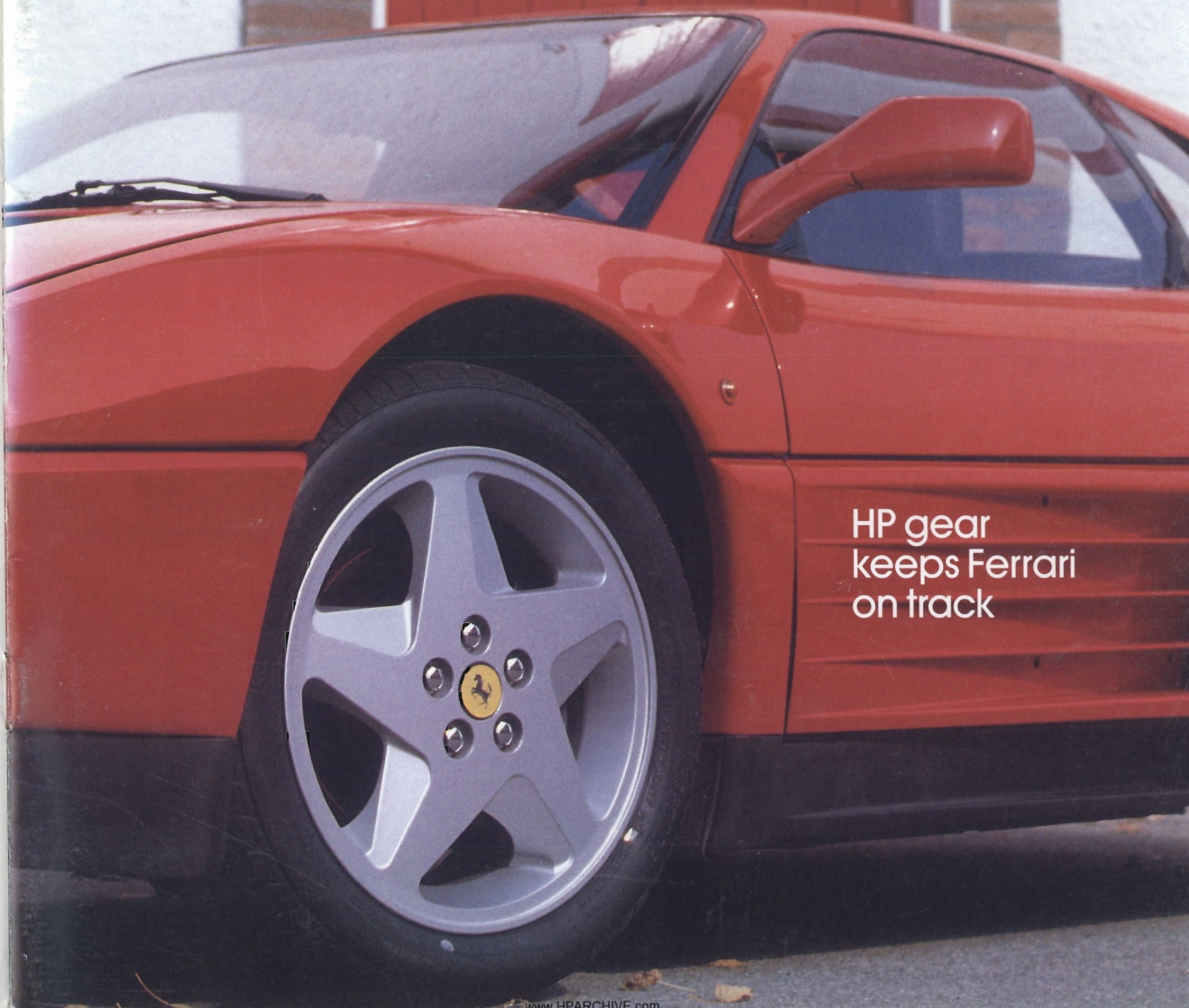


MEASURE

For the people of Hewlett-Packard

January-February 1990



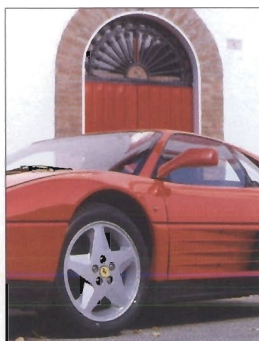
HP gear
keeps Ferrari
on track



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On the cover: In Maranello, Italy, Ferrari's new 348 model strikes a sleek pose in front of the office doorway of Enzo Ferrari, the late founder of the company. See page 8 to learn about HP's role in testing the most electrically complex Ferrari ever. Cover photo by John Lamm.

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MEASURE

Editor: Jay Coleman	Circulation: Karen Flansaas	Graphic designer: Thomas J. Brown
Art Director: Annette Yatovitz	Associate editors: Betty Gerard Donna Jones	Contributors: Tom Ulrich Jim Scheetz

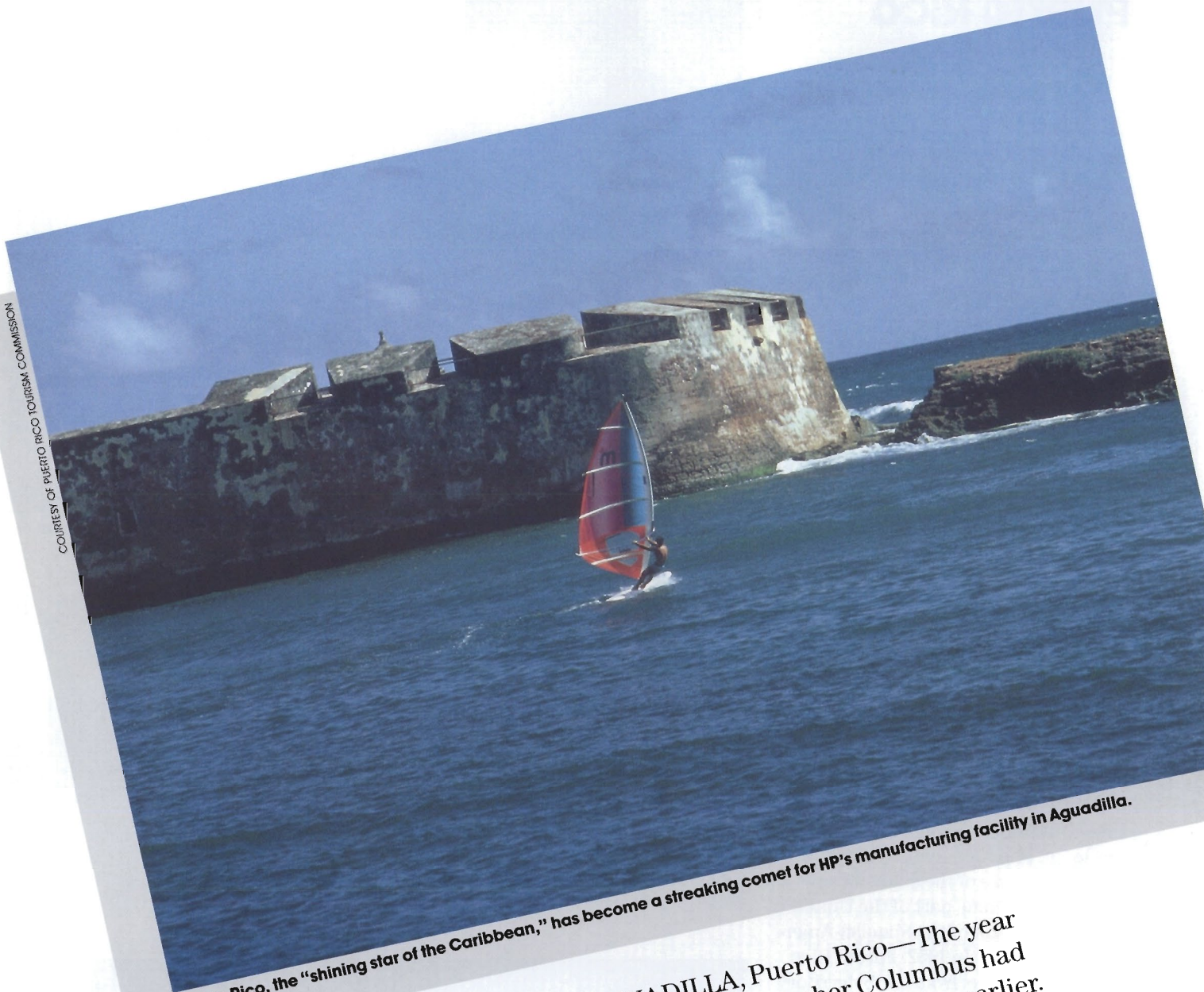
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Hewlett-Packard Company is an international manufacturer of measurement and computation products and systems recognized for excellence in quality and support. The company's products and services are used in industry, business, engineering, science, medicine and education in approximately 100 countries. HP employs more than 95,000 people worldwide and had revenue of \$11.9 billion in its 1989 fiscal year.

COURTESY OF PUERTO RICO TOURISM COMMISSION



Puerto Rico, the "shining star of the Caribbean," has become a streaking comet for HP's manufacturing facility in Aguadilla.

Puerto Rico: HP's best-kept secret

Chris jumped back onto his ship and set sail for other uncharted waters. Before you could say "Land ho," he arrived at a small tropical island and stepped onto Puerto Rican soil near what is now Aguadilla.

It took most people about 500 years to learn what Chris discovered in a few moments—that Puerto Rico is a rare gem. Or, as it is known today, the "shining star of the Caribbean." Hewlett-Packard made its discovery of this lush area in 1980

AGUADILLA, Puerto Rico—The year was 1493. Christopher Columbus had just discovered America a year earlier. Being the adventurer that he was,

when it established a facility to manufacture HP 2621A video-display terminals.

Today, the Puerto Rico Manufacturing Operation (PRMO) is one of HP's fastest-growing facilities with 50 percent growth in shipments each of the past two years.

That "shining star" has become a streaking comet.

"I think PRMO is HP's best-kept secret," says Operations Manager Jack Parks. "People who have never been here think 'Do they wear loin cloths in Puerto Rico?' Then they come here, see our first-rate facility, see the quality of our work, meet our sharp, talented people, enjoy the beauty of the island and notice the highly sophisticated industrial environment. Within 48 hours of when they left home, they think Puerto Rico is super."

Puerto Rico has had a rich history since Columbus claimed the island for Spain. The rectangular island—roughly the size of the state of Connecticut—became part of the United States as a result of the Spanish-American War in 1898. In 1952, Puerto Rico changed its status from a U.S. territory to a U.S. commonwealth.

As a commonwealth, Puerto Rico receives preferential federal income-tax treatment for companies operating here. In turn, Puerto Rico provides income-tax incentives. The combined tax rate means significant advantages for doing business on the island.

As you might expect, more than 200 of the *Fortune* 500 companies manufacture in Puerto Rico, including most major electronic, pharmaceutical and chemical companies.

"The tax benefits give HP enormous opportunities in Puerto Rico, especially on high profit-margin products," Jack says. "But the tax benefits aren't the focus for those of us here. We're



Harry Colon (left, with Hector Bocanegra) worked himself out of a job as quality-assurance manager when he introduced a "quality culture revolution" to the 422 PRMO employees.

PRMO at a glance

Location: Aguadilla, Puerto Rico

Reports to: Computer Manufacturing Division

Established: March 1980

Facilities: 125,000 square feet

First product: HP 2621A computer video-display terminal

Employees: 475

Current products: More than 60 networking and memory products





Jack Parks (center), PRMO operations manager, checks out hardware in the motor/encoder assembly area with Esther Lamourt and Harry Caban. PRMO has recorded 50 percent growth in shipments each of the past two years.

committed to making this the best manufacturing operation in HP.”

If any one event turned PRMO from a good manufacturing operation to an outstanding one it was the “quality culture revolution” instituted in 1984 by Harry Colon, then PRMO quality-assurance (QA) manager and now production manager.

“We held a blood drive with a theme of ‘Let’s put quality into everyone’s blood,’” Harry explains. “Then we trained all 422 people at PRMO in the total-quality-control (TQC) methodology, TQC problem-solving and satisfying our customers. We printed up T-shirts that said ‘The client counts on me— how lucky he is.’”

All of a sudden a couple of things happened:

1) As *all* employees assumed a greater role for ensuring quality, the QA staff decreased from 33 employees to seven.

“All production workers had the right to stop the line and point out errors,” Harry says. “No one was pen-

alized for finding errors; in fact, we emphasized that finding them is good. Now the operators know that the products are going directly to the customer without final inspection, so each person is more concerned with quality.”

Wave-solder defects, for example, dropped from 8,400 parts per million

“People who have never been here think ‘Do they wear loin cloths in Puerto Rico?’ ”

(ppm) in 1984 to 50 ppm today.

2) By instituting TQC throughout, Harry worked himself out of a job as QA manager.

“Harry made the people who do the work responsible for the quality,” Jack says. “By any measured results, our quality today is as good as any quality-leading manufacturing operation in HP.”

“All of the people here have done a great job,” Harry says. “*They’re*

the heroes.”

At the same time PRMO made quality its No. 1 priority, the product mix and volume began to change, says Waldemar Ramirez, engineering manager. The original production line of video-display terminals was shifting to a combination of networking, plotter and memory-board products.

“We’ve increased from 23 manufacturing engineers in 1988 to 46 at the end of 1989,” Waldemar says, “and we’re involved with some of the most sophisticated production in HP such as surface-mount technology.

“We intend to be the best manufacturing operation in the Computer Manufacturing Division (of which PRMO is a member). Even without the tax benefits, we’ve shown that we are a very viable manufacturing operation.”

Part of that new product mix is due to the shift of memory-board production for Apollo Systems Division workstations from Exeter, New Hampshire, to PRMO in September 1989. That has increased production by 10 percent.

Another reason for PRMO's surging success has been its ability to attract top talent, including hiring from the island's top engineering and business schools, and from prestigious mainland universities, as well as people with experience at local and stateside operations.

PRMO's technical-upgrade program has been particularly effective in luring top talent. For example, 40 percent of the engineering managers have master's degrees. Sixty percent of them have prior experience with major competitors, such as IBM and Digital Equipment Corporation.

Luis Lopez is one person who has "come home" to Puerto Rico.

Luis earned a bachelor's degree in electrical engineering from the University of Puerto Rico at Mayaguez (UPR-M). He left the island to get an MSEE at Stanford University, and earned a master's in business admini-

"By any measured results, our quality today is as good as any in HP."

tration while working for Motorola in Ft. Lauderdale, Florida.

In 1982, with a new baby girl and the desire to be closer to his parents, he moved back to Puerto Rico and joined HP. In the past four years, he's become an engineering expert in surface-mount technology.

"We've had some technically challenging surface-mount-design projects here," Luis says, "but we have some very bright people who have designed solutions that other surface-mount centers in HP have adopted."

Ivonne Ortiz is another PRMO over-achiever. After earning a degree in industrial management and marketing



Nearly three dozen PRMO employees traveled as much as seven hours a day to help victims of Hurricane Hugo rebuild the town of Ceiba.

Hugobusters

HP employees in Aguadilla virtually were untouched when Hurricane Hugo slammed into Puerto Rico's eastern seaboard on September 19 and killed six people.

Untouched physically, but certainly not emotionally.

Employees immediately collected 70 boxes of food and delivered them to the storm-ravaged capital of San Juan. They continued their efforts with more food, ice, water and supplies for several days.

But they wanted to do more. Nicolas Davila, PRMO director of environmental health and safety, found out from the Civil Defense that Ceiba (pronounced SAY ba), a small town on the opposite side of the island, desperately needed help repairing damaged homes.

During the next three weeks, as

many as 33 HP employees shuttled back and forth—some traveling seven hours a day round trip—to help rebuild Ceiba. The volunteers replaced the roofs on 20 houses and built a temporary shelter for 24 homeless families.

PRMO paid the employees' salaries during the cleanup efforts, and donated \$25,000 to the shelter project and \$25,000 to Puerto Rico's general relief fund. Aguadilla employees even raised \$3,000 more by selling "Hugobusters" T-shirts.

"This is a beautiful example of one person helping another," said Puerto Rico Governor Hernandez Colon. Added a Federal Emergency Management Agency official, "You have touched lives in ways that are profound and moving. You have cared for your brothers and sisters."



Blanca Rivera (left) confers with Marta Perez while hand loading components on a chassis. PRMO began building computer video-display terminals in 1980 and now manufactures more than 60 networking and memory products.

from UPR-M, Ivonne came to the U.S. to get an MBA. In 1983, she returned to Puerto Rico to work for HP, where she's a production supervisor—and a part-time teacher at her alma mater.

A production supervisor with an MBA?

"I'm convinced that the degree helps me deal with engineers, planners, schedulers and accounting people," Ivonne says. "They know that I know both sides of the business—production and the financial side.

"And when I'm teaching production management at the university, I can give the students real-life experiences on topics such as just-in-time manufacturing. Plus, it's a good opportunity to encourage some of the best students to interview for jobs here at HP."

HP also has a stake in helping develop future engineers. Last May during the inauguration of modern facilities and celebrations for PRMO's 10th anniversary—and HP's 50th—the company donated \$750,000 to UPR-M, the largest gift ever to the university.

And PRMO's generosity doesn't stop at university donations (see story, page 6). PRMO employees proudly point out that their annual participation in the United Way campaign is the highest in HP. In the 1989 campaign, PRMO recorded a whopping 98 percent participation and a yearly per-capita gift of \$123. And this from a common-

"We have a very precious resource in our highly educated, hard-working people."

wealth of 3.4 million people and the lowest average income in the nation.

"I believe our high participation is because the people who have the least often give the most," says Jose Luis Perez, manufacturing logistics manager. "I think that says something about the quality of the people who work here.

"People who had never been to Puerto Rico used to ask us if we had

electricity and running water. Now that we've proven ourselves, people are coming to us because it makes good business sense."

For example, HP and Oki Electric Industry Company of Japan will build and operate a joint printed-circuit-board manufacturing facility next to PRMO. The 110,000-square-foot building on PRMO's 68-acre site—due for completion in 1991—will employ about 200 people.

Says Jack Parks, "We are a computer-driven company and there are some obvious advantages to manufacturing high-volume products here in Puerto Rico. But there's an even better reason: We have a very precious resource in our highly educated, hard-working people. And that's an advantage you can't put a price on."

—Jay Coleman

Ferrari puts HP to the test



At full strength, the Maranello, Italy, plant will produce 11 Ferrari 348s per day.

MARANELLO, Italy—It is almost 12:45 p.m. From a large room at The Little Horse cafe (*Il Cavallino*), a foursome of factory workers throws in a hand of tresette, debating the wisdom of the cards they have just played. Young factory workers chide one another over yesterday's football score.

For all its richness of being, Maranello, just a turn in the road at the time of Michaelangelo, remains bound to the craft tradition. For here, in fallow earth beyond the village square, lies the soul of modern Italy.

Enzo Ferrari, artist and engineer, founded Ferrari S.p.A., manufacturer of race cars and high-performance sports coupes, near this northern-Italian village nearly a half-century ago.

This noon, bands of denim-clad school boys stroll past The Little Horse cafe on their way back to Alfredo Ferrari public school. And Ferrari employee Luciano Noli recalls the afternoon seven years ago that Enzo Ferrari met with Luciano's schoolmates from the class of '84. "He spoke of his passion for the cars, the race and your job," Luciano says. "From the beginning," Luciano adds, "Mr. Ferrari instilled in us a passion for the art of building an automobile."

Luciano, a graduate of Alfredo Ferrari technical and mechanical school, manages the first computer system installed on a Ferrari assembly line. His work and the work of others at the assembly plant's department of new technology elevated the art of manufacturing a high-performance sports car to a science.

Craftsmen and engineers modeled the manufacturing process here after traditional European methods for low-volume automobile assembly and an electrical test system designed, built and supported by Hewlett-Packard's Advanced Manufacturing Systems

Operation (AMSO) and HP Italy.

Faced with the challenge of building their highest-quality production automobile ever and meeting safety and environmental standards set by government agencies from around the world, engineers at Maranello re-tooled an assembly line for the introduction of the 348, Ferrari's new high-performance sports coupe. Limited production of the 348 began in August 1989.

A blend of "humanware" and hardware, the 348 production line requires highly skilled laborers operating sophisticated general-purpose equipment to produce world-class automobiles for a small, but ever-changing, international market.

Craftsmen station themselves along the 200-meter production line in the 80,000-square-meter assembly hall. They install whole assemblies, such as the wiring, instrument panel, or the steering column, during a 40-minute period. (Workers spend 52 to 60 seconds assembling their portion of a car

"Mr. Ferrari instilled in us a passion for the art of building an automobile."

along a conventional production line.)

They check the quality of their work throughout the assembly process with an electrical test system designed and manufactured by AMSO. The test system is located at four of the 20 work sites along the Maranello production line. The system includes five HP 1000 A400+ computers and HP 35751 color terminals. It instructs craftsmen which regulatory or safety features to add; tests and verifies assembly and operation of each electrical part they install; and records and returns test



Equipment from HP's Advanced Manufacturing Systems Operation tests the electrical system of the Ferrari 348 at four of the 20 work sites.

results to an HP 1000 A900 computer.

The 348, one of the most electrically complex Ferraris ever produced, contains nine kilometers of electrical wire—about 5½ miles worth—and 204 electronic components and connections. Pre-production tests prompted Ferrari to return one electrical part in 12 to its suppliers.

“Technicians test the instrument cluster (the speedometer, temperature gauge, oil gauge and tachometer) before they send it to the production line,” Luciano explains. “Craftsmen test it again after they install it in the 348.”

Besides the instrument cluster, craftsmen test wiring harnesses, the instrument panel, dashboard electronics, the air conditioner, tail lamps, head lamps, steering-column electronics, electrical windows and mirrors.

They also test the complete electrical system for the 348 at the end of the

production line.

“Thanks to the electrical test system,” says Luciano, “we are producing a higher-quality automobile.”

The test system, however, delivered results before production even began.

“Thanks to the electrical test system, we are producing a higher-quality automobile.”

“Engineers at Ferrari drew up the correct specifications for an electronic side-view mirror,” says Luciano. “We ordered a prototype of the assembly. Craftsmen tested it manually. They saw that the mirror was working, but did not pay attention to the direction of its movement.”

The test system pointed out that a motor moved the mirror, for example,

to the right instead of the left. AMSO engineers alerted engineers at Ferrari. Before production of the mirror assembly began, their supplier rebuilt it to meet the specifications set down by Ferrari in the original design.

Ferrari also used the test system to design less expensive, more efficient wiring harnesses for the 348.

Once production began, Ferrari used the test system to track the assembly of the electrical system for each 348 Maranello produces.

Dealers placing an order for a 348 today must wait three years for delivery. (Sometime this year, Maranello expects to reach full production of 11 348s per day.) Each 348 has exacting specifications based on where the Ferrari is shipped. Because the 348 will be driven across the European, African, Australian, Asian and American continents, its performance must match the safety and environmental regulations

of its country of destination.

“Wiring specifications for the 348 differ for an Italian and American model,” Luciano explains. “One of the first tests we run determines whether we have installed the European or American version.

“The test system also allows us to tune the electrical system for the 348,” Luciano says. “We set the current for each component based on the complete list of standard and optional electrical features contained in the car.”

At the site where craftsmen install head lamps, for example, the test system determines whether the lamps are drawing 11 to 13 amps as required by English law or 12 to 14 amps as required by American law. (The test system is accurate to 1/100th of an amp.)

At the assembly-line site where craftsmen install safety equipment,

Dealers placing an order for a (Ferrari model) 348 today must wait three years for delivery.

the test system determines if an alarm sounds should an American driver not fasten his or her seat belt or should a Saudi Arabian driver travel at a speed of 120 kilometers per hour.

The test system also maintains a history of the electrical systems for all the 348s Maranello produces. With information on the 348's performance on the production line, designers can tighten the specifications of electrical parts craftsmen install in the factory, and service technicians can more easily diagnose electrical problems they face at the dealership.

“We are now looking at statistical patterns that allow us to more accu-



Engineers Byron Cheung (left) and Ken Cook (in car) help develop programs to test a prototype Ferrari 348 at the AMSO lab in Sunnyvale, California.

rately determine how much electrical current each component needs, Luciano says.” Narrower tolerances mean more reliable, longer-lasting parts.

Before the factory delivers a 348, a test driver guides it through the streets of Modena for three 30-minute test runs. After each test spin, the driver evaluates the car's performance.

Test engineers placed a fifth electrical test station in a workshop outside the factory. Craftsmen use it to repair electrical problems they do not have time to fix on the assembly line. Test drivers use it to help diagnose electrical problems they discover on the road.

“We use it as a final test,” Luciano says. The test driver then releases the 348 to the open road.

In fewer than 50 years, Ferrari has won eight world championships on race tracks like Le Mans, Sebring, Targa Florio and Nurburgring. It also has won nine Formula 1 world championships.

For all its skill at pushing technology to the edge at the race track, Ferrari was not the first auto maker to use an electrical test system built by AMSO.

Ferrari learned about the electrical test system from Pininfarina, an Italian design studio and car manufacturer which has designed high-performance race coupes for Ferrari since 1954.

Using HP's electrical test system, Pininfarina and General Motors began manufacturing the Cadillac Allante (GM35) in 1984. GM also uses the electrical test system to assemble its Buick Reatta sports coupe in Lansing, Michigan.

“Given the results of Reatta's product introduction, Ferrari should be pleased with what they are getting,”

Narrower tolerances mean more reliable, longer-lasting electrical parts.

says Bob Thompson, program manager for the Reatta Craft Centre.

When Buick introduced the Reatta in January 1988, it achieved the highest rating for quality of any new car in GM history. Ward's *Auto World*, as part of

its annual car and truck evaluations, rated the quality of the \$25,000 Reatta second to the \$52,500 Mercedes 300CE in Ward's luxury specialty class.

A tour of Pininfarina's manufacturing plant, however, convinced Ferrari to purchase an HP test system.

"It all started with Pininfarina," says Emilio Ghilardi, sales marketing manager for HP's European Advanced Systems Operation (EASO). "Several years ago, people in the manufacturing department of Ferrari paid their biannual visit to the Pininfarina assembly plant in Torino. They saw the GM35 electrical test system at work.

"Ferrari became interested in our test system because they were replacing the 328, which Pininfarina helped design 10 years ago, with the 348. Pininfarina contacted HP Italy immediately.

"Thanks to the efforts of AMSO's team, we funded a study at Ferrari Maranello to determine the practicality of a GM35-like test system for the 348."

In January 1988, Ferrari accepted AMSO's and EASO's proposal to equip the 348 production line with an electrical test system.

"We immediately formed a team of engineers," says Emilio. "It installed the system at Maranello in 12 months, far exceeding Ferrari's expectations."

"The key to our success in Maranello," says Stefania Marri, program manager for HP Italy, "was our goal to have the electrical test system accepted by everyone at Ferrari—managers, engineers and production workers."

The notion of having skilled workers use general-purpose machinery to produce high-quality goods for global markets appeals to managers and workers beyond the factory gates



Drivers put each bright red Ferrari 348 through its paces during three 30-minute test runs before the car is delivered. Exacting specifications ensure peak performance.

at Ferrari Maranello. It is fueling an industrial renaissance in the northern Italian manufacturing districts of Prato (textiles), Brescia (steel), Sassuolo (ceramics), Ancona (shoes), Como (silk), Brianza (furniture) and Reggio-Emilia (farm machinery).

At the most advanced manufacturing plants, craftspeople use computer

"It is not possible for us to have good quality electrical equipment without HP's electrical test system."

technology to produce a wide range of goods for constantly shifting markets.

"Ten percent of all manufacturing in Europe is automotive," says Emilio. "EASO's mission is to integrate information systems to help the European automotive industry to increase the quality of its products, processes and services.

"We hope to broaden our mission to include selected industries once we have succeeded in the European

automotive market."

The word is already out.

"The 348 is very important to the future of Ferrari," says Antonio Olivieri, manager of new technology at Maranello. "We prepare two Testarossas, four Mondial 8s, and in the future, 10 to 12 348s a day.

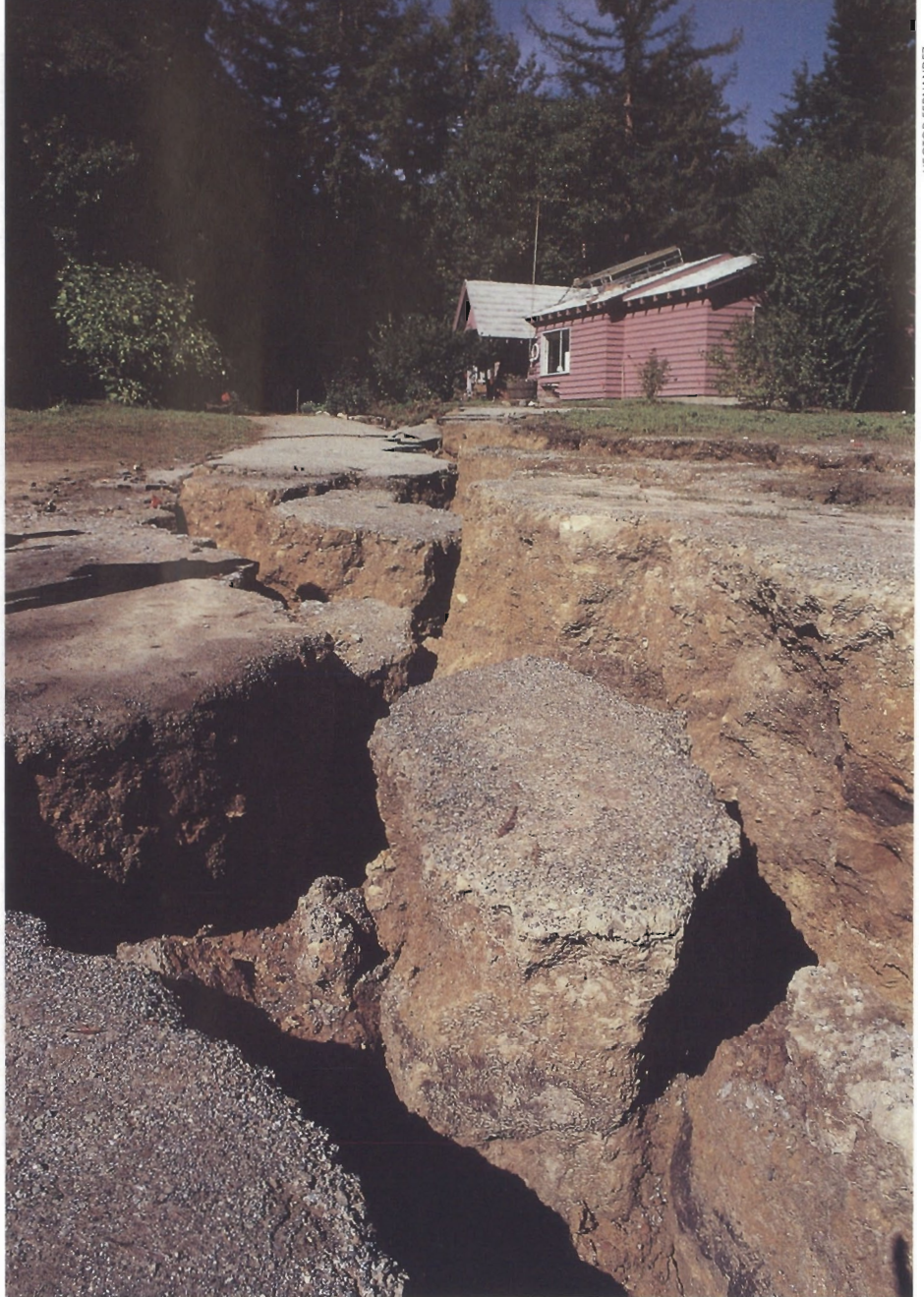
"It is not possible for us to have good quality electrical equipment and assembly without HP's electrical test system."

—Tom Ulrich

(Tom Ulrich is a senior writer at the Advanced Manufacturing Systems Operation in Sunnyvale, California. He last wrote for Measure in the May-June 1989 issue on how the Canadian Aviation Safety Board uses AMSO equipment to determine the cause of airline accidents. —Editor)

When Mother Nature took hold of the Bay Area in October there was a

Whole lotta shakin' goin' on



HECTOR FERNANDEZ

Near the epicenter of the October 17 earthquake, a 1,000-yard crack opened in Summit Road in the Santa Cruz Mountains. The new crevice was 17 feet deep in some spots.

Minutes before the third game of the World Series was scheduled to begin on Tuesday afternoon, October 17, a deadly curve ball was thrown at Northern California.

Near the coastal city of Santa Cruz, the land abruptly slipped upward and to the north along the surface of the San Andreas fault. From the earthquake's epicenter 11.6 miles underground, tremendous energy shot outward in a north-south direction.

At its source, the quake measured 7.1 on the Richter scale, varying in

intensity at different points as it traveled. The nearby towns of Santa Cruz and Watsonville on the coast were the first to feel its destructive force.

For the most part, the killer quake just brushed Silicon Valley on the other side of the coast range, but shattered parts of San Francisco and Oakland farther north. It ripped loose a section of the Bay Bridge that joins the two cities and collapsed a stretch of Oakland's Interstate 880 freeway.

Experts say that it took a mere 10 seconds for the fault to slip.



Ceiling tiles fell in many HP buildings during the quake. During cleanup at the Sunnyvale site, Jack Gephardt of facilities uses the phone of GM Bob Puette to make a report.

When HP people talked later about where they were during the earthquake—and for days, it was a staple of every conversation—they invariably added, “It’s the first time I’ve ever been scared enough to get under my desk.”

Only two of the 110 buildings which Hewlett-Packard occupies in the San Francisco Bay Area took the full brunt of the quake. Otherwise, quake damage was uneven from site to site, depending on how the building was constructed, the type of ground and earthquake bracing done earlier.

Hardest hit were buildings 26 and 18, both in Palo Alto, which suffered severe structural damage. They have been closed and employees relocated.

Repairs are under way in 26, a relatively new HP Labs building on Deer Creek Road. Designed as a structure within a structure, it suffered damage to steel I-beams and welded brace-frame connections. The unexpected impact of the quake could well lead to a future change in the building code.

Down the hill, leased building 18 had windows that exploded both inward and outward, and electrical systems that fell from the ceiling in a rain of sparks. HP-TV and two corporate departments had to find new homes. HP is still negotiating with the landlord about future occupancy of 18.

A major structural repair on the Personal Computer Distribution Operation’s main building in San Jose was

“It’s the first time I’ve ever been scared enough to get under my desk.”

expedited immediately after the quake to keep vital shipments rolling out.

In dozens of other HP buildings, ceiling tiles crashed down, windows broke, bookcases and heavy cabinets tipped over and loose objects shot across the floor—but these were all



In Cupertino, seismic force slid this disk-drive rack into a floor opening.

minor difficulties. Tipped-over water-tanks on roofs and broken sprinkler systems did more damage. The cafeteria on the large Santa Clara site, which had broken glass walls and a collapsed ceiling, closed for renovation.

By the following Monday, however, 97 percent of HP sites in the affected area were back in full operation. Amazingly, only five people suffered injuries—all minor.

However, hundreds of aftershocks of varying magnitude served as an uneasy reminder of the whiplash action of the October 17 earthquake—now known as Loma Prieta.

For years Northern Californians have talked about “the Big One” that might strike the area one day. A 7.1 earthquake falls short of that cataclysmic dimension, but it does test the company’s earthquake procedures that are now in place.

For the past seven years, HP sites have been audited on their emergency preparedness by Corporate Environmental Health and Safety (CEHS).

Earthquake

Employee health and safety has been the prime concern, as well as chemical releases to the environment.

As a result, each site has put together its own Emergency Response Team (ERT). It is made up of people from facilities, environmental health and safety, medical, manufacturing and security. With regular drills, they were ready to go when the quake hit.

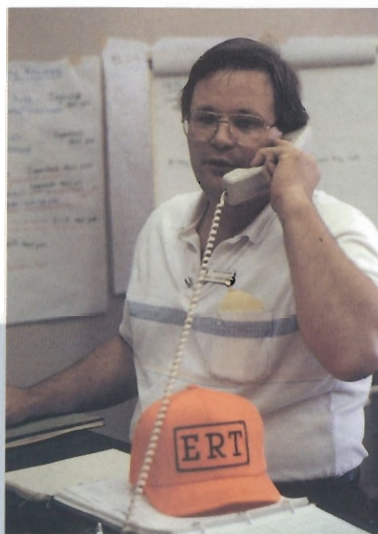
Mike Johnson, facilities manager for the corporate offices, says “the real thing” meant coping with a host of unplanned factors, often simultaneously. He plans to expand the emergency checklist, which covered in detail only the first two hours when the focus was on life safety and damage from water, gas and so forth.

When his own site was under control Tuesday night, Mike’s role shifted to heading a regional command post.

“Most of our Bay Area facilities weren’t hit... We were lucky this time.”

A central point was needed to gather and share updated information for ERTs working on their own at each site. An emergency hotline went into operation. The team’s public relations professionals asked Bay Area media to get out word that HP employees should stay home Wednesday while damage was being assessed. The same message was broadcast on many voice-mail systems.

Mike brushes aside praise he received for his coolness under fire. “Next time we’re going to have some way to communicate out of the area—perhaps by shortwave radio—to our computer center and PR backup in Loveland, Colorado,” he says.



JAY COLEMAN

At the Bay Area command post, Mike Johnson stayed on duty all night.

Pitching in to help

After the Loma Prieta earthquake, HP people pitched in to deal with the emergency and to get business going again.

John Meyer was the only employee left in the Direct Marketing Division warehouse on the night of the quake. He spent three hours on a forklift removing pallets of product from a rack to get at an exposed sprinkler water pipe needing repair. He was cut off from news about his family in Santa Cruz.

At the corporate offices, water coming from a broken pipe on a water heater poured full force into a room housing electrical and mechanical utilities. Dimitry Holl, operations manager for facilities, put on rubber boots and lineman’s

gloves to turn off high-voltage electric power. Then, water pouring down his arms and chest, he climbed to the ceiling to turn off streams of water gushing down. Controlling the flow was critical to restoring air conditioning to HP’s vital central-computing center.

Technician Felipe Espinosa came into the closed Santa Clara Division Wednesday morning to test 21 cesium-frequency standards so a large order could ship on time.

At the same site, Woody Engle saved a year’s worth of design effort on an important new instrument by returning right after the quake to shut down computers, then restarting them the next day and confirming the integrity of the data.

Impressed by the efforts he saw firsthand the night of the quake, HP President John Young wrote thank-you notes to 140 HP individuals and groups nominated by their sites for heroic actions.

Countless employees gave cash to quake relief funds and took food and clothing to victims. Hewlett-Packard Company contributed \$200,000 to Bay Area relief efforts.

A room on the top floor of the corporate offices building has been stocked with supplies ranging from an emergency generator to flip-boards for a message center. It will serve as a permanent Bay Area command post. When the quake hit, a sophisticated radio network was being installed to link this hub with all other area sites.

Probably no one in the company has thought more seriously about earthquakes than Bob Lanning of the

Corporate Computing Center, who originally had the charter of seeing that its eight mainframes and other equipment were seismically safe.

For the past year and a half he’s been working with Pat Castro, worldwide facilities manager in Corporate Real Estate, on a broadened earthquake-preparedness program.

One important component is a business-risk assessment to determine the

effect on HP if operations are interrupted in a particular building. The company will also look at seismic implications when choosing sites.

An early move is to find out which HP-occupied buildings are located in areas of high earthquake risk. Converting the local seismic codes of other countries to the zone system used in the U.S., consultants found that California is in the highest-risk zone (4)—and so are Japan, New Zealand, Venezuela and Mexico City. Another 20 HP buildings are in the next highest-risk zone (3), including some in Italy, Greece, China and Canada.

Structural analysis has already been completed for 141 buildings in the Bay Area and Oregon. By the end of 1990 similar data should be available for 90 buildings in Europe, 97 in Intercontinental countries and 180 more factories and sales offices in the U.S. that are in seismic zones of 2 or greater.

To make local ERT plans more consistent with one another, Bob Lanning is working with Bruce Davidge, security manager for the Rohnert Park, California, site, on a common format.



Displaced from their Palo Alto building by the quake, HP-TV and Corporate training people wait for word they may return to their offices briefly to get things left behind.

At every major manufacturing site, one person serves as the focal point of the ERT program. Site management is kept informed on the type of crises that might happen at that location, and the resources needed.

The management team of the Signal Analysis Division in Rohnert Park has

In a situation where employees couldn't go home, supplies are on hand to keep employees on the Rohnert Park site for 72 hours. Included is material to set up outdoor shelters in case buildings can't be occupied. No such measures were necessary this time, though, as the area barely felt the Loma Prieta quake.

An earthquake is perhaps the supreme test of preparedness planning. It is sudden, unpredictable and regional in its impact. Worst case, it can rip apart the utilities and means of transportation on which communities depend for everyday life.

HP's earthquake experts agree that the company, which sustained an estimated \$9 million in quake damages and additional loss from paid time off after the quake, did not experience the impact of a major shock.

"Most of our Bay Area facilities weren't really hit by the October 17 earthquake because its energy went north and south," Bob Lanning says. "We were lucky this time."

—Betty Gerard

Which HP-occupied buildings are located in areas of high earthquake risk?

gone through a four-hour "table-top" exercise to test its readiness to handle a major disaster (in this case, an earthquake). Based on messages they received about such imaginary events as power problems, injuries and a natural-gas leak in the kitchen, they made decisions on what actions to take.

To be ready for the real thing, General Manager Duane Hartley and his functional staff will soon carry beeper/radios at all times.

CONSTANCE CRAWFORD



In San Francisco, all was not lost.

A snapshot of Colorado Springs

Nestled in the eastern foothills of the Rocky Mountains and 14,000-foot Pikes Peak, HP's Colorado Springs site is the home of the Colorado Springs Division (COL), Colorado Telecommunications Division (CTD), the Logic Systems Division (LSD), the Colorado Tech Center and the Electronic Design Division (EDD).

The city of 279,000 people also is home to the U.S. Air Force Academy, and borders a picturesque red-rock formation called the Garden of the Gods. Many southern Colorado residents are runners, hikers and lovers of the great outdoors.

HP first established a Colorado Springs plant in 1962, and today employs 2,100 people. *Measure* offers its readers this brief pictorial look at the people of Colorado Springs.



above right

Employees at the Colorado Springs Division (COL) arrive for work on a city bus as the sun spreads a warm glow on Pikes Peak.

right

Mary Esteve, Colorado Telecommunications Division telephone operator, checks a phone number in her Braille directory while her faithful dog, Vesper, keeps a wary eye on the photographer. A CTD engineering team helped set up Mary's work area with a Braille writer, printer and a computer with a voice synthesizer.



PHOTOS BY REG FRANCKLYN



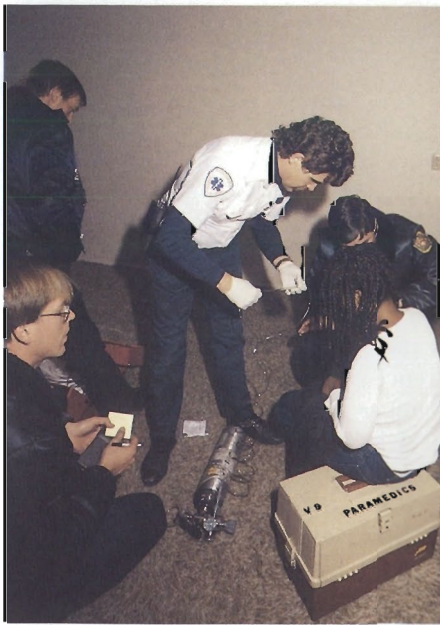
left

Electromagnetic-compatibility engineer Bob Hinton tests an Odyssey emulator for radio-frequency interference in the anechoic chamber at the Briargate site, which houses EDD and LSD. The chamber helps eliminate outside radio-frequency interference to achieve extremely accurate test results.

below

When Biff Hallenbeck, (CTD) procurement office administrator, began working at his new job in 1984, CTD had one customer—AT&T. After the telephone industry breakup, CTD began shipping worldwide, and Biff began collecting flags from each country shipped to. He has 138 country flags, plus one from the European Community of 1992.





above

COL's Max Montague, an emergency medical technician for a Colorado Springs ambulance company during his off hours, administers care to a woman having difficulty breathing.

right

The Garden of the Gods, just minutes from HP's COL and CTD facilities, is a popular area for runners, hikers, cyclists and rock climbers, even during the lunch hour.



top right

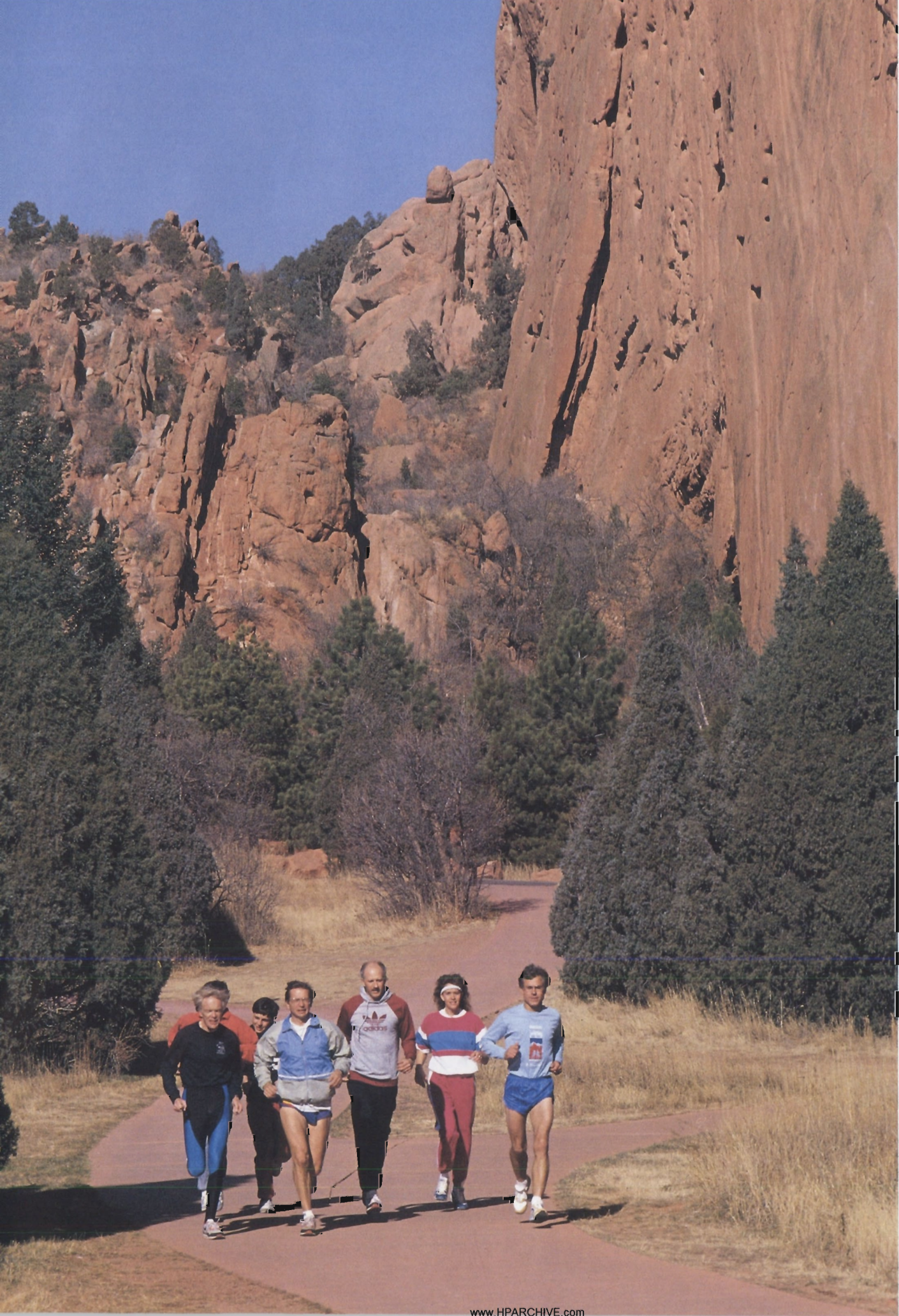
HP employees in Colorado Springs often act as surrogate families to Air Force Academy cadets away from home. COL's Steve Galchutt (right) reads while his daughter, Kyra (left), and their visiting cadet, Lisa Kirk, study homework.

bottom right

COL's Patrick Bestgen adjusts the B-scan while testing cathode-ray tubes on the "ager" racks. The tubes will be shipped to HP divisions that build digital displays and frequency analyzers.



PHOTOS BY REG FRANCKLYN





HP's visual image was a jumbled mixture of typefaces, design and looks (above), which varied greatly around the world. The new design system (page 21) presents a unified look, incorporating "the frame."

We've been framed

Imagine this: A customer flips through a magazine and notices an HP ad. She goes to a computer store and sees an HP counter display that has no visual similarity to the magazine ad. She then looks for one of HP's products only to find that its package has yet another look.

While this is a fabricated scenario, for many customers it's been a real problem. Until last year, HP's advertising, sales literature, packaging, stationery, business cards and many other

printed materials had conflicting identities.

It was often difficult for HP customers to tell that the varied communication pieces came from one company. Their appearances not only differed from one business sector to another, or one country to another, but even within a single product line.

Past communication materials were produced with great innovation, but had little visual unity. However, all of this is changing due to the emergence of a new companywide design system.

Simply put, HP's design system is the combination of elements—such as the familiar HP logo, specific color



choices and a selection of typefaces—which together project a unified look to all of HP's written materials.

Perhaps the most memorable element of the design system is the "HP frame." Used on three adjacent sides of a piece, the frame gives a bold, distinctive look to all company communications. Sometimes the frame is merely implied through the use of lines, such as on the new HP stationery and business cards.

Dick Alberding, executive vice president, formed the Communications Design Center (CDC) in 1986 to tackle

the problem of inconsistent visual identities and to centrally manage HP's graphic design. It has the charter of implementing a single visual company identity.

To meet this challenge, the CDC chose the design firm of Anspach Grossman Portugal (AGP) to help develop the new design system. In addition, advisory teams from HP's marketing-communications community were formed to help refine the system for their specific communication requirements. Together, AGP, the CDC and the advisory teams developed HP's communication design system.

While the complete implementation

of HP's design system will occur during the next two years, customers and employees can already see evidence of the new system.

Corporate design benefits

The benefits of HP's new design system are strategic as well as cosmetic.

This one identity:

- emphasizes to HP customers and employees that HP is one company;
- supports HP's integrated product offerings by having integrated communications;

- saves hours of design time since basic guidelines are already formed; and

- saves money because HP can purchase items such as binders and folders in bulk due to the standardization of materials.

With a single look and a unified approach, HP's design system will help prepare the company for its role in the global marketplace of the '90s.

"In a world of abundant communications, the ability for a single company to be heard is a challenge," says Maxine Schur, CDC communications consultant. "With a well-managed design system, a company is able to overcome the onslaught of visual messages in the marketplace and leave a lasting impression."

—Donna Jones

Legacy of a logo

The history of HP's logo is as old as the company itself.

With the flip of a coin the company's name was born and within a couple of years Hewlett-Packard introduced its first logo.

An integral part of HP's design system, the logo is the company's legal trademark.



The first visual image, developed in 1941, encased the lower-case italic "hp" within a circle. By this time, with growing sales and work force, the

young company had moved from "the garage" to a small building nearby.

In 1946, the company simplified the logo for legibility and ease of engraving on products. Those basic elements remained for the next 21 years. During this period, HP saw broadened product lines and sub-



stantial growth in new markets, such as the medical electronics and analytical chemistry fields.

HP's physical expansion paralleled the company's product diversification, and by 1966, the company introduced its first computer. A year

later the company logo was redesigned to look more contemporary and to reflect the new direction of



the company. However, HP retained the lower-case italic "hp" in a circle.

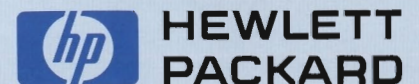
Since the logo did not visually complement the linear design of many HP products, HP modified the logo for products in 1968. This



period witnessed a boom in the development of calculators. HP built new facilities all over

the world and introduced leading electronic, medical and analytical instrumentation products.

That redesign endured more than 10 years. In 1979, HP reworked the design to fit the logo to new product design. The stacked names on the right use a unique typeface known as HP Gothic, while the lower-case italic "hp" in an open circle preserves the original design spirit.



YOUR TURN

Measure readers share their views on matters of importance with employees

Innovation, not positioning

John Young's comments on the future of HP with the emphasis on positioning rather than innovation reminds me of the old farmer who followed his horse around with a wheelbarrow in hopes that the horse would poop in the wheelbarrow so the farmer would not have to use his shovel.

Mr. Hewlett's oscillator and the HP-35 calculator created new markets through innovation and excellence. If we wait for others to lead the way, we are doomed to finish third or fourth, not first.

CHARLEY BITTMANN
HP Labs (retired)
Los Altos Hills, California

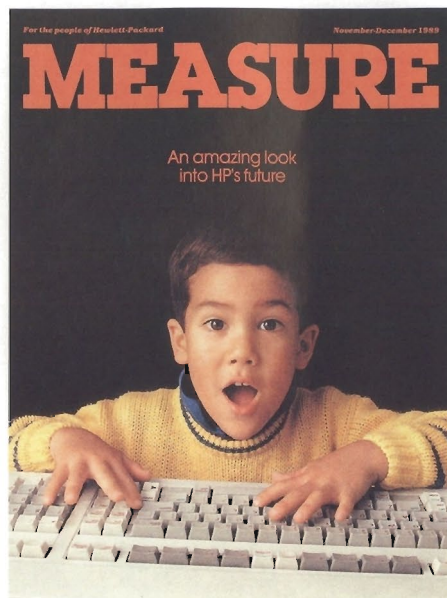
A religious difference

I am offended by a letter on page 19 of the November-December edition. I am speaking in reference to the words of Edith Young of Loveland, Colorado.

I respect her right to believe as she sees fit, but I object to including such a one-sided view of religious philosophy in a magazine intended for HP employees. I feel that such inclusion, disregarding other beliefs, exceeds the purpose of *Measure*.

DAVE ARNOLD
Fort Collins, Colorado

In the July-August Measure, all HP employees were invited to share their "Vision of the future" for the special November-December issue. We didn't share the opinions of all "visions" submitted, but we didn't discard any because they conflicted with personal views. Like HP's worldwide employee audience, Measure tries to reflect different people, cultures and thoughts.
—Editor



Outstanding issue

The (November-December 1989) issue was outstanding! Could you please send me additional copies for friends? By the way, what does "For the people of Hewlett-Packard" mean?

MICHAEL RAYNHAM
Sunnyvale, California

Measure's primary audience is Hewlett-Packard employees. However, we hope that the information in Measure is of interest to employees' families, friends, customers and others, and you can share the magazine with them. We print a limited number of extra copies and will provide them as long as supplies last.—Editor

And the winner is. . .

If you were to choose a winner among the "HP in the year 2039" forecasts, my vote would be for Franco Mariotti.

Super humor!

ANN MITCHELL
Mountain View, California

Here's another vision of the future from a special contributor who says that HP "continues to be one of America's most exemplary companies."

—Editor

Fifty years from now, the world will be much different. Globally, business and service markets will integrate and become more unified. Trade barriers will be lowered and countries will exert a balance of trades by focusing on producing products with sustained comparative advantage. In America, we will experience the greatest benefit of today's programs in 50 years:

- The new foundation being established by leaders in business, academia and government for improving education will provide the economy with a knowledgeable, skilled, mobile and flexible work force.
- Our social and physical environments will dramatically improve. Successes will be achieved in turning the tide against drug usage. The environment will become cleaner and safer for us and our future generations.
- The process with R&D to bring science and technology to the marketplace will become more effective and efficient as universities and businesses

strengthen consortia for product development.

■ Free enterprise will receive support from a government that maintains a climate that encourages innovation in all sectors of the economy and provides general incentives to stimulate investments.

Overall, Americans will have adopted new standards of excellence and expectations that, with the significant involvement of companies such as Hewlett-Packard, the year 2039 will be an exciting and significant point in our future history.

DAN QUAYLE
Vice President of the United States

How about Ms. CEO?

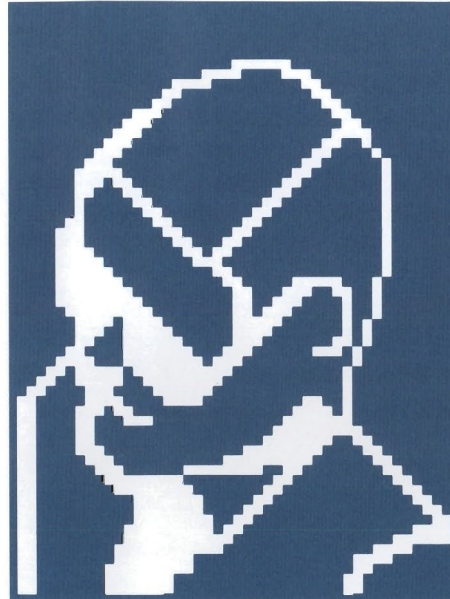
I enjoyed the article in which employees shared their visions. However, I was very surprised that no one mentioned our culture and cultural diversity in the future. For example, "HP's president and CEO announced during the 100th anniversary that she found the HP way to be well and alive after 100 years."

MYRON HUNT
Bristol, England

Shocked at the lack of curren(t)-cy

The Spokane Division team carried their signal generator all the way up Mt. Rainier (November-December) and no one brought an extension cord to plug it in?

LELAND WONG
Roseville, California



Trapezoids-over-bent-banana-with-legs

Your picture showing the "agent" in the November-December issue illustrates some of the pitfalls of labeling anything "easy to use." The designers are too close to the product to know, and only true, objective user-testing can prove whether a design is easy to use or not.

While the caption for the "agent" gave me a hint, it was not until my wife held the picture across the kitchen that I could see that the "trapezoids-over-bent-banana-with-legs" had any resemblance to a human.

Please emphasize that users can be very different from designers, and that we *must* test! (In the Batman logo I *always* see "teeth" before I see the "caped crusader.")

RON MILLER
Fort Collins, Colorado

What are your qualifications?

It would be nice if Barney Oliver would state for us his qualifications to participate in the future breeding stock (November-December).

WILLIAM E. FEELEY
Santa Clara, California

Check that bed for steroids

I was amused to read (November-December) that the HP Canada entry in the Great Muscular Dystrophy Association Bed Race was coached by "Canadian track star Ben Johnson."

I can't help but wonder: after HP took third place, did (race officials) check the bed for steroids?

CRAIG CALLAWAY
Santa Clara, California

Please send mail

Do you have comments about something you've read in *Measure*? Send us your thoughts. We want to share them with 95,000 other employees.

If your letter is selected for publication, you'll receive a *Measure* T-shirt. Be sure to send a return mailing address, and indicate your T-shirt size—medium, large or X-large.

Address letters by HP Desk to Jay Coleman; by company mail to *Measure* editor, Public Relations Department, Building 20BR, Palo Alto. Via regular postal service, the address is *Measure*, P.O. Box 10301, Palo Alto, CA 94303-0890 USA. Try to limit your letter to 150 words. We reserve the right to edit letters. Please sign your name and give your location. Names will be withheld on request.



ORDINARY PEOPLE

MANCHESTER, New Hampshire—It's a crisp October morning as World War II pilots and crew members gather at a local airfield with their "war birds"—the aircraft that took many of them to the brink of death and back.

These are salty veterans who are alive today because of a combination of skill, reliable airplanes and a smidgen of seat-of-the-pants luck.

Most of the war birds and the men who flew them are beyond retirement age. Does that mean their memories are retired, too? Hell, no. Other than a little rust on the airplanes and perhaps a few extra pounds on the pilots, you'd think it's 1945.

Darting among these grizzled fly boys in this winged time warp is a diminutive young woman who wasn't even born when these birds were in

"You end up contorting your body into strange positions to get the shot."

their glory. She hugs a 19-pound video camera, recording the sights and sounds from a bygone era—both the men and their machines. She'll take those swatches of history and weave them into a rich visual tapestry.

This 5-foot, 2-inch dynamo is Nancy Zawistowski—Nancy Z for short.

And while she earns her living sitting behind a computer assisting graphics hardware design for HP's Apollo Systems Division in Chelmsford, Massachusetts, she spends much of her free time videotaping "war bird"

DICK PENTHNEY

When she's not working on graphics hardware design for the Apollo Systems Division, Nancy Z spends most fall weekends videotaping vintage World War II air shows.

Extra ORDINARY PEOPLE

air shows and creating videotape highlights for air-show fans.

Recording air shows for posterity began about four years ago. Nancy and her husband, Pete, both have a great love of the outdoors. And Pete had about 20 years' experience in videotape-recorder operation and repair. So, naturally, their weekend video project took off.

Nancy and Pete videotape several private and military-sponsored air shows each year. They're most involved with the New England Escadrille, a non-profit organization dedicated to the preservation, restoration and enjoyment of World War II and classic aircraft.

The shows usually include U.S. World War II bombers, jets and training planes—such as the B-17 “Flying

“It’s mentally and physically demanding, but we haven’t killed each other yet, and I think that’s a good sign.”

Fortress,” F9F Panther and T-6 Texan, respectively—performing various aerial routines.

“Only the pilot and his crew can be in the airplanes during the show, so almost all of our work is on the ground,” Nancy explains. “The only time we can shoot air-to-air footage is before a show.”

Most of the routines are choreographed, but that doesn't mean they're always predictable.

“We know who's flying, but not necessarily exactly what they're going to do,” Nancy says. “You end up contorting your body into strange positions to get the shot.



Nancy operates the video camera while husband Pete (left) checks audio levels and partner Dick Pentheny (in sunglasses) interviews two China/Burma/India “hump” pilots.

“Videotaping a moving object, especially an airplane, isn't easy. You have to keep it in focus and follow it smoothly. You don't always use a tripod and you don't have those whiz-bang Hollywood things like cranes that always make the movements look fluid, no matter what direction the object turns.”

Nancy has videotaped aerobatic flying routines from aircraft such as the Pitts S2 Special—an aerobatic biplane—and a Korean War-vintage T-33 jet.

“That's pretty demanding because I'm carrying 18 ½-pounds of camera on my shoulder and the plane is pulling

3½ G's,” Nancy says. “I really have to brace myself.”

After a two-day air show—and there's one nearly every weekend during the New England fall—Nancy, Pete and a partner begin the arduous task of editing 16 to 20 hours of footage into one-hour tapes which they sell commercially.

“One time a (wrestler) eight times my size almost fell on top of me. It was all pretty strange.”

Editing is an art form; group editing can be nerve-wracking. Eventually, the trio decides which footage, music, public-address descriptions and pilot



Pete helps strap Nancy into a Pitts S2 Special airplane for some aerobatic photography. It's pretty demanding work, Nancy says, because the camera equipment weighs about 19 pounds and the plane pulls 3½ Gs.

interviews will appear in the tape.

"It's mentally and physically demanding, but we haven't killed each other yet, and I think that's a good sign," Nancy says with a laugh.

They've sold about 200 copies each of the six videotapes they've produced. The buyers usually are air-show attendees and other World War II aviation buffs.

It's not a way to make much money. Nancy and Pete devote their time and energies to the tapings because they've come to know the pilots and aircraft.

In addition to the war-bird shows, Nancy and Pete have donated their services to the local North Reading, Massachusetts, cable-TV-company telethon to raise money for a high-school-scholarship fund.

A few years ago, the couple worked

part-time taping professional wrestling matches in Worcester and Waltham.

"The matches were choreographed like air shows," Nancy notes. "Good

"When the flying bug bites you, it becomes a passion."

guys became bad guys after a while and bad guys became good guys. One time a guy eight times my size almost fell on top of me. It was pretty strange."

Who were Nancy's favorite wrestlers?

"None, whatsoever," she exclaims.

No, Nancy much prefers the wild blue yonder over the wild men of the ring. In fact, she recently earned her private-pilot's license.

Nancy chuckles at the memory of her first flight. When they were air-

borne, the instructor asked her to line up the blue stripe on the engine cover with the horizon. But at 5 feet, 2 inches, she couldn't even see over the front of the plane. Now she sits on two cushions and loves every moment in the air.

"When the flying bug bites you, it becomes a passion," Nancy says. "Explaining why I like flying is like trying to explain why I like the color blue. It just gives me a real joy when I'm up in the clouds. It's a whole new perspective on the Earth."

— Jay Coleman

LETTER FROM JOHN YOUNG

President John Young discusses challenges facing HP in the 1990s

The start of a new decade provides a good impetus to think about the future. To help HP do that, a group of managers from around the world received in-depth briefings on likely changes in the business, political and economic environment. The group then spent four days in December considering what lies ahead and the implications for HP. Their findings were part of our 1990 General Managers Meeting in January, but I'm writing this message before that event. So instead of describing the outcome of the meeting, I'd like to preview some of the challenges your colleagues identified. You'll hear more about these subjects during the year.

Global growth

During the next 10 years, the markets, technologies and skilled people HP needs will be increasingly located outside the United States. The European Community and the Pacific Rim nations will represent trading centers that rival the U.S. in size and attractiveness.

These global markets represent a real opportunity to HP, but they also present challenges. We'll need to expand our international presence, finding the right balance between consolidating our activities and, on the other hand, distributing our efforts around the world. Our products, too, have to be world-class and cost-competitive, yet easy to localize. And the complexity and geographic dispersion of our organization will present a real management challenge. We need to be big enough to compete globally but flexible enough to win against niche and regional competitors.



Carla McCarter of the Signal Analysis Division in Rohnert Park, California, discusses the capability of a competitor's spectrum analyzer with John Young.

The value chain

The many steps required to satisfy customer needs are often called the value chain. For the electronics industry, the chain starts with basics like IC technology, moves up to building blocks such as central-processing units, operating systems, disk drives or instrument modules, then on to systems that combine these building blocks, then to application software and activities such as distribution, training, systems integration and support. Value can be added at any point in the chain.

Our industry is seeing two basic changes. First, the value chain is getting longer as customers demand ever more complete solutions to their problems. The length of the chain provides us with a multitude of choices about where we want to add value. We'll need to make those choices with a view to the distinct needs and profit potential of each business. And we'll need to evolve measurement systems that reflect both the uniqueness and the interdependence of HP entities with different roles in the chain.

The growth of standards represents a second significant change. Standards provide consistent interfaces between the various technical parts of the chain so customers can choose pieces of

their total solution from different vendors. This freedom of choice provides HP with the opportunity to compete in areas that were previously closed to us because of proprietary architectures. Standards present similar opportunities to our competitors. So we need a clear focus on where we can make a contribution in a marketplace that is more and more open.

Demographics

Declining birth rates mean there will be fewer people entering the work force, and not enough of them with training in technical areas. There will be fierce competition for those who do have the requisite skills. To attract those skilled people, HP will have to be viewed as a very desirable place to work. We'll also have to increase our ability to attract and motivate people from a diversity of backgrounds.

The work force of the 1990s will also be older. We'll face the challenge of constantly renewing the skill set of the people we already have. A corollary challenge will be motivating and retaining key people during a time of slower employment growth. We need to tap the full productive potential of each and every employee, with more

self-directed teams and fewer layers of management.

Our customers will also face the challenges of fewer entrants into the work force and shortages of key skills. This will give us a growth opportunity if we can develop products and services that increase our customers' productivity.

Changing markets

We're seeing many changes within our current markets. Our customers want modular systems based on standards. They want very complete solutions to their diverse and complex problems. Besides buying directly from HP, customers are increasingly turning to alternate channels of distribution, such as dealers and value-added resellers. They want quality that goes far beyond product reliability. And so our challenge is to broaden our definition of quality to encompass all our business activities...and to find ways of forging enduring relationships with customers who didn't buy their HP equipment directly from HP.

There are also forces at work shaping demand for our products... the thawing of the "cold war," growing concerns about the environment, the demand for better yet lower-cost health care, changes in telecommunications and datacom technologies, the growth of "knowledge worker" employment, and the expected shortage of skilled labor. We need to understand and use these changes to our advantage.

We can't assume that growth will come automatically to HP. While there will be abundant areas of opportunity, the average market growth rates are likely to be lower than in the preceding

years. Finding the right, profitable growth opportunities will be one of our biggest challenges.

Technology

Technology will continue to drive HP's growth, and the pace of change will accelerate. We will continue to invest heavily in research and development, but I think our past approach to R&D will be challenged in three ways.

First, we'll need to expand our ability to tap the growing number of scientific advances that will originate

HP must remain a responsive and flexible company... one that can create opportunities and make them successful.

outside the U.S. For example, many leading-edge technologies are now emerging in Japanese consumer electronics, such as digital-audio tape.

Second, we'll increasingly need to work with other companies and organizations to provide the total solution customers require.

Third and finally, we can't just innovate; we must also reap the financial rewards of our innovations. To fund future product cycles, we must capture the sales volume that allows us to make a profit from our innovations.

Constancy amid change

The managers who surveyed the future concluded that it's very hard to predict what will happen in the decade ahead. A look at the unanticipated changes of the 1980s makes the point, and the 1990s promise similar surprises. The group emphasized that HP must

remain a responsive and flexible company...one that can create opportunities and make them successful.

I recognize that HP's continual adaptation to change can be troublesome to some. It alters careers and requires new skills. But at its heart, this change is where the opportunities for the future will be found.

We are a company with a broad expertise in electronics technology, whose contributions enable customers to acquire, display, analyze, manage and communicate information. We share the same set of timeless values and objectives that emphasize respect for people and integrity in all our business dealings.

We all know that change is the future's only certainty and that we must continually improve our ability to compete. That includes improving the way we execute business fundamentals, achieving profitable growth and creating real value for our customers...thereby gaining and keeping their loyalty, without which we cannot prosper.

Despite the continuing flux foreseen by our study group, the values and objectives that have been so central to our past success will continue to guide us in the future. They are our compass as we navigate a sea of change.



EXTRA MEASURE



Some 4,000 international customers are flocking to HP's demobus.

Driving home HP products

HP's Test and Measurement group in Geneva believes in keeping its products rolling.

An HP team is in the midst of a five-month demobus tour that will bring more than 20 products to some 4,000 people in Greece, Turkey and the Middle East.

In its quest to demonstrate the latest scopes, logic analyzers, spectrum analyzers and computer systems, the 15-ton bus will visit more than 80 customer sites.

The bus rolled out of Geneva last September and is currently heading for Greece, the last stop on its eight-country tour.

The bus' 50-foot trailer is built specifically for demonstrations. Its maintenance, insurance, security and drivers are part of a package for which HP contracted. By leaving the driving to others, the HP team

can concentrate on demonstrating its products.

Individual distributors represent HP throughout the Middle East. Because of the wide range of products and markets, it's becoming increasingly difficult for them to keep up with new HP products.

"Since many engineers in these countries don't have the luxury of attending seminars, the demobus provides HP the most cost-effective way to get our measurement solutions to these customers," says Bill Hulme, Middle East and Africa T&M sales and marketing manager.

"However, this project required a multitude of planning," says Bill. "Getting a 15-ton bus full of high-technology instruments through customs at 20 borders and across 18,000 kilometers is no easy task."

BOTTOM LINE

For the fourth quarter of fiscal year 1989, ended October 21, Hewlett-Packard reported a 25 percent increase in net revenue and a 23 percent increase in earnings from operations. Net earnings grew 1 percent (due to effects of the acquisition of Apollo Computer Inc. in May—including a special contribution of six million to the profit-sharing fund—and money set aside to cover earthquake damage).

Net revenue for the fourth quarter was \$3.377 billion (up from \$2.709 billion in the year-ago quarter). Earnings from operations for the fourth quarter totaled \$386 million, up from \$315 million.

Fourth quarter net earnings totaled \$246 million or \$1.04 per share on approximately 238 million shares of common stock outstanding (compared with \$243 million or \$1.03 per share in the year-ago quarter).

Orders for the quarter totaled \$3.149 billion, up 20 percent from \$2.616 billion in the year-ago period.

For FY89, net revenue was \$11.899 billion (up 21 percent from \$9.831 billion in FY88); net earnings were \$829 million (up 2

percent from \$816 million); and net earnings per share were \$3.36.

NSS GROUP CHANGES

Within the Networked Systems Sector:

■ In the Computer Systems Group (CSG), the Data and Languages Division (DLD) no longer exists as an entity and its activities have been reassigned. DLD's former Data Products Management Operation has been combined with the former Roseville Information Systems Division into a new Data Management Systems Division under **Dave Sanders** as GM. It is HP's first division to focus on client/server computing.

■ A new Information Networks Group (ING) has been formed under **Bob Frankenberg** as GM. It combines the former group by that name and the former Information Systems Group. The new group comprises seven divisions and two operations, including the Australian Software Operation that was formerly part of DLD.

Alain Couder has joined ING in the new role of CCE System general manager.





Maxi Bourse, France's 1988 "Game of the Year," features HP.

Move over, Boardwalk

If you can imagine an international version of the game Monopoly, you have a fair idea of how to play Maxi Bourse—a new game which features 40 of the world's largest and most prestigious corporations, including Hewlett-Packard. The game tests players' skills at buying, selling and negotiating, and the art of deal-making. In the game, stock prices plunge, plateau or skyrocket in direct response to players' bids,

world events and rumors, just as they do on the world's stock boards. Players compete against each other for financial control of the 40 corporations on the board. The first player to control majority interest in companies within an industry—or several industries—wins. Maxi Bourse was named "Game of the Year" in France in 1988, and was second in sales only to Trivial Pursuit.



Did I feel what earthquake?

CHART CHANGES

New sales entities in the Far East Region: HP and Blue Star Ltd. have formed a joint venture, Hewlett-Packard India Pvt. Ltd., under GM **Suresh Rajpal** to sell and service most HP products in the country. It is known informally as HP India... HP Thailand Ltd. under GM **Larry Amsden** is a new, wholly owned subsidiary for computer sales and service. A new Exeter Computer Manufacturing Operation has been formed as part of the Computer Manufacturing Division (CMD). It comprises manufacturing sites in Exeter, New Hampshire, and Livingston, Scotland, that were formerly part of the Apollo Systems Division.

NEW HATS

Steve Markman to GM, Business Networks Division... **Jim Olson** to GM, Colorado Telecom Division... **George Koliris** to GM, HP Hellas in Greece... **Ho-Ming Huang** to GM, HP Taiwan... **Peter Gladkin** to GM, World-wide Health Care Information Systems. **Neil Johnston** to director of Corporate Education, a new post in Business Development.

Bob Olson to operations manager, Personal Computer Distribution Operation... **Tom Viola** to operations manager, Colorado Computer Manufacturing Operation.

Len Cutler to Distinguished Contributor, Technical Staff of HP Labs.

GETTING TOGETHER

HP Belgium has taken a 26 percent minority position in the Belgian software company Denkart N.V. In Colorado, HP has purchased a limited equity stake in Spatial Technology Inc., which develops CAD/CAM software. HP also bought certain assets of Optotech Inc., which designs and develops optical-disk drives. HP and Philips Components of the Netherlands have agreed to jointly develop and manufacture high-voltage optocouplers.

WORTH NOTING

HP Labs has established a second science center, located at the University of Pisa in Italy... The Circuit Technology Group announced a major advance in chip technology based on submicron CMOS (complementary metal-oxide semiconductor) technology.

Just call him Doctor Bill

Bill Hewlett reaped one of his highest lifetime honors in October 1989 when the University of Bologna in Italy, the world's oldest university, presented him a Laurea ad Honorem (honorary doctorate) in electronic science.

The university, which celebrated its 900th anniversary in 1989, lauded Bill for his contributions to developing electronics and computer industries.

"Without his fine and original thinking, which has resulted in basic innovations, and without his constant effort to press ahead... it could clearly not have been possible to bring such prestige to an industry... which operates in a field of major importance where new ground is constantly being broken," the university said.

Bill, who has received honorary doctorates from several universities, was honored as a "great



Professor Fabio Roversi-Monaco (left), rector of the University of Bologna, congratulates Bill Hewlett in October when the university presented Bill with an honorary doctorate.

engineer" and a "gifted businessman."

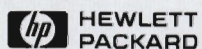
He joins an enviable circle of laureates, including King Juan Carlos of Spain, Prince Charles of England,

Italy's President Francesco Cossiga and Czechoslovakian reformer Alexander Dubcek.

The University of

Bologna initiated the Magna Carta of Universities defining fundamental rules of scientific freedom.

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