

MANUFACTURE





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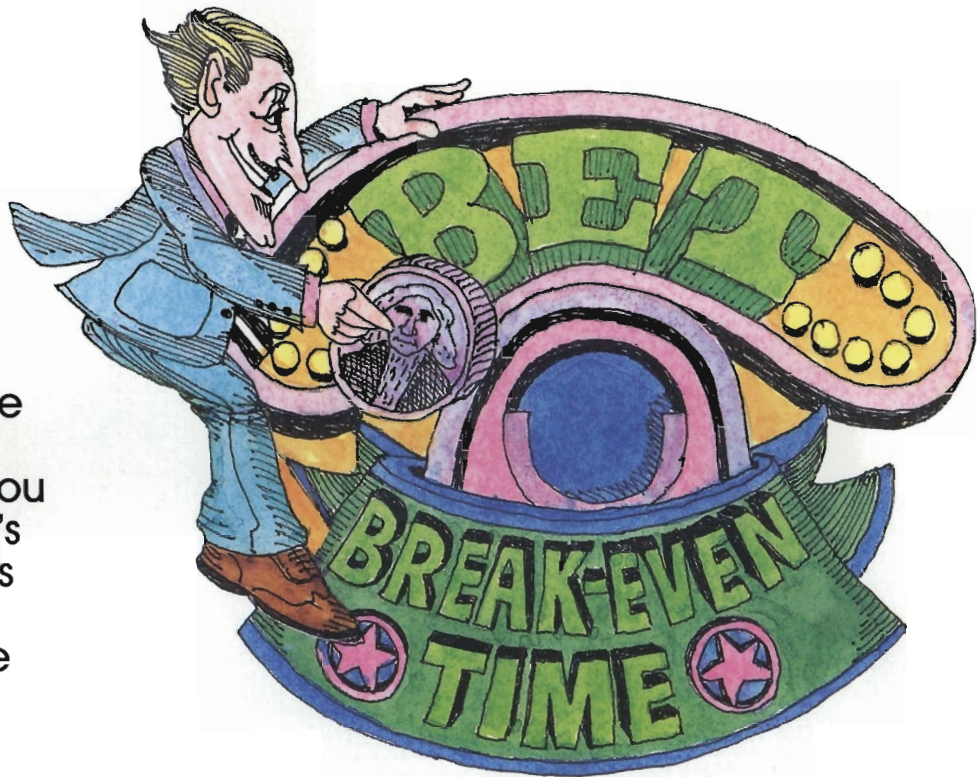
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Hewlett-Packard Company is an international manufacturer of measurement and computation products and systems recognized for excellence in quality and support. The company's products and services are used in industry, business, engineering, science, medicine and education in more than 93 countries. Founded in 1939, HP celebrates its 50th anniversary this year. HP employs more than 87000 people worldwide.

Step right up, ladies and gentlemen. Place your BETs. To win the game, see how low you can make them. That's the mission for the '90s as HP President John Young challenges the company to

Cut your BET by 50 percent



What's BET? It's break-even time—the time it takes HP to recover the money the company spends to develop your group's product and bring it to market. It's part of a larger concept called the return picture.

Trying to reduce break-even time is affected by a whole raft of influences: the cost of developing the product, the time it takes to get the product to market, how profitable it is and how well it sells.

Put another way, the faster you start making a profit on a product, the more your profits increase. That increases shareholder value, customer respect, your ability to spend more on innovation, heightened sales and higher employee profit-sharing.

Reduce BET and everybody wins.

The basic idea is that the clock starts when an investigation team is formed. That's when you begin tracking the investment you're making. Then it moves into the product-investigation and product-development stages.

Eventually, the product is released to manufacturing. At that point, investment levels off and, if all goes to plan, the product begins to make a profit. The time it takes for the revenue coming in to equal the investment laid out is the break-even time.

With BET as the measure of success, it's no longer enough for R&D to come up with the world's greatest gizmo. If manufacturing can't build the gizmo economically, or marketing can't sell it profitably, the product is a failure despite its technical merits.

And therein lies BET's appeal.

Chuck House, general manager of the Software Engineering Systems Division, who co-authored a paper on the return-picture concept, says, "One reason for the effectiveness of the BET measure is that it involves all three major functional areas in the development and introduction of new products. It provides indicators of the effectiveness of R&D via investment

BET implies that you have to watch development costs and make the right set of tradeoffs.

data, marketing performance via orders, and manufacturing efficiency via shipments... The sense of urgency is captured in the objective of keeping break-even time as low as possible."

"Commonly, people talk about time-to-market," says Marv Patterson, director of Corporate Engineering. "If you push time-to-market as the single metric to look at, and make it the only visible and important thing, you foster all kinds of bad behavior.

"Managers under severe time pressure may decide to forsake product quality or features or customer solutions to get the product out. Or they'll sacrifice their engineering work force, work those people all day Saturday and Sunday for two years—whatever it takes to get the product out.

"On the other hand," Marv continues, "if you track break-even time, that means the product not only has to get



Designers Charlie Elman and Bill Carmichael (from left) have worked with Marv Patterson, director of Corporate Engineering, for the past year to develop a BET metric.

out on time, it has to make a profit when it does. BET also implies that you have to watch development costs. And you have to make the right set of tradeoffs between time-to-market, profitability and investment. So if you focus on BET, it pushes you toward the right behavior in all three areas."

Lew Platt, executive vice president of the Computer Products Sector, agrees. "Time-to-market (by itself) is no good," he says. "It measures only the amount of time it took you to get the product out. It could also be a terrible product, poorly documented or costly, among other things. But to minimize the

break-even time and generate a good profit, the product has to have good manufacturing costs and good marketing costs. And it can be optimized only when everybody pulls together."

In other words, with BET as the arbiter of performance, the "bunker" mentality no longer is appropriate. Time was when R&D could invent a product, throw it "over the wall" to manufacturing, which would produce it and then throw it over the wall to marketing. Those days are fading rapidly. Attention to BET breaks down the walls.

"One of the most powerful things



The dramatic success of the HP DeskJet printer illustrates the benefits of using development teams to help reduce break-even time. The Vancouver (Washington) Division team developed HP DeskJet in 22 months—less than half of the usual four-year development cycle.

we can do to improve break-even time aggressively," says Marv. "is to encourage a very intense early-on effort to define the right product. This takes not only the R&D folks and marketing folks working as a team, but also the manufacturing folks on that team."

Product-development managers say that the main reason products don't come out on time is because the product definition keeps changing during the development stage.

"On the other hand," Marv adds, "I've seen products that came out on time, under budget and with more features than anyone expected, but the products failed in the marketplace because no one in the field knew how to sell or support the products. That's why it's vital to define the right product before you start."

Ideally, the product triad—R&D, manufacturing and marketing—works as a team from the time the product

comes out of the investigation stage to the day it's released to the market, and even for some time beyond that.

The HP DeskJet printer development at the Vancouver (Washington) Division is a perfect example of the kind of activity HP hopes to "aBET."

- Marketing identified a brief window of opportunity for a printer with high print quality, ease of use, dependability and low cost.

- R&D went to work to apply HP's thermal ink-jet technology to the new product. They created a clean, customer-installable, snap-in pen (which makes 54 electrical connections upon insertion); an automated "service station"

that wipes, caps and primes the pen; and an output paper-handling tray that prevents ink from smearing between pages.

- To aid communications, manufacturing dedicated a team of engineers to the product team early in the development stage. Manufacturing also published design-for-manufacturability guidelines and held regular reviews to make sure the guidelines were followed.

Marketing took a breadboard unit to focus groups and followed that with repeated customer testing of subsequent product versions. Working within its overall schedule and cost objectives, R&D responded to marketing's feedback.

The team tested manufacturing and supplier processes at the same time it conducted product testing. Prototype

production revealed the payoff of manufacturing's early involvement in the product's development.

In parallel with the prototype build-test-fix cycle, marketing finalized its strategy. Based on what it learned from focus groups and market surveys, the new product was positioned as providing "laser-quality output for under \$1,000."

Thus did HP DeskJet burst upon the scene—in 22 months instead of the usual four years for a new printer product. It is now, of course, selling like hotcakes.

Although no one was tracking BET at the time of the DeskJet development, that style of product development is what BET encourages.

The first BET packages, consisting of a Lotus-type spreadsheet on a floppy

"BET coaxes you to make the right decisions."

disk and an instruction manual (see story on page 7), will be available soon from Corporate Engineering. Once users get comfortable with it, BET will be applied in a variety of ways.

For example, project managers working on a new development might want to put some ideas together with their marketing counterparts to determine the product's viability. If the managers devote these resources and include these kinds of features, what might the BET look like? The team doesn't want to spend a lot of time on this, it just wants to get a sense of where this project might fall in relation to two or three others the team is thinking about.

So right at the start of the project, the R&D, manufacturing and marketing managers will get together and determine their best estimates of investment, time-to-market, sales volume and manufacturing costs, which will



Using the BET metric will help improve business decisions throughout the product-development process, say Norm Johnson, manager of engineering metrics (left), and John Fenoglio, manager of productivity management.

produce the break-even time. As the project goes ahead, actual performance then will be plotted on the same picture as the project progresses, and the accuracy of the forecasts then will be visible for all to see.

Teams can play "what-if" games. For example, what if the forecasts varied by 20 percent—over or under? What are the implications of reaching mature sales six months earlier (or later)?

During development, project managers will track investment cost and product schedule versus the estimates. Then, as managers make decisions through the project, they will assess the impact on the financial profile. They will be concerned, not just about time-to-market, but also about the impact on investment and profit.

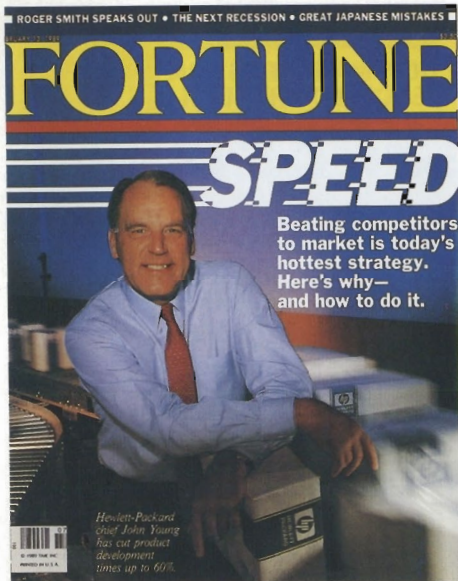
The selection of a different compo-

nent or subassembly might have a sizable impact on profit. So might a change in the features of the product. And if they're willing to wait for that new manufacturing process to come on-stream, the loss in time-to-market might be more than made up in profitability and, consequently, better BET.

"BET coaxes you to make the right decisions," says Marv.

Throughout the process—at key life-cycle check points—the financial-support person for the lab makes detailed calculations of what BET will be.

And, of course, the most obvious function of the BET measure is to indicate success or failure when the break-



Fortune magazine featured HP President John Young in its February 13, 1989, cover story on speed, one factor in BET.

even point is achieved. How did we do? Did we meet or exceed our forecasts? Did we fall behind? By how much? Where was the slippage? How can we improve?

How can we improve?

There's the most important question. As the BET data becomes available and compiled, a baseline will begin to form against which to compare the next project's performance.

And if John Young has his way, the next project will move in the direction of half the previous BET.

So step right up, ladies and gentlemen. Place your BETs.

Let the game begin.—Sam Lightman

(Free-lancer Sam Lightman makes frequent contributions to HP publications from his aerie on Saltspring Island, British Columbia. He last wrote for Measure in November-December 1985 on what's in the cards for personal computers. He says his BETs are a source of continuing amusement.)

Project break-even time

(Discount rate = 15%, tax rate = 34%, R&D tax rate = 34%)



The making of a metric

"My department has been working hard for the last year to nail down the definitions, identify the appropriate approximations and establish the tracking systems needed to pull together all the numbers," says Marv Patterson, director of Corporate Engineering.

It isn't easy, developing a new metric to look at something as comprehensive as break-even time (BET). For example, at the moment there is no direct way to track marketing costs. Estimates or ratios of typical marketing costs will have to suffice.

"BET is a metric that has to do with investment and profit, but that's only a small part of it," says Norm Johnson, manager of the engineering metrics department in Corporate Engineering. Norm and John Fenoglio, manager of the productivity management section of the customer engineering organization, have been working with Marv for a year to convert the concept of a BET metric to a usable reality.

"The difficult part is getting a tool for the project-management community to use," Norm explains. "We've tried to work with Corporate Finance to come up with the proper way to define and account for all the expense categories. In other words, how do you collect the cost of marketing, manufacturing, engineering support, tooling, capital and so on? And then on the profit side, what do

you do with all the discounts, product costs and those kinds of things? So it's really a job of taking a simple concept and fitting it into HP's incredibly diverse business."

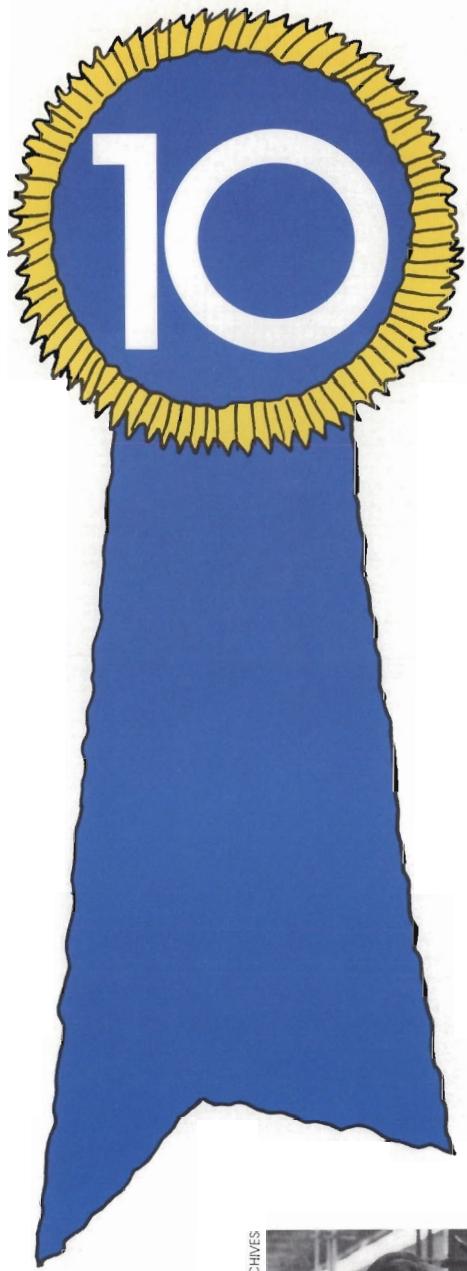
Norm sees two customers for the product—a disk-based spreadsheet application accompanied by an instruction manual: There's the project manager who just wants an engineering estimate of his or her latest inspiration. And the support person who might want to do a detailed calculation of what BET really is going to be.

So part of the package includes the ability to perform simulations and sensitivity analyses, risk simulation and other sophisticated operations which have been included by designers Charlie Elman and Bill Carmichael. The new BET package will, in other words, satisfy both customers.

"The manual, too, has to support both cases," says Norm. "And now, having produced the tool, how do you get it into the hands of the target customers and get them to use it so that, in fact, their business decisions are better?"

Dean Morton may have removed any question of BET's importance by making it one of his primary objectives for FY89.

Developing a break-even time metric is a challenge Marv and his organization have vowed to accomplish. It's an extremely difficult goal, but the smart money says don't BET against them. —Sam Lightman

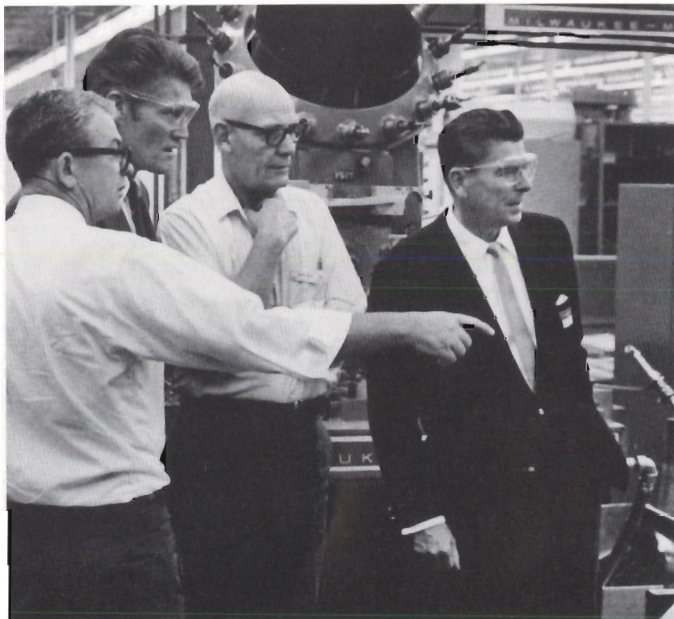


HP's 50th anniversary book of lists

10 famous people who visited HP

1. **Ronald Reagan** (The former U.S. President visited HP in 1966 while governor of California; actor **Chuck Connors** of "Rifleman" TV fame came with Reagan.)
2. **Prince Philippe** of Belgium (1985)
3. **Queen Elizabeth** and **Prince Philip** of England (1983)
4. **Charles De Gaulle** (former French president; 1960)
5. **Grand Duke** and **Grand Duchess of Luxembourg** (1984)
6. **King Carl VI Gustaf** of Sweden (1984)
7. **Herbert Hoover** (former U.S. President; 1959)
8. **Lee de Forest** (inventor of vacuum tube; 1956)
9. **Sri N.T. Rama Rao** of India (chief minister of the state of Andhra Pradesh, India, and former movie star; 1984)
10. **John McEnroe** (... almost. He was a little too tired the morning he was to show at HP for a tennis promotion. But, HP President John Young finally met him later that evening at San Francisco's Transamerica Tennis Tournament in 1984).

HP ARCHIVES



Chuck Connors (second from left) with Governor Reagan.

DAVID POWERS



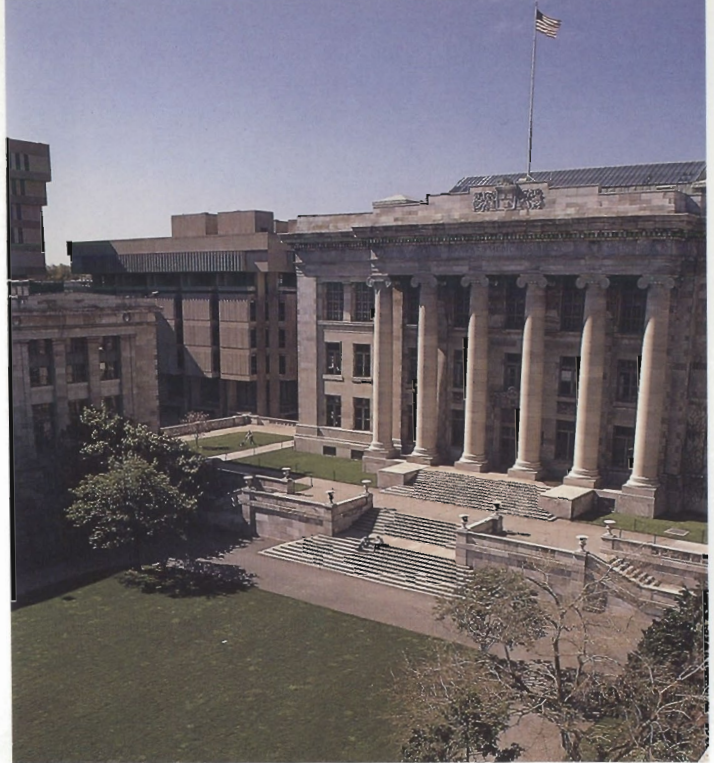
Dave gives Queen Elizabeth the grand tour.

10 noteworthy HP grants

1. **San Francisco** (California) **Opera**—Computers for staging and rehearsals
2. **Cornell** (New York) **University**—Workstations for the application of computer graphics to architecture
3. **Soviet Armenia**—Medical equipment to diagnose and treat 1988 earthquake victims
4. **Argentina**—Medical equipment for ambulances for emergency services for the poor (ambulances donated by Northrop Corporation)
5. **Lawrence Hall of Science**, Berkeley, California—Personal computers for the Chemical Education for Public Understanding program
6. **Free University of Berlin**—Workstations for artificial intelligence geology work
7. **Harvard University Medical School**—Computers for major experiments with information technology for medical education
8. **Gallaudet University for the Deaf** (Washington, D.C.)—Computers for education
9. **California Museum of Science and Industry**, Los Angeles—Equipment and software for a hands-on graphics and design “Bicycle Factory” exhibit
10. **San Francisco State University**, the **University of Massachusetts** and the **University of Hawaii**—Workstations for experimental project to improve science education for high school students using computers



The calculator watch was a timely experiment that just didn't add up.



COURTESY OF HARVARD UNIVERSITY MEDICAL SCHOOL

HP earned an “A” for a grant to the Harvard Medical School.

10 experiments or products that never quite made it

1. **Bowling alley foul indicator** (don't step on the foul line!)
2. **Lettuce-crop thinner** (pruned rows of lettuce with an electric eye to improve production)
3. **Electro-shock weight-reduction machine** (enough said)
4. **Welding machine timer** (used in shipyards during World War II)
5. **Harmonica tuner** (A company wanted to make harmonicas and asked Bill Hewlett and Dave Packard to make a tuner. Their conclusion? They dropped the idea when Bill realized it would be tough to replicate the human ear. “The ear is pretty sensitive to tonal changes in music,” Bill said, “and we couldn't devise a system that would do it.”)
6. **Telescope clock drive** (for Lick Observatory on Mt. Hamilton, San Jose, California)
7. **Diathermy machine** (heated body with radio-frequency energy for medical treatments)
8. **Automatic flushing toilet** (for Stanford University)
9. **Anesthesia-inducing oscilloscope** (used as an anesthesia for animals by sending electric signals through needles)
10. **Calculator watch** (a calculated risk which may have been ahead of its time)

10 newspaper headlines the week of January 1, 1939 (when Bill and Dave became partners)

1. Government Deficit Less Than Forecast
(Federal expenditures exceeded income by \$2.1 billion.)

2. Rose Tourney Celebrates 50th Birthday
(More than a million people jammed the streets of Pasadena, California, for the 50th annual Tournament of Roses Parade. The grand marshal was “golden-haired screen starlet” Shirley Temple.)

3. Dictators Won In 1938; 1939 Is Another Year

4. Japanese Matmen To Face Spartans
(San Jose State University wrestlers prepare to face their first international competition—wrestlers from the universities of Waseda and Keio.)

5. French to Work Longer
(42-hour work week for shops, 48-hour week for pharmacies and 45- to 50-hour weeks for cafes, hotels and restaurants)

6. 1,828,103 British Jobless
(328,900 higher than a year earlier)

7. Palo Alto Points With Modest Pride at Building Record for Last Year
(The city issued 619 building permits in 1938 with a total outlay of \$1,377,225.)

8. Celebrate the New Year with a Complete Turkey Dinner—\$1.50
(advertisement for the Brass Rail restaurant)

9. 2-Way Radios Authorized For Police Cars
(Palo Alto receives permission to use five watts of power and “an ultra high frequency of 31,780 kilocycles.”)

10. Stamps Still 3 Cents



You can find HP worldwide, including Casablanca (above).

10 out-of-the-way HP locations

- 1. Reykjavik, Iceland**
- 2. Västra-Frölunda, Sweden**
- 3. Baghdad, Iraq**
- 4. West Berlin, Germany**
- 5. Moscow, Soviet Union**
- 6. St. Michael, Barbados** (an island in U.S. West Indies and former pirates' lair)
- 7. Al Manāmah, Bahrain** (a tiny Island in the Persian Gulf)
- 8. Negara Bruni, Darussalam** (on the Northwest coast of Malaysia where the proclaimed “richest man in the world” lives in a famous gold-plated castle)
- 9. Trivandrum, India** (the city on the southern coast where India has its space center)
- 10. Casablanca, Morocco** (actor Humphrey Bogart's old hangout in the movie *Casablanca*; “... play it again, Sam”)



Bill and Dave try out the HP 9100A scientific desktop calculator.

10 of the top HP technical contributions

- 1. HP interface bus** (1975) Industry adopted the HP-IB as an interface to connect instruments.
- 2. HP 524A electronic counter** (1951) It reduced the time needed to measure high frequencies from minutes to seconds.
- 3. HP 5060A flying clock** (1964) HP engineers flew the atomic clocks they developed to 18 countries to synchronize international time standards.
- 4. HP 9100A scientific desktop calculator** (1968) It was the world's first programmable scientific desktop calculator.
- 5. HP-35 scientific calculator** (1972) The world's first scientific handheld calculator—and Bill Hewlett's favorite HP product—made the engineer's slide rule obsolete.
- 6. HP 32-bit microprocessor** (1982) HP's NMOS-III technology produced a silicon chip with 600,000 transistors — more than any other on market for many years.
- 7. HP 3000 computer** (1972) The HP 3000 business computer was the industry's first commercial distributed data-processing system.
- 8. HP Precision Architecture computers** (1986) Hewlett-Packard was the first major computer maker to commit to a broad line of products based on reduced-instruction-set computing, or "RISC."
- 9. HP-28S calculator** (1988) It was the first calculator to perform symbolic algebra and calculus.
- 10. HP LaserJet printer** (1984) HP LaserJet is the world's most popular personal desktop laser printer.



The HP 524A electronic counter made news.

10 HP employees born nearest January 1, 1939

- 1. Yoshiaki Mikuni** (1/1/39) Yokogawa Hewlett-Packard sales (Yokohama, Japan)
- 2. Delores Arkowski** (1/2/39) Colorado Telecom Division (Colorado Springs, Colorado)
- 3. Marlene Disney** (1/2/39) Fort Collins Site (Fort Collins, Colorado)
- 4. Altheda Hagle** (1/3/39) Network Measurement Division (Santa Rosa, California)
- 5. Margaret Foltz** (1/3/39) Northwest Integrated Circuits Division (Corvallis, Oregon)
- 6. Helen Sanchez** (1/4/39) Colorado Computer Manufacturing Operation (Fort Collins, Colorado)
- 7. Robert Gomez** (1/4/39) HP Laboratories (Palo Alto, California)
- 8. Lucille Romero** (1/4/39) Neely Sales Region Headquarters (North Hollywood, California)
- 9. Joan Alley** (1/5/39) Direct Marketing Division (Sunnyvale, California)
- 10. Terry L. Smith** (1/5/39) Colorado Integrated Circuits Division (Fort Collins, Colorado)

—Lists compiled by Vernon Andrews

(Vernon Andrews, HP historian and visitor relations coordinator, is one of the top 10 experts when it comes to HP trivia. He last wrote for Measure about new members of the HP board of directors in the May-June 1987 issue.)



What really happened to Flight 412?

At 9:58 a.m. EDT, Flight 412 rolled back from the cargo terminal at Dorval International Airport near Montreal, Canada. The turbo prop taxied to the runup area, signaled the tower, raced down the runway and soared into a "clear-as-James-Bay" sky.

The aircraft, a British Aerospace Hawker Siddeley 748, climbed smoothly to a cruising altitude of 4,000 feet and headed west toward Ottawa. The cargo plane followed its prescribed half-hour flight plan, and within 16 minutes, transferred from Dorval to Ottawa air-traffic control. Inside the aircraft, captain Mike McClintock and co-pilot Sean O'Donoghue prepared for their final approach to Ottawa International Airport.

At 10:17 a.m. EDT, Flight 412 vanished from Ottawa's radar screens.

Moments later, a firestorm roared across the gravel pit near Cheney.

Investigators learned much about the September 15, 1988, crash walking the pit in the long hours that followed. Yet the fundamental question—how the accident happened, and why—remained a mystery for a team of computer scientists and engineers to solve.

Before the last piece of gravel at Cheney shed its unearthly glow, Mike Poole visited the failing aircraft from a computer laboratory at Ottawa International Airport. A Hewlett-Packard high-speed graphics workstation relived the sights and sounds of the accident on command.

Mike is the superintendent of computer systems engineering for the Canadian Aviation Safety Board (CASB). The CASB investigates incidents occurring in Canadian airspace and accidents over international waters when a majority of Canadian citizens are involved. Last year, the CASB reviewed more than 500 aviation mishaps, including the Air India crash off the coast of Ireland, the Arrow Air disaster at Gander, Newfoundland, and the Alitalia crash near Milan.

An engine fire on a 1984 flight leaving Calgary, Canada, sent flames and smoke in the air and the CASB to determine the cause.



The CASB investigates incidents occurring in Canadian air space, including the Air Canada DC-9 (above) which tumbled off the end of the Toronto, Canada, runway in 1978.

The CASB has gained a worldwide reputation for developing space-age tools to determine the causes of airline crashes. Most recently, the work of Mike Poole and his team of computer scientists, technologists and engineers answered questions that puzzled investigators of the crash. In a sense, their work provided the most detailed eyewitness account of the accident.

Three computers—an HP 1000 Series A900, an HP 9000 Model 236 and an HP 9000 Model 320 which runs a full-color, three-dimensional, computer-aided animation package—are the heart of CASB's newest investigative tools.

Mark Armitage, a customer engineer from the HP Ottawa sales office, installed the Model 320 in August 1988. Together, the computers and several Hewlett-Packard instruments received their flight test when the Hawker Siddeley 748 fell to earth last September. [Armitage replaced the Model 320 with a Series 835 Turbo-

SRX—HP's newest 3-D graphics workstation—this February.]

In the rubble at Cheney, investigators found the aircraft's two flight recorders—the cockpit voice recorder (CVR) and the flight data recorder (FDR). CVRs pick up exchanges between the ground and flight crews, and most sounds heard by the captain and co-pilot. FDRs, on the other hand, track the altitude, pitch, roll and engine performance of the aircraft. Both voice and flight data are recorded on quarter-inch magnetic tape.

For Mike Poole, the laboratory analysis of the Cheney crash began when investigators brought the Day-Glo orange flight recorders back to the computer-systems-engineering laboratory.

The flight data recorder takes periodic readings from flight and cockpit

What really happened?

instruments and records them on magnetic tape as a continuous stream of ones and zeros. "The HP 3968 instrument tape deck pulls those magnetic signals from the FDR and CVR for processing by the HP instruments and computers," Mike says.

While other aviation safety labs require separate playback hardware to decode various types of flight data recorders, the CASB uses only an HP 3852A data-acquisition box and some high-powered software to make the analog-to-digital conversion.

Software written by the CASB, HP and Prior Data Systems of Ottawa allows Mike's team of analysts to pull digital waveforms—expressed as ones and zeroes—directly into the HP 1000 Series A900 computer. By processing waveforms using software, the CASB can analyze data interactively from any HP terminal at up to 100,000 samples per second.

"Other safety boards analyze digital waveforms using an oscilloscope or a strip chart," Mike explains.

This means CASB computer scientists, engineers and technologists can edit data which comes from flight recorders on-line. "A sudden maneuver or hard landing can distort a signal," says Mike. "Typically, those few seconds of data can be crucial to the investigation."

Careful analysis allows the CASB to restore the integrity of damaged flight data accurately and quickly. The CASB can recover poor-quality data in software where other investigators are forced to painstakingly analyze the data on oscilloscopes and strip-chart recorders, Mike says.

"Getting data off the FDR is a data-processing problem," he says. "Interpreting it is an analysis problem."

Once engineers and technologists culled the information from the Hawker Siddley FDR, they stored it in the A900 until they needed to interpret the data.



Mike Poole (center), in charge of consumer systems engineering for the CASB, shows the infamous "black box" to HP Ottawa sales reps Mike Harvey (left) and John Mitchell.

Software, which runs statistical routines, also plots the altitude, pitch, roll, engine performance and airspeed, for example, over time.

The software hastens the process of analyzing data by replacing the calculators, drafting curves and graph paper traditionally found at other aviation safety labs with an HP 1000 A900 computer.

"At this point in the investigation," Mike says, "we transferred the data to the HP 9000. To get a first-hand look at the crash, we watched a computer simulation of the flight."

"Once we gathered and refined all the data," says Mike, "we flew the aircraft over a computer model of the terrain and synchronized the sounds from the voice recorder and matched the picture, frame for frame."

The HP 9000 Turbo SRX Model 835 and an HP 98748A high-resolution monitor displayed an instrument panel showing the altitude, heading, ailerons (hinged sections which control the rolling movements of the plane), engine RPMs, engine torque, trim, gyroscope and a view of the Canadian countryside.

Analysis from most other areas of the CASB's engineering branch have yet to show anything unusual for the crash. Component testing, metallurgy, microscopy, physical analysis and electrical-mechanical have already filed reports.

The outcome of the investigation now relies in large measure on the recovery of flight-data-recorder and cockpit-voice recorder data, and what the simulation of Flight 412 showed.

"You can sit in the cockpit or follow the aircraft in a chase plane," says Mike, explaining the simulation. "If you have witnesses who said they were standing on the ground at a specific location the moment the aircraft flew over, you could direct the Model 835 to put them at that exact location and have the flight pass overhead just as it did for the eyewitnesses."

Had captain McClintock lived to tell the story, he would have described the

scene that Mike and CASB investigators have seen over and over again: the Hawker Siddeley rolls slightly to the right, then rolls violently to the left 1½ times—hitting the ground 11 seconds later.

“The ailerons, which are on the trailing edge of the wings, are used to control the roll and attitude of the aircraft,” Mike explains. “At an airspeed of just over 200 knots, the ailerons went full travel, sending the plane out of control.”

The aircraft was nearly destroyed by the crash at Cheney. The flight data recorder and the cockpit voice recorder survived.

“It’s not often that a flight recorder measures the position of both right and left ailerons,” Mike says. “We were fortunate; not only did it report on the ailerons, but several other flight parameters as well.”

With the final report still pending, the Canadian Aviation Safety Board issued a warning for airlines around the world to check Hawker Siddeley 748s for improperly rigged ailerons. There are 30 Hawker Siddeley 748s registered in Canada and about 345 worldwide.

“The concern we have is that it is not a one-plane problem, but a many-plane problem,” says CASB investigator-in-charge David McNair.

“The aileron for Flight 412 had been removed for repainting and was reinstalled without taking it out for a flight test,” explains Bill Tucker, CASB director of safety programs. “They should do a flight test after that.”

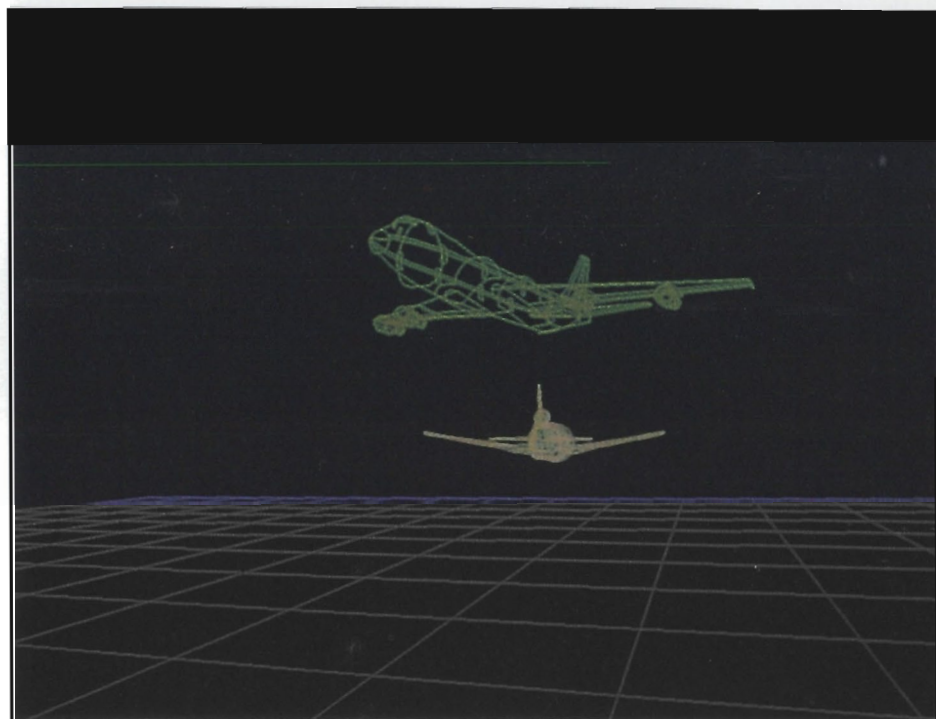
“You can spend hours analyzing graphs of the flight data and still lack an appreciation of what happened,” says Don Langdon, CASB chief systems engineer. “By modelling the aircraft and showing its gyrations on a computer screen, you get a clear and common understanding of the accident in minutes. Knowing and agreeing on what happened, the team then can work on finding out why it happened.”

—Tom Ulrich

(Tom Ulrich is a senior writer at the Advanced Manufacturing Systems Operation in Sunnyvale, California. He last wrote for Measure on HP’s role at General Motors in the July-August 1986 issue.)



Using an HP 9000 TurboSRX Series 835 computer and an HP 98748A high-resolution monitor, CASB scientists can simulate the September 1988 flight of the Hawker-Siddeley 748.



An HP computer simulation shows the near-miss of a Boeing 747 and a Lockheed L-1011 off the coast of the Canadian island Newfoundland over the Atlantic in June 1987.

Extra

ORDINARY PEOPLE



LOUIE LANGTON

"If HP makes it and I can use it, I've got it," says Harry W. "Sonny" Margolis, founder and chairman of the board of CompuTrac.

Welcome to Sonnyland

"It's more like a small amusement park than it is a large house," laughs Dana Margolis, Sonny's wife of 25 years.

"It's not a very serious house," adds Harry W. "Sonny" Margolis.

The house—all 25,000 square feet of it—sits on 5½ wooded acres just north of Dallas, Texas, in a community that sounds like the name of a TV private detective: Frisco Texas. Even in a state legendary for its love of size, Sonnyland—the name friends have given the house—is impressive. Among its features are:

- Five bedrooms;
- Eleven bathrooms ("I wish we had included a 12th so I'd have one closer to my hobby room," Dana says.);
- Forty telephones, complete with a paging system throughout the house and grounds;
- A six-car garage (although it was built large enough for nine cars so doors don't bump when opened);
- Outdoor barbecue large enough to smoke 50 briskets at a time;
- A 100-foot swimming pool with a separate slide pool (where you land after sliding down the 30-foot-high, 165-foot-long, custom-built slide);
- Separate indoor golf pavilion with driving range, putting green and sand trap, plus computerized golf swing analyzer and mini video studio;
- Two game rooms with pool and ping-pong tables, stand-up shuffleboard,

video arcade and six slot machines;

- Media center with eight plush chairs and ottomans; four video-cassette recorders; a laser videodisc and a 100-inch screen on which to project shows from the three satellite receivers; and a 10-speaker digital "surround-sound" system. An HP Vectra personal computer handles simultaneous taping and viewing in virtually any imaginable combination;

- A huge kitchen with twin double electric ovens, microwave ovens, electric range (for Dana) and gas range (for Sonny), plus three dishwashers;

- A 1,600-bottle wine cellar stocked with several bottles of rare Lafitte and Mouton Rothschild wines;

- And rooms for every purpose, including dining room, exercise room, cabana with complete kitchen appliances, Dana's office and the library where Sonny spends 10 to 12 hours daily working at a computer.

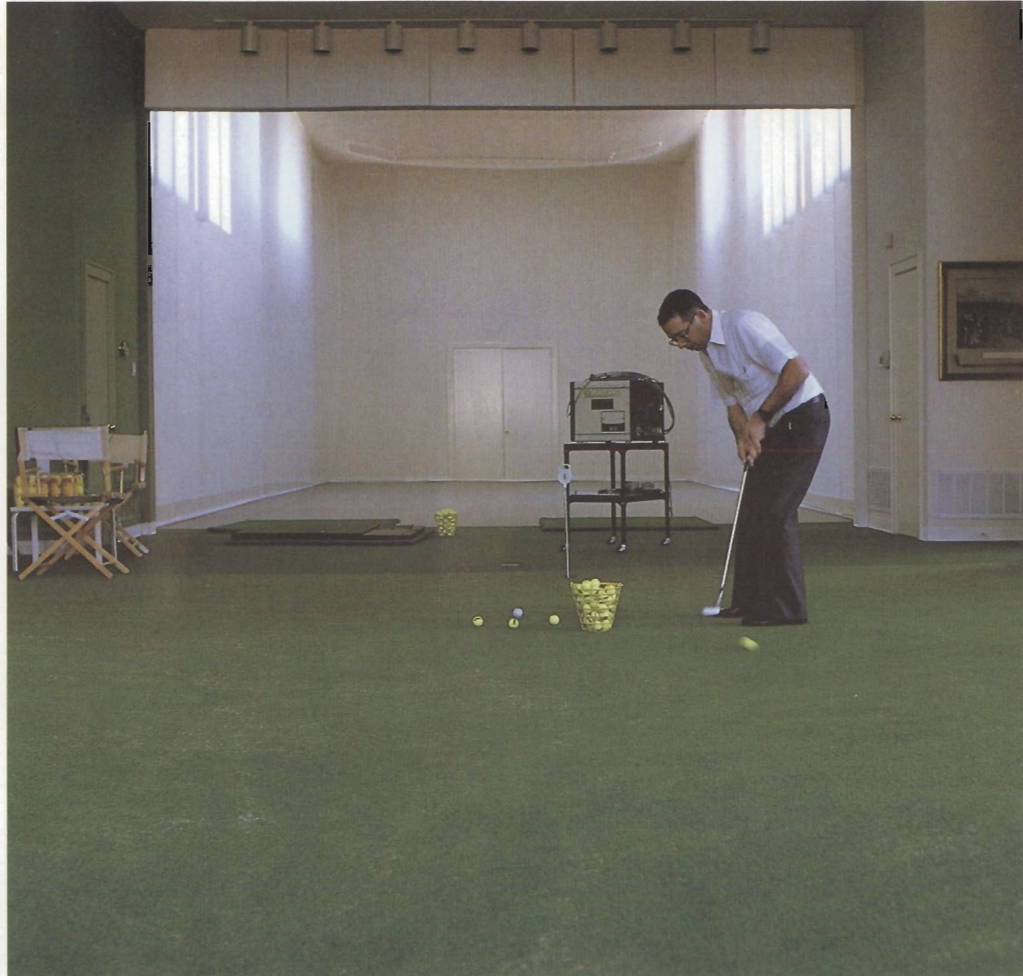
Those features alone make it an incredible house. But there's more. The house is controlled by sophisticated electronic systems and monitored by Hewlett-Packard equipment to make it as energy-efficient as possible.

What kind of person builds a 25,000-square-foot house? Sonny Margolis is everything you might imagine: unconventional; a self-described gadget nut; a night owl who usually works on the computer until 4 a.m. and rises promptly at noon the next day; and a visionary whose hobby of computer programming led to a \$12 million annual business.

Sonny Margolis is one-of-a-kind.

"There was a time years ago when Sonny would pay employees out of his pocket to make this business work," says Irwin Arnstein, technical standards manager for CompuTrac, Inc., the software company Sonny founded in 1977, and one of HP's top 10 national-account value-added resellers. "Sonny was not to be denied; he was committed to make CompuTrac successful."

Sonny's business instinct dates back to the early 1960s when he was a political-science student at UCLA. One time he won the bid to handle all laundry at the college dorms—even though he



The indoor golf pavilion features a driving range, putting green and sand trap, plus a computerized golf-swing analyzer and a mini video studio.

didn't own one washing machine. Instead, he subcontracted the job to the second-place bidder and pocketed the profit.

With college degree in hand, Sonny entered law school at Southern Methodist University in Dallas in 1964. Sonny wasn't a very serious student, so it was quite a shock to many Texans in 1967 when he placed first among the hundreds of people who took the Texas bar exam.

He set up a law firm and practiced law for 10 years in Dallas—occasionally representing members of the Dallas Cowboys professional football team—while constantly dabbling in computers to develop effective software systems for law offices.

When his software-programming activities took more time than his law practice, his partners suggested he leave the firm.

That's when CompuTrac was born in 1977. Today, according to *Business Week* magazine, it's one of the top 100 small businesses in the United States.

CompuTrac's DARWIN (data retrieval with intelligence) software, packaged with HP 3000 business computers, has

made the company a leader in providing computer systems for law offices of 50 or more people.

"We've grown a lot bigger and faster than my goals," says Sonny. "At this rate, we could be a \$50 million company in the next six or seven years."

Working at CompuTrac is a special experience, employees say. Computer programmers get the best offices and often are hired because of their musical ability, a trait Sonny believes signals a good programmer.

CompuTrac also is known for its perks. There's the 10-cent Coke machine in the lunch room, the VCRs which all 80 employees can use at home for as long as they work for CompuTrac and the infamous "Let's Make A Deal" Christmas party last December.

"The party was at an exclusive country club near Sonny's home," says HP sales rep Linda Reymond, "and people were dressed in tuxedos, cocktail dresses and tennis shoes. And they all carried large garbage bags filled with every imaginable item into the dinner.

"After dinner, Sonny started giving away money. He'd say, 'I've got \$500 for the first person to bring me a golf tee,'

Extra ORDINARY PEOPLE

and people would start running to the stage. This went on until 2:30 a.m. when the money Sonny brought was all given out."

But if anything measures up to Sonny's bigger-than-life persona, it's Sonnyland—the just-for-fun house with the futuristic energy-management system.

"Dana and I had been living in the same 4,000-square-foot house for 20 years," Sonny says, "and we always wanted to build our dream house. We thought we could build it on 2½ acres, but by the time we included everything we wanted, it took 5½ acres."

Those acres, Sonny says, cost about \$5,000 each 15 years ago when it was developed. Today, it's about \$70,000 per acre.

Construction on the home began in November 1986 and ended two years later. Sonny and Dana celebrated by throwing a party for 550 friends. While the marble entryway, elevator and theater-sized media room drew rave reviews, Sonny is most proud of Sonnyland's efficiency.

When the house was designed, the local utility company estimated that Sonnyland's yearly power bills would be about \$30,000. Based on the first six months' bills, Sonny figures the yearly tab closer to \$12,000.

"It's almost a game to see how low I can get the power bill," Sonny says. "I want to see how wrong I can prove the power company."

The secret to the low energy use is a combination of a computer system which controls all utilities and an HP 3852 data acquisition and control system, which monitors the systems and lets Sonny know when to make adjustments.

For example, the Margolises can program the HomeTronics computer system room by room and hour by hour throughout the house. The temperature in the master bedroom, for instance, can be set to 62 degrees when they're asleep and changed automatically to 70 degrees when they wake up. Adjoining rooms can be on completely different schedules.

A corner of Sonny's library looks like a mini HP showroom. The display includes the HP 3852 to monitor the



Sonny spends 10 to 12 hours a day his office-library, surrounded by HP equipment, including an HP 3852 data-acquisition and control system and two HP Vectra personal computers.

HomeTronics system, an HP 9142 tape subsystem, an HP 6622 system power supply, an HP 2934 business printer, an HP 7550 graphics plotter and two HP Vectra personal computers.

"If HP makes it and I can use it, I've got it," Sonny says.

Together, the system in Sonny's library stores and updates energy-use data every three seconds. Every 15 minutes the system calculates energy use during the past 48 hours.

"One of the first things I found out is that various items weren't using the energy I thought they would," Sonny explains. "The electric dryer, for example, was using about twice the energy I thought it would, so I replaced it with a gas dryer.

"I also programmed the system so that all the lights in the house are shut off twice a day. Too many lights were being turned on when nobody really needed them. If you need the light, you just flip the switch back on. It's no big deal to have a computer turn lights off, except that it saves about 3,000 watts a day."

The system also monitors water use

provided by the Margolis' private well. In January, the system showed that a large amount of water was being used for no apparent reason. Sonny and Dana combed the house looking for leaky faucets, running toilets or other explanations. Using the monitoring system, Sonny isolated the leak in the golf pavilion. A water pipe had frozen and burst; as temperatures warmed, the pipe thawed and water flowed.

"Without the computer system, I wouldn't have known about the leak or where it occurred," Sonny says.

Sonny realized just how efficient the system was when he recently compared utility bills with neighbors who live in "smaller" 10,000 to 15,000-square-foot homes. Although Sonnyland is twice as large as most homes in the affluent Frisco area, his bill was the smallest. In fact, Sonny notes, utility costs are running less than those from his prior 4,000-square-foot house.

"My February bill was 80 percent higher than the March bill because we had a cold spell and I hadn't learned as much about the system," Sonny says.

Sonny's latest investment is a



"Sonnyland" is more like a small amusement park than a large house, Dana says.



An aerial view is the best way to see the enormity of the Margolis' just-for-fun house on 5½ acres in Frisco, Texas, just outside Dallas. Features include a golf pavilion and water slide.

weather station. He figures he can correlate the temperature and humidity with energy consumption to determine how much energy the house should use.

He'll also have the computer check how much rainfall the area has had, then feed that data into the system which controls the sprinklers.

About the only things Sonny ruled out when he designed the house were a bowling alley and a flight simulator. They waste too much energy, he says.

Just when does wise energy management become more of an obsession than a challenge?

"The day that Sonny tells me I was in the shower for 15 minutes instead of the usual 12, that's when I put my foot down," Dana laughs.

—Jay Coleman

Flights of fancy

Then there was the time Sonny started his own airline.

When Texas International went on strike in the early 1970s, Sonny and former Dallas Cowboys wide receiver Bob Hayes established Apollo Airlines—a three-plane fleet serving small Texas towns, including Abilene and San Angelo.

To say it was a shoestring operation is to defame shoestrings:

- Apollo's "offices" were three pay telephones in the Dallas-Fort Worth airport terminal.
- To maintain proper balance on the cramped, 10-passenger planes, Dana Margolis loaned her bathroom scales. Baggage and passengers were weighed separately.

The fly-by-night (and day) operation was in business for four months. But it almost didn't get off the ground.

The planes, Sonny admits, were notorious for leaking oil. After a few

weeks in operation, airport officials complained to Sonny about the oil the planes dripped on the runways and at gate areas.

Just when the airport threatened to shut down the fledgling airline, Sonny came up with an idea.

"I've got the problem solved," he told airport officials. "We've ordered two million oil-eating red ants from California. They'll take care of the oil in a matter of hours."

"What happens to the ants then?" an airport official asked.

"Oh, they'll just disperse all over the city," Sonny replied.

"Do they sting?" the official asked. "Yes," Sonny said, "that's the down side. "They sting like crazy."

The stunned official was speechless. "I'll get back to you, Sonny." Three hours later the official called. "Cancel the damn ants; we can live with the oil."



CHARLES FOX

Employees can help protect HP trade secrets by being careful not to inadvertently share sensitive company information.

Can you keep a secret?

A shadow crosses Humphrey Bogart's face as he pauses outside the door of a sleazy office. Suddenly he bursts in on devilish Sydney Greenstreet. The villain's desk is littered with R&D and marketing plans from local companies. In his fleshy hands he holds the in-house phone directory of a nearby firm.

"Looks like you got a nice little operation stealing companies' trade secrets," says Bogart. "But I'm afraid your days of information crime are over."

Information crime may sound like something out of an old detective movie, but it's a real issue for companies today. The problem: companies' confidential information winding up the wrong hands.

Experts say incidents are on the rise, resulting in losses as dramatic as a Bogart film. *Business Week* magazine estimates that leaks of confidential information from U.S. companies cost firms billions of dollars annually in missed sales and wasted R&D efforts. That's why many companies, including HP, are paying more attention to protecting their competitive information—their trade secrets.

Many consider information to be HP's most valuable asset. Ideas for new products, marketing plans, customer lists, manufacturing processes, our pay system: these are just some examples of trade secrets—information HP considers confidential. Why the need for

Telephone Tips

If you receive a request on the phone for trade-secret information or names of employees below functional-manager level:

- Confirm the caller is an HP person before you give out the information. (A good way is to ask for a Telnet number and call the person back.)
- If the caller is not from HP, ask him or her to make the request in writing. If you have any question about how to respond, politely offer to call back so you can discuss the request with your manager.
- If the request seems unusual or out of line, report it to your manager, personnel department or entity information specialist.

secrecy? HP has spent considerable time and money developing this information. If competitors had access to it, they could benefit from HP's investment.

Virtually everyone who works for HP comes in contact with sensitive information. If you're wondering what trade secrets you work with, just ask yourself what information you use on the job that you wouldn't want to share with HP's competition. Some trade secrets may be known widely in your department but still should be kept secret outside the company, according to HP confidentiality experts.

"Employees have a critical role to play in protecting HP confidential information," says Charlie Marshall, one of the coordinators of HP's trade-secrets protection program. "The key is simply to treat this information with care.

"One of the the most frequent ways we lose our trade secrets is through employees who inadvertently share information with someone they shouldn't," continues Charlie. He adds that this can happen in a casual conversation outside HP or, as it often does, on the phone.

"I've received a number of suspicious

calls from people trying to get information" says Laurie Jedynek, a secretary from HP's Cupertino, California, site. "One person said she represented a local university; another claimed to be an old friend of my boss. I've even had a few people who said they were HP employees and turned out not to be. When I asked all these people a few polite questions about what they were looking for, their answers made it clear they weren't who they said they were. So of course I told them I was sorry, but I couldn't give them the information they wanted."

Corporate Security estimates it receives reports of such calls on an average of one a day. By tracking these incidents, the company is able to alert HP entities about persistent callers.

The information these callers usually request is names and titles of employees. Why? According to HP Security, often these people are headhunters looking for employees to recruit away from HP. But, trade-secret experts say, there's another reason. Employees are the gateway to more information. With more names of employees to contact, callers have a better chance of finding someone who unwittingly will share the information they want.

"That's why," says Charlie, "it's important to treat the names of employees below functional-manager level as sensitive information."

The United States courts will help HP protect its trade secrets only if the company makes an effort to protect them, too. So later in 1989, as part of HP's continuing protective efforts, the company will provide more information about trade secrets to U.S. employees as a follow-on to the company's 1987 U.S. program, "Be Aware Before You Share HP Information." To confirm employee awareness of this issue, U.S. employees may be asked to sign a form reaffirming they understand their responsibility to protect HP trade secrets.

So what can you do to help? Here's what HP's trade-secret protection program recommends: Be sure you know what information you work with could be considered a trade secret. If you're not sure, talk to your boss about it. Trade secrets should not be given out or

Dealing with Documents

If you work with sensitive documents, make sure you label and handle them appropriately.

These are the two HP classifications most commonly used:

□ **For Internal Use Only**

Documents that have broad distribution within the company but should not be shared outside HP. For example, HP telephone directories and department organization charts. Dispose of these by recycling them or putting them in a shredder or shredder bin.

□ **Company Confidential**

Documents that if disclosed would significantly damage HP's interests. For example, customer lists, lab notebooks, proposals and bids. These shouldn't be left out in your work area when you're away from your desk, or copied indiscriminately. Dispose of them in a shredder or shredder bin.

These two classifications are used by specialized groups in HP:

□ **HP Proprietary**

Usually for documents that are transferred to outside suppliers via purchase orders. The order should state that the document is not to be duplicated or disclosed except as authorized by HP.

□ **Company Private**

The most sensitive documents, solely for the use of senior management. Examples include non-public consolidated financial information and R&D proposals.

freely discussed outside of HP or with non-HP employees on the phone. Also, if you work with sensitive documents, make sure you handle and label them correctly.

You don't have to have Humphrey Bogart's nerve to protect HP's trade secrets — just a little awareness.

—Rhea Feldman



More than 2½ million pieces moved through the Personal Computer Distribution Operation in San Jose, California, last year.

CHARLES FOX

The best little warehouse in HP

To fill up to 1,500 orders daily for some of HP's hottest products, you really must have your act together.

At the Personal Computer Distribution Operation (PCDO), this means working with HP's manufacturing divisions to have the right amount of inventory on hand to ship personal computers, PC peripherals and related software to U.S. and Intercontinental customers when they want it.

That's a noble goal, and one that PCDO frequently meets these days.

Actual shipment may be from PCDO's automated main facility in San Jose, California; a second facility three miles away which stores large blocks of products for extra-quick turn-around; or PCDO's East Coast depot in Rockaway, New Jersey.

Having the right items on hand at the right time is no easy matter. This particular piece of HP's business has been a box-office hit the past five years. In 1988, one-fourth of all the company's U.S. shipments went through PCDO—involving 32 HP suppliers, 1,700 active products and more than 35,000 customer orders per month.

A whopping 2,500,000 pieces moved through PCDO last year with an industry-leading customer-service "order fill rate"—the percentage of orders that fill from stock right away.

Today's much-applauded operation is a long way from the early days in 1983 when HP first began selling HP 150s through dealer channels. HP soon found these retail outlets wanted urgent delivery of orders.

Pat Guerra, PCDO operations manager, remembers the early efforts to bend the company's classic order-taking and physical-distribution methods to suit these impatient new customers.

"Our production-planning systems back then were geared to building to customer order, rather than to stock," Pat says. "We had some unhappy customers before we got up to speed."

PCDO spent a good deal of time listening to the HP sales force and to customers to learn their expectations. PCDO representatives also visited other companies noted for world-class customer service, distribution excellence and techniques, and gathered

KURT FOSS



Singapore's rapidly growing Far East Distribution Center is expected to double in employees and orders in 1989.

CHARLES FOX



Jaime Lopez drives a forklift full of HP hardware into PCDO's receiving area. One-fourth of all HP shipments went through PCDO in 1988, involving 32 suppliers, 1,700 active products and more than 35,000 customer orders per month.

market research. PCDO modernized its processes and formed an in-house marketing-administration team to take orders directly from dealers, and to process field-entered orders from the Corporate order-processing system.

"Our people ARE Hewlett-Packard to the customers who call them," Pat says. "They're the ones on stage and the rest of us—accounting, information systems, warehouse and others—are the supporting cast."

That same spirit is evident at HP distribution centers around the world.

To get started in a hurry last year, the Far East Distribution Center (FEDC) in Singapore modeled its 45,000-square-foot facility on PCDO, adopting the California operation's information systems and processes.

"We wanted to use the most efficient and high-quality ways of distribution that have stood the test of time," explains Bruce Greenan, FEDC operations manager.

"We have a close relationship with PCDO," he adds. "Our people go over there and their people come here to see our operation and work on process

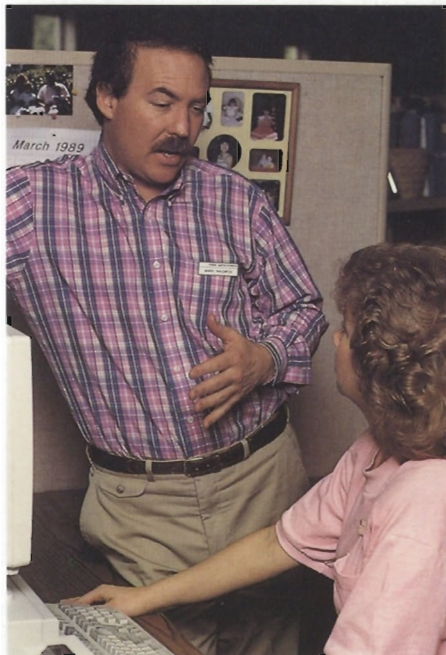
CHARLES FOX



Jim Correa, a material handler in bulk shipping, discusses a potential problem with a bar-code reader with Lisa Bowen, PCDO process engineer at the distribution center.

The best...

PHOTOS BY CHARLES FOX



Marketing manager Mark Naismith and associate Donna Beckman are part of the PCDO marketing administration team.

improvements.”

FEDC is expected to double during 1989 in employees and volume of orders. Currently, half of the shipments go to Australia, the other half to Far East countries.

Nudging FEDC out of contention as the company's newest distribution center, however, is European Distribution Center—Amsterdam, which opened in The Netherlands this February as a remote arm of the European Distribution Center's peripherals activity. For now, it's concentrating on shipping HP LaserJets into the U.K. market.

Whether moving products, parts or consumables, HP's distribution centers are all stars these days.

—Betty Gerard



Forklift driver Curtis Kirby can motor up and down the narrow warehouse aisles with ease as he helps fill the day's orders. PCDO reps have revamped their systems to speed deliveries.



Ken Dillard, a distribution specialist at PCDO's second facility, uses a laser bar-code reader to verify an order.

YOUR TURN

Measure readers share their views on matters of importance to employees.

Hooray for "ONE DAY..."

Congratulations to you and your staff on a TERRIFIC publication. *Measure* gets better and better every issue. "ONE DAY" was a super idea and was executed beautifully. Bouquets to all of you.

RUTH GILOMBARDO
Palo Alto, California

I just received the latest *Measure*... and I'd like to make a big compliment for an outstanding job to you and the whole team involved in producing this issue.

This issue probably will have collecting value. Thanks very much for a great job.

HARTMUT SIEVERT
Böblingen, West Germany

Congratulations on your fantastic January-February '89 issue. The "ONE DAY..." theme and *National Geographic*-quality photography made it the best issue you've ever done.

DAN BRAUN
Loveland, Colorado

"ONE DAY..." was a celebration of life! Thanks for the great issue.

MARTI CURRAN
(an employee's wife)
Sacramento, California

Thank you for the 50th anniversary issue (January-February). It was well worth the effort of making it as explained at the end.

Would it not be appropriate, however, for the staff... to acquire a somewhat better geographical knowledge... and not mention Scotland and Great Britain as two countries?

JAAP VEGTER
The Netherlands

Jaap, of course, is right. We mistakenly said Great Britain when we should have said England. Sorry for the error, ol' chap.—Ed

The January-February issue was great!!! Too bad you overlooked Canada.

MARK GLAZER
Mississauga, Ontario



Our son, Todd Anderson, took the photographs in Italy for your (January-February) magazine issue. We were so happy that he was able to have this once-in-a-lifetime opportunity, and wish to thank Hewlett-Packard for him.

MR. & MRS. NEIL ANDERSON
Ft. Wayne, Indiana

I especially enjoyed "ONE DAY..." However, I was extremely disappointed by the lack of representation of the McMinnville facility.

PATRICIA SNOW
McMinnville, Oregon

With 87,000 employees and products in more than 90 countries, it's impossible to capture the expanse of HP in a 52-page magazine. The Measure staff hopes "ONE DAY..." symbolically represents all of HP.—Ed

"Test of time" draws praise, criticism

I just wanted to express my thanks and appreciation for the March-April issue. The HP history lesson was a welcome change from the usual technically oriented articles. I enjoyed the historical facts and knowing that this company

was founded by everyday people like my co-workers and me.

KATHY REILLY
Valley Forge, Pennsylvania

In your article "The test of time,"... an insensitive and frivolous, at best, remark was made about (the) Ukraine...

The other matter I would like to bring to your attention is the usage of THE in front of Ukraine. Ukraine is a country, not a region, and "the" Ukraine is as wrong as "the" France or "the" Lithuania.

I hope you will see merit in my comments and will publish an apology to HP employees of Ukrainian descent who may have interpreted your introduction as an ethnic slur.

JERRY MERKELO
Palo Alto, California

Measure meant no disrespect in its reference to the Ukraine. Writer Gordon Brown merely hoped to show HP's growth to locations never before imaginable. Webster's New World Dictionary, the World Almanac and the Associated Press Stylebook all refer to "the Ukraine," a republic of the U.S.S.R.—Ed

Please send mail

Do you have comments about something you've read in *Measure*? Send us your thoughts. We want to share them with more than 87,000 other employees.

If your letter is selected for publication, you'll receive a special *Measure* T-shirt with the 50th-anniversary symbol. Be sure to send us a return mailing address, and indicate your T-shirt size—unisex medium, large or X-large.

Address letters via company mail or HP Desk to Editor, *Measure*, Public Relations Department, Building 20BR, Palo Alto. Via regular postal service, the address is *Measure*, Hewlett-Packard Company 20BR, 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.

LETTER FROM JOHN YOUNG

President John Young discusses HP's profitability

STEVE CASTILLO



HP Chairman of the board and co-founder Dave Packard chats with President and CEO John Young after the recent shareholders meeting at the Cupertino, California, site.

We've recently announced our profit-sharing percentage for the first half of FY89. This announcement always prompts plenty of discussion about HP's profitability, and so it should. One of the positive aspects of profit-sharing is that it reminds all of us that we have a real day-to-day stake in the profitability of the company. So that's what I'd like to address in this letter, first with some background and then the actions we're taking.

One of the key challenges HP faces in FY89 is to achieve balanced, profitable growth. This was an important subject

at our January General Managers' meeting. By "balanced" I mean all parts of the company showing both a healthy growth rate and good profitability.

This balance exists in some cases but not all. There are parts of HP that, while satisfactorily profitable, are growing slowly or not at all. Others are growing by leaps and bounds but aren't as profitable as we'd like. These groups need to strike a better balance between profits and growth. We can't reach the full potential of our company without every part contributing.

The best way to understand HP's profitability is to look at our operating-profit margin. Expressed as a percentage of sales, this figure shows earnings

Improving our operating-profit margin is the top priority for HP.

generated by the products and services we sell—that is, our profits before we add or subtract financial items such as interest income and expense, and before we set money aside for our taxes. Operating-profit margin is a figure that senior management and the financial community watch very closely. It's also the primary base for profit-sharing.

The two pie charts here tell an interesting story. HP's revenue growth has been healthy; our 1988 revenue, represented by the larger pie, is more than three times greater than it was in 1980. But if you look at the yellow segment of the pies, you'll see our operating-profit margin has eroded. That, in a nutshell, is the problem.

What's driving this trend? You can understand by looking at the blue and red portions of the charts.

The blue piece represents cost of sales—that is, the cost of the materials, labor and overhead directly involved in manufacturing products. As a percent of revenue, cost of sales has increased. There are two principal reasons this happens.

First, our customers may not perceive the value we add to be much greater than our costs. This can happen when a product is hard to produce or is missing distinctive features. The result is that we may not be able to price a product appropriately to generate strong operating profit.

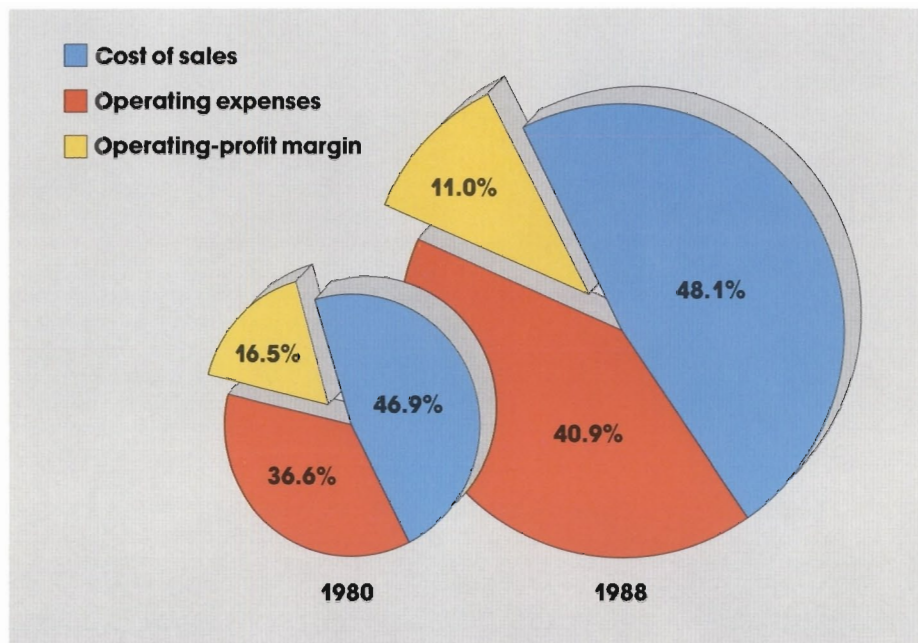
A second and quite different reason is that we are increasing our use of indirect sales channels, such as dealers. Products sold through dealers are discounted from list price, since we are, in effect, transferring the sales function to them. That makes HP's revenues decrease, which causes cost of sales expressed as a percent of revenue to increase. Note that in this case, a rising cost of sales doesn't necessarily mean the products aren't competitive.

We must continue to work hard to keep our cost of sales in check by applying all we've learned about designing for manufacturability as well as better procurement and manufacturing effectiveness. But we still expect this slice will be an increasing portion of our pie, since the proportion of sales through indirect channels is on the rise.

Increasing cost of sales will cause our operating-profit margin to suffer unless we offset the growth by reducing our operating-expense percentage, represented in red on the chart. Included

Growth is important, but growth without profits has no value to our company and simply consumes resources that should be put to better use.

here is spending for R&D, marketing and selling, and administration. As you can see, operating expense as a percent of revenue has grown even more than cost of sales since 1980. That's why managers are paying strict attention to controlling expenses and hiring.



While HP's net revenue has more than tripled since 1980, the company's operating-profit margin has declined.

Improving our operating-profit margin is the top priority for the company, and we're doing a lot to make it happen. We're increasing growth rates in our traditionally profitable areas and deploying investments to new high-growth market segments. We're correcting business fundamentals in product areas where we can't price to earn attractive profit. Recognizing the impact of different sales channels, we're working to ensure manufacturing costs and operating expenses track to meet our targets.

However, we must accelerate our efforts if we are to see improvement in 1989. As I look at the spending and hiring plans in many areas, I see they're not consistent with this objective.

The company can't increase its operating-profit margin without the help of all employees. I expect everyone in HP to be focused on this result.

Addressing this issue requires some tough choices, but we need to make them now. We must focus our resources

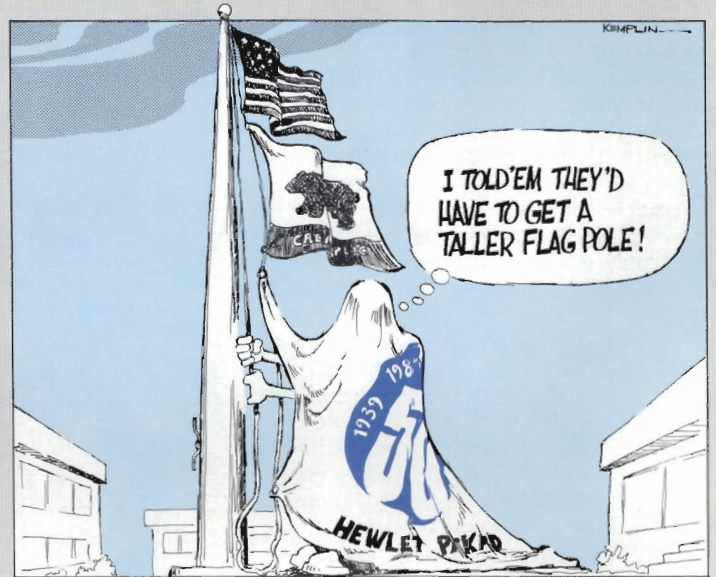
on business segments and products where we can be most successful and make real contributions to customers. Growth is important, but growth without profits has no value to our company and simply consumes resources that should be put to better use.

Perhaps Dave Packard said it best: Our profitability is one of the best ways we can evaluate our work. Profit shows us that customers are willing to pay more for our products than it costs us to make them. It tells us that people value what we do.

EXTRA MEASURE



Marijke Schroots has just the ticket for the May event.



50th anniversary events are a blooming success

Everything's coming up roses—or pansies in one case—as HP sites worldwide celebrate the company's 50th anniversary in 1989.

Interest in the 50th is growing—literally—at the Sunnyvale, California, site where groundskeepers planted 1,500 pansies in two eight-foot circles—one in the shape of the letters "HP" and the other, the number "50."

"We were looking for a creative way to recognize the anniversary and brighten the landscape," says Tom Apodaca, of Sunnyvale site facilities, who designed the circles.

"The plants were all green when we put them in in February, so you couldn't tell

what it was going to look like. Since they started sprouting in late March, a lot of people have told us how much they like the arrangements."

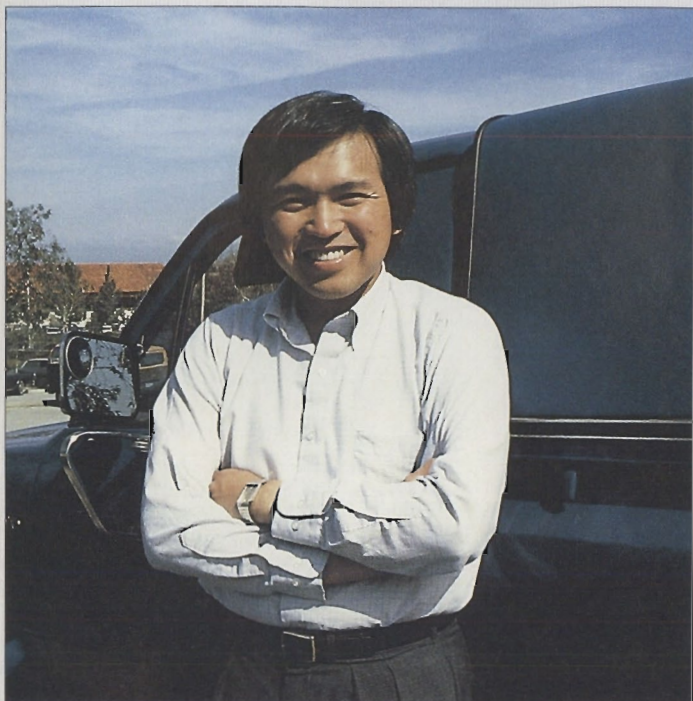
Meanwhile, HP entities around the world chose their "ambassadors" for the May dedication of "the garage"—Bill Hewlett and Dave Packard's first workshop—as a California state historic landmark.

Marijke Schroots, travel specialist at HP's office in The Netherlands, received an oversized replica of a plane ticket when she was told she would be the Dutch representative.

More than 100 ambassadors from 103 sites in 32 countries will travel to Palo Alto for the May 18-20 celebration.



Tom Apodaca gave the Sunnyvale, California, site a flowery touch.



Robert Dea's fast action helped save the lives of two California teenagers who were trapped in a burning car in February.

HPer credited as lifesaver

How would you react in a life-threatening situation?

HP engineer Robert Dea's (pronounced DEE) instinctive efforts helped save the lives of two California teenagers in February after the car they were riding in flipped over and caught fire.

Robert and his wife were returning to Fremont, California, after a weekend in Los Angeles when they spotted the burning car a few miles from home. He arrived first at the scene and soon was joined by other passing motorists.

"It was dark," Robert says, "but I saw two young people trapped in the car. We released the seat belt of the guy and pulled him to safety, then went back and got the girl out.

"The flames began to

spread right after I pulled the girl out, and I was afraid the car was going to explode at any minute," says Robert, who works in the Software Engineering Systems Division in Palo Alto.

Robert ran back to his truck and broadcast an emergency message on a citizen's-band radio. Within 15 minutes the police, fire department and ambulance arrived.

Fremont police said the two youths "no doubt" owe their lives to their rescuers. Robert and three other motorists will be nominated for commendations.

"I've never had anything like that happen before and I just acted on instinct," Robert says. "There wasn't time to think about the consequences. I just knew I had to act fast."

BOTTOM LINE

Hewlett-Packard Company reported a 21 percent increase in net revenue and an 8 percent growth in net earnings in the first quarter of its 1989 fiscal year ended January 31.

Net revenue totaled \$2.657 billion, compared with \$2.192 billion for the same quarter in FY88, with international up 31 percent (to \$1.432 billion) and U.S. up 12 percent (to \$1.225 billion) compared with the year-ago quarter.

Net earnings totaled \$193 million, equal to 83 cents per share on approximately 233 million shares of common stock outstanding, compared with \$179 million or 71 cents per share on some 251 million shares in the first quarter of FY88.

Incoming orders for the quarter were \$3.013 billion, compared with \$2.440 billion in an especially strong first quarter in FY88.

SOUTH AFRICA

HP announced March 21 that it plans to sell its sales subsidiary in South Africa to Siltek Ltd., a socially responsible South African computer company.

All 245 employees of Hewlett-Packard South Africa (Pty) Ltd. will be offered full-time employment by Siltek, which will take on all HP product lines.

HP President John Young said the company's difficult decision was based on business conditions and failure of the

South African government to make significant progress toward ending apartheid.

HP will set up a trust fund to continue to fund many of HPSA's social justice programs.

CHARTING MEDICAL

The Medical Products Group has restructured to five business units. **Jeff Langan** becomes general manager of a new Clinical Systems Business Unit, which includes activities of former cardiology and critically ill patient-monitoring BUs. **Dave Perozek** heads an expanded Imaging/OB Care BU, while **Ed McDonald** will manage a new Group Marketing and Field Operations BU (which includes the Medical Supplies Center). Two geographical BUs remain unchanged.

Basic organizational unit of MPG in the future will be smaller "application business units."

NEW DIRECTIONS

HP Labs will spend some \$15 million in the next three years to establish science centers at three universities to tap into long-range scientific research. First one is at Stanford, with Europe and the Pacific Rim each to have one later.

All Corporate real estate responsibilities have moved from Corporate Manufacturing to Chief Financial Officer **Bob Wayman**. **Dennis Raney** will become the first director of real estate.



HP training made history in February with the transmission of the first European support-engineering "teleclass" by satellite.

Europeans beaming over teletraining

HP training in Europe entered a new era in February when it beamed a support-engineering "teleclass" by satellite to 10 HP locations throughout Europe.

HP has transmitted training courses to U.S. regional sales sites since 1983, but the February broadcast from the Bonaparte studio in Paris was a first.

Ron Lidell, worldwide

manager of product support training, opened the three-hour broadcast with an introduction on the evolution of customer-engineer training. Product and marketing presentations followed.

The broadcast on HP's private television network was a combined effort involving HP's European support-training organization in Grenoble, France, the Grenoble Network Division, HP-TV and VTCOM, a Paris consulting company.

The best of the excellent

Japan's Nikkei business newspapers recently named an HP 82000 integrated-circuit tester one of 16 products to receive a Nikkei Award as "most excellent" products for 1988.

The IC tester, made in Böblingen, West Germany, was chosen from among 20,000 new products and



Adolfo Gascon from the HP Guadalajara Computer Operation receives a certificate for completing his master's degree.

A 2,000-mile diploma

An HP engineer in Guadalajara, Mexico, was one of the first six students outside the U.S. to earn a master's degree in engineering using lectures from the Stanford Instructional Television Network (SITN), sponsored by Stanford University.

Adolfo Gascon from the HP Guadalajara Computer Operation completed the three-year program which was conducted in partnership with the Autonomous University of Guadalajara (UAG).

While UAG actually issues the degree, each student received a certificate affirming their successful

completion of the courses originating from Stanford University. HP Guadalajara helped set up the arrangement with SITN along with other Guadalajara companies.

Stanford provided videotapes of its engineering classes. After watching the tapes, a UAG tutor led discussions and answered questions.

Professor James Gibbons, dean of the Stanford school of engineering, presented the certificates during January graduation ceremonies in Guadalajara. HP engineers in Silicon Valley have taken the courses by television since 1968 and elsewhere in the U.S. since 1973.

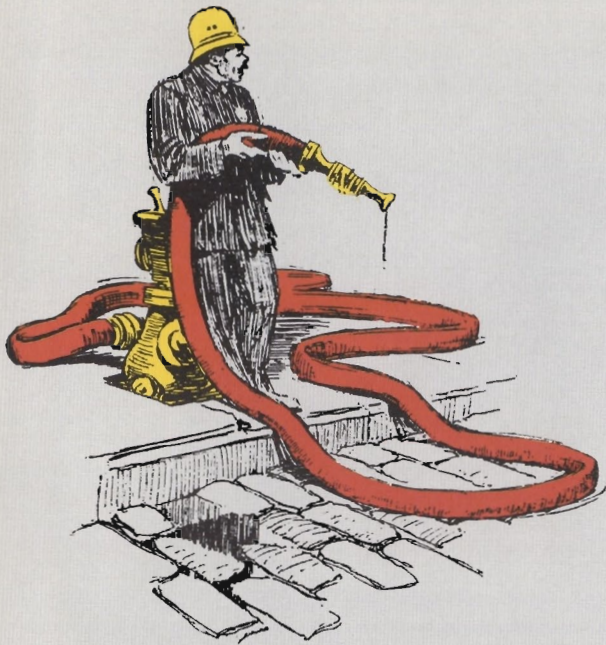


HP 82000 integrated-circuit tester

services reported in four Nikkei newspapers in '88.

The *Japan Economic Journal*, the English-language version of Japan's

leading daily economic newspaper, *Nihon Keizai Shimbun*, presented the award.



Neither rain, nor snow...

When the Hoechst Celanese chemical corporation suffered an explosion at its Pampa, Texas, plant, buildings near the center of the blast were flattened—including the main laboratory, which housed two HP 1000 computers. The roof collapsed, and the equipment inside wasn't recovered until weeks later.

In a letter to HP President and CEO John Young, 20 Hoechst Celanese employees explain what happened.

"One of the HP 1000s was at a 45-degree angle, supported by a fume hood. The side of the cabinet was partially collapsed where it had been struck by the ironstone top of a laboratory bench.

"The other HP 1000 was on its side under a partially collapsed brick-and-concrete block wall. Both computers had been exposed to rain, snow and weather

since the explosion.

"We dug both systems out of the rubble and took them to an off-site location where we disassembled and cleaned the dust and debris from the CPU (central processing unit) and exposed surfaces to the disc drive. (Then we) knocked the dents out of the sides of the cabinets.

"As our backup tapes were burned in the same incident, we had no choice but to attempt to boot the systems up to recover our data. Both systems came up perfectly...

"Horchst Celanese is a quality performer in the chemical industry, and we appreciate quality performance by our vendors. These HP 1000s are quality products. Please relay our sincere appreciation for quality performance by all those involved.

"Those of us 'on the firing line' here in Pampa appreciate our friends on the line at Hewlett-Packard."

NEW HATS

Jorgen Herlevsen to GM, HP Denmark... **Jean-Claude Vandebosch** to GM, HP Belgium.

Mike Hetrick to operations manager of the Data Management Products Operation, part of the Data and Language Division. **Sam Prather** replaces him as operations manager of the MPE System Operation, part of the Commercial Systems Division.

GETTING TOGETHER

Boards of directors for HP and Apollo Computer Inc. jointly announced on April 12 that they unanimously have approved a definitive agreement for HP to acquire Apollo. It would be HP's largest acquisition ever. Founded in 1980, Apollo manufactures network-based workstations and open computing products. The transaction is subject to regulatory approval.

HP and 3Com, a Santa Clara, California, computer-networking-systems company, have formed a strategic alliance that includes joint product development and marketing. HP will make an initial equity investment of up to 5 percent of 3Com's outstanding stock.

NEW PRODUCTS

Stanford Park Division's new HP 8791 frequency-agile signal simulator (FASS) provides complex signal testing for modern

electronic-warfare, radar and communications systems.

HP has entered the high resolution PC graphics market with an intelligent graphics controller (the HP 82328A) that can display 16 colors simultaneously from a palette of 4,096 choices. Also new: two sizes of color displays. From the Graphics Technology Division...



HP 82328A with color displays.

Personal computers have high-performance network access to UNIX-system-based X Window graphic applications through HP AXDS/PC software. It accelerates graphics-application performance to 2 million instructions per second. From the Panacom Automation Division.

HP CLP PLUS is new software from the Scientific Instruments Division that simplifies and speeds the process of analyzing and reporting data for total organics required by the U.S. Environmental Protection Agency for contract labs.

The new HP 3070 SMT-series combination board test is believed to be the first to create a fully integrated surface-mount technology test system. From the Manufacturing Test Division.

PARTING SHOT

A Measureable honor for Terry

Last year, Terry Nimori read an ExtraMeasure story about how fellow HP employee Maurice Liang's color photograph was chosen for display in the Journey Into Imagination Pavilion at Walt Disney World/Epcot Center in Florida.

"Photography had been a growing interest of mine," Terry says, "and that story was my inspiration to take more pictures and enter a local contest."

In November 1988, the Santa Clara (California) Division R&D engineer won first prize in the color division in a *San Jose Mercury News* contest—the first Terry ever entered.

The winning entry, "Spiral tapestry," advanced to the 1988 Kodak International Newspaper Snapshot Awards competition. And, yes, Terry's photo now hangs in the Disney Pavilion with Maurice's.

He was walking around San Francisco's Embarcadero Center one weekend when he spotted the eye-catching scene.

"I was fascinated by the complex circular patterns and how the staircase appeared to converge toward the bed of chrysanthemums," Terry says. "The



TERRY NIMORI

brilliant yellow contrasted wonderfully with the subdued grays, and the image reminded me of a nautilus."

"It was the first time I had tried shooting slide film and I had only one frame. I've

gone back to that staircase a few times to try and take the shot again, but the light has never been the same. I was fortunate to get the shot when I did."

Now the image, chosen

from among more than 500,000 entries, hangs in the Walt Disney World/Epcot Center permanent display, which has attracted about 50 million people since the pavilion opened in 1982.

MOVED LATELY? CHANGE OF ADDRESS SHOULD BE REPORTED TO YOUR PERSONNEL DEPARTMENT.



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