Computer Advances

Winter 1990

Applied Materials manages explosive growth with HP international electronic mail

Martin Marietta selects HP workstations to improve productivity

HP enhances Voyager II data and photos

Break-even time: HP BETs on speed

by Dean Morton

This year, HP President John Young issued a challenge: reduce the amount of time it takes the company to bring a product to market by 50 percent. He reasoned that speed is one of the keys to a winning competitive posture. The faster a new product is brought to market, the sooner a company profits from it.

Before HP could take up the challenge, however, we had to agree internally on a way to define and measure the time-to-market interval.

Our corporate engineering staff produced what may be the single best measure of productivity in product development and introduction that we have seen.

Break-even time metric. Our metric, called "break-even time," or BET, is a simple two-dimensional computer plot or measurement of three sets of numbers. BET is the time it takes from the start of a product's investigative phase to the point when the entire investment is paid back—or break-even time.

The three BET measurements are (1) investment in dollars, (2) sales in dollars, and (3) operating profit. When the estimated investment and profit plots intersect, and the two numbers equal each other, BET has been reached.

One goal is to reduce break-even time by cutting the time a product goes to market. But time-to-market measures only one slice of time. Also vital are development costs because products must make a profit.

BET avoids pitfalls common to simple "time-to-market" and other popular metrics because it measures not only R&D effectiveness, but also manufacturing efficiency, marketing performance, and sales success.

BET links everyone's efforts. While the focus is still on speed, BET forces a company to consider development, production, marketing costs, profitability, and what makes a good product. It encourages early and continued cooperation among R&D, manufacturing, and marketing—cooperation that's vital to the success and profitability of any product.

Managers use BET to make quick analyses of competing projects and to get a better feel of how they might compare. Or they play complex "what-if" games to flush out the implications of various changes. Variables might include: design for ease and speed of manufacturing, pricing, time frame, sales volume, and investment or profit.

I might be willing, for example, to endure a slower time-to-market if I could be convinced that waiting for a new manufacturing process would provide greater profitability.

BET captures the link between R&D and the rest of the company and the customer. It also contains several other measures that are worth considering.

These include the length of time of the investigative phase, time-to-market, and what we call BEAR, or break-even after release to manufacturing. This is a measure of production ability and marketing efficiency.

An analytical and predictive tool. You can use BET as a predictive tool, a set of milestone analysis and revision points, and an after-the-fact analytical tool. It is equally powerful, whatever its application, yet needs only a personal computer to perform its sophisticated analyses.

At HP, BET is the primary measure. HP managers are now implementing BET metrics, starting with new-product investigations. Some managers are currently in the midst of developing products using the BET measure. BET will improve our business decisions in every area of the product development and marketing process.

We also have found that BET complements Hewlett-Packard's use of continuous process improvement, also known as total quality control, in our search for higher-quality products, better business decisions, and solutions that meet your needs.

Dean O. Morton
Executive Vice President
and Chief Operating Officer
Hewlett-Packard Company
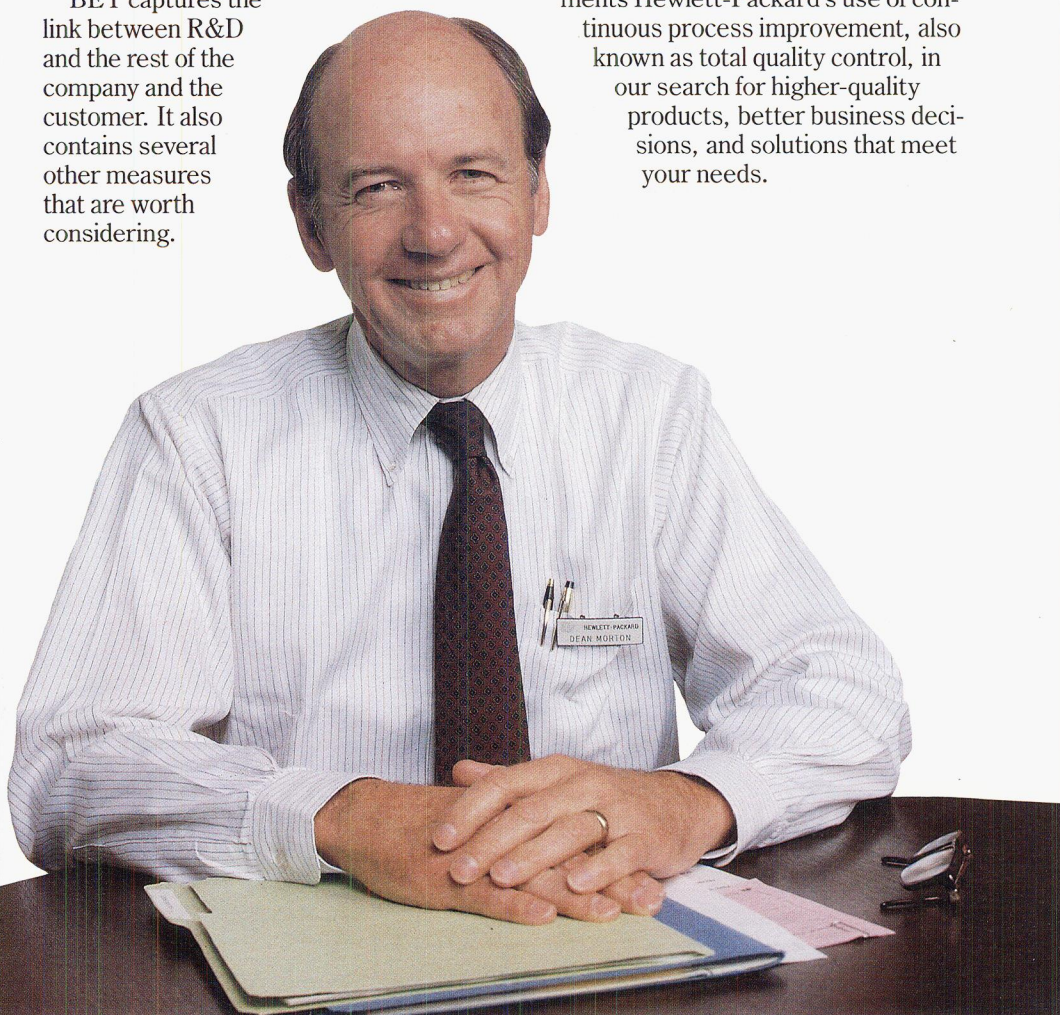
Martin Marietta integrates computing environment to enhance productivity

Company selects HP workstations to support transfer of designs from printed circuit applications to mechanical designs.

One of the world's largest space companies searched for a year to find a tightly integrated engineering computing hardware environment to enhance productivity by bringing designs to mechanical reality without building costly prototypes.

The Astronautics Group of Martin Marietta, responsible for one-third of the corporation's $6 billion in annual sales, includes four companies that produce Titan space launch vehicles, advanced space systems, private-sector launch vehicles, and strategic systems.

These companies have 400 active contracts ranging from robot research to next-generation launch systems. They include the Venus-bound Magellan space probe, designed to capture high-resolution images of the cloud-shrouded planet using an advanced radar system.

Engineering challenges facing the Astronautics Group. The Astronautics Group needed a reliable, integrated computer platform for its design software systems—a platform with the ability to support the transfer of a design from a printed circuit application directly into a mechanical design package. In a hands-on evaluation, HP was selected.

An evaluation team, headed by John Yatchak, manager of Electrical Engineering Systems, considered and judged 70 vendors, eventually narrowing the search to HP and two others. "We needed to electronically exchange information between processes," said Yatchak. "HP demonstrated this ability." The HP platform was selected for all four of the Astronautics Group's product-oriented companies.

"The unusual environment of this industry requires comprehensive evaluation procedures, and the Electrical Engineering team did a very thorough job," said Ron Remy, manager of Computer-Aided Engineering, who is responsible for engineering automation at the Astronautics Group.

The Concurrent Engineering challenge. "A significant portion of a system's life cycle cost is committed during the early phases of design. In a highly competitive market, this places a premium on design/analysis integration and cross-functional information sharing," said Remy. "Scientists and others working on a product's development in one area of the company must have a coordinated view of the product in other areas of the company.

"Concurrent engineering encourages a high degree of up-front interaction among disciplines normally involved later in the product life cycle," stated Remy. "Serial development is generally inefficient. Our goal is to decrease product cost and increase product quality and reliability. HP hardware fits in this strategy because of its degree of process integration."

To facilitate Concurrent Engineering, the Astronautics Group uses multifunctional development teams composed of all traditional areas of product design, plus representatives from manufacturing, materials, reliability, and purchasing. (HP is implementing a program to link workgroups together into networks to increase productivity and use computer resources efficiently. HP calls this concept "team computing.")

"We placed a premium on HP's ability to support our required functions and existing equipment and software," says Remy. "HP's integration with a broad range of third-party applications gives us added flexibility and functionality."

Since HP's selection, the Astronautics Group has installed 10 HP computer networks, ranging from 2 to 17 workstations each. The company installed 68030 microprocessor-based HP 9000 computers—Models 340, 360, 370, and the HP-PA-based Model 835 to run design and analysis programs. The Model 835S system incorporates RISC (Reduced Instruction Set Computing) technology, and is used as a database, peripheral, and simulation server.
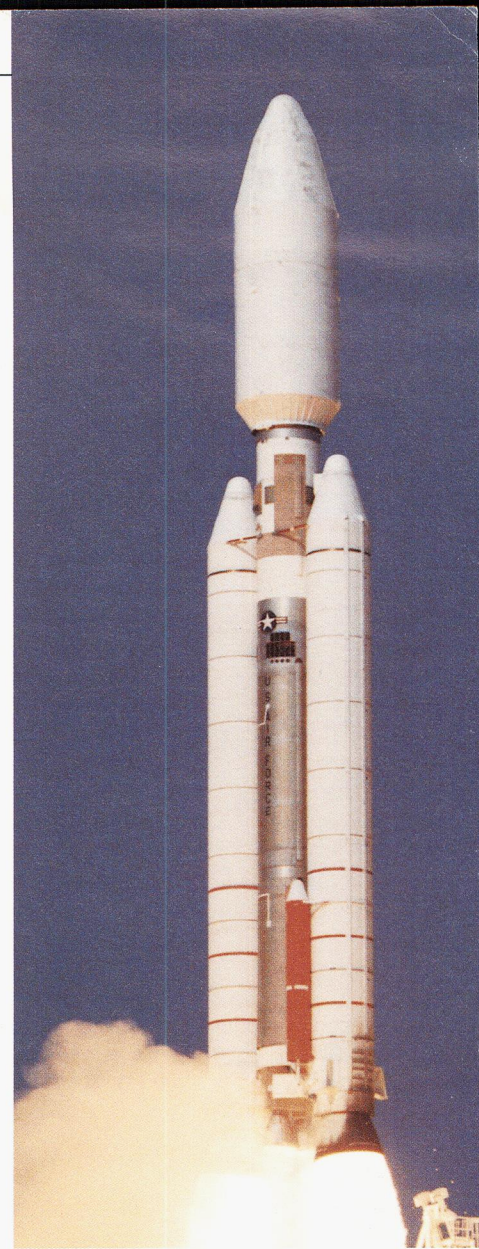
Titan IV, America's most powerful unmanned space launch vehicle.

Integration with third-party applications. HP hardware currently integrates 20 Astronautics Group systems, including third-party and HP applications. The application software from HP handles schematics, thermal, analog, digital, packaging, PC design, manufacturing processes, and solids board modeling.

Third-party applications include Analogy's SABER analog and systems design and analysis tool; SDRC's IDEAS 3-dimensional engineering system, and Pacific Numerix's PCB Thermal and printed circuit board thermal and vibrational analysis tools.

HP's ongoing commitment to develop competitive products for the marketplace within industry standards, and its willingness to participate in team efforts for industry-unique product design development, make HP a reliable partner for Martin Marietta.

Applied Materials manages explosive growth

HP DeskManager saves about $1/2 million annually, provides worldwide communications network and higher productivity

In the fiercely competitive world-wide market for semiconductor wafer fabrication systems, Applied Materials, Inc. manages explosive growth with uncommon skill. Sales more than doubled, from $174 million to $362 million during the firm's 1988 fiscal year, and increased 38 percent in 1989.

Strong revenues in the last few years have made Applied Materials the largest supplier of chip manufacturing equipment in the United States and fourth in the world.

Producing systems that cost up to $2.5 million, the company derives nearly 40 percent of its gross sales from Japan, often considered an unreachable customer for chip-making capital equipment. In fact, 66 percent of Applied Materials' total sales are generated outside the United States.

An Applied Materials' Precision 5000 etch control monitor and a light pen are used by electronics firms to call up silicon wafer process recipes for manufacturers of specialized chips. Applied Materials has installed HP 3000 Series 70 systems, four HP 3000 Precision Architecture systems, and 600 HP Vectra personal computers to assist in manufacturing and other applications.

Leaping international boundaries. "Our emphasis is on worldwide business, and with five divisions and facilities scattered from the Far East to Europe, we can't be successful without timely and accurate communication," said Richard Diamond, Applied Materials' director of worldwide information systems.

Five years ago, faced with the need to communicate through a dozen time zones and across cultural and linguistic boundaries, the 21-year-old company faced serious communications problems. Applied's managers had to find a computer system that could keep up with its surging growth, and also help stimulate it without imposing technical, service, and support problems along the way.

Applied Materials chose Hewlett-Packard Company's HP 3000 computer system with HP DeskManager electronic mail. The company installed a Series 44, upgraded it to a Series 70, and then installed higher-performance HP 3000 systems, including three Series 950 systems, and a Series 935 with Reduced Instruction Set Computing (RISC) technology. Those decisions have paid off.

Applied saves half a million. "In terms of time and money, we estimate savings of thousands of hours and half a million dollars a year over facsimile and telex costs," said Hank Waash, Applied Materials' manager of MIS technical planning and administration. "But the benefits of clearer communications are incalculable."

"Hewlett-Packard's reputation for easy-to-operate systems, excellent service and support, and low cost of ownership have been key factors in our choice of HP products over the years," said Diamond.

He added that "HP's pricing is attractive and the company's preventative maintenance is better than we've seen from other manufacturers."

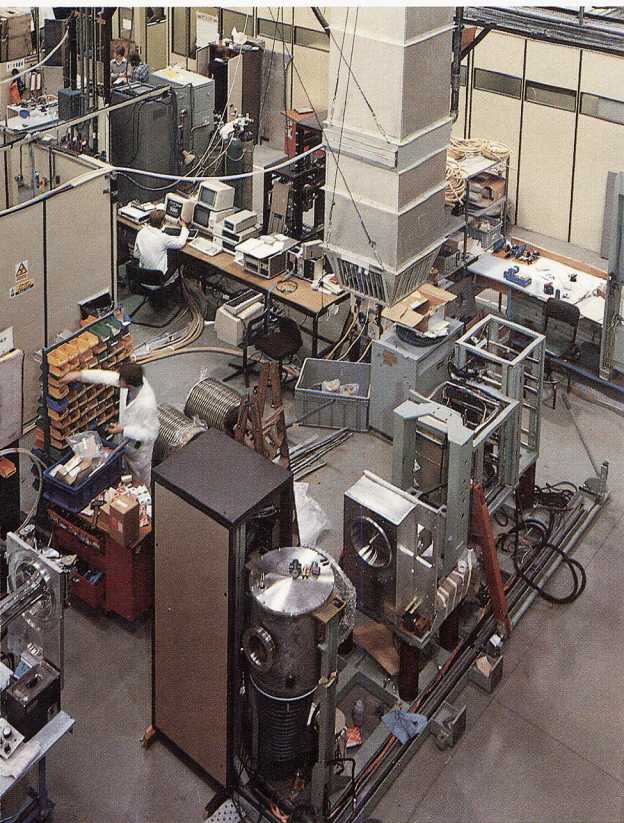**Communication power with HP DeskManager.** "I'm convinced that without the communication power that HP DeskManager provided, we would not have been able to handle our explosive growth," said Diamond. Fifteen hundred people, over half of Applied Materials' employees, are now using electronic mail on HP DeskManager.

"We don't just use E-mail for text messages," Diamond said. "Our people download spreadsheet and database files, store part number lists on the system, use international service bulletin boards, and carry and update sales reports, quotes, forecasts, and financial reports."

AdvanceNet worldwide distributed network. Applied's HP systems around the world are linked via an HP AdvanceNet distributed network. Every part of Applied Materials' business is connected by HP DeskManager—R&D, manufacturing, sales, marketing, purchasing, customer service, finance, and all other support groups. "We even supply laptops to traveling employees, giving them a list of MCI nodes to dial so they can check in wherever they might be," said Diamond.

This Applied Materials factory manufactures ion implantation systems. Each of Applied's five manufacturing operations uses an HP 3000 computer to handle procurement, materials management, and other production work.

Cindy Cormier, above, office automation administrator for Applied Materials, is one of 1,500 employees who use HP DeskManager electronic mail for text messages, spreadsheets, database files, part number lists, international bulletin boards, sales reports, forecasts, quotes, and financial reports. Applied Materials' corporate Data Center backbone network system shown here consists of five HP 3000 systems and an HP 9000 computer.

"HP DeskManager's mail system is the central focus of our corporate-wide distributed computing system. It's the backbone of our business," stated Diamond." Our full suite of financial reporting systems, including general ledger and fixed asset reporting, run on the HP 3000 computer platform. The system also is used for marketing information and sales forecasting. Applied is implementing a global order management system with an Omar software system from ASK. It should increase both sales force productivity and customer satisfaction. Our company sells complex equipment, and systems like these are not a luxury but a necessity," Diamond added.

Waash had worked with HP DeskManager
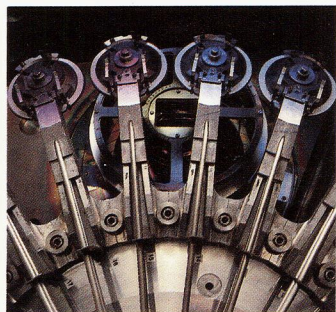
Cover: Applied Materials' Precision Implant 9000, showing a target assembly wheel with silicon wafers at the end of each spoke. Every part of Applied Materials' business— R&D, manufacturing, sales, marketing, and support—is connected by HP DeskManager.

at a previous employer. When he joined Applied five years ago, he brought the concept along.

"It evolved from an electronic mail system in our own department, and we used the success there to sell its benefits to top management," said Waash, "and then watched it grow throughout the company."

Computers manage manufacturing and more. Hewlett-Packard computers and services help Applied Materials run other parts of its business, too. In 1982, Applied replaced its batch-processing NCR system with an interactive HP 3000 computer to handle its growing information management needs.

Since then, the company has upgraded that computer, added two more HP 3000 Series 70 systems, purchased four HP 3000 Precision-Architecture computers, and nearly 600 HP Vectra personal computers.

Each of the company's five manufacturing operations in the U.S. and England use an HP 3000 computer system with HP's Manufacturing

Management and/or ASK materials management software to handle procurement, materials management, and other production administration tasks.

"We use an in-house developed procurement system integrated with HP's Manufacturing Management software to create a distributed U.S. system," Diamond said. "Division systems are linked to cost accounting systems, which also are tied to our corporate general ledger system.

"We evolved from a centralized system to this more responsive one in a relatively organized way because of the capability of the HP systems," he said.

Hardware and software evolved with the company. "During the last five years, we have evolved our MIS capabilities to match the growth of the company," Diamond said. "This evolution matches the company's philosophy of progressing through constant, continuous improvement. We've not had to face a revolution in equipment changes.

"I'm pleased with the evolution of Hewlett-Packard's product line. HP has developed into areas that fit our business needs," Diamond said. "We moved to Precision-Architecture systems because they offer significantly higher capacities and great expandability."

HP enhances data and photos during Voyager 2 flyby of Neptune

As Voyager 2 raced past Neptune and into deep space, Hewlett-Packard equipment tested, measured, and enhanced data and photo signals received from three billion miles away. HP played a key role in increasing the quality and quantity of the 5 trillion bits of data and 100,000 photographs returned during the 12-year mission to four giant planets.

Prior to launch, for example, HP engineers assisted JPL engineers in developing measurement systems for Jet Propulsion Laboratories' (JPL) Deep Space Network (DSN), located in California, Spain, and Australia. Ten HP 8510B network analyzers tested reliability and made component measurements.

During the Voyager 2 journey, one of the most successful space explorations ever made, according to JPL scientists, HP signal generators and signal-monitoring spectrum analyzers aided in automatically tracking Voyager's transmissions, testing system performance, and assisting in eliminating errors in telemetry signals created when Voyager flew behind a planet or moon.

HP 9000 Series 300 computers and HP instruments identified sources of electromagnetic interference (EMI) that could interfere with reception of Voyager's signals. HP 1000 computers performed environmental testing of the network's antennae to verify hardware stability, and HP 9915 computers controlled a portion of the space network before and during the flight.

As Voyager's distant 20-watt signals (weaker than a light bulb) reach an earth antenna, they arrive on earth as miniscule radio signals only a ten-quadrillionth of a watt—one twenty-billionth of the power needed for a digital watch. JPL and NASA's deep space network uses 36 huge radio antennas on four continents to catch whispered radio messages, and HP equipment to enhance them.
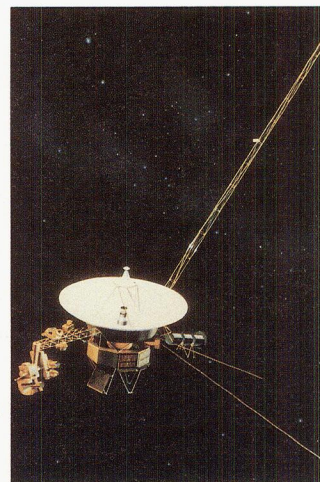
HP synthesizers in the JPL control room in the DSN act as local oscillators to convert signals from higher to lower radio frequencies. This increases the quality and usability of photos and data received from billions of miles away. JPL captures even more complete data with HP 3562A dynamic signal analyzers, which allow the receivers to lock onto the weak space signals faster.

One of the most useful discoveries leading to successes of the Voyager was an earthbound solution worked out more than two years ago by HP. According to Bob Hughes, JPL manager of the Receiver-Exciter Lab, "HP configured an HP 3326A synthesizer to control the frequency and cancel out the Doppler frequency shift. This enabled continuous communication with Voyager, even during frequency changes. It helped minimize stress on the receiver subsystem due to Doppler changes, and enhanced our ability to receive good quality data."

HP computers and instruments enhanced scientific data and photos sent by Voyager 2, above.

Major discoveries of the 12-year journey of Voyagers 1 and 2 include active volcanoes on Jupiter's moon Io and geysers on Neptune's satellite Triton; six new satellites of Neptune, three of Jupiter, three of Saturn, and 10 of Uranus; previously unknown rings around Jupiter and Neptune, and new detail in the rings of Saturn and Uranus. In addition, the spacecraft brought new understanding of the weather and atmospheric processes of the giant planets, discovering Neptune's stormy Great Dark Spot.

The two Voyagers are now headed out of the solar system in different directions, with an expected 20-to-30 years of operation ahead of them. HP equipment will be there to test, measure, and enhance all data and photographs and bring them to life.
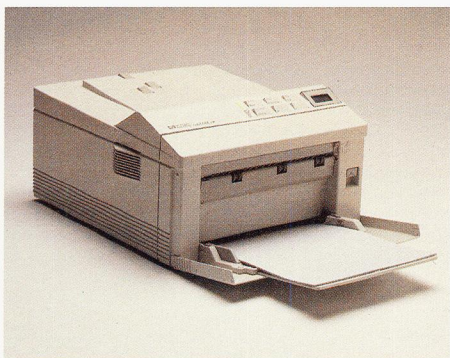
Jupiter, closer than life, 3 billion miles away.

4-page-a-minute laser printer at a breakthrough price

Now you can print four pages per minute with the affordable personal HP LaserJet IIP printer, the newest member of the HP LaserJet family.

HP LaserJet IIP printer lets you create professional-looking documents at a price you can afford.

Compatible with HP LaserJet Series II printers and most PC software, the printer's 300-dpi laser-print quality lets you create professional-looking documents at a breakthrough price.

With HP LaserJet IIP printers, you can increase paper-handling capabilities with an optional lower cassette, and add more memory for full-page graphics and downloaded fonts. The HP Master Type Library offers even more choices to create better-looking documents.

Fourteen standard fonts are included with HP LaserJet IIP printers: portrait and landscape Courier fonts in 10- and 12-point families, and a compressed line-printer font.

For first-time users, HP offers new Great Start font cartridges, ideal for spreadsheets and word processing. Great Start cartridges also work with HP LaserJet Series II, IID, and 2000 printers.

You can switch from dot-matrix printers to HP LaserJet IIP printers and protect your software investment with optional emulation cartridges for the Epson FX/IBM Proprinter.

(Note: HP LaserJet IIP printers are designed for a PC environment and are not supported on HP 3000 systems).

*For more information, check **B** on the HP Reply Card.*
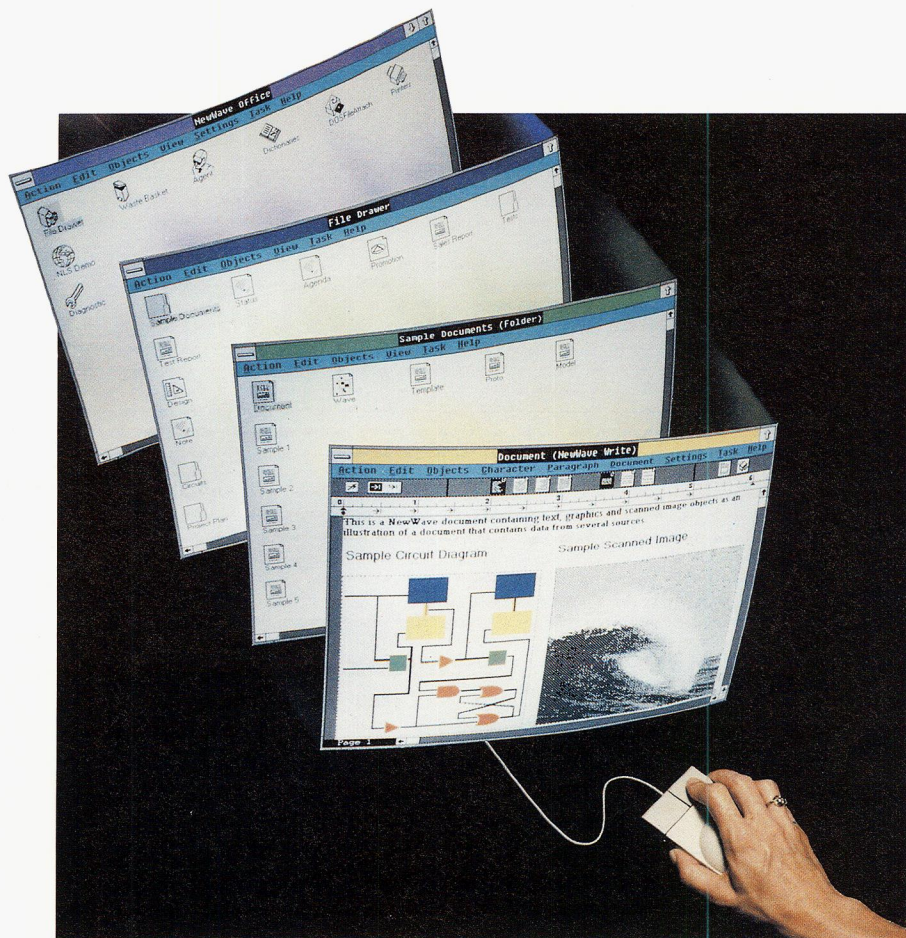
HP NewWave—a better way to manage information and automate tasks

With HP NewWave, you can use an industry-standard PC to complete and automate tasks easily by integrating applications in a standard graphical environment.

HP NewWave is a powerful personal computer software system that works with Microsoft Windows/286 and MS-DOS. A consistent and predictable graphical user interface, computer-based training, and on-line help make HP NewWave easy to learn and use.

new tools you need to boost productivity. BSP provides host services and PC applications that link host systems to PCs. HP NewWave enhances BSP with a consistent, easy-to-use environment on the PC. You can add your choice of PC applications and host services to build a customized information system to solve specific business problems.

You can open, file, mail, copy, or delete information with your favorite MS-DOS and Microsoft Windows applications.

HP NewWave offers you a totally new way to manage information. Based on Microsoft DOS and Microsoft Windows, HP NewWave is an easy-to-use way to extend the capabilities of your PC by providing a more natural and consistent method of working with information.

HP NewWave lets you link and combine text, numerical data, and graphics from multiple applications with its Object Management Facility. With HP NewWave Agent, you can record and perform any task automatically.

HP Business System Plus (BSP) combined with HP NewWave gives you the

There are thousands available, and a growing list of HP NewWave applications that take full advantage of the innovative features in the NewWave environment.

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

Microsoft® and MS-DOS® are U.S. registered trademarks of Microsoft Corporation.

- **Company of Year.** HP President and CEO John Young and Hewlett-Packard Company are the winners in the 1989 annual *Electronic Business* magazine's Best Executive and Best Company survey. "Young's stature in industry has so evolved that he epitomizes the right way to run a successful American manufacturing company in the increasingly global marketplace," write the editors.

- **HP ranks first** among 13 major computer vendors in the 1989 *VAR-BUSINESS Annual Report Card Review.* HP captures the blue ribbon in 11 of 18 categories, including breadth of product line, quality of products, market support, willingness to address reseller problems, and overall impression. "HP is the closest (rated vendor) *VARBUSINESS* has had to a perfect 10," said news editor Jenny McCune. "It knows how to listen to resellers and customers and provide the right systems for them."

- **Forbes's List.** Hewlett-Packard Company ranks 19 in *Forbes* magazine's list of America's 100 largest multinationals, based on sales booked abroad by a company's overseas operations in 1988. Foreign operations of the 100 listed companies booked sales of $506 billion, a 15 percent increase over 1987.

10 new HP AdvanceNet capabilities now available for 900 Series HP 3000 systems

You can now select from 10 new HP AdvanceNet capabilities if you use 900 Series HP 3000 systems. These new capabilities demonstrate HP's commitment to multivendor networks, high-performance networks, PC-mini integration, and ease of use.

They include new HP-to-IBM communication products and the X.25 link provided by the Datacommunications and Terminal Controller (DTC).

HP X.400 offers standards-based multivendor connectivity for HP's leading electronic mail product, HP Desk-Manager. You can exchange messages transparently throughout a multivendor network or linkup with public messaging services with X.400 and HP Desk-Manager. The new HP-to-IBM capabilities include BSC Remote Job Entry/XL,
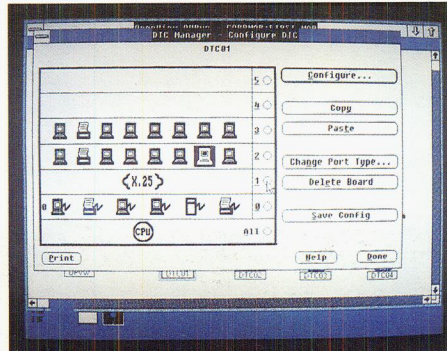
The OpenView DTC Manager's graphical presentation, pull-down menus, on-line help, and mouse-driven interface make it easy to configure.

BSC Link/XL, SNA LU 6.2 API/XL, and SNA DHCF/XL.

You can increase system performance with these new products by offloading networking to an outside processor, making more CPU power available for transaction processing.

HP now has a solution to provide HP 3000-to-Novell PC LAN connectivity. With it, Novell PC users have access to HP 3000 applications, powerful Business System 3000 applications, and Business System Plus (BSP) office-automation applications.

The OpenView DTC Manager meets your network-management needs with graphical presentations, network maps, and a mouse-driven interface to speed DTC configuration and management.

*For more information on DTC and OpenView, check **C** on the HP Reply Card. For more information on BSC or RJE, check **D** on the HP Reply Card.*

© Hewlett-Packard Company 1990

HEWLETT PACKARD

Hewlett-Packard (Canada) LTD.
6877 Goreway Drive
Mississauga, Ontario Canada
L4V1M8

```
00011400                    30
ADOLF SPECHT
430 FELTON PLACE
N VANCOUVER, BC
V7G 1Z9
```

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.