serves as a line termination for line-receiver applications, clamping line voltage and regulating the LED current. This minimizes the effect of line reflections. The regulator shunts excess current above a typical LED current of 12.5 mA.

Speed and reliability

The optocouplers can accept inputs at up to 10 Mbits/s. This speed, coupled with the high radiation immunity of a photodiode IC, makes the optocouplers an excellent choice for inclusion in military systems.

The HCPL-1930 also includes an enable pin, which can be used to control operation, giving designers further flexibility. It provides high common-mode transient immunity and line-termination features.

Six-gate fan-out (TTL)

Propagation delay time to both high and low output levels is 100 ns maximum. At an input current of 10 mA, six gates (TTL) can be sunk at the output.

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

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

New portable 3½-inch microfloppy

Major enhancements to the current HP 9114A 3½-inch Portable Microfloppy have resulted in a new B version. The HP 9114B offers longer battery life, faster access to data, and a battery charge indicator—with no price increase.

Increased battery life

The HP 9114B's new "power miser" slimline drive substantially increases battery life. With continuous use (100% duty), you can expect a battery life of 1.8 hours with the recharger (90% improvement over the HP 9114A) and 1.0 hour without the recharger (50% improvement). The majority of typical customers (5% duty cycle) will be able to have continuous ac usage not possible before.

The HP 9114B features faster access to information, longer battery life, and a battery charge indicator.

Faster access to information

This slimline drive gets the information you need much faster. The HP 9114B has an access time of 225 ms which is twice as fast as the HP 9114A.

Battery charge indicator

No more guessing about when to replace your battery. A "fuel gauge" on the front panel lets you know how much battery life remains. Three indicators display whether the battery is ⅔ to full, ⅓ to ⅔, or ⅓ or less. When only 10 minutes of battery life remain, a flashing light alerts you to plug in your recharger and continue working.

Additional features

Other features include data exchange from the HP 150, Portable, and Portable Plus to the IBM PC and PC/XT via the HP 9114B and the HP 82973A Portable Desktop Link; data exchange between single and double-sided drives; and up to 710,000 bytes (formatted) of storage capacity in a compact five-pound package. It's designed to stack neatly under your ThinkJet Printer or travel easily. The 9114B is supported on the HP Portable and Portable Plus, and the HP Series 40 and 70.

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

ASYST adds PC Instruments control

ASYST® Scientific Software now offers instrument control capabilities for both HP-IB instruments and HP PC Instruments on either the HP Vectra PC or the IBM PC/XT/AT. ASYST combines graphics, statistics, numerical analysis, HP-IB instrument control, and HP PC Instruments control into one programming environment.

ASYST offers a powerful alternative to programming HP PC Instruments from BASIC. The advantage of using ASYST comes from its powerful single-word commands such as FFT, INTEGRATE.DATA, or Y.AUTO.PLOT to analyze and display captured data from HP-IB or HP PC Instruments. ASYST provides fast execution because all commands are memory-resident and all mathematical calculations use the PC's 80287 coprocessor. This provides you with quick, high-performance solutions.

ASYST's interactive mode also brings powerful graphics and analysis commands to your fingertips. In addition, PC Instruments' soft front panels are callable from ASYST. This provides "manual" instrument control and a helpful debugging aid when writing programs.

ASYST combines analytical functions with instrument control using the HP Vectra PC or the IBM PC/XT/AT.

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

ASYST® is a registered trademark of MacMillan Software Company.

Enhanced portable computer for professionals

The Portable PLUS is a durable, full-performance briefcase-portable PC designed for mobile people, including middle and upper managers and sales and service professionals. This enhanced version of The Portable PLUS features a new liquid-crystal display, increased internal memory, new ROM-based software applications, additional data-communications capabilities, and significant price reductions.

Easy-to-read screen

The new display features a contrast improvement of more than 200 percent over the previous LCD. This makes it more readable in all kinds of lighting conditions. The flip-up screen displays the same amount of information as most desktop PCs.

Convenience and durability

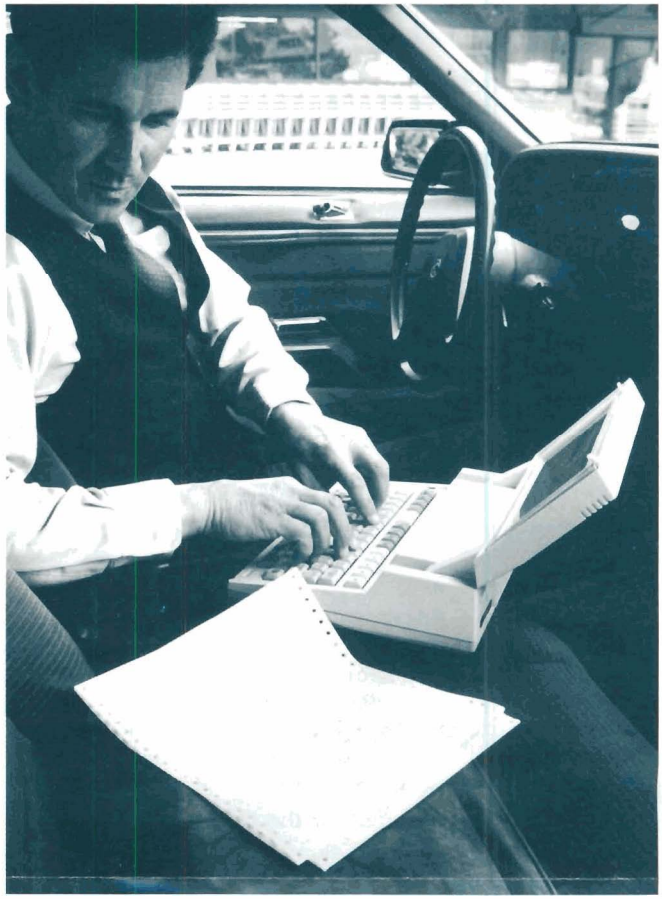
The Portable PLUS is a nine-pound portable computer about the size of a three-ring notebook. It is now available in both 256K and 512K RAM models. Memory options allow you to expand to 1.28M in the 512K memory version.

The electronic disc, a part of system memory that emulates a disc drive, eliminates the need for a fragile mechanical disc drive and speeds up the computer's operation. It is used for program and data-file storage.

ROM/RAM drawers permit memory expansion and the use of either customized or off-the-shelf, plug-in ROM software cartridges. ROM-based applications include Lotus® 1-2-3®, Microsoft Word®, Reflection 1™, MultiMate ™, and Executive Card Manager. Frequently used applications distributed on discs can be installed in the internal electronic disc.

Powered with a rechargeable battery, the new PC can function as a stand-alone computer or a portable intelligent terminal. Durable and rugged, it withstands mechanical shock and adverse environmental conditions. And the warranty for The Portable PLUS is now a year.

1-2-3® and Lotus® are registered trademarks of Lotus Development Corporation. Microsoft Word® is a registered trademark of Microsoft, Inc. Reflection 1® is a registered trademark of Walker, Richer, and Quinn. MultiMate™ is a US trademark of Multimate International.



Sales representatives can use HP's enhanced Portable PLUS to write sales-call reports at customer sites. The report then can be sent to a central computer via an internal modem and a telephone line.

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

Announcing corporate site licensing program for HP personal computer software

A corporate site licensing program offering savings of up to 75 percent has recently been introduced by Hewlett-Packard Company. Companies using HP Vectra, HP Touchscreen, IBM, or IBM-compatible computers will benefit. HP is the first of the major computer manufacturers to announce such a program.

With this new program, you are allowed to reproduce a specified number of copies of a software package from a master disc provided by HP. The right to reproduce the software may be purchased in increments, starting at 50 and going over 5,000 copies.

Depending on the software selected, you can save from 15 to 75 percent off list price. The total reduction is a combination of the site licensing discount percentage and your purchase agreement discount.

Corporate program structure

For each group of 50, you receive: one master disc, one right-to-reproduce license, five sets of documentation (10% of quantity ordered), 50 right-to-use agreements (one for each end user), and 50 serialized labels with your company's name.

If you don't have the capabilities or desire to reproduce software, HP will reproduce the software for a fixed price. Additional documentation may also be purchased as part of this program.

Available products

The program involves HP's proprietary software for the Touchscreen and Vectra personal computers, including: HP Access, AdvanceLink, Executive MemoMaker, Executive Spreadsheet, Executive Card Manager, Print Central, HP Message, HP Word 150, R:BASE™ 5000, and Gallery Collection. Many other products are expected to be added to the program in the near future.

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

R:BASE™ is a trademark of Microrim, Inc

New ¼-inch tape autochanger provides unattended backup for midrange systems

The HP 35401A ¼-inch Cartridge Autochanger Tape Subsystem has a capacity of up to 536 Mbytes and is ideally suited for unattended computer system backup. By combining the major components of the HP 9144A Tape Drive with an autochanger mechanism, the HP 35401A automates cartridge loading and unloading, and allows the tape drive to use up to eight cartridges from a removable magazine. It allows system backup to be scheduled without an operator. As a result, costly overtime or the need to shut down the system for backup during normal hours can be avoided.

The HP 35401A is suitable for both HP 3000 system users who can benefit from unattended backup and HP 9000 system users who appreciate high capacity and flexibility.

With its 536-Mbyte capacity, the HP 35401A satisfies present needs and allows for future growth. It is fully media compatible with the HP 9144A and HP's range of integrated cartridge tape/disc drives.

Application flexibility

Because cartridge changing no longer requires an operator, the HP 35401A is suited to other applications such as software duplication. With up to eight cartridges in a magazine, data can be structured to suit you, perhaps by user or by day of the week. The HP 35401A can be used for on-line data storage in applications where access times are not critical.

Designed for the office

Whether used as a stand-alone unit or integrated with a computer system into HP's Design Plus cabinet, the HP 35401A fits well into the office. Its noise and heat output levels are unobtrusive, and it occupies only about one-tenth the space of a reel-to-reel tape drive. Only a few minutes are needed to learn how to use the HP 35401A and it is customer installable.

The HP 35401A ¼-inch Cartridge Autochanger Tape Subsystem improves productivity through increased daytime system availability.

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

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HEWLETT PACKARD

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