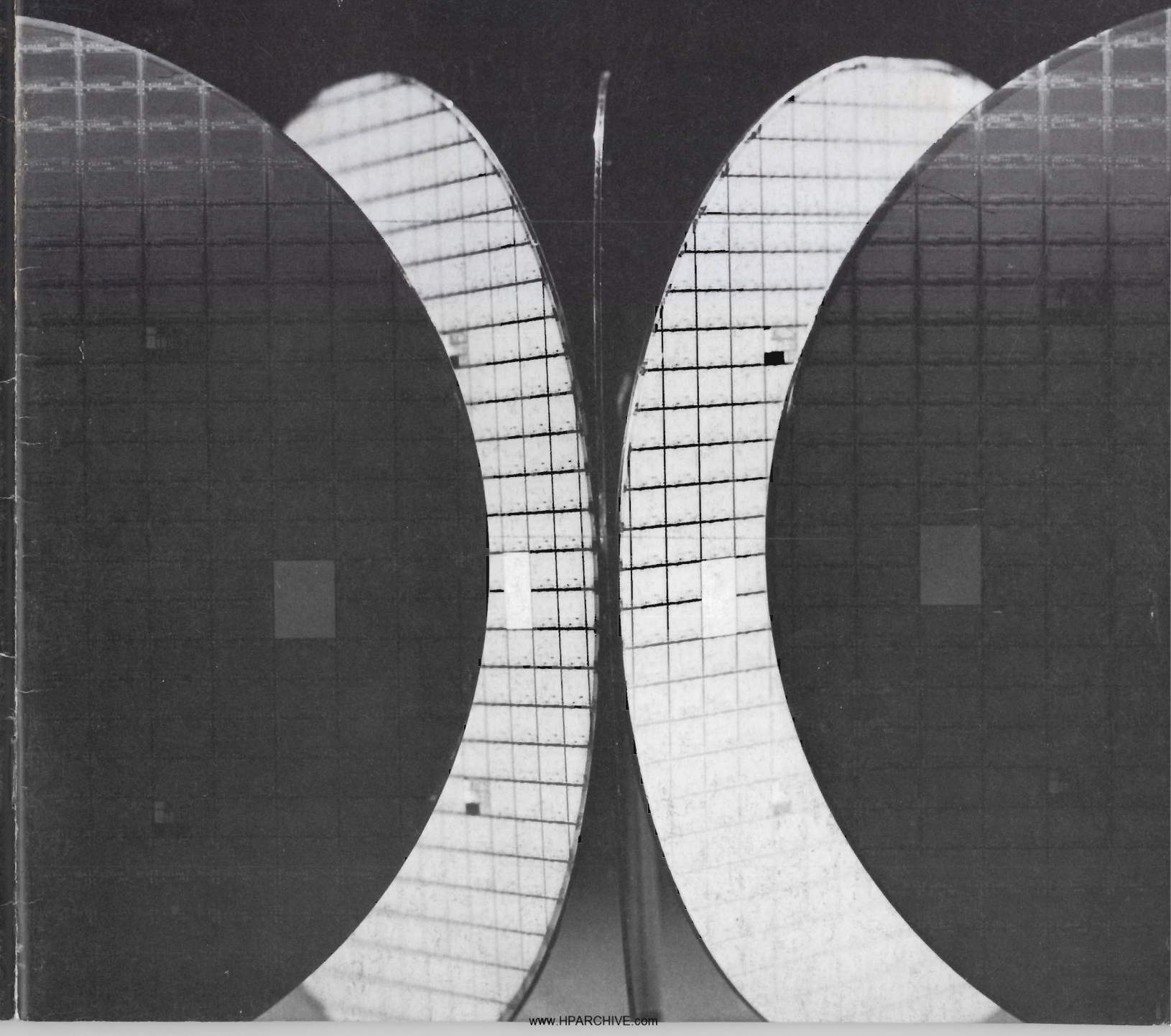
MEASURE

For the people of Hewlett-Packard

March-April 1981

ICs: THE COMPETITIVE EDGE



UP FRONT

Comments on the changing HP scene— and the people behind it.

HP's Bob Youden with Dr. Deming.

Answering a question about correlation tables from John Monroe of Data Terminals Division.

For HP's Bob Youden, the two-day seminar on statistical quality control which Dr. W. Edwards Deming recently gave in Cupertino for several hundred company managers had a moment of unexpected personal meaning.

Deming is the 80-year-old American statistician who has become something of a living legend for his role in helping transform Japanese industry into a singular success story through statistical quality control. He recently starred in an NBC documentary, "If the Japanese Can, Why Can't We?" and is a sought-after speaker these days.

In the course of his HP seminar, Deming used an anecdote about Bob's father, W. J. Youden, a well-known statistician (Youden's Squares) at the National Bureau of Standards.

"When I wanted to learn about factorial experiments, I went to Dr. Youden. He told me, 'Don't worry about the techniques — get the problem well defined,'" remembered Deming.

Bob, attending the seminar as a reliability engineer for the Computer Support Division, went up at intermission to reminisce with Deming about his family.

Deming's basic message, which is receiving a great deal of respectful attention from U.S. industry these days, is the necessity for total involvement — from the top down — with statistical methods.

"You must look at what you're doing in terms of whether it's in statistical control — even if you're not happy with it," says Deming. It is important to distinguish between two types of faults that affect quality and, therefore, productivity: faults in the basic way things are done — which result in about 85 percent of quality defects and must be corrected by management — and special causes which can be traced to some individual breakdown such as human error or a faulty machine.

"It's not true that there would be no problems in production or service if only workers would do their jobs correctly," Deming declares.

A lot of supervisory techniques have been off target, he says, depending too much on inspection at the end of the manufacturing process rather than critically examining the system itself. (He points to a new analysis which suggests that in some cases parts should be flowed through a process without inspection — or else inspected 100 percent rather than merely sampled.)

Applying statistical methods to supplies from vendors is also essential, according to Deming. (For an HP example of achieving zero defects through close cooperation with a vendor, see p. 18.)

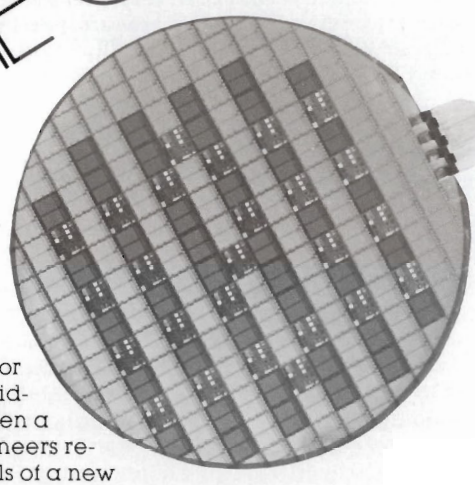
Some variation is inevitable, according to Deming, but it is vital to know what's happening exactly, to establish control limits, and to keep altering the system to narrow those control limits.

Deming believes so firmly that all line managers should be involved in the management of quality that he specified to Corporate Product Assurance, which arranged his appearance, that he would come to HP only if top management were well represented.

Meeting Dr. Deming had special significance for another seminar attendee: Kenzo Sasaoka, president of Yokogawa-Hewlett-Packard, whose employees take part in 95 quality circles aimed at improving work methods. YHP is in active competition for a Deming Prize awarded in Japan each year for outstanding application of quality control principles. That prize was established in 1950 with a lecturer's fee which Dr. Deming refused to accept for his now-historic eight-day seminar on statistical quality control methods which turned Japanese industry in a new direction. **M**

Tiny electronic components produced from exotic substances like silicon, sapphire and gallium arsenide are making major contributions to the success of HP products. Measure looks at the ways semiconductor technology gives the company's products

THE COMPETITIVE EDGE



Hewlett-Packard shook up the semiconductor industry in mid-February when a team of engineers revealed details of a new powerful computer chip. The quarter-inch square holds 450,000 transistors on its glittering surface — more than four times as many devices as any semiconductor firm has ever packed on a chip that's been publicly announced.

With the unveiling of the 32-bit integrated circuit (still in development stages at Fort Collins, Colorado), HP took an important step in the race to pack as much computing power as possible on as small a chip of silicon as possible. While HP doesn't sell any of its custom integrated circuits (ICs) to the outside world, the company has designed and manufactured them for internal use since 1965.

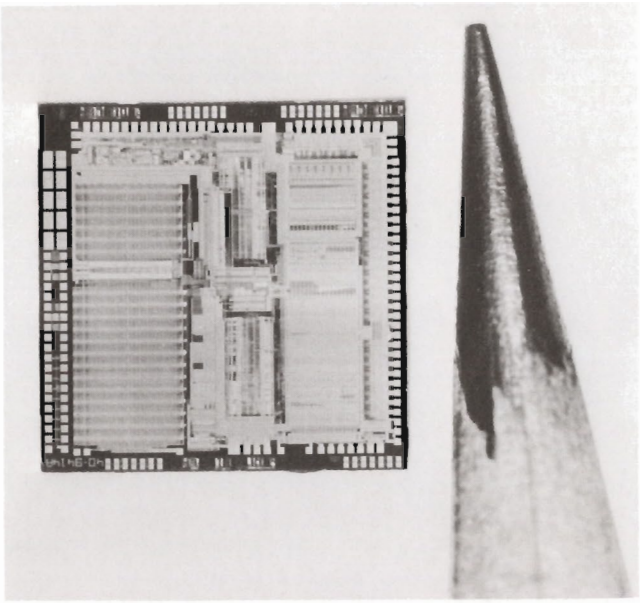
The IC industry traces its roots to the late '50s when scientists began creating transistors, diodes, resistors and capacitors on a slab of thin silicon, along with the circuitry needed to hook it all together. HP started manufacturing its own solid-state devices more than 20 years ago "when we found we could make better rectifying diodes for our own vacuum tube voltmeters than we could buy on the market," says Barney Oliver, vice president of Research and Development. "Soon it became apparent that special-purpose components could lead to brand new instruments. For example, the step recovery diode made possible a sampling oscilloscope with gigahertz bandwidths."

These tiny microelectronic devices are all descendants of the vacuum tube, but they've grown up in different families. HP's Microwave Semiconductor Division (MSD), for example, is a major vendor of semiconductor components to other companies and various HP divisions. Related to these solid state devices are the more complex integrated circuits that have made Silicon Valley famous.

"In ICs, the degree of integration is the key," says Bob Grimm, head of the Technology Research Center of HP Labs. "We've moved through the era of small-scale integration (SSI) with less than a thousand devices on a chip; through medium-scale integration (MSI), with one to 10 thousand devices per chip; and into large-scale integration (LSI) with up to 100,000 devices on a chip. The frontier today is VLSI (very large-scale integration) with more than 100,000 devices on each chip."

The increasing density of the chip is the driving force behind the semiconductor industry because, as density increases, the cost per transistor drops. A chip with 10,000 devices may cost $10 today — the same price as a chip with only a few hundred elements five years ago.

The decision to fully develop in-house IC capabilities came in 1965. The major reason: by conducting research and development in ICs, the company would be able to make significant contributions to products without waiting for similar ICs to become available on the commercial market. "If you look inside HP's best selling products, you'll find HP custom chips in almost every one of them," says Bob Grimm. If HP were to sell the chips



The HP "Super Chip," as it was described by newspapers, radio and television, is smaller than the tip of an ordinary lead pencil. The 32-bit processor chip holds 450,000 transistors on its surface and is "faster and more powerful than some of today's main-frame computers" according to an account published in The Wall Street Journal.

produced in its IC facilities on the open market, they would bring in annual sales of more than $140 million. But, since the only place you'll ever find an HP chip is inside an HP product, that "sales volume" is meaningful only in ranking "captive" IC suppliers. Captive suppliers produce ICs solely for their own consumption. Of these, Hewlett-Packard is the world's fourth largest, behind IBM, Western Electric and Delco.

Chips from other semiconductor companies can be found in HP products, too. Part of HP's integrated circuit strategy is to buy chips available on the commercial market and manufacture only those that give HP products technical performance advantages. As a result, there are about two commercial ICs for every HP custom chip inside company products.

Doug Chance, general manager of the Technical Computer Group, feels there will always be general purpose chips purchased from the outside, but in-house IC capabilities allow HP to differentiate products from competitors and add special features that customers want. And he adds, "If you wait until the other people introduce the chips, then you're going to have a two- or three-year lag behind the person who can develop the chip himself."

HP's president, John Young, believes in-house capabilities give the company an edge in introducing products that make significant contributions. "Product contributions have been a foundation and strength for the 40-plus years we've been in business. Product contributions depend, to a great measure, on component contributions. Now a component contribution can be as great as the design of a whole computer once was."

Integrated circuits for the company's calculators, instruments and computers come primarily from seven IC facilities that design and produce custom chips. Other facilities (described on page seven) specialize in related solid-state technology. Santa Rosa, for example, designs and manufactures gallium arsenide field effect transistors and ICs, resonators, diodes and hybrid circuits for microwave products.

Gallium arsenide circuits offer some special advantages over silicon circuits, and those advantages have helped in a number of HP products. "Speed is the key advantage this technology offers," explains Charles Liechti, section manager in HP Labs' Solid State Laboratory in Palo Alto. "These circuits have ultra-fast switching capability: three times faster than the fastest silicon IC. Our highest-speed circuit of MSI complexity operates at data rates up to five gigabit per second."

HP first started using gallium arsenide to manufacture displays for the HP-35 hand-held calculator in 1972. The offshoot of that pioneering work is the current Optoelectronics Division (OED) in Palo Alto.

Back in 1974, the Technology Center of what was the Microwave Division (now Stanford Park and Santa Rosa divisions) started using gallium arsenide FETs in buffer amplifiers in sweep oscilloscopes. Then MSD was able to exploit the unique lownoise properties of gallium arsenide transistors for microwave receivers. Today sophisticated jet fighters use MSD's gallium arsenide amplifiers in their microwave circuitry.

A facility used to design and manufacture gallium aresenide, silicon and other semiconductor devices is expensive to build and run. As a result, a plan was adopted in 1975 that sought to get the most mileage out of every IC dollar. Last year a task force defined specific programs that will give divisions shared access to a number of IC centers while preserving tight ties to each division's development plans in ICs. Since so much of any new instrument or computer nowadays is inside ICs, a designer is very limited in his ability to contribute new ideas if he cannot determine what new things are to go into at least some of the ICs. IC facilities are expensive to build and operate, but divisions will share the fixed costs of these centers, and will be able to make extensive use of "workhorse" processes that will be put in place.

"The major changes since the 1975 strategy was spelled out have been the grand scale at which we're operating, and the involvement of more groups throughout the company," says Marco Negrete, one of the leaders of the 1980 task force from the Technical Computer Group. "We're moving from an era when the IC facility was a tightly knit group working in concert with its division to a time where we must share that technology with more people throughout the company." The model center proposed by the IC task force would cover 20,000 to 40,000 square feet and produce $20 million to $60 million worth of ICs each year. When the center is fully developed, it would use half of the facility for production, one-fourth for research and development and the remaining fourth as back-up.

In addition to the ongoing R&D efforts at the IC centers, HP Labs would focus on the feasibility of new IC processes, circuit concepts, new devices and the like. There would also be research and recommendations on new equipment, processes and IC designs.

The company's present IC facilities employ 3,000 people in a variety of jobs from circuit design to wafer processing. Different centers specialize in certain IC processes to produce chips with special characteristics. For example, CMOS (complementary metal oxide semiconductor) chips, although presently slower, use one-fifth the power of NMOS (N-channel metal oxide semiconductor) chips. That's why you find CMOS chips in most of HP's handheld products, and NMOS chips in products where power is not a problem and more speed is desired.

Through the maze of processes like CMOS, NMOS, SOS and bipolar, HP currently manufactures hundreds of different IC designs for use in products. But that figure doesn't include the designs in the expensive stages of re-

search and development. "It can cost a couple million bucks to try out a new IC design," says John Moll, senior scientist in charge of IC structures research at HP Labs. "That's why the biggest challenges facing the industry are quick design and turnaround. With those in place, we'll be able to try out new ideas for about one-tenth the current cost."

Quick design and turnaround are being helped along by a process of computer-aided design (CAD). Before the computer became involved in the design phase, complex circuits took shape as a series of large-scale drawings on an engineer's drafting table. What looks to the untrained eye like a crazy mass of intersecting roadways is actually a blueprint for the three-dimensional routes to be taken by electrical impulses as they zip through the chip's layers near the speed of light.

As more and more devices get packed on every chip, the job of deciding where each transistor, resistor, capacitor, diode and all their interconnecting pathways should go gets more complex. One industry expert explains, "Before CAD, a 100,000 transistor MOS chip would have taken 60 man-years to lay out and another 60 man-years to debug."

Today the old process of drawing shapes on layers of clear plastic film and then entering the locations of the intersections and devices in a computer ("digitizing") is being replaced with artwork techniques performed on computer screens and powerful new programs that help designers place devices on a chip.

The entire process of VLSI chip composition is becoming so automated with CAD that "people will be able to complete microprocessor designs as fast as they can define the properties of the microprocessor," explains Carver Mead of the California Institute of Technology.

HP has had its own CAD program since 1975 and has not waited for commercial systems to satisfy designers' needs. "We found we couldn't buy what we needed, so we set out to build our own," explains Merrill Brooksby, HP's manager of corporate design aids. Just as important as many of the available computer-based design tools is a design strategy or methodology. "You can place the same tools in the hands of people who understand the strategy and a group who don't, and the group that understands the design strategy will be much more productive," says Merrill. "The new 450,000 transistor 'Super Chip' produced in Fort Collins wouldn't have

A chip is born

Cheryl Lohman unloads a planetary of wafers from a sputtering system that applies a thin coat of aluminum to each wafer.

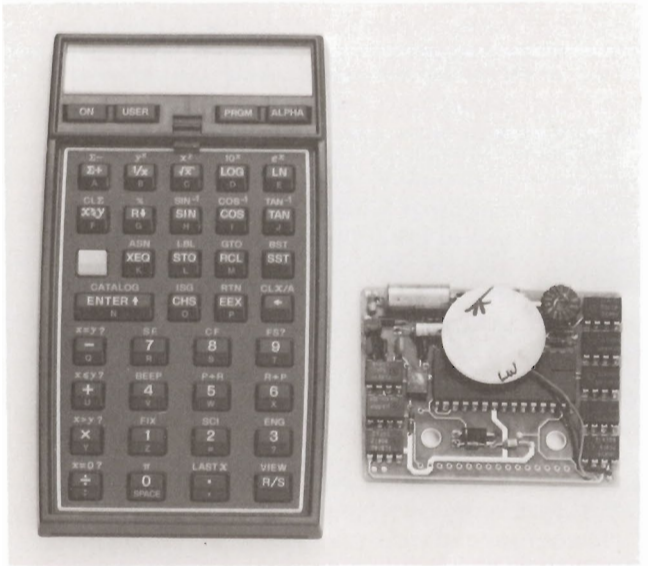
A typical HP integrated circuit starts life as a $7, sliced-and-polished silicon crystal about four inches in diameter. HP buys all these silicon wafers from outside suppliers. Perfectly pure silicon is almost an insulator, but by adding doping chemicals in amounts from 10 to 100 parts per million, the silicon conducts electricity, more or less.

Next, light is focused on photosensitized wafer surfaces through a series of complex masks projected on the silicon. Each layer is formed by developing the surface much as you would a photograph, leaving a pattern of exposed substrate. After etching, the appropriate semiconductor material is diffused into the silicon. This sequence is repeated, with variations, for each step in the process. After masking, etching and diffusion is completed, the wafer is tested, scribed and broken into individual chips no larger than your smallest fingernail.

These tiny electronic squares then make a trip to HP's integrated circuit packaging operation in Singapore. There the chips are centered in plastic frames and hairfine leads are wired from the chip to the legs of the IC package. HP's packaging operation, like those of most semiconductor companies, is located in Southeast Asia, where many costs are lower. How small are the thinnest lines on integrated circuits? As more and more devices are packed on a chip, it follows that the finest lines become even finer. Today those lines are about three microns (a millionth of a meter) wide and headed for two. By comparison, a human hair is 50 microns across. Hair and airborne dust particles can wreak havoc during the manufacturing process when they settle on the intricate circuit patterns. To cut down on the number of such particles, workers wear special caps, masks, gowns and booties, and work in glass-enclosed clean rooms.

Clean rooms filter the air to "Class 100" standards, meaning there are fewer than 100 half-micron or larger particles in each cubic foot. An average air-conditioned room has about 300,000 such particles in every cubic foot.

Needless to say, such clean room facilities are expensive to build and maintain. It takes an initial investment of from $15 to $20 million to create an IC center, and there's a continuing investment of 20 to 25 percent of the initial cost each year just to keep the center up-to-date. "In a five-year period, the most expensive pieces of equipment in a facility will become obsolete," says John Moll, senior scientist in charge of IC structures research at HP Labs. "It's certainly a capital-intensive business."



The HP41C calculator is a fancy package for HP custom integrated circuits. The nine HP ICs, identified by the tiny HP logo on each, are all manufactured at the Corvallis Division.

Computers are helping engineers plan, draw, check and test circuit designs. Bill McCalla, from HP Design Aids in Cupertino, uses the stylus of a graphics tablet to modify an integrated circuit design stored in the computer's memory.

been possible without a design strategy."

Among the programs that bring the strategy to life are interactive graphics systems with color display that provide fast artwork generation, programs that simulate circuit and logic and others that make certain the circuits follow design rules.

HP also has been innovative in spreading the latest word about VLSI design. The company television studio became a VLSI classroom last April when 12 experts in the field (including Cal Tech's Mead) starred in "Introduction to VLSI Systems," a videotape series which will be used throughout the company to introduce engineers to the latest techniques in NMOS design.

A number of promising technologies may change the way silicon wafers are exposed, and thus speed the process of getting chips from design to working prototype. "Everything we've done since we started in the IC business has been based on optical lithography," says Fred Schwettmann, director of HP Labs' Integrated Circuits Laboratory in Palo Alto. Alternatives to traditional optical exposure methods — x-ray and electron-beam lithography — hold promise for the future. X-ray lithography would work in much the same way as photolithography: a beam of x-rays shining through a photomask would expose the wafer. Since the wavelength of x-rays is shorter, smaller lines could be more sharply drawn than with visible light.

For VLSI, masks for optical or x-ray lithography must be made with an electron-beam system. All the information about the circuit pattern is stored in the computer's memory to steer a powerful beam of electrons directly on the mask's surface — much the same way the electron beam in a television set is manipulated to produce an image. Since the circuit pattern is stored in the computer, changes would be a simple matter of rewriting an existing program.

As an alternative, using a computer-controlled beam of electrons could eliminate the need for photomasks entirely. The electron beam could write directly on the wafer, removing the chances for errors inherent in mask lithographic methods.

As design and production tools allow quicker design and turnaround, new problems will start to appear. "As the width of certain lines drops below the two-micron barrier (a micron is a millionth of a meter), we'll be forced to look at new fabrication methods," says John Moll. "One kind of improved processing will be the replacement of wet etching using acid solutions with a dry process, such as plasma or reactive ion etching."

Improvements to HP's IC processing have been "revolutionary" in the past, with a great deal of time and technological distance between NMOS I, NMOS II and the new NMOS III process (the Fort Collins Super Chip process), for example.

"It's been a matter of 'you bet your division' when it came to new processes," says John Young. "With our new IC strategy, we'll place an increased emphasis on evolution of processes, so there are improvements all along."

HP Labs will now focus research efforts on finding those evolutionary improvements and transferring them to the various IC centers. "Anytime you're dealing with a manufacturing process with 40, 50 or 60 different operations, there are ways to improve individual units of the process without inventing new processes," says Fred.

Is there a finite limit to the number of devices that can fit on a single chip? "It looks like the limit may be 10 million devices on a chip, a point we'll reach around the year 2000," says John Moll. "That would also be the point at which the electrical energy we put into a chip won't be retrievable." The technology advances that will lead the IC industry to the 10-million device chip trace their roots back to the late '50s when ICs were just getting started. Those advances have been increasing the performance of computers at 30 percent a year ever since, "one of the most remarkable changes in the history of the industrial world," says John Young. "We're now looking at an era when mainframe computing capability will be available to everyone virtually on a free basis. What's so interesting about the next decade in electronics is that we aren't able to see what the impact of free computing is going to be on the way we live our lives and the ways we organize and conduct business.

"We are fortunate to be in a position to make many of those unforeseeable events take shape and turn them into reality."

And it's all made possible by HP's semiconductor technology and the 3,000 employees who are involved in an incredible shrinking act. **M**

Solid state in three states

Seven of HP's semiconductor centers specialize in integrated circuits for the company's calculators, instruments and computers. The remainder specialize in related solid-state fields. The 12 centers include:

HP LABS' TECHNOLOGY RESEARCH CENTER
Palo Alto, California

The Technology Research Center specializes in long-range research into solid-state science and technology. The three labs include the Solid State Laboratory, the Integrated Circuits Laboratory and the Integrated Circuits Processing Laboratory.

COLORADO SPRINGS DIVISION
Colorado Springs, Colorado

Designs and manufactures high-frequency analog integrated circuits, high-complexity digital bipolar ICs, thick film and hybrid microcircuits for the division's electronic test and measuring instruments.

CORVALLIS DIVISION
Corvallis, Oregon

Designs and manufactures large-scale integrated, complementary metal oxide semiconductor (CMOS) and N-channel (NMOS) circuits for the division's handheld and desktop calculators.

CUPERTINO INTEGRATED CIRCUIT OPERATIONS
Cupertino, California

Designs and manufactures complementary metal oxide semiconductor silicon-on-sapphire (CMOS-SOS) and NMOS circuits for various HP computers and instruments.

DESKTOP COMPUTER DIVISION
Fort Collins, Colorado

Designs and manufactures NMOS processors, ROM and LSI random logic chips and thin-film products for the division's computers and peripherals.

LOVELAND INSTRUMENT DIVISION
Loveland, Colorado

Designs and manufactures high-speed LSI chips, precision analog signal processing chips, thin-film LSI resistor network chips produced on sapphire wafers and multi-chip hybrids for the division's electronic test and measurement instruments and systems.

MICROWAVE SEMICONDUCTOR DIVISION
San Jose, California

Designs and manufactures semiconductor devices and components such as Schottky, PIN and PN junction silicon diodes; silicon bipolar transistors, gallium arsenide field effect transistors (FETs) and amplifiers for sale to outside customers and various HP divisions.

OPTOELECTRONICS DIVISION
Palo Alto, California

Designs and manufactures optoelectronic semiconductor devices and systems including light-emitting diode (LED) lamps and displays, optically coupled isolators, fiber optic transmitter and receiver links and emitter-detector systems for sale to outside customers and various HP divisions.

SANTA CLARA DIVISION
Santa Clara, California

Designs and manufactures high-frequency devices and integrated circuits including linear bipolar devices and LSI circuits for the division's measuring instruments and systems.

MICROWAVE TECH CENTER
Santa Rosa, California

Designs and manufactures gallium arsenide FETs and ICs, silicon microwave bipolar transistors, yttrium iron garnet resistors, microwave diodes and hybrid circuits for the division's own instruments and all other HP microwave instrument divisions.

NEW PATHS ACROSS CAMPUS

Lending HP people to teach for a year at predominantly minority colleges is not a new idea for the company: since 1975, a number of HP engineers have spent one or more academic years as loaned professors at black colleges throughout the United States.

The news this year is the company's first loaned professor at an institution in the Southwest — which has a large Hispanic and Native American population — and the first instructor exchange program between an HP division and a college.

A SPECIAL CULTURE

Like all of HP's loaned professors, Rich Kochis from the Desktop Computer Division is adding an industrial perspective to the courses he's teaching at New Mexico State University in Las Cruces.

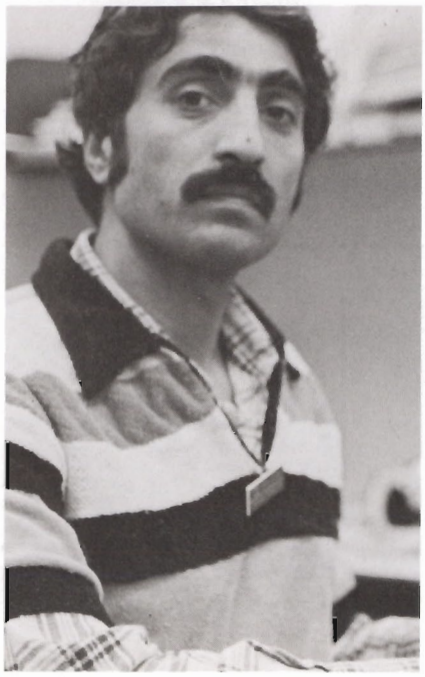
In the digital system design course that he gave last fall, students had a chance to learn the theory of designing LSI chips—a subject about which Rich has special expertise as an IC project manager in the Systems Technology Operation and one of the co-developers of the new "Super Chip." He also has been teaching a computer architecture course at NMSU.

The university is in an area comprised of New Mexico, southern Colorado, western Texas and eastern Arizona which is uniquely tricultural. "Anglos" (whites) are almost a minority; just under half the population is of Hispanic origin and nearly 10 percent is Native American.

Rich, who grew up in Colorado with many Hispanic friends, jumped at the chance to pioneer a loaned professor role in the Southwest. While 26 percent of the 2,200 engineering students at NMSU is Hispanic, that number is still below the ethnic representation in the area.

One reason, according to Rich, is that "Hispanics here don't view engineering as the way to go."

To do something about it, he's been giving talks about science and engineering at nearby secondary schools in addition to his college teaching. At Gadsen High School, which is 90 percent Hispanic, he helped present a one-week computer applications and technology course. "One kid was going to be a truck-driver," Rich says. "We got him to program a computer and now he's considering that as a possible career."



Gene Khaja

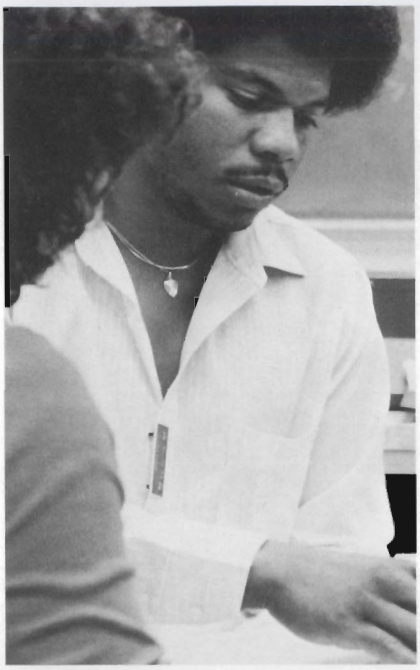
The biggest hit at a science academy for junior high school students one Saturday was a battery-controlled R2-D2 toy robot hooked up to a computer which gave commands in various sequences. It was a learning experience for Rich to work with that age group, he admits, but he's already been asked to repeat the day for another junior high.

Other HP engineers serving as loaned professors this academic year are Abdul Aziz from the Eastern Sales Region at Howard University and James Stewart from Colorado Springs Division at North Carolina A. & T.

CAMPUS-INDUSTRY SWITCH

Merritt College, located in the hills behind Oakland, California, is a community college which stresses hands-on experience and practical preparation of students for jobs.

During the last three years HP has hired a number of graduates of its twoyear program in computer technology. When the college asked the company's help in improving the curriculum, the natural solution seemed to be an exchange of personnel for a year.



Ed Butts

Rich Kochis

HP lends a professor to a university in the Southwest and pioneers the first instructor-exchange program.

Gene Khaja, an instructor at Merritt for four years, joined the Computer Systems Division in Cupertino in September to update his knowledge in the operating systems area. His experience will be directly useful in teaching a new course in that subject back on campus next year.

That month HP supervisor Ed Butts from the same division became a member of the Merritt College staff. He's taught a microprocessor course (using five HP 5036A microprocessor labs and HP textbooks donated by the company) and developed much of the material in a CPU peripherals class based on the HP 3000 hardware and support peripherals. He and Gene touch base frequently on other curriculum development for the program. Like Rich Kochis in New Mexico, Ed has reached off campus to teach a 16-week course on vocational electronics at Oakland's Castlemont High School on Fridays.

Taking part in the instructor exchange program has been an eye-opener for both Gene and Ed.

This is Gene's first exposure to working in industry, although he had helped develop computers at both Manchester University and the University of California at Santa Barbara.

He was happily surprised not to find the structured environment he had pictured: "You sit down with your boss and set out some goals, and then have a fair amount of freedom in how you arrive at them."

"I get ideas from seeing what people are doing in the labs," Gene says. "A lot of things are a mind-set, a way of thinking. It helps to listen to people who've been working on these problems for five to 10 years."

Cooperating on projects in the computer field reminds Gene of an arch in his native Pakistan: "Many people helped build it but there's no line where one left off — it's the result of a lot of teamwork."

Ed, who had taught computer courses to HP techs, finds it different in the Merritt classroom. The far wider variety among his students makes it a challenge to reach everyone with the same material — some need a special boost while others are already capable of moving into jobs in industry. He's given some students microprocessor kits to take home to build their own programming interface cassettes.

Aside from technical training, he's trying to give his students insight into "the key things that the system really judges them on," such as establishing good working relationships, showing initiative, and being dependable. The idea of lending an HP employee to release a college instructor to spend a refresher year in industry has worked so well that plans have already been made for another Merritt instructor to come to HP next September and Corporate Employment is encouraging other divisions to try their own exchanges. **M**

WORKSTYLE OF THE FUTURE

In the 1930s, the future was expected to bring glass-enclosed supercities, a rocket sled in every garage and full-course meals in the form of a pill. It hasn't turned out that way. There have been significant changes in the way we eat, live and travel thanks to computers. And those computers are also letting us make fundamental changes in the way we work.

The computer terminal on your desk beeps to life at 8:17 a.m. and warns you that "ONE MAIL — URGENT" is waiting in your electronic mailbox. With a simple command, you're reading the memo that was sent from Geneva while you were driving to work.

"Please send me a copy of your letter to J. Fuhrmann ASAP. He has questions about the service on his gas chromatograph. Thanks."

You press a button and, in a nearby building, one of HP's computers quickly searches through all of your business correspondence. In seconds you have the right letter on the screen before you.

Then, by punching in a special code, the letter is on its way to Geneva. It travels from computer to computer in seconds on a voyage that would take a piece of paper a week to complete.

Farfetched? Not at all. Scenes like that will soon become commonplace as technology rapidly changes the administrative, clerical

and managerial side of work at HP.

Productivity is the key word for the '80s and the office environment is ripe for new ways to cut costs and streamline operations. Studies have shown that the most unproductive side of work in many companies today is office work, simply because the way the work is done has changed little since the arrival of the typewriter and telephone in the early 20th century.

Although computers and their peripherals have been around for a quarter century, it's only been within the past few years that they've become small enough and cheap enough to consider using in the office environment.

Computer technology is solving many of the office headaches of supervisors, secretaries and managers at HP. The number of terminals in HP's offices has almost doubled — from 3,600 to 7,000 — in the past year. By putting that computing power in the office, productivity climbs and jobs become more meaningful. Text processing, electronic filing, and electronic mail are just some of the tools being used in the office automation revolution.

Office automation at Hewlett-Packard got its official start as a goal late in 1977 when the Office Utilities Group was formed within Corporate Information Systems. The next year saw the introduction of TYPIST, and an effort to bring together many of the experiments in on-screen editing, letter writing, message transmission and the like.

A year later the group released the initial versions of SLATE, LETTER and COMGRAMS. See page 12 for a description of the utilities.

"Our job is to reach as many people as possible at HP to make their jobs as easy as possible," explains Luis Hurtado-Sanchez, manager of the Office Utilities Group. Besides trying to reach a large HP audience, the goal is to do so as cheaply as possible by using HP equipment and to meet business needs unique to HP's offices.

"The combination of SLATE and TYPIST gives users on HP3000 computers virtually all the features of expensive electronic typewriters and $10,000 stand-alone word processors for a very small fraction of the cost," said Luis. Internal transfer costs (HP selling products to itself within the U.S.) decrease the cost of equipment.

"Two groups in our division had plans to buy stand-alone word processing systems," said Marc Clarke, a research and development engineer at Colorado Springs Division. "Those plans were scrapped as soon as the groups saw a demonstration of SLATE and TYPIST."

Since October, the number of engineers, supervisors, programmers and marketing people using the computer-based programs has jumped from zero to 80 at Colorado Springs. "People are able to cost-justify their purchases of terminals on the savings they'll realize solely through the use of SLATE and TYPIST," said Marc.

Electronic transmission of messages has been a cost savings for the New Jersey Division, according to Ed Laczynski, head of systems development there. "We were buying terminals for the COMSYS network to keep up with our message transmission needs. But that seemed a bit of a waste considering we had a significant number of terminals hooked to an HP3000 computer.

Russ Feirstein, Bob Horowitz, Susan Green, Luis Hurtado-Sanchez and Amy Mueller form the nucleus of HP's Office Utilities Group in Palo Alto — the group charged with developing utilities for improving productivity in the office. The current list of programs available to HP3000 users in the company includes:

SLATE is a word processing program that offers a simple way to enter, edit, save and print documents. Instead of complex commands, SLATE's friendly, pushbutton approach is based on a "what-you-see-is-what-you-get" design. SLATE is in use at more than 80 HP computer sites.

TYPIST is a document reformatter that works with all sorts of printers and forms, making a breeze of tough typing jobs.

COMGRAMS lets anyone at an HP3000 terminal enter a message to other parts of the company. By doing so, users can save time and eliminate errors in messages.

LETTER is designed for anyone who sends out form letters or must maintain mailing or distribution lists. It will print individually addressed letters, memos, labels, envelopes, and just about any kind of list you'd need.

NORMAN is a new electronic mail system for intra-facility messages. The program lets users at one HP3000 terminal send reminders to others of meetings, notes about projects, general announcements, etc. And, as long as your terminal is turned on and directly connected to the computer, you'll be notified of all incoming mail.

The Office Utilities Group also produces software packages intended for use by applications programmers throughout HP. Currently these packages include ZEUS, FORMWTRSCRIO and UX.

"That's when we learned about the COMGRAMS program. Since we're moving from a batch computing environment to HP 3000 on-line systems, the use of COMGRAMS seemed a natural. And there's been an added benefit: it's a great teaching tool to get people using terminals and on-line systems."

The electronic office of the future doesn't mean an instant end to paper, erasers, white correction fluid, filing cabinets or mail delivery. It simply means a new way will gradually appear to share more information with more people. "It doesn't mean that people will make better decisions simply because there's more information," explains one expert in office automation. "But we know that we can give an employee more information, or the same amount of information in less time. And the information can be made more precise."

Ready access to information is a growing requirement for increased productivity. HP's philosophy has always been to let the people closest to the problem have the information needed to make the decisions. An electronic office with a terminal on every desk ultimately means decision-making is based on the maximum amount of profit-related information.

The effect of all this technology on the workplace will depend more upon the attitudes of the people who use it than on the technology itself. Automation is more than replacing typewriters with computerized word processors. It's a process of re-examining work tasks, redefining some jobs and, ultimately, reviewing the entire office work force. But at the very least, it will be a change for the better. **M**

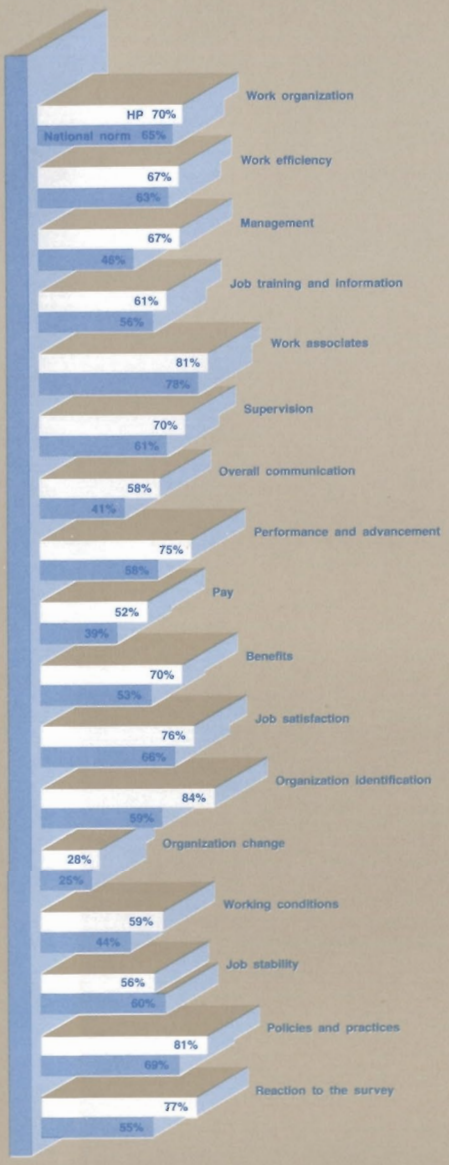
OPEN LINE

SPECIAL REPORT

As the name implies, Open Line was — is — essentially a communication process involving many people and all levels of the company. Initially it took the form of an attitude survey in September 1979, during which 7,966 employees in the U.S. organizations were asked to give their views and answer questions on more than 100 topics. Their responses were reviewed by an independent survey organization (International Survey Research of Chicago) and placed in 17 categories. The results then were compared with the results of similar surveys of 200 leading companies. The comparison of favorable responses is illustrated in the chart on the next page.

Using these results as a springboard, Open Line analysis groups — teams of from seven to 12 people — began a long, searching process of formulating specific concerns. In all they generated some 3,500 problem statements which generally fell into 22 categories. Most of these concerns could be addressed at the local level. Others were clearly corporatewide issues; the various actions and resolutions made in response to them are summarized in the following reports.

In this chart, the percentage of favorable responses by HP employees for 17 categories of questions is shown in white and compared with figures from the national sample of 200 top U.S. companies.



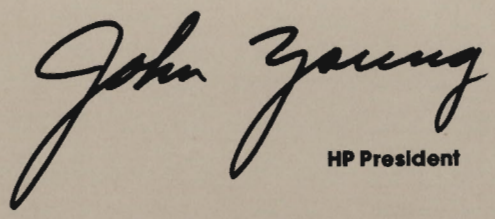
A MESSAGE FROM JOHN YOUNG

I hope that each of you has shared at least some of the involvement or interest that started more than a year and a half ago with the Open Line attitude survey. As you may recall, the survey produced no big surprises among the data. In fact, the returns were very favorable to HP. Less than 2 percent of U.S. companies studied in the past two decades are in a class with HP.

Nevertheless, all of the organizations involved in Open Line were asked to form teams to analyze those results and to suggest appropriate areas for improvement. From these teams came a wide range of problem statements and recommendations that were reviewed by local task forces for local action or referred to Palo Alto for corporate consideration.

By far the greatest number of problem statements were resolved at the local level. Of those sent along for corporate review, in most cases our existing policies and practices were adequate but need more emphasis, training and communication.

The overall process of review is now complete, and most resulting actions have been undertaken. It's time, therefore, to summarize the Open Line experience. Although this report presents the major questions and responses that emerged, I believe the most important result was the experience itself. That is, in using Open Line to take a critical look at our policies and practices as well as the various aspects of our management philosophy, we reinforced the processes of openness and listening that are fundamental to the HP way. We will all be working with the decisions and changes arising from Open Line for some time to come. More important, we will need to keep the spirit of that process working in our daily activities on the job. In short, we must continue to create opportunities for communication by listening carefully to one another's ideas, and by responding openly and constructively to one another's concerns.



HP President

PAY

The overall HP employee Open Line response regarding pay was quite positive. In fact, it was significantly higher than the national norm as measured against 200 other progressive companies. In its summary report on HP's Open Line results, International Survey Research of Chicago made the following comparison: "The two factors of pay and benefits at HP are unusually stable and positive when compared to distinctly unstable and negative national norms for these categories. The dominant feeling at HP toward pay and benefits is that the systems are intelligently constructed and fair. There is an interesting and rare notion found in the data that, whatever economic tumult may arise in the future, HP management will quickly cope with the situation." This report certainly indicates that feelings at HP about pay are generally very positive. But some issues still need additional attention, as was evident in the many analysis sessions. These concerns centered around three major areas:

- Concern relating to salary curves and ranges.
- Concerns about pay administration on these curves or ranges.
- Local concerns within a division or region.

In order to address the first two, a high-level task force was established by the Executive Committee and charged with developing a company position. This task force first studied the concerns and then developed a statement of compensation (pay) philosophy for HP (see accompanying statement). This method let the task force evaluate the concerns in light of the stated HP philosophy.

The task force recommendations fell into three categories: those that could be addressed immediately; those that should be addressed by education and training; and longer-range items requiring further study.

AMONG THE CHANGES WHICH WERE MADE:

- Established the competitive position definition. This was a reaffirmation of the philosophy of "paying among the leaders." And, coupled with our projection out a full year of the competitive position, will ensure that HP employees are unlikely ever to be behind the market.
- Moved toward the resolution of the two curve problem of HP engineers: The new 01 curve, drawn to reflect our desired competitive position, is now the curve for all engineers. Continued efforts will ensure equity among those in different functional areas.
- Reward long-service employees by increasing the slope of the curves-ranges beyond the competitive range. This is not a seniority concept but simply allows recognition for longer-term employees who have contributed to HP's success and who are now called upon to impart the HP philosophy to newer employees.

EDUCATIONAL PLANS:

Many of the concerns arose from an incomplete understanding of the HP pay program despite major training investments in recent years. Efforts are underway to revise both "Working at HP" and "Salary Administration Workshop." A brochure explaining the pay system is being developed and will be distributed to every employee for inclusion in the pay and benefits binder. In addition, many divisions and regions have held seminars to explain this pay program. This three-pronged approach should ensure that all employees have a good understanding of this pay program.

PAY PHILOSOPHY

At Hewlett-Packard, we believe in paying people at competitive rates that place us among the leading companies in the country or region from which we attract our people. Our merit system uses curves and ranges that are derived from survey data.

The salary position within these ranges is determined by the sustained contribution that an individual makes to the company, its customers and shareholders relative to the contribution of others at HP doing similar jobs.

The relationship of HP salary structures to competitive pay practices is determined in one or more of the following ways:

- When comparing with five to 10 truly leading companies, HP will be approximately equal to the average.
- HP expects to be approximately five to 10 percent above the average of a group of 10 to 20 companies that have been selected from a broad survey because of similarities to HP.
- When using broad surveys of 30 or more companies selected by a third party, HP will be approximately 10 to 15 percent above the average. In the past, these comparisons have yielded approximately the same result. HP's cash profit sharing is a true sharing of the company's success with its employees. This profit sharing is not included by HP as a salary element when making competitive comparisons.

Competitive data are the basis for calculating the range of appropriate salaries. The result is a series of ranges or curves within which a person's pay should fall based on performance and experience level.

The competitive data reflect both market and cost-of-living considerations. HP projects the expected increases one year ahead when setting the curves and ranges. Therefore, HP employees are unlikely ever to be behind the market.

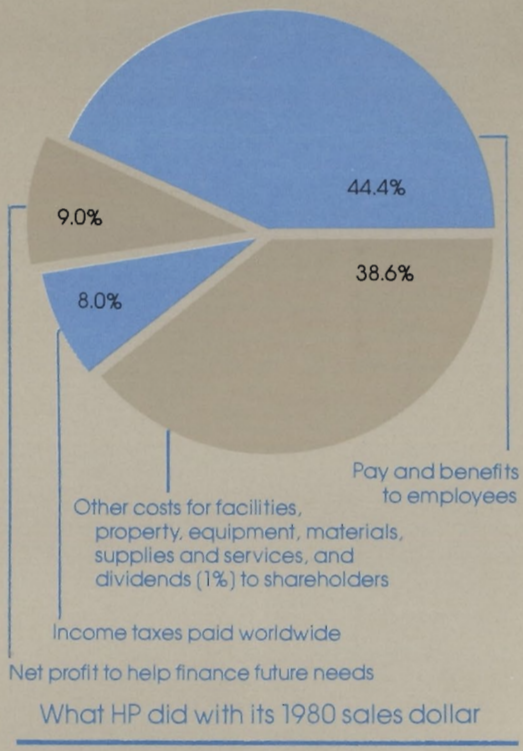
HP uses broad ranges and makes no artificial distinctions among people doing the same job. However, there may be different ranges for jobs in the same family when job content is significantly different. e.g., P.C. Designer I, II, III, etc.

HP people are paid for the relative worth of their contribution to company performance. "Relative worth" takes into account how one's job or function is ranked in relationship to other jobs or functions within HP. This is usually expressed by the phrase "internal equity." "Relative contribution" refers to one's individual performance ranking in relation to HP peers doing the same job. The salary level for a given individual within a job classification should reflect a consistent pattern of demonstrated performance and be relative to the performance of others as well. Job classifications with roughly 30 or more people will have salaries distributed over an entire structure in close to a 10-40-40-10 percentile distribution at the expiration of the curve.

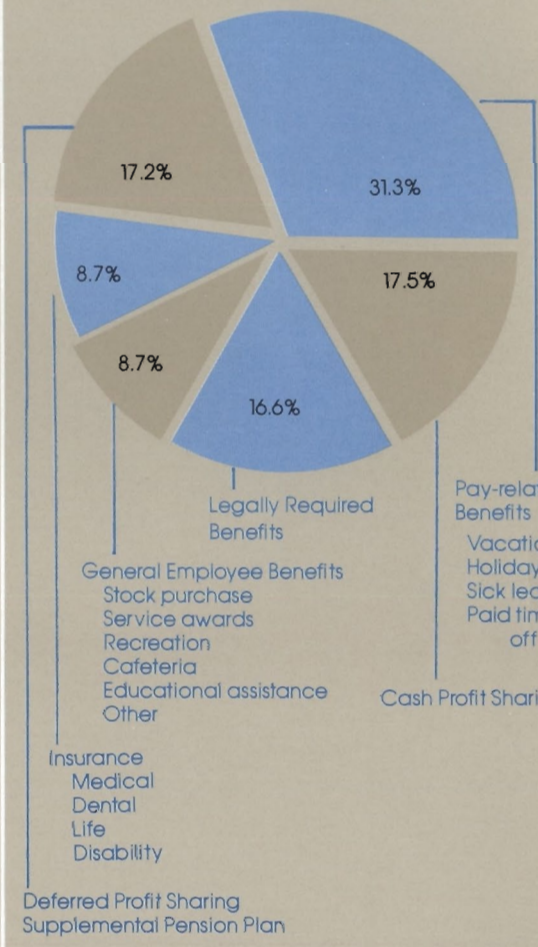
Starting rates for new employees are determined by short-term market conditions; they may not exactly match the curves since they attempt to anticipate market conditions. Newly hired people are not included in the performance ranking distribution until their sustained performance can be evaluated.

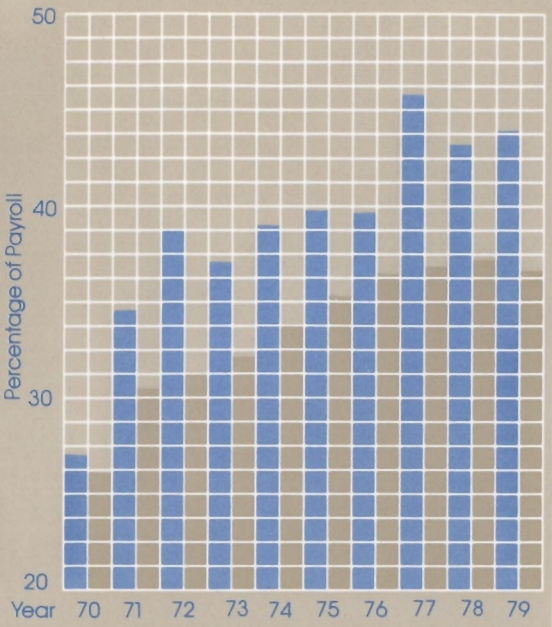
Salaries are administered by the individual's supervisor and reviewed at the next level. In some cases, higher level review is necessary to obtain the goal of equitable salary administration throughout the company. Except for people on annual commission plans, salaries are reviewed but not necessarily changed every quarter.

HP's compensation system is "open." Individuals are encouraged to understand the compensation process and to review their pay curves or ranges. Managers are expected to ensure that their employees understand the compensation process. Individuals are not entitled to see scattergrams (unless confidential information can be masked), ranking



What HP did with its 1980 sales dollar





Hewlett-Packard
Chamber of Commerce Survey

The cost of HP's benefits as a percentage of payroll is compared to similar data from a group of 922 of the largest U.S. companies. Traditionally, HP spends about 30 percent more, according to statistics taken from U.S. Chamber of Commerce surveys.

listings, confidential survey information or other people's pay.

The important thing about pay at HP is that it should be fair with respect to competition outside the company and fairly administered within the company according to sustained relative contribution.

BENEFITS

While Open Line and comments by analysis groups were being analyzed, Corporate Personnel was conducting extensive surveys to confirm that HP's benefit program is fully competitive. The survey results showed that HP spends about 30 percent more money on benefits than the average spent by a group of 922 of the largest U.S. corporations (see accompanying graph). Moreover, when matched against a much smaller sample of truly leading U.S. companies, HP's investment in benefits compares favorably.

That information, together with the generally positive results expressed by employees, led to the conclusion that the company is still in a strong position of leadership and should develop a plan to maintain that position in the benefits area.

A group of managers reviewed the competitive data and then looked extensively at comments made on the survey and by analysis groups.

All survey suggestions about benefits were reviewed for employees' perceived value, ease of implementation, compatability with HP's benefits philosophy and cost. Many of these comments will lead to benefit changes which may be implemented over the next several years. The following changes have already occurred:

- The annual maximum allowable dental expense for individuals has been increased from $1000 to $1500.
- Lifetime orthodontia benefit has increased from a maximum of $500 to $1000 per individual.
- The maximum outpatient psychiatric benefit per visit has doubled from $16 to $32. Also, inpatient psychiatric care costs now apply toward the $250,000 lifetime maximum medical benefit, but do not apply toward the $50,000 lifetime maximum psychiatric benefit.

Some comments requested changes in the way programs are administered. HP has made some changes, and others are being contemplated. For example, some people wanted dental coverage for dependents without purchasing medical coverage. This change was accomplished during last year's open enrollment period. Also, several requests were made for additional hospital benefits guarantee cards per family. Additional cards were printed and distributed last year.

From the survey feedback, it was also determined that training programs need to be developed or strengthened so that people have a better understanding of their benefits. For example, some comments stated that the retirement plans do not provide adequate benefits. However, most people retiring from HP at age 65 after 30 years' service will realize enough retirement income from HP and government sources (social security) that living standards will not need to be changed. Obviously, more information about retirement, as well as other programs, is needed.

To promote an increased awareness and understanding of the HP benefits program, special emphasis has been placed on informational materials. Specifically:

- New brochures outlining HP's life insurance and disability plans joined the family of benefit brochures distributed to all employees. Employees have already received copies of brochures about deferred profit sharing and supplemental pension plans, the HP medical and dental plans, and all general benefits.
- HP's third annual benefits statement was mailed to employees in March as part of a continuing program to highlight benefits. The statement, which has been well received, shows how individual employees stand in the HP benefits program.
- A project is underway to develop a benefits workshop for personnel representatives. Portions of this program will be condensed and included in employee and supervisory development courses.
- A letter to all employees about deferred profit sharing and supplemental pension plans explained the move toward more aggressive management of the retirement funds. As the letter indicated, "the growth in the fund balance has outpaced most profit-sharing and pension plan indicators by a wide margin this past year."

Finally, some Open Line requests appear unfeasible because of extraor-

dinary cost, incompatibility with HP philosophy or because only a small group of people will benefit.

One such issue is child care. As explained in the January-February issue of **Measure**, HP's position was spelled out by a task force of HP employees: the company will encourage private or community efforts to solve child-care problems. The company supports local efforts by volunteering employees' time to serve on committees and boards. HP has been involved with several other companies looking into the formation of an independent childcare center. A task force of employees from each company concluded that control of the center should be a committee job and not left to any one company.

BENEFITS PHILOSOPHY — A REVIEW

Hewlett-Packard's benefit package is designed to protect people from serious losses, to give them opportunities to share in the success of the company, to provide for supplemental income at retirement, to enjoy adequate relaxation through paid time off, and to participate in a hospitable work environment that encourages personal growth, loyalty and efficiency. The package is designed to meet the needs of a diverse employee population. The goal is to provide a balanced and competitive package, even though some of its individual programs may not have the magnitude of some competing programs.

Specific criteria are used in the design of the HP benefit package:

- The full package of benefits competes favorably with those of leading companies and industries. Studies and surveys of such competing programs are conducted regularly to insure the overall competitiveness of our package.
- Benefit plans should be designed to minimize the effect of a catastrophic accident or illness on employees and their families.
- The company believes that employees should share to some extent in the cost of certain programs as a means of promoting sensible decisions and nonexcessive use. By not assuming the total cost of such programs, the company is able to other useful benefits.
- Eligible employees should share in HP's success through significant profit sharing.
- Each benefit should provide adequate coverage, protection or income. Social and tax implications are taken into consideration.
- Paid time off from work is an important part of the HP benefit package, and should be comparable to that received by people in similar local organizations.
- In arriving at a benefit package for any given country, there will be necessary tradeoffs between the traditional HP benefits that exist in the U.S. and local national benefits. Benefits legislated by governments must also be considered in the HP benefits package: HP will always comply with legal requirements. HP groups or countries should identify these requirements and consider them when contemplating benefit changes.
- Benefit programs must meet the needs of many different people. Employees have individual preferences in how a balance is established between time off, insurance plans, retirement, etc. Whenever possible, changes to benefit programs should reflect the wishes of most employees.

MANAGEMENT CONCERNS

With a score of 67 percent favorable response, employees who were surveyed rated HP management well above the national norm of 46 percent. The rating covered such questions as the fairness of management decisions and the concern of managers for the well-being of the people they manage. To questions relating to job security, employees gave HP a rating of 56 percent, 4 percent below the national norm. Concerns in this area didn't involve worry about losing one's job, but rather related to rapid changes in organization and technology as well as relocation of divisions.

Among the 22 top issues generated by survey analysis sessions, four showed concern about management and the application of management philosophy: the quality of some managers was questioned by a number of analysis groups; others stated that management-by-objective (MBO) as well as management-by-wandering-around (MBWA) were not used widely enough; and some said that use of the Open Door policy was sometimes

The basic HP principle of individual responsibility for work is enhanced by an easily accessible management team. Frances Salazar, a production supervisor in Stanford Park Division's microcircuits area, listens to work suggestions from Ildiko Videmsky.

In a little more than two years, 17,000 employees have learned about HP philosophy, working environment and organization through "Working at HP" classes. Becky Smith, employee development manager, tells a group of corporate staff employees some of the secrets of managing work time effectively.

TRAINING

How many training programs are available from Corporate Training and Development?

A) One to five
B) Five to 25
C) 25 to 50
D) 50 or more

What does Corporate Training and Development, working through divisions and sales regions, hope to do in 1981?

A) Help HP people become more familiar with their company
B) Help HP people improve skills for their present jobs and future opportunities
C) Help HP people work effectively in teams
D) All of the above

Where can HP people find information about training programs?

A) From their manager
B) From their local personnel department
C) From the Training and Development catalog
D) All of the above

frustrated by feelings of threat.

Fundamental responses to these concerns are seen chiefly as a matter of local responsibility and action, although corporate support in the form of training, communication and management evaluation is important. In fact, most divisions and regions have redoubled efforts to strengthen both the application and understanding of HP's management philosophies. Some organizations, for example, have restated a crystal-clear HP policy that says any attempts by managers to block the use of Open Door will not be tolerated.

The startup of more than 300 quality teams at many locations is serving to improve both productivity and the practice of MBO. The Open Door policy as well as MBWA were topics of messages by President John Young in recent issues of **Measure**. Both are closely related, their critical common elements being the accessibility of managers to their people and the need to establish a work climate of openness and trust. This issue, along with others in the management category, will be emphasized in continuing communications, and be taken into consideration in the evaluation of managers.

The analysis sessions produced only a few problem statements about job stability. These statements came mainly from divisions facing relocation or reorganization, their chief concerns being uncertainty and lack of information. A review of division responses to Open Line indicates that most are aware of their responsibilities to inform and prepare people for changes in organization. They have generally improved their abilities to offset concerns through better planning of the people aspects of changes, and by improved communication.

TRAINING

If you answered "D" to all of these questions, you are correct and perhaps a bit surprised, if Open Line survey results were any indication. Although Open Line respondents generally were favorable about training and development oportunities, a few key concerns were revealed: not enough formal training, not enough information about training, and not enough training for employees who are new to their jobs or for those considering advancement.

Beyond these, Open Line revealed broad needs for added emphasis on training in a number of specific areas. For example, a high percentage of the problems that were stated in the Open Line process arose from peoples' misperceptions of various programs and policies. Many of these misperceptions could be traced to inadequate exposure to correct information. Training is certainly one of the important means available to insure that employees are presented with and have access to adequate information.

What follows is an attempt to clarify these issues and to review the actions being taken:

Over the past few years, divisions and sales regions have been equipped with a broad new menu of development opportunities, bringing the total to more than 50. They have three main goals:

FAMILIARIZATION

Courses have been introduced to help all employees understand basic HP philosophy, policies and guidelines, and management style. In addition to New Employee Orientation, the Working at HP course (designed to reflect the same concepts that are taught in management courses) has now been presented to more than 17,000 employees in just over two years. Newcomers to HP's sales and service organization become familiar with the company via centralized neophyte sales seminars held throughout the year.

SKILL-BUILDING

Based on feedback from Open Line, Corporate Training is taking major steps to help divisions and sales regions with the organizational direction and resources they need to provide jobskill training for employees. Currently being developed or implemented are assembly skills for improved workmanship standards, electronic data processing skills, clerical skills and job instruction training for supervisors to assist them in communicating job skills to employees. An extensive array of courses on videotapes has also developed. Employees can learn about subjects such as digital troubleshooting either on their own time or as part of a classroom learning situation.

TEAM-BUILDING

At the same time, Corporate Training has moved quickly to help divisions and sales regions effectively involve employees in quality teams. The de-

partment has trained about 500 prospective quality team leaders and facilitators to date. (Quality teams are HP's version of the Japanese quality circle concept; employees from the same work area volunteer to meet regularly with their managers to identify, analyze, and solve work-related problems.)

Division Management Simulation represents a new approach to promoting teamwork between managers. Using HP computer equipment, it helps functional managers gain a better understanding of one another's roles. The goal is to increase overall effectiveness as a unit.

AFFIRMATIVE ACTION

Among other important areas, Open Line examined employees' feelings about HP's Affirmative Action program.

Overall responses to the 115 Open Line questions were compared to the responses given by subgroups such as women and various age and ethnic groups. Each of these comparisons was quite favorable. Apparently, most HP people enjoy working at HP, and this holds true regardless of sex, age or ethnic background. When an additional comparison is made between HP employees and those of the top 200 companies in the U.S., minorities and women at HP averaged eight and 10 points respectively higher than the national norms. The only category on which the national norm exceeded the average for women and minorities at HP was the Job Security scale, but this was also true for HP as a whole.

Employees over age 40 were generally more positive about HP than younger age groups. Employees 55 years and older consistently ranked above company norms on all scales except Job Security, but even in this category they were only three percentage points lower than the HP norm of 49 percent.

In the 17 major categories investigated in the Open Line survey, the differences between men's and women's responses were small. The two largest differences were seen in the areas of Management and Job Satisfaction, and here the differences were only five and three points respectively. When the scores were totaled for all 17 categories, women scored nine percentage points higher than men. It's also interesting that women viewed Pay and Benefits more favorably than men.

Although minority employees ranked comparably to national norms in all 17 categories, individual minority groups averaged about four points less than the company as a whole. When these groups — Blacks, Hispanics, Asians and Native Americans — are examined individually, some similarities and differences appear.

All four groups showed concern about the issues of Policies and Practices, Job Security, Organization Change, Management and Pay, yet on other issues there was a greater divergence of opinion. Asian and Native American employees express more concern about Work Associates, Work Organization and Job Satisfaction than do Black and Hispanic workers.

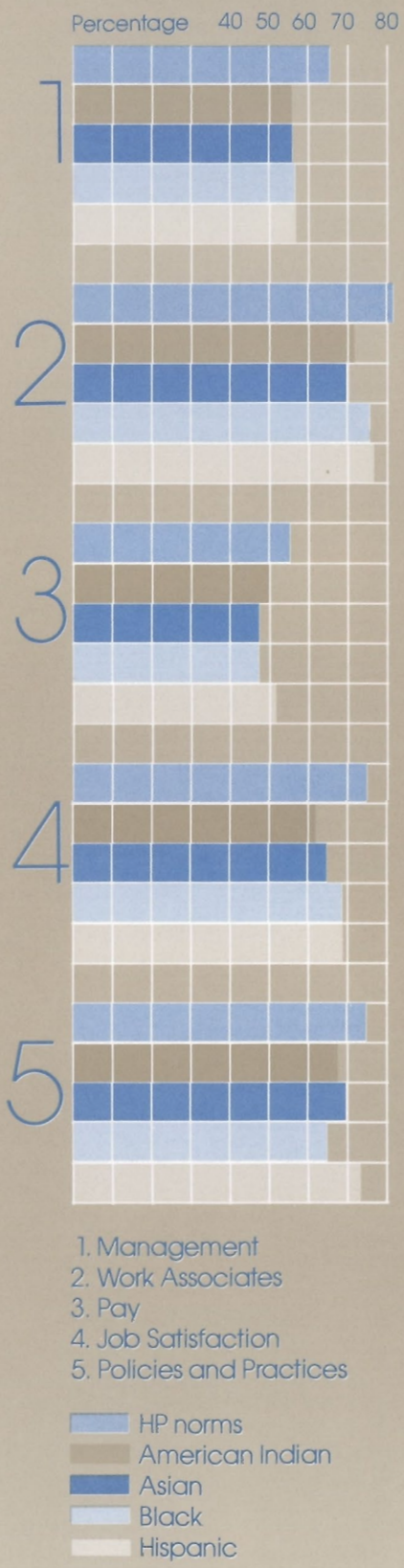
In examining all the Open Line scores for the various sex, age and ethnic subgroups within HP, it is clear that a single, simple solution will not serve as a panacea for all groups. Just as ethnic priorities differed between groups, it appears different solutions must be developed to fit the requirements of all the subgroups within HP.

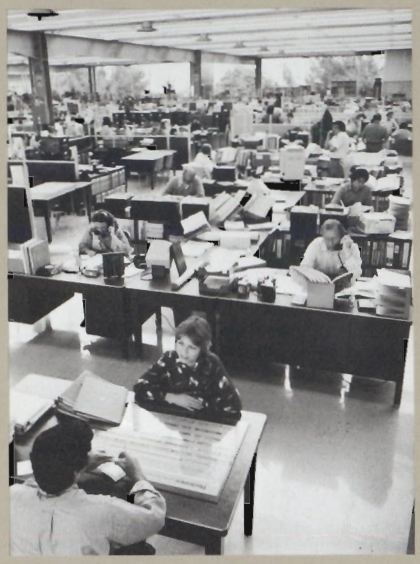
Finally, the issues of Understanding Company Policies and Management, as well as Access to Jobs, emerged as themes linking the survey responses together. They suggest that how one comes to understand the organization and how one gets ahead in the organization strongly influences the perceptions of minority groups and women.

What is the next step in AA? HP is piloting a workshop on Managing a Multicultural Workforce. The workshops will focus on many of the areas of concern discussed earlier. Also, seminars specifically for Black professionals and managers were successfully piloted last year by General Systems Division. HP is now piloting a similar program for women and will soon start work on programs for other minorities. These programs will go a long way toward improving perceptions about Access to Jobs, Concern about Change, and Understanding Company Policies and Management.

These programs for minorities and women go well beyond present HP training programs such as Managing at HP, and will present tools that will be useful to women and minorities in matching their expectations to the realities of the organization. They should also help overcome personal and organizational barriers to career achievement.

The varying responses of four ethnic groups to five key categories of Open Line questions are charted here. Overall, individual minority groups rated HP an average of four points below that given by HP employees as a whole, though still far above the national norm in almost all cases.





The open office environment is a boon to increased communication among employees. Mike Cunningham and Jan Holler in the product marketing department of Stanford Park Division discuss plans for a new product.

"After the completion of all the possible problem statements, it was the consensus of our group that Hewlett-Packard is a good company to work for and, although it has its problems, there is no other company they would rather work for."

Finally, the Affirmative Action Workshop has been totally revamped and should be available in May 1981. More and more, affirmative action at HP will be based on meeting our objectives of citizenship, the community and people — rather than government compliance.

COMMUNICATIONS

Overall communication was one of the seventeen categories of responses analyzed in the original Open Line survey. As in most categories, the percentage of favorable responses was well above the national norm. The survey showed that employees feel the company keeps them well informed and that managers are receptive to employee opinion. This suggests that we are doing a good job in general, but responses to several other categories indicate there is room for improvement in our communications.

Comments from the Open Line analysis groups illustrate that employees do have some misperceptions about our management policies and philosophies despite major efforts in our training courses and published information. As a result, John Doyle, vice president of Personnel, chartered a task force to examine how we could improve the communication of personnel programs.

The Communications Task Force recommended the establishment of a communications strategy with the basic goal being "to enhance employee understanding and awareness of Hewlett-Packard personnel programs." In addition to pay and benefits, this should include the many management philosophy and policy issues so important to understanding the HP way and improving the effectiveness of Management by Objective.

In addition to previous articles and letters in **Measure**, much of the response to Open Line issues has taken place at the local level. This is as it should be and most are continuing to do an outstanding job in this process.

A MESSAGE FROM JOHN DOYLE

In the last seven pages you've learned many of the results of our Open line employee survey, including people's attitudes toward, and understanding of our company, its practices and philosophy. We have learned a lot, and there have been changes as a result of the survey.

But in this final report about Open Line, it's important to put this process in its proper perspective. Hewlett-Packard has a reputation of being an employee-oriented company, a reputation that's solidly based in actions throughout our 40-plus year history. The survey was yet another attempt to ensure that our reputation is still deserved. At the outset, no one, including me, imagined how involved the Open Line process would become. But we knew that if we elevated employee awareness of the company's attitude and concern for its employees, we'd accomplish a great deal.

We were not survey specialists, and we made a few mistakes along the way. In spite of our scrambling, the final results are tremendously helpful, thanks to the efforts of a lot of people. Sometimes the process of exploration is as important as the outcome.

Changes came about slower than we expected. Perhaps some people came into the analysis groups with the idea of overnight results. We now know that any changes take careful planning, review, consideration and implementation. This is particularly true when those decisions affect the entire company. For instance, the decision to add an extra holiday or vacation day to the schedule is a $3.5 million decision. Benefits in the years ahead will see an increased emphasis on what we call soft benefits. As companies, in an effort to be competitive, develop similar benefit programs, the key difference will be found in HP programs like profit sharing, Management by Objective (MBO), flexitime, open offices, casual dress, employment stability, informal access to management, etc. These programs have helped make HP the success it is today, and will continue to do so in the years ahead.

Although this is a final report, it is by no means the end of the Open Line process. There are still a few issues to be addressed at the corporate level. As we look at benefits in the future at HP, comments from the survey most certainly will guide our choices. And, in not too many years, we will probably conduct another Open Line survey to once again make certain our employees feel we're still on the right track.

YOUR TURN

Invites you to question or comment on matters of importance to the readers of Measure.

KUDOS

You are doing a wonderful job with **Measure** magazine!

I am pleased to have a quality corporate news magazine which I not only look forward to receiving and reading, but I even show it off to my designer friends as an example of excellent design in a news publication.

I look forward to many more exciting issues in the future.

KATHY GARD
Business Computer Group
Cupertino, California

ULTRASOUND — A LIFESAVER

In a recent issue of **Measure** you had an item about the HP7702A Ultrasound Imaging System. It's difficult to convey the heartfelt thanks I feel for the development of such a system. January 9th I stood for an hour or more as the staff at the Stanford University Medical Center used a loaned instrument to analyze my mother's heart condition after she had congestive heart failure during a visit to her son-in-law in the hospital.

Mom has had a long history of hypertension yet some of her symptoms were that of a disfunctional aortic heart valve. Textbooks say that the two conditions do not exist in the same person. After several tests and conflicting results, the decision was made to use the new HP equipment to get a "better picture" of the problem. Its reading that she had a valve problem complicated by hypertension was later confirmed by a cath test.

I'm happy to report Mom was put first on the list for open heart surgery. She came through the opertion like a champ and is now recovering at my sister's home.

Thanks, HP. You've added my mother's life to the many you've saved.

JUDY JACKSON
Corporate Marketing Services
Palo Alto, California

The equipment used for Judy's mother had been loaned to Stanford by the Andover Division for field evaluation.

WRITE ON!

I've been reading the letters you've printed in Your Turn and wonder if you ever choose to leave letters out of Measure for one reason or another?

KAREN NAKANO
Corporate Personnel
Palo Alto, California

In the 10 months since Your Turn began, we've printed almost every letter received. To date, the only ones we've left out have been either specific problems between an employee and supervisor or those which duplicated another on the same subject.

There have been instances where a letter was received so close to deadline that we couldn't squeeze it in the current issue, and had to postpone it for an additional two months.

For the record, most of the letters we receive are signed, and most HP people allow us to print their names along with their comments. However, we will withhold printing the writer's name, if requested.

Letters tend to focus on subjects which have appeared recently in Measure, *although we don't want to limit content to just those. We're particularly interested in hearing from people who have something of interest and importance to share with 58,000 other employees — views and concerns about almost anything that affects our working lives. It's Your Turn, so let's hear from you.*

Address letters via company mail to Editor, **Measure**, Public Relations Department, Building 28A, Palo Alto. Via regular postal service, the address is Editor, **Measure**, Hewlett-Packard Company, 1501 Page Mill Road, Palo Alto, CA 94304. Try to keep your letter under 200 words. Please sign your letter and give your location. Names will be withheld on request. Where a response is indicated, the best available company source will be sought.

THE ONE AND ONLY

Bernard M. Oliver. Dr. Oliver. Barney Oliver. Barney. Those are some of the variants of a name that has earned a unique place and distinction at Hewlett-Packard. As head of the company's research and development since 1952, Barney Oliver has contributed directly and significantly to the invention of many of its products and their underlying technologies. More important, perhaps, he has influenced the work of hundreds of fellow scientists and engineers on the staffs of its laboratories and divisions, fostering an environment conducive to their creativity. Beyond these, he has put his mind to tasks that have ranged all the way from public transit systems and energy to the technologies of detecting and communicating with intelligent life on distant star systems.

On May 27, his 65th birthday, barney will retire officially as vice president of Research and Development, head of HP Labs, and as a director of the company. He will, however, continue as technical adviser to the president. Describing this role, President John Young said Barney "will be looking broadly at our programs with respect to those of important companies here and abroad, new directions in technology, and any other matters relevant to keeping HP in the forefront technically, including university research."

No one has been allied more closely with Barney, or more observant of the Oliver style, than Bill Hewlett, HP's co-founder and chairman of the Executive Committee. To mark the important transition in Barney's role, Measure asked Bill to comment on his association which, clearly, has been one of mutual friendship as well as professionalism:

"Just consider some of the things the man has done." Bill Hewlett glanced at the 1977 biography of Barney Oliver and cited just two of the entries — 40 technical papers, 52 U.S. patents.

Barney's premier role, said Bill, has been to suggest the right course for people to follow in solving technical problems and then to more or less work in the background while a project is underway. In that respect he's been an important stimulus to the thinking of the whole company.

"Sometimes, though," Bill continued, "he gets so involved he does it all himself.

"I remember one project — the old HP 300 wave analyzer — that we were redesigning. Barney designed a condenser to give it the kind of frequency spread you want in this kind of instrument. What intrigued him so much was that — for the first time — he had found an application for a 'hypergeometric' function! So this particular condenser was made using that very esoteric mathematical function!"

Another project Bill recalled was Barney's solution to the problem of amplitude stability in the early 200 C oscillators — they tended to 'bounce.' Oliver traced the feedback loop, figured out how to fix it, and soon thereafter redesigned the whole instrument into a vastly superior device.

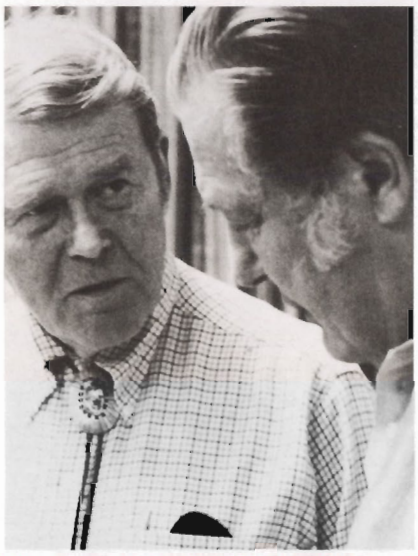
"As you look back," Bill said, "there have been a whole series of projects like that. He just has a tremendous ability to invent a way out of any problem.

"For example, in designing one of our first computer series, we got into a real bind because of the power supply. Somehow, the design allowed very little space for the power supply. It had the makings of a disaster.

"So Barney got his people involved, and in very short order they actually invented a smaller power supply that fit into the available space. And because it needed some

"HE JUST HAS A TREMENDOUS ABILITY TO INVENT A WAY OUT OF ANY PROBLEM."

Bill Hewlett and Barney Oliver looked on as Lee de Forest tried out a new HP waveguide device during a tour of HP in 1956. De Forest's invention of the three-element vacuum tube — the "audion" — ushered in the age of radio. In turn, many young engineers including Barney Oliver and Dave Packard were introduced to electronics by their experiences as "ham" radio operators.



At a recent meeting, Bill Hewlett and Barney Oliver continued their lifelong collaboration.

low voltages, Barney sat down and developed a fractional-turn transformer for which he subsequently received a patent. It was a typical instance: When you got Barney involved in a problem, by golly that problem got solved!"

More recently, that ability was brought to bear in helping to solve the Mystery of the Missing Trains. BART, the Bay Area Rapid Transit system serving the San Francisco-East Bay counties, had experienced a loss of contact with some trains as they moved from one signal section to another.

In 1971 Barney was appointed by the state senate to a panel of scientists whose task was to assess the safety of the system. In the course of the next year he, along with HP's Len Cutler and Dave Cochran, developed and demonstrated a very satisfactory solution — simple, yet elegant and inexpensive. In principle, it stated that if a train entered a "block" and had not emerged at the other end it must be in the block. Very few trains disappear into thin air. The concept was made available to BART at no cost, although HP still holds the patent rights.

Hewlett recalled that the Oliver problem-solving style was evident very early in their association: "I knew Barney at Stanford, although he started a few years behind Dave and me. At one point in his undergraduate years Barney talked his way into taking a graduate course in radio engineering taught by Fred Terman, even though he had not had the usual background studies. Professor Terman was reluctant, but said 'OK — however we'll review the situation at midterm.' At midterm Barney had the highest results in the class and of course stayed on."

The crossing of paths of Hewlett, Packard and Oliver was intermittent in the years immediately following Stanford: After a year in Germany Barney moved on to Ph.D. studies at Cal Tech and then to Bell Telephone Laboratories in 1940. "I used to see Barney from time to time during and after the war," Bill said. "Later in the '40s Dave and I tried to get Barney to join the company. At that time he was engaged in a very interesting television project project — trying to compress the signals. Obviously, Bell Laboratories didn't want to lose him, so they gave him a great deal of freedom. And he was working alongside some very stimulating colleagues.

"On the other hand, California was his home, his mother still lived near Santa Cruz, and he had some interest in the things we were doing. We

EVEN BEFORE HE JOINED THE YOUNG COMPANY BARNEY BEGAN SOLVING SOME OF HP'S TECHNICAL PROBLEMS.

Unaccustomed to sports or to the great outdoors when he joined HP, Barney was first attracted to such activity by tales of the High Sierra, as reported by Eileen Dugan, his secretary. Her husband, Hal, and half a dozen other HP fishermen had maintained a long tradition of fishing trips, one which persists to this year. In time, Barney became adept at casting a line, formidable at the game of cribbage, and a great storyteller around the campfire.

finally convinced him to join us in 1952."

Even before he joined the young company, Barney began solving some of HP's technical problems, according to Bill. "We were trying to increase the frequency range of the RC oscillators, and about 1945 I remember Barney asking if we had thought of using a threephase oscillator. After he pointed out the significance of this approach it was obvious that this was the way to go to higher frequencies. At the time he was simply pointing out that this was the kind of thing we could do — that it was not difficult to do. In fact, this was the genesis of a new instrument, the 650A. Then he came out here and did so many more of them that you begin to lose count."

He had an important influence and interest in the decisions affecting HP's entry into important new project lines, said Bill. Most notable were the calculator lines — both desktop and handheld. Barney also served as a magnet in attracting outstanding talent to the company's laboratories. Nevertheless many HP people know him best for the "Barney Oliver Amplifier," a high fidelity instrument still treasured by aficionados of sound systems (by the way, he also designed an optimum television antenna, said to be a simple but very efficient wideband antenna).

But the Oliver search for solutions ranged far beyond instruments. Hewlett recalled that Barney's presidency of the Institute of Electrical and Electronics Engineers (IEEE) in 1965 came just after two important and related organizations — the IRE and the AIEE — were reunited after more than 50 years of separation. Barney had had a direct hand in the difficult negotiation process. The quality of public education has been another of Barney Oliver's strong interests and concerns. For 10 years — from 1961 to 1971 — he served on the Palo Alto School Board, two of them as its president.

More than any other realm of inquiry, however, astronomy and the relationship of humans to the universe have absorbed his attention. "He's always been interested in astronomy," said Bill. To the point where in 1971 he was named codirector of "Project Cyclops," a National Aeronautics and Space Administration (NASA)-led design study of the engineering systems needed for detecting extraterrestrial life. Barney took six summer months off from HP for Cyclops — "the most important period in my life" he would write later. It was followed by further design and feasibility studies conducted by NASA and known as SETI: the Search for Extraterrestrial Intelligence.

Commenting on these experiences, Hewlett stated that "Barney could keep a thousand people busy with his ideas and interests. We encouraged this because it made his career here more challenging while allowing him to make contributions in the public interest.

"Have you heard about his clock? Now Barney knows a lot about clocks, and one time he figured out a new way to make one that used a wheel moving continuously at a constant speed determined by a torsion pendulum. He had worked out all the mathematics for it and filed a patent.

"For one of his birthdays the people in the model shop got together and built one of these clocks — the first of its kind. They gave it to him — and it worked! He was tickled to death!

"That's just so typical of him. His mind is so facile. He's always writing memoranda that explain complex things in a clear and straight forward way — such as an analysis of the energy problem, or how to compute an analemma (a scale used by navigators).

"It has been a great experience working with him on a number of projects and observing his influence on the growth and development of HP Labs. Just sitting down and talking with Barney is a refreshing thing to do. In short," Bill added, "I have never known anyone else who covers such a broad range of interests and who is so very good at so many of them." **M**

"BARNEY COULD KEEP A THOUSAND PEOPLE BUSY WITH HIS IDEAS AND INTERESTS."

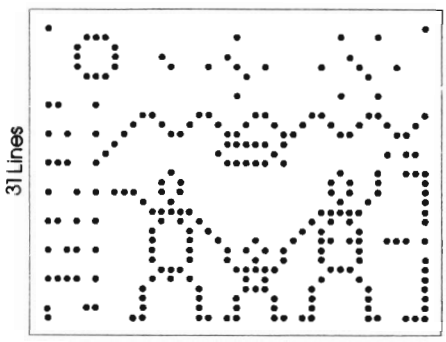
Silhouetted against a projector screen, Barney recently gave packed houses of HP people a guided tour of the VOYAGER journeys to parts of the solar system. At right is the image of Saturn.

In June 1968, **Measure** reported on developments in radio astronomy, noting the uses of HP instruments in these explorations. As a backpage postscript to the report, one of Barney Oliver's many contributions was described:

HELLO FROM EPSILON ERIDANI

Radio astronomers have recently had a field day gathering in strange radio pulses from interstellar sources. However, the scientists have concluded that intelligent beings are probably not originating these signals. The question remains: How would a technically advanced extraterrestrial people send communications across space in the hope of contacting neighbors a hundred billion miles away?

They might, wrote HP's Barney Oliver in a now famous proposal, prepare a mathematical code based on pulses and pauses, representing one and zero respectively. Any sharp math type in the universe should be able to decode it. First clue is the 1,271 "bits." Since this figure is the product of the prime numbers 41 and 31, lay out the message accordingly. Leaving out the zeroes, this would yield the pictogram shown here. The message, says HP's research vice president, describes a race of sexually reproducing bipeds. Its star and planets are shown along the left; the man is pointing to the fourth planet, his home. The symbols for hydrogen, carbon and oxygen show at the right of the sun. The idea of water on the third planet is conveyed by the wavy lines originating here. Below it, a fishlike figure appears. Finally, a computation based on digits at lower right and the wavelength of the transmission tells us that these hypothetical adult inhabitants of Epsilon Eridani are between six and seven feet tall.



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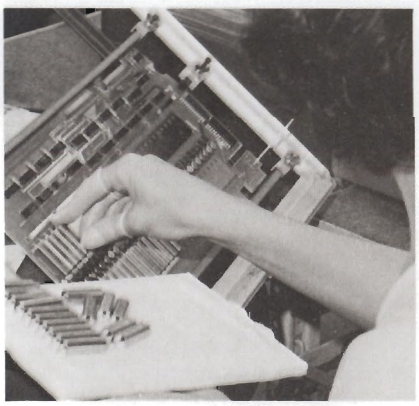


Loveland assemblers no longer have to worry whether the reed relay parts used in the 3060 board test system will be defective.

a partnership that really works

Nobody wants a lemon. In fact, when something you buy keeps breaking down, you probably change brands or products. That's usually what happens at HP when a small supplier ships consistently unreliable parts.

But a few months ago Loveland Instrument Division (LID) entered into an unusual arrangement with a supplier, the Gordos Corporation of New Jersey, because too many of Gordos' mercury-wetted reed relays used in building the 3060 board test system were defective.

Doesn't sound like such a big deal until you realize that LID was buying 10,000 of these relays a week—at $3 apiece—making it the highest dollar volume part purchased at that division.

The tiny little part was causing considerable frustration because up to 15 percent of the relays were found to be defective during incoming inspection, and about 12 percent more failed during the process of building the 3060 system.

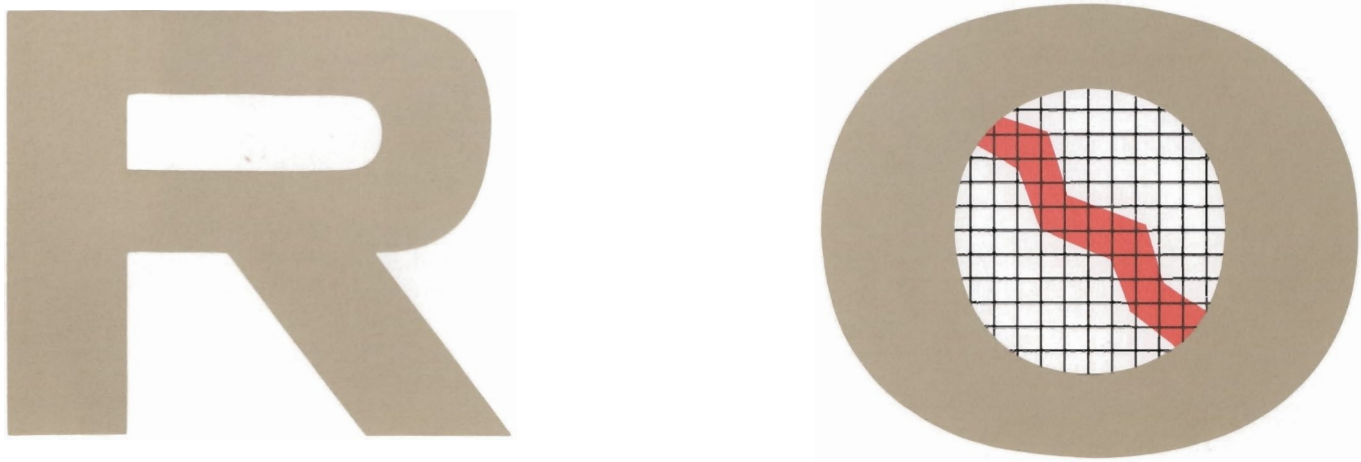
"As a consequence, we experienced higher than expected manufacturing costs and missed our shipment goals," recalls LID General Manager Bill Parzybok. Such a poor-quality part usually means that vendor gets the axe or at least some kind of pointed warning to "shape up or we'll take our business elsewhere," says Bill.

But this time HP decided to try something different.

"We formed a partnership with Gordos," he explained. "Not a legal partnership but one based on our mutual need. We decided to get really involved with the vendor to figure out how we could correct this problem."

During the next several months Gordos and HP got together many times to discuss the matter. Production Engineering put together a notebook of full-color photos showing exactly what a defective part looked like and, conversely, what the same part looked like when it was "perfect."

The album was in reality a very elaborate "spec" (specifications) sheet and it was used by HP and Gordos people to agree on how to define what a "perfect" part was.



Then, as Gordos worked hard to provide relays which met all HP's quality expectations, the production engineers, in turn, sent weekly quality reports back to the vendor.

After about two months something special began to happen: relay quality steadily improved. The odd coupling of the two companies was **working**. Vendor and buyer were **cooperating**. To their surprise, each found they really had not understood the other's problems.

"We had never really explained how we were going to use these relays. Even more important, we never explained what sort of manufacturing process the part had to survive," says Bill. The relays, in fact, had to hold up through a wave soldering process which caused some of the failures.

To maintain the improved quality, HP asked Gordos not to make any changes either in their manufacturing process or in the parts used to make the relays without prior approval.

"For example," notes Bill, "they were considering changing to plastic bobbins on the relay. They didn't realize the problems this could have created for us. Most likely this would have increased the bobbin's moisture absorption and caused our system to operate poorly in humid environments."

But the close encounters between HP and Gordos prevented such problems before they occurred. One engineer, in fact, was assigned on a fulltime basis to work with Gordos.

The result was nothing short of sensational.

A few weeks after this concentration of effort to improve quality, Gordos shipped HP 56,000 parts—and not one of them was bad!

"This turnaround certainly surprised us because it was much faster than we dreamed possible," says Bill. "I sent Gordos a letter commending them for making such a concerted effort to improve."

The experience confirmed Bill's belief that "when a buyer and supplier have a relationship like we have now with Gordos, super things are bound to happen.

"We also learned some lessons. For one, we caused a lot of our own problems by not communicating better from the start. They really didn't know what was causing their part to fail because we hadn't provided a detailed description of how we were using it."

Gordos has recently changed its focus, Bill reports. "They are now building slightly less in total output, but of much higher quality. That's HP's philosophy, too.

"It's a win-win situation: Gordos has a higher quality manufacturing process that produces less rejects, and HP gets parts that don't fail in our manufacturing process. It used to cost us between $5 and $25 to find and replace each defective relay so Gordos is saving us time and money."

As if all this harmony weren't enough, HP and Gordos are continuing their efforts to improve the part. Now that both sides understand how the relay is manufactured and used, further redesign efforts are planned.

Predicts Loveland Production Engineering Manager Bruce Huibregtse, "We expect to see an additional 30 percent reduction in the cost of the part because it will soon cost much less to manufacture."

The whole experience has been so uplifting that Bill says he's hoping to find ways to work with suppliers of other key parts "to help motivate them to work toward zero defects.

"Our efforts with Gordos proved it can be done. This has truly become a partnership that really works." **M**

CLOSE UP

Zooms in on the ever-changing world of HP people, products and places.

In the 15th century, the world was thought to be flat as a pancake. But a few people challenged the status quo and discovered a lot of surprising things.

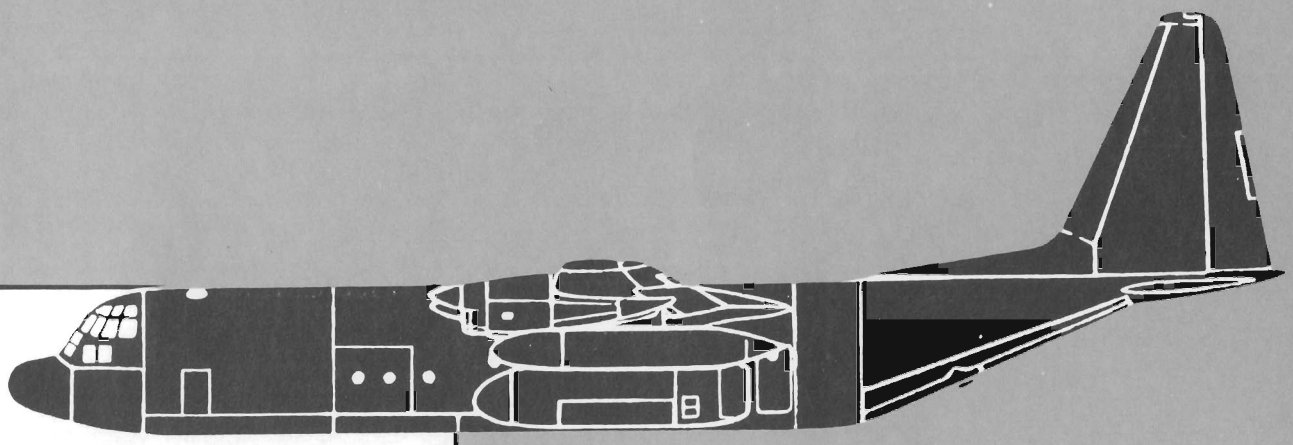
HP's oscilloscope sales force is challenging customers to look at some of the revolutionary changes in high-performance oscilloscopes. As a novel sales gimmick, prospective buyers receive a square-world mug with a color map of the world, circa 1500, after they've witnessed a product demonstration.

才智

Science students from Hwa Chong Junior College won HP Singapore's Electronics and Technology Quiz, taking home HP34C calculators for team members and an HP85 personal computer and software for the winning school.

Eight area junior colleges competed in the quiz, organized by the division's community activities committee. Judges for the competition were selected from the National University of Singapore, Singapore Polytechnic, Ngee Ann Technical College, SISIR, the Science Centre and HP. The quiz has increased awareness of electronics and computer science in area junior colleges and high schools.

Dr. Heinz Engelhardt of Saarbrucken University fields questions about the use of high pressure liquid chromatography at an HP-sponsored symposium near Munich. More than 190 specialists from Austria, Denmark, the Netherlands, Sweden, Switzerland and Germany learned about practical applications of HPLC in the field of biochemistry. The two-day event was put together by HP and the Max-Planck Institute of Biochemistry in Munich.

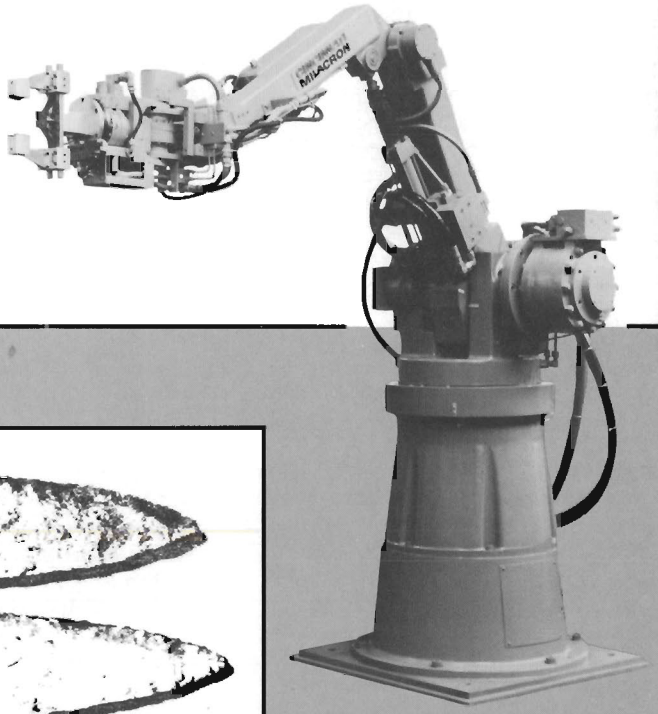


Medical products are flying high aboard the first selfcontained airborne emergency hospital, manufactured by the Lockheed Aircraft Service Company in California. The C-130 Hercules aircraft is designed to fly into remote areas with complete medical facilities whenever a disaster strikes.

On board are examination, surgery, intensive care and recovery rooms. HP supplies patient monitors, recorders, central stations, defibrillators and EKG carts for the flying hospital.

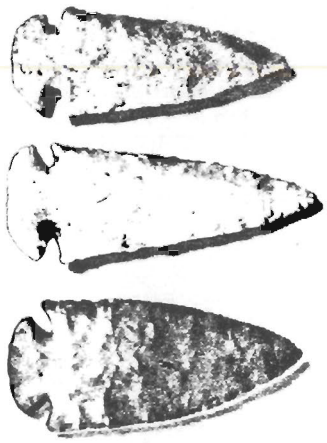
There's a 10-foot robot at Corvallis Division performing a job most people would find boring. T3, the company's first industrial robot, works at the end of the injection machine line, performing the repetitious, monotonous job of handling the plastic that makes calculator faces. The robot picks up material from a stack and places it on a machine that pierces locating holes. Then the robot moves the material to a machine for cutting out individual face plates.

Tom Winslow, the division's automation technology engineer, says T3 was picked over other robots because it is the most intelligent machine on the market today. T3 can reach 13 feet off the ground and tips the scale at a hefty 5,100 pounds.



Arrowheads, knives and scrapers from HP's Andover Division are now part of a collection of prehistoric aboriginal artifacts. The small pieces of stone aren't part of the division's line of medical products. Instead, the artifacts come from the northeast corner of HP's property — the site of archaeological excavations that have unearthed tools that appear to date from 6000 B.C. to 1000 A.D.

During those times, an aboriginal culture lived near rapids in the nearby Merrimack River and enjoyed abundant fishing. The Massachusetts Historical Commission has picked part of HP's property and adjoining Digital Equipment and conservation property for more excavations to learn about northeastern Massachusetts prehistoric culture.



NEWS CLIPS

Recaps the newsworthy events, changes and achievements within HP.

During a break at the 1981 shareholders meeting in Cupertino, California, on February 24: HP director Ernest C. Arbuckle, Harold J. Haynes (who was elected to the board that day), and Francis L. Moseley, who has retired from the board after 15 years as a director. Haynes is chairman of the board and chief executive officer of Standard Oil Company of California.

FIRST QUARTER FY81

Hewlett-Packard reported a 17 percent increase in both sales and net earnings for the first quarter of the company's 1981 fiscal year. Sales totaled $775 million, compared with $664 million for the first quarter of FY80. Net earnings amounted to $63 million, in contrast to $54 million during the first quarter of last year. Incoming first-quarter orders of $931 million set a record unmatched in any previous quarter and represented a 16 percent increase over orders of $800 million in the first quarter of FY80.

DELCON MOVE

The former Delcon Division has changed its name to Colorado Telecommunications Division (CTD) as part of a phased move from Mountain View, California, to Colorado Springs, Colorado. (It will be known informally as Colorado Telecom Division.) The startup group now in Colorado Springs moved March 30 into a temporary leased facility adjacent to the Colorado Springs Division, with the entire move to be completed by early 1982. HP has excercised an option to purchase a 206-acre site in Colorado Springs to house both the future permanent facility of Colorado Telecom and expansion of the Colorado Springs Division.

NAMES TO KNOW

Ken Patton has been named the new general manager of the McMinnville Division replacing Bill Craven, now director of Corporate Personnel. Patton was R&D manager for both the Waltham Division and Medical Group. . . . Bob Puette has moved from general manager of the Computer Support Division to the same role at the General Systems Division. Mike Leavell, formerly Neely's regional sales manager for computer products, replaces Puette. . . . Robert Aydabirian will head a newly created Grenoble Technical Systems Operation, responsible for Data Systems and and Roseville divisions' activities at that location.

HONORS

First members of the Instrument Group's Founders Club which honors top sales representatives for recognized excellence over a period of several years: Neely Sales Region's Gordon Angus, Bill Calton, Larry Fisher, Jim Macrie, Jim Martin, Saleem Odeh, Don Swanson, Roger Tracy, Chuck Winberg; Midwest's Jim Alt, Bill Vance, Glen Wikre; Eastern's Tom Duffy, Joe Fasulo, Lawson Singer, Vince Yaras; Southern's Mark Birmingham, Chuck Carpenter, George Drury, Reid Nesbit, George Tahu. . . . Fred Riley, product assurance manager of the Manufacturing Division, has been elected president of The International Association of Quality Circles for 1981-82.

CONFERENCE NEWS

HP scientists from the Desktop Computer Division's Systems Technology Operation made news at the International Solid State Circuits Conference in New York City on February 19 with two technical papers about a new 32-bit processor chip with 450,000 transistors which is now in the developmental stage in Fort Collins (see p. 3). Dubbed "Super Chip" by the media, it caught the attention of national press, radio and TV. Presenting the papers on behalf of the research teams were project leaders Joseph Beyers and James Mikkelson; authorship included Louis Dohse, Joseph Fucetola, Richard Kochis, Clifford Lab, Gary Taylor, Eugene Zeller, Lawrence Hall, Arun Malhotra, Dana Seccombe and Martin Wilson. At the same conference, Rory Van Tuyl, project manager for gallium arsenide ICs in the Santa Rosa Technology Center, received the best paper award.

A MESSAGE FROM JOHN YOUNG

HP President John Young chats with an employee during the annual shareholders' meeting in Cupertino.

A statement summarizing the company's philosophy on benefits was drafted recently and is presently being distributed widely as part of the Open Line final report. Our experience from Open Line tells us that as we become larger and more dispersed we must take greater care to define exactly what we mean in major policy areas.

The benefit policy sets out the broad goals of our benefit programs: a "package" approach that's designed to meet the needs of many people, and the basis on which HP expects to maintain a position "among the leaders." The statement also outlines the specific criteria that are used in evaluating the overall package and its components.

We believe this statement provides a very sound, yet flexible, standard by which to measure our benefit programs. The definitions should be very useful to all of us whenever we want to improve our understanding of a particular benefit, to measure the worth of a proposed new benefit or to compare our programs with those of other companies.

A number of key points are made in the opening paragraph of the statement. One deals with our competitive position on benefits. We intend to provide benefits that put HP in a leadership position compared to other corporations. This parallels the salary philosophy I discussed in the last issue of Measure. Another, which I would like to expand on here, notes that a fundamental goal of many of our programs is "to protect HP people from serious losses."

The company's first health insurance program for employees got its start in August 1942. At the time there were just 51 people on the payroll, all of them located in one rather small building in Palo Alto. That first program consisted of an insurance policy which paid $5 per day for hospital room and board for a maximum of 70 days, plus up to $100 in miscellaneous expenses. The total cost of that insurance to the company was $25 a month. Today, the health coverage for HP's 42,000 employees in the U.S. costs the company more than $2,858,800 a month.

That was a beginning, and while it was not a "first" in industry it definitely placed HP in the vanguard in benefits. Not long after, the company extended its health coverage when an employee experienced a critical illness. Looking at the longterm consequences of such an illness and the serious impact on employee and family, we developed a program that would provide continuing financial protection in the event of catastrophic failure in the health of an employee.

In the nearly 40 years that have passed since those first HP health programs, much progress has been made in the concept of employee benefits. We've seen programs grow in sophistication, becoming much more comprehensive as well as costly. Many of the changes are outgrowths of social and economic forces. The range of programs in the U.S. organization now includes medical and dental plans, income protection, Workers Compensation, group life insurance, retirement plans and social security.

These kinds of personal protection have gained almost universal acceptance, and are now incorporated in one form or another in most of our international programs. Clearly, all of us want to feel assured that we are adequately protected against that unknown calamity or illness. By sharing some of the risk and the cost of that protection we've come a long way toward that goal.

MEASURE

"Man is the measure of all things."
–Protagoras (circa 481-411 B.C.)

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