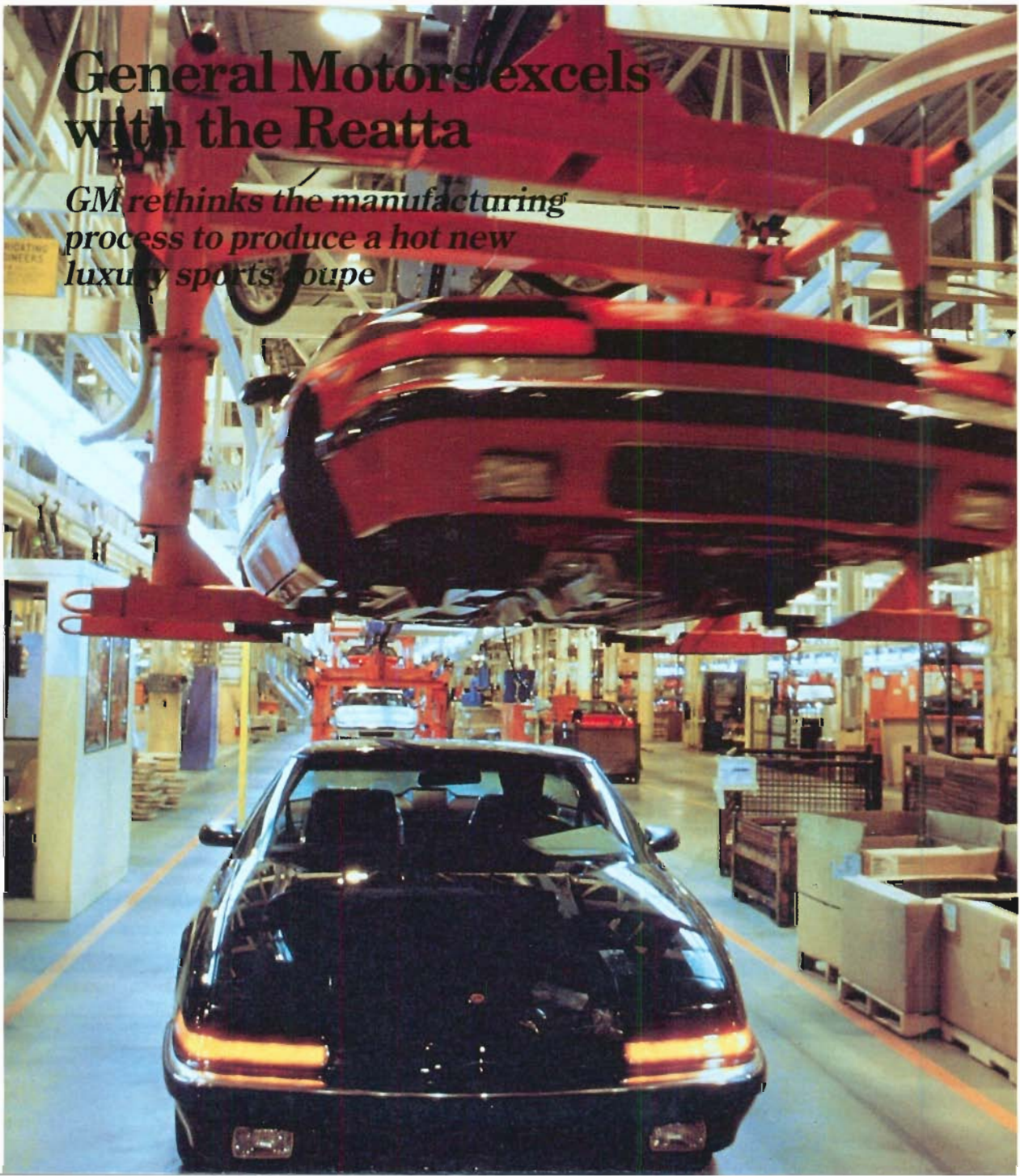


# Computer Advances

Fall 1988

## General Motors excels with the Reatta

*GM rethinks the manufacturing  
process to produce a hot new  
luxury sports coupe*



# Open Software Foundation: Meeting customer needs

by John Young

**T**his past May, I had the pleasure of joining chief executives from IBM, Digital Equipment Corporation, Apollo, Groupe Bull, Nixdorf Computer, and Siemens to announce the formation of the Open Software Foundation (OSF). The announcement was really good news—both for our customers and for the Hewlett-Packard Company.

**Good news for customers.** OSF will fulfill several customer needs. The foundation's charter is to define specifications, develop software, and promote an open application environment—making it possible for customers to move software applications from one vendor's hardware to another's (termed portability); operate networks of computers from various vendors (interoperability); and use the same software on many classes of computers, from personal workstations to large computers (scalability).

If vendors commit to and use OSF specifications, customers

will be able to mix and match hardware and software from different vendors, and will be able to add new capabilities knowing that their current software investments are protected. Finally, OSF will provide truly open systems. Such openness can only be accomplished by joint efforts, where no single vendor has control and members and computer users have open input into the development process.

**Good news for HP.** The formation of OSF is also good news to HP, for a number of reasons. First, OSF reaffirms the wisdom of HP's

commitment to open systems. We've been a strong supporter of standards for some years now—in operating systems, networking, graphics, data management, user interfaces and languages. Our standards-based product offering is strong, so we're very well positioned in the area of open systems.

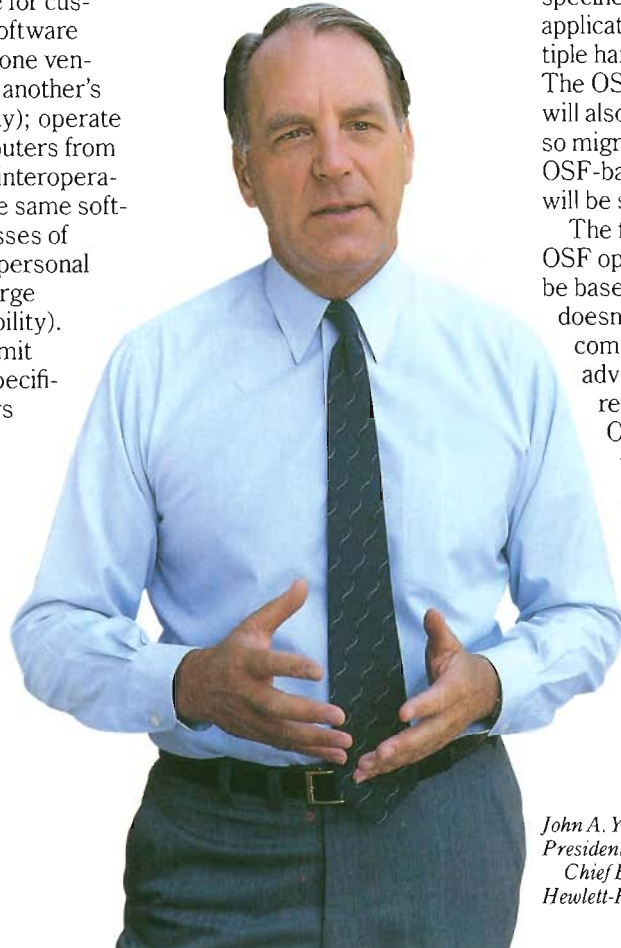
Second, the standards-based OSF operating system will dovetail nicely with future plans for our HP-UX operating system. Long before discussions leading to the formation of OSF, we had begun enhancements to HP-UX to comply with POSIX-IEEE's specification to ensure that applications can run on multiple hardware systems. The OSF operating system will also be POSIX-compliant, so migration to the future OSF-based version of HP-UX will be straightforward.

The fact that the future OSF operating system will be based on IBM technology doesn't necessarily give that company's products an advantage over our current HP-UX offering. OSF will be using parts of a future IBM product, not its current AIX offering. OSF sponsor companies, universities, and others will add software contri-

butions to this kernel. After the initial technology transfer, all OSF members have equal insight and input into its future development. OSF is an independent organization with its own management team and objectives.

**Plenty of room for differentiation.** There's a third reason that OSF is good news for HP: Adherence to open systems still gives HP plenty of room to differentiate itself. What becomes standard with OSF is the interface between the operating system and other software. We can add plenty of value both below and above that interface—price/performance, systems administration and network management, graphics, specialized servers, quality, support, and unique functionality. These are areas of strength for HP.

Finally, OSF is an inflection point for computing, making it possible for customers to use and integrate a wide choice of systems and applications. This is something our customers have told us they want to do, and we're in the business of satisfying customer needs. I believe the formation of OSF ushers in a new era of responsibility and responsiveness in the computer industry. And I'm proud that HP has played a pivotal role in this very exciting venture.



*John A. Young  
President and  
Chief Executive Officer  
Hewlett-Packard Company*

**HP Computer Museum**  
**[www.hpmuseum.net](http://www.hpmuseum.net)**

**For research and education purposes only.**

# ● Process monitoring for defect control at Eastman Kodak Company

*Kodak puts HP systems to work scrutinizing surface-mount PC board production, and quality takes a quantum leap.*



**W**hen Eastman Kodak Company decided it needed a surface-mount printed circuit board production line to compete in the subminiature electronic age, it turned to HP for its quality monitoring systems.

Surface-mount technology permits a component density

Process monitoring entails collecting the usual process variables data—temperatures, pressures, flows, and the like, along with switch and alarm statuses—from the various production elements during the course of each product run.

The process-monitoring system comprises an HP 1000 Series A900 industrial computer running under the Real-Time Executive (RTE) operating system; two HP 3497 ADCs; two HP 9000 Series 310 workstations to collect the process data; and Starnet supervisory control software (supplied by Denniston and Denniston of Chicago).

The system provides an overall facility display which keeps the operators and supervisors informed about all aspects of the process. If any data point on a machine exceeds specified limits, its associated box on the display turns red. A technician is alerted and can respond accordingly.

Kodak's surface-mount facility has also benefited from a combination hardware and software package called Touchscreen 1000, developed by the local Hewlett-Packard office for applications precisely like theirs.

As circuit boards come off the assembly line, they proceed to one of three inspection stations, each of which is equipped with an HP touchscreen terminal. Each component is highlighted on the screen representation of the board. The inspection technician touches the displayed component matching the one he has found defective, bringing a red dot onto the screen at that point, indicating the component is being actively inspected. Defect information is then entered into the HP 1000 and stored in the quality database.

Through bar-code tracking, defects can be associated with process operation and corrections made very quickly. Kodak process engineers also make recommendations to customers on how to improve board quality. In one case, defects dropped from 2,700 ppm to 250 ppm from one lot to the next as a result of changes recommended by Kodak process engineers.

How did Kodak come to choose HP? "We really liked the touchscreen technology," says Jeff Saunders, the systems analyst who did the system design and selected the vendors. "And it was a people decision," he adds. "It's been one of the best working relationships I've ever had with an outside company."

*Data on defective circuit boards is entered into an HP terminal displaying a pictorial representation of the board.*

five to seven times that of standard leaded, through-hole technology on the same size board. It also provides certain electrical advantages, such as faster circuitry and lower noise.

Kodak uses the surface-mount facility to meet its internal parts needs for its photocopiers, film processors, medical equipment, and business and professional products. It then sells its excess production capacity to outside customers, including Hewlett-Packard.

"The computer monitoring system has been one of our biggest selling points," says Wendy Mancuso, project manager on the installation. "We're able to use process monitoring to drive down defect parts per million (ppm), so we're getting the best possible product at the first level."

# General Motors excels with the Reatta

*Manufacturing process blends European methods with HP electrical test system*

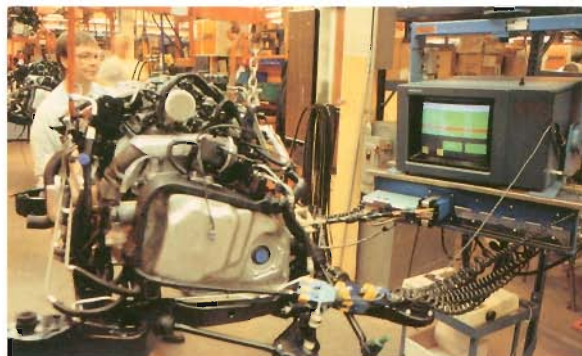
**C**raftsmen and engineers at General Motors' Reatta Craft Centre in Lansing, Michigan, have turned the art of manufacturing a luxury sports car into a science. GM's Reatta team modeled their manufacturing process after traditional European methods for low-volume automobile assembly, but with the high-tech addition of an electrical test system designed and built by the Hewlett-Packard Company. This blend of old and new is already showing results—by April, the Reatta Craft Centre had sold out its entire 1988 model year.

**Six onboard computers and an in-dash CRT screen.** Perhaps the most electronically complex production car in the world, the Buick Reatta has six onboard computers which communicate with each other via a local area network. Microprocessors control everything from electronic fuel injection to the diagnostic information which appears on the Graphic Control Center, a 3¾ by 4½ inch CRT screen imbedded in the Reatta's dashboard.

Craftsmen maintain the quality of the Reatta at each step of the production process by using an electrical test system designed and built by Hewlett-Packard's Advanced Manufacturing Systems Operation in Sunnyvale, California.

HP's electrical test system checks the onboard computers and wiring of the Reatta at every step in its assembly. It

*A Reatta craftsperson tests a new engine electronically rather than mechanically using an operator interface unit, part of HP's electrical test system.*



measures everything from the number of amps drawn from the battery when a craftsman tests the left turn signal to the accuracy of the instrument gauges which appear on the Reatta's CRT screen.

**Production process puts quality first.** The Reatta Craft Centre represents a rational blend of people and machinery. "We've taken the assembly boredom out and put employee ownership back in," says Bob Thompson, program manager for the Craft Centre. "It's no longer a matter of tightening the same bolt every day. Each worker is responsible for a sizable portion of the automobile."

Craftsmen work at 10 craft stations in the 210,000-square-foot assembly hall. A central computer dispatches driverless carriers laden with partially assembled Reattas along wire guidepaths to each craft station. Teams of workers install and test entire assemblies—for example, the instrument panel, wiring system, or steering column—over a 28-minute period. By comparison, workers at conventional automotive plants spend 52 to 60 seconds assembling their portion of the car.

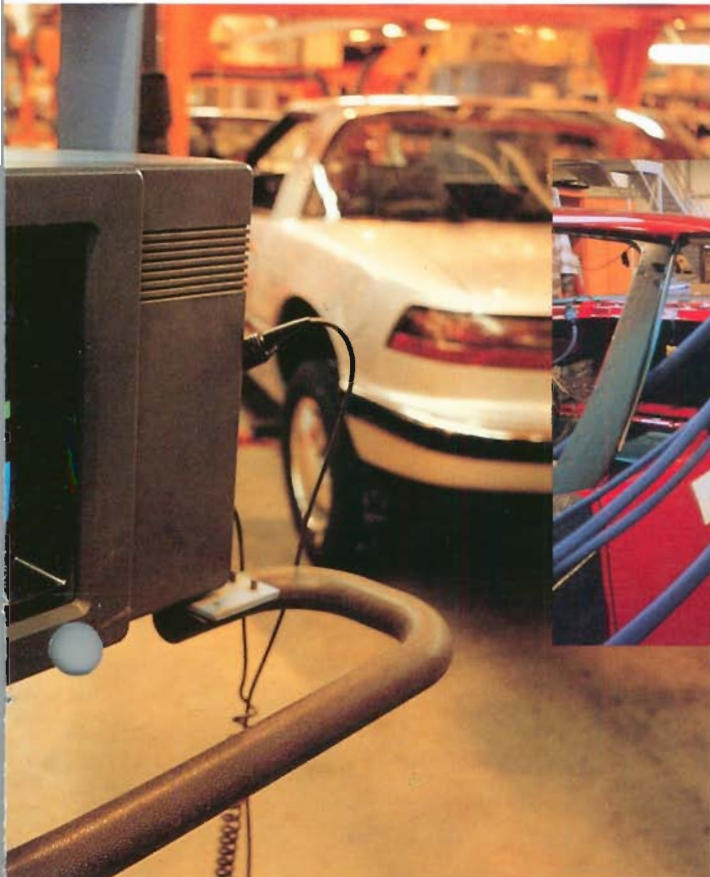
"This line is driven by the worker, not the process," says Thompson. "On a conventional line, a worker makes a conscious decision to stop production. Pulling the stop cord signals he's having trouble completing the job. At the Craft



*All electronic systems in this fully assembled Reatta are now in place and communicating via an internal local-area network, here undergoing more testing by an HP operator interface unit.*

Centre, a craftsman assembles his portion of the automobile, decides whether it meets engineer and customer expectations, and makes a conscious decision to release the car."

**Electrical test system enhances assembly process.** Computers on board the Reatta direct hundreds of electronic operations which other automobiles carry out mechanically. So Hewlett-Packard engineers designed the electrical test system to do more than measure the accuracy of the speedometer during a test spin. Because electronic parts comprise 16 percent of the Reatta, the test system must add electronic features as well.



*Craftsmen load customized electronic features into each Reatta via blue electrical "harnesses" which are linked to an HP 1000 A600 computer.*

After a craftsman installs the computer which controls the Reatta's Graphic Control Center, a mainframe computer sends data describing the climate control, stereo system, instrument gauges, and diagnostic information to an HP 1000 computer on the factory floor. The HP 1000 computer then "burns" data on these features onto the Graphic Control Center's microchip. Similarly, an HP 1000 computer passes on a whole range of electronic features to each Reatta as it moves from craft station to craft station.

"The electrical test system is a booming success," says Thompson. "We have

several sites that report perfect parts and assembly all day, every day. We never have a faulty engine, ever." According to Dave Acton, manager of electronic design, processing, and systems for Buick, Oldsmobile, and Cadillac, "the success of the electrical test system means that we go from containing bad product to perfecting the assembly process."

The HP electrical test system outputs data on the Reatta at each step in its assembly, and has cut the incidence of faulty parts down to one part per million. Because of this accuracy, engineers have begun to look at the test system as a way of fine-tuning the production process. "Our goal is to convert the electrical test system to a process-control device by the end of the next model year. The Craft Centre will then become an incubator

for perfecting the assembly process," says Acton.

Last summer, Craft Centre engineers programmed the electrical test system so that they could change the electronic features of the Reatta from the 1988 to the 1989 model in only 15 minutes. Engineers elsewhere in the automotive industry measure model change-over in man-years.

**Ferrari chooses HP system.** The success of the Reatta Craft Centre's electrical test system has captured

the attention of another world-famous automaker. Pininfarina, an Italian design studio and automobile manufacturer, has designed luxury sports cars for Ferrari since 1954. Recently, Pininfarina and General Motors joined forces to design and manufacture the Cadillac Allante.

When Ferrari sought help for its new electronically sophisticated sports-car design, Pininfarina recommended Hewlett-Packard test equipment.

**High expectations for new Reatta.** When Buick introduced the Reatta on January 15, 1988, General Motors gave it the highest quality rating for any new car in GM history. "We are no longer interested in building a world-class car," says Bob Thompson. "We want to build the best car in the world."

# HP Disaster Recovery Services: Keeping your business running

*With HP's new Disaster Recovery Services, you'll be ready to act decisively to minimize disruption and loss.*

**F**ire. Flood. Tornado. Hurricane. Disaster can strike with little or no warning, and not always to the "other guy." With today's increasing reliance on data processing, a loss of processing power can threaten the very survival of your business.

That's where Hewlett-Packard's new Disaster Recovery Services comes in. Now you can be sure that when disaster strikes, your critical applications are safe.

**A two-part program that offers a total recovery solution.** To provide you with the services you need, HP's recovery solution is comprised of two parts: HP Disaster Recovery Planning and HP Backup. Each is available separately, or they can be combined for a total solution.

**HP Disaster Recovery Planning.** HP's Disaster Recovery Planning thoroughly anticipates critical recovery needs and supplies the tools and training to develop a comprehensive recovery plan tailored to your organization.

*Planning methodology:* With HP's proven methodology, you'll learn how to organize your planning team, identify your most critical applications, define specific recovery procedures, and train your personnel.

*Recovery plan template:* Designed for the HP 3000 environment, the recovery plan template includes a detailed sample recovery plan easily adapted for your organization. Available in disk form, it's ready to update with your word processor.

*Project management template:* To help your project management team stay on top of critical planning tasks, the project management template provides a complete breakdown of tasks involved. Available on disk, the project management template can be used with a variety of existing project management software packages.

*Training:* HP will conduct an intensive two-day training course at your site, to show you how to develop your own recovery plan.

**HP Backup: Processing power and expert assistance.** HP Backup supplements HP Disaster Recovery Planning by providing the hardware, technical support, and customized telecommunications capabilities you need to keep your critical

applications up and running after a disaster strikes.

*Fully equipped recovery facility:* HP Backup gives you around-the-clock access to a fully operational HP 3000 computer facility within 24 hours of notifying HP. Terminals, modems, multiplexers, direct-dial lines and public networks provide remote access to your system users at your home site.



*On-site training and a host of on-line tools will help you create a recovery plan tailored to your organization.*



*Because disaster can strike at any time, having a detailed recovery plan in place is essential.*

*Resources of HP's worldwide customer support organization:* An HP Backup representative will help you coordinate activities between the HP Backup facility and your home site until you can resume normal processing. Your HP representative is also your link to HP's complete network of support experts.

*Annual rehearsal and review:* HP Backup provides up to six working days per year to rehearse your recovery procedures at the HP Backup facility.

*Disaster site restoration:* Local HP personnel will work with your home site staff to evaluate equipment salvageability, identify steps to re-establish normal operations, and expedite delivery replacement equipment.

## Powerful engineering workstation offers the highest price/performance



HP's new state-of-the-art engineering workstation, the HP 9000 Model 360, handles such computation-intensive applications as solids modeling.

The new HP 9000 Model 360 workstation doubles the performance of HP's most popular midrange workstation, the HP 9000 Model 330, with little change in price. The high-performance Model 360 workstation lets engineers apply all the power of Motorola's 32-bit, state-of-the-art MC68030 micro-processor to a variety of technical tasks, including mechanical and electrical design, test and measurement, and general scientific and technical computation.

As a member of the MC68000 family, the HP 9000 Model 360 inherits a large base of hardware, operating systems, and application software that runs on this popular architecture. The Model 360 has a fast 25-MHz clock rate and an equally fast 25-MHz MC68882 floating-point coprocessor built in, resulting in speeds of up to 5 million instructions per second (MIPS).

Because the Model 360 runs on HP-UX, Hewlett-Packard's implementation of the industry-standard operating system with both Berkeley and HP enhancements, it is compatible with the advanced RISC-based HP Precision Architecture systems.

The Model 360 has a built-in 32-bit system bus, HP-IB (IEEE 488) peripheral interface, direct memory access, and Ethernet/IEEE 802.3 ThinLAN for network access. You can purchase options for VME bus expansion, SCSI disk interface, DOS coprocessing, and an additional floating-point accelerator.

If you are a current owner of an HP Model 330 workstation, you can install a simple board kit to convert your Model 330 into a Model 360.

## HP LaserRX—breakthrough PC-based performance management tool



The key to maximizing the return on your investment in your HP 3000 business computers is your ability to access information essential to the proper support, maintenance, and growth of the system. HP LaserRX, a new personal computer-based performance management tool, lets you monitor system information on your HP 3000's CPU usage, memory and disk activity, response time, and transaction throughput. That means you can identify and isolate performance bottlenecks, evaluate corrective actions, and balance system components for maximum efficiency.

HP LaserRX is the industry's first performance management tool to use the personal workstation for its user interface. Using powerful CD-ROM (Compact-Disk Read Only Memory) technology and a user interface based on Microsoft® Windows, HP LaserRX runs on an HP Vectra PC or IBM PC/AT. The advantages of a PC-based system to your organization include efficient use of resources, a friendly user environment, and quick and easy access to pertinent information.

Designed to monitor HP 3000 business computers, including the Reduced Instruction Set Computing (RISC)-based HP Precision Architecture systems, HP LaserRX reduces the complexities of performance management by collecting and logging data on one or more HP 3000s around the clock without any user intervention. When you're ready to evaluate the information, you can automatically transfer data from the host computer to your PC. You can also easily transfer information to other software pack-



HP LaserRX helps you maintain peak computer-system performance by providing extensive and continuous system information.

ages such as Lotus 1-2-3 for analysis.

Through the use of Microsoft Windows on HP LaserRX, you get a flexible and friendly graphics interface which adds to the presentation clarity.

*Note: HP LaserRX is not available in some countries. Check with your HP sales representative for more information.*

Microsoft is a U.S. registered trademark of Microsoft Corporation. Lotus and 1-2-3 are U.S. registered trademarks of Lotus Development Corporation.



■ **Sailing goes high-tech.**

HP 9000 computers were used to design both the U.S. and New Zealand yachts in this year's America's Cup challenge. The 133-foot "New Zealand" monohull features several onboard HP computer systems used for a variety of advanced applications, such as monitoring shape and twist of sails, tracking stresses on the craft, and analyzing position relative to its opponent. The crew of the winning U.S. "Stars & Stripes" catamaran used a compact HP-71B handheld computer for course navigation.

■ **New HP Vectra PC.** Hewlett-Packard recently introduced its most powerful desktop personal computer to date—the HP Vectra QS/16, equipped with a 32-bit, 16-MHz Intel 80386 microprocessor and a 40-Mbyte hard-disk drive. Designed for business and CAD/CAE applications, the newest member of the HP Vectra PC family offers the high performance of the floor-mounted HP Vectra RS/16 PC in a compact desktop package.

■ **Finland chooses HP.** The government of Finland has purchased 22 HP 3000 business computers worth over \$12 million, as part of a library-automation system from VTLS, Inc., of Blacksburg, Virginia. The Virginia Tech Library System (VTLS), a comprehensive, integrated, online library package running on HP computers, will be used by 27 academic and research libraries throughout Finland. The HP computers will provide resource-sharing capabilities and establish a single-source library information network.

## New HP 7600 electrostatic plotters offer high-speed quality

The new high-speed, high-resolution HP 7600 Series electrostatic plotters dramatically increase reliability and throughput in high-volume CAD environments.

The HP 7600 Series Model 240D, used for A1/D-size plots, and the Model 240E, for A0/E-size plots, offer pen-plotter quality in a fraction of the time. Both have a powerful, built-in vector-to-raster converter and 40-Mbyte hard disk drive.

With a resolution of 406 dots per inch and print speed of only one minute for a full-size drawing, the HP 7600 Series plotters give you fast, high-quality drawings with well-defined lines, smooth curves, and crisp characters.

With an HP 7600 plotter, you can produce professional-

quality technical drawings using almost any computer system, and any of the widely used CAD software packages.

One HP 7600 plotter can easily serve the needs of a high-productivity CAD workgroup. Each plotter has a simple paper-loading procedure and front-panel controls that can be mastered in minutes.

In addition to complete HP-GL/2 and HP 7686B software emulation, the HP 7600 plotters have RS-232-C/CCITT V.24 (with RS-422-A capability), Centronics parallel, and HP-IB (IEEE 488) interfaces.



*The HP 7600 Series electrostatic plotters are ideal for high-volume CAD applications.*

## High-speed tape drive doubles system backup capacity

Now you can cut your HP technical and small-business system backup time in half with the new high-performance HP 9145A 1/4-inch tape drive. At four megabytes per minute, the HP 9145A has twice the data transfer rate of the HP 9144A and HP 35401A.

The HP 9145A has double the cartridge capacity of the HP 9144A. You can store 133 Mbytes of data on a single cartridge tape—giving you savings on both cartridge and operator costs.

Although the HP 9145A is a 32-track tape drive, it can still read tape written by HP's other 1/4-inch 16-track cartridge tape drives. That means your data investment is secure if you already own an HP 9144A, HP 35401A, or one of HP's integral disk and tape drives.

If backup requirements are fast outgrowing your

HP 9144A, now is the time to upgrade to the HP 9145A. For a limited time, you can get a return credit on your HP 9144A. Check with your local HP sales representative for details.



*HP's new 1/4-inch tape drive cuts backup time in half and offers double the cartridge capacity of its predecessors.*

*To find out more about Hewlett-Packard or its products and services, please call your local Hewlett-Packard sales or service office. Note: Not all HP computer products are sold and supported in all countries.*

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