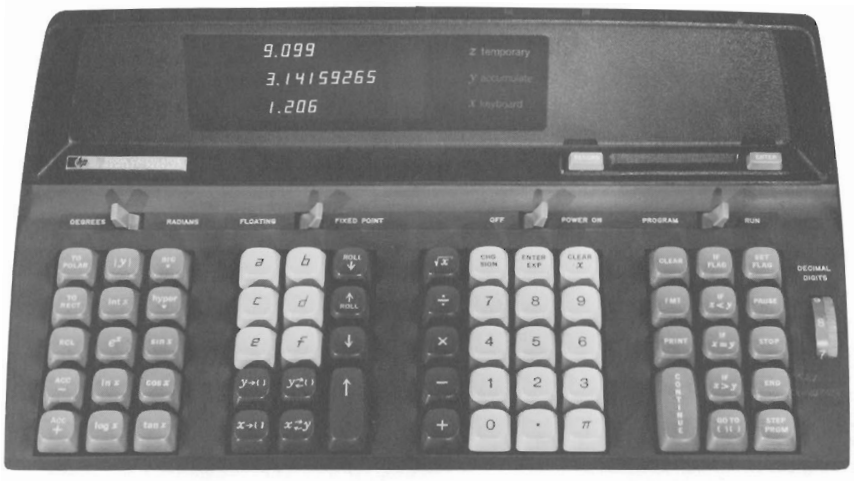
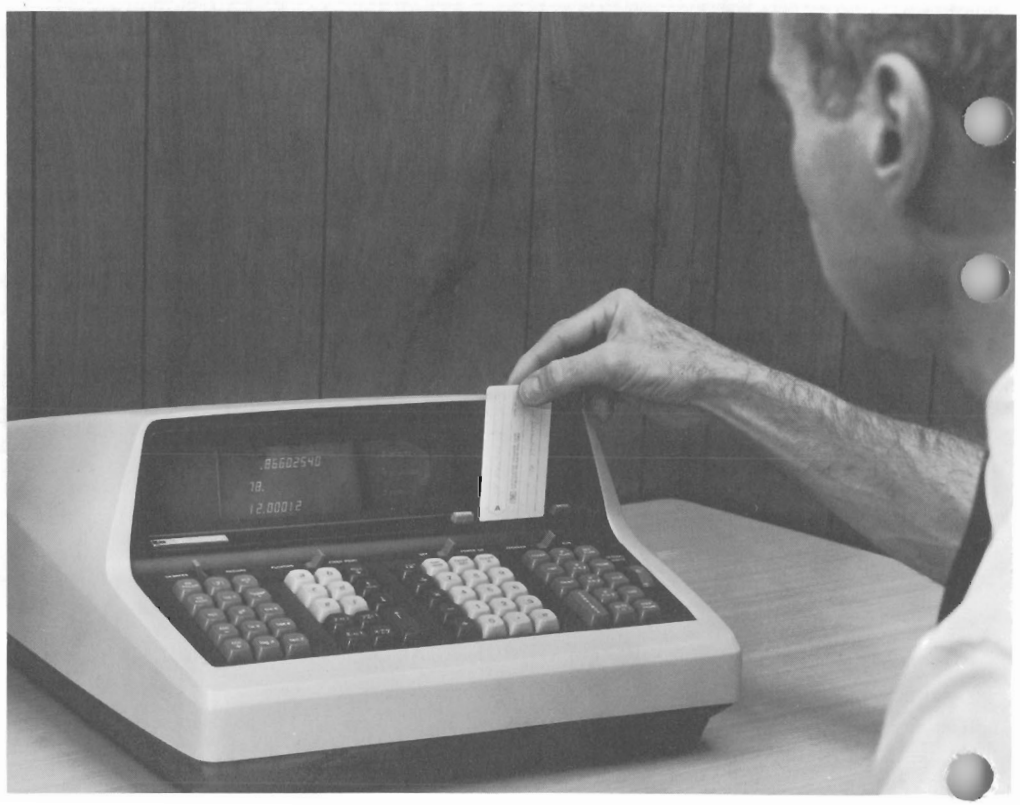
Measure

For the men and women of Hewlett-Packard/MARCH 1968



HP's new desk top calculator:

Problem solving at split-second speeds



Exemplifying ease of operating HP's highly sophisticated new desk top calculator, an engineer activates stored program by inserting magnetic card. Programming requires only ordinary English or algebraic labels.

NEW YORK, March 11—Hewlett-Packard officials today announced the development of a self-contained electronic calculator the size of a typewriter.

It can, they reported, outperform many computers.

In making the announcement, Board Chairman David Packard said the calculator was developed primarily for scientists and engineers, to speed and simplify their complex calculations. He said it is also expected to find wide use in education and in those areas of business involving higher mathematics.

"With the rapid growth of science and technology has come an increasing need for easily operated, attractively priced calculating machines that will perform a broad range of mathematical operations at split-second speeds," Packard said. "Another requirement of these machines is that they be programmable, like computers, to solve complicated problems. In meeting these objectives, the new Hewlett-Packard 9100A desktop calculator exceeds all other calculators on the market today.

"It was more than two years in development, and represents something of a departure from our traditional product line," he added.

Outlining specific features of the calculator, Dr. Bernard M. Oliver, HP's vice president for research and development, pointed out that the instrument's keyboard includes all the functions commonly found on the engineer's slide rule. Among these are logarithms, exponentials, hyperbolic and trigonometric functions and the inverse of these, as well as coordinate transformations. He pointed out that it's as easy to transfer a vector to polar form as it is to add two numbers.

"We believe one of the most interesting and popular uses of the calculator will be in teaching math to students," Oliver said. "By removing the time-consuming drudgery of manipulating numbers and consulting tables, the calculator will enable the student to concentrate on the pure principles of mathematics and thereby enhance his learning process."

□ With the March 11 conference at New York City's Waldorf-Astoria Hotel, the press had the whole story. There, with representatives of the nation's business and technical magazines and newspapers in attendance, the rumors that these reporters had been asking about from time to time came to an end.

Yes, there was a desk top calculator--but not just another desk top calculator.

The reporters learned, for example, that the 9100A's speed of operation makes it possible for the machine to solve problems in science and engineering which have been considered beyond practical solution by calculators. Since it is at least 10 times faster than earlier machines, and often 100 times faster, the new calculator can, in seconds, solve problems which took minutes on earlier machines—if they could solve them at all.

Contributing to the ease and speed with which the 9100A can solve complex problems is its broad programming capability. Simply by pushing appropriate keys, the user can make the machine perform complicated, successive operations automatically.

Up to 196 program steps are provided in the machine itself, more than in any other calculator. Some important, computerlike kinds of program instructions are provided, such as conditional branching and looping, allowing the calculator to make decisions, much as large computers do.

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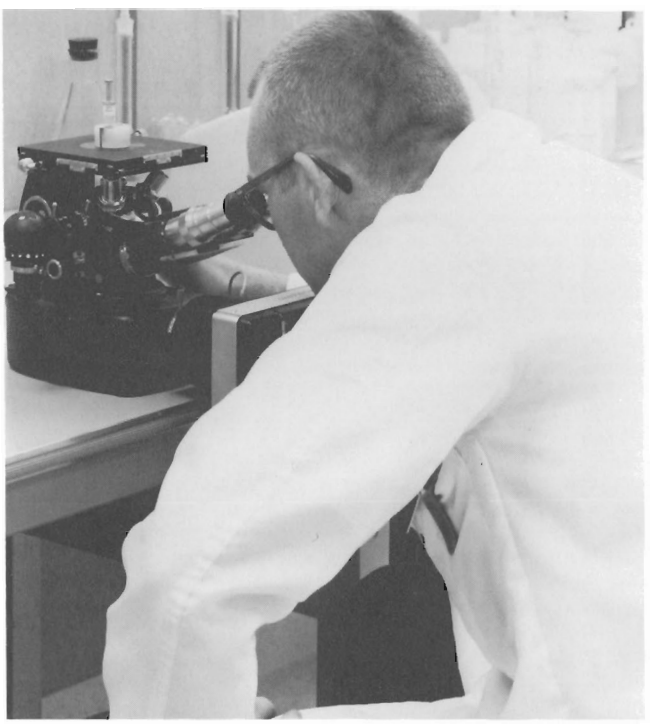


Loveland's Larry Huston checks a cross section of a multi-layer printed circuit board using metallurgical microscope with attached camera. He looks for such things as proper alignment, bonding, and electroplating of the through holes for connections to the inner circuits.

desk top calculator

The desk top calculator, introduced at a special press conference in New York City on March 11, ranks as one of the most exciting instruments developed by the company in its 29-year history. The following interview with HP President Bill Hewlett explores some of the more significant aspects of the new instrument and its impact on the marketplace:

. . . we wanted to teach the calculator routines so that it would never forget . . .

. . . traditional customers will account for only about a quarter of the market . . .

. . . it was designed with eve consideration given to the gic of layout and ease of operation.

MEASURE: Turning first to the technology of the desk top calculator, what are a few of the more important features of the instrument that set it apart from currently available calculators?

MR. HEWLETT: I would say that the desk top calculator's ease of operation, its wide range of standard mathematical functions available at the fingertip, its capability to accept programming — either manually or by magnetic card, and the fact that it is designed to operate with auxiliary equipment such as printers and plotters, are certainly some of its outstanding features.

MEASURE: A look at the keyboard shows that the desk top calculator is capable of some highly complex performance with a minimum of effort by the operator. Can you give us an example of a problem that would illustrate this, and some indication of the time required to solve the problem using the 9100A?

MR. HEWLETT: One good example would be found in surveying. Let's suppose that a surveyor is trying to measure an irregularly-shaped plot of land. It will be necessary for him to make a number of sightings to get around the plot. His measurements will be in the form of angles and distances, called polar coordinates. He needs to convert these measurements into rectangular coordinates, that is, so many feet north or south and so many feet east or west. For every readout, therefore, he must use a set of trig tables with lots of multiplying to obtain the new rectangular coordinates of the point — a tedious and time consuming job. With the 9100A, all he needs to do is simply enter his angle, then his distance, and press the Polar to Rectangular key. The answer in rectangular coordinate appears at once. Another button on the keyboard will let him add each of these calculations to the previous calculations. His "closure" error is then immediately available at the touch of another key. A simple program will also provide the area enclosed by the traverse.

MEASURE: We understand that the desk top calculator doesn't use integrated circuits. Could you explain the type of circuitry it does have, and some of the reasoning that led to this type of design?

MR. HEWLETT: We wanted to build in a lot of routines, such as changing from Polar to Rectangular coordinate mentioned above, and we wanted to use a very special type of circuitry that would teach the calculator these routines so that it would never forget. Such a device is called a Read Only Memory. The 9100A's memory contains over 32,000 bits of information. We achieved a Memory of this capability through the use of very complex multilayer circuit boards. The board consisted of 16 separate layers all laminated together, each with the necessary geometric design corresponding to the information desired to be stored on them. Transistors appeared to be the most effective method of coupling into and out of the Read Only Memory.

MEASURE: In the area of marketing, what is HP's estimate concerning the size of the calculator market?

MR. HEWLETT: The calculator market is in a period of substantial expansion, so it's hard to pin a specific figure on its present size. However, there's no question but that this market is a sizable one.

MEASURE: Would you expect that our electronic customers will make up the bulk of calculator sales, or will we find that we are dealing with a new profile of technical personnel?

MR. HEWLETT: A preliminary survey indicates that our traditional customers will account for only about a quarter of the market. Other major customer areas will include such fields as mechanical engineering, civil engineering, chemistry, and physics. The calculator will also have strong application in the field of statistics and general business use. The great flexibility of the calculator means that it will find wide use in many diversified fields, related only by their mathematical computational needs.

MEASURE: Will this result in any changes in our field sales organizations from the standpoint of numbers of people or specialized personnel?

MR. HEWLETT: We feel sure that we are going to have to have field sales specialists who are thoroughly conversant with the power and general flexibility of the calculator, and who can call on a wide, diversified group of customers.

MEASURE: What sort of acceptance do you think the calculator will get in international markets?

MR. HEWLETT: I would expect that the calculator would find very great acceptance in the international market, for it can perform many functions that a more traditional computer might perform, but at far less expense.

MEASURE: The Loveland Division will manufacture the instrument. What effect, if any, will this have on Loveland's production facilities and its employment?

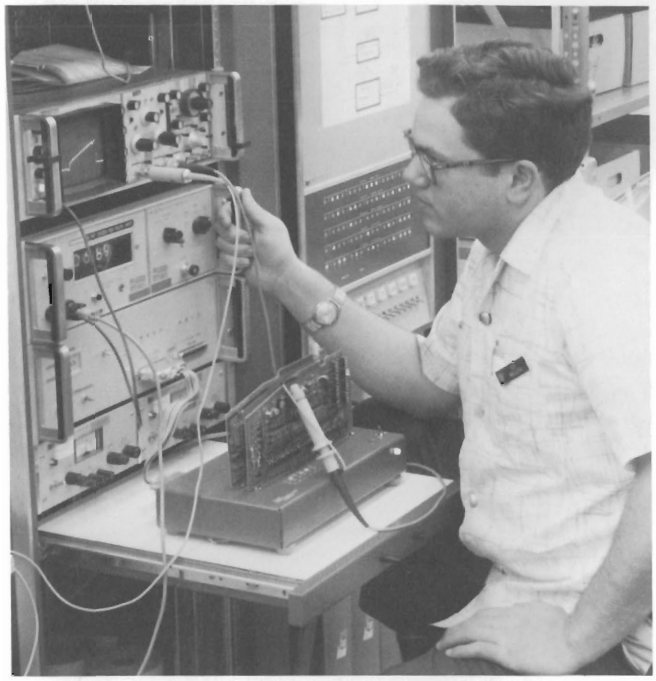
MR. HEWLETT: There isn't much I can say about the employment level at this time, since that will depend almost entirely on the volume of sales. With regard to production facilities, it was necessary to introduce special facilities at Loveland to manufacture and check out the calculator. One example is a special printed circuit facility to make the Read Only Memory. In addition, a considerable amount of automated equipment is being installed to give final checkout to the instruments.

MEASURE: When will the first units be available for delivery to customers?

MR. HEWLETT: The estimate now is that instruments will be available for delivery in late summer.

MEASURE: Finally, we understand that the overall approach to the calculator was unique, and accounts for the instrument's flexibility and capability. What was this approach?

MR. HEWLETT: Unlike other calculators, the 9100A was designed from the outside in, not vice versa. By this I mean that the controlling design factors were set at the interface between the calculator and the operator. It was designed with every consideration given to the logic of layout and ease of operation as far as the user is concerned. Subject then to this constraint, the designers had to come up with the necessary internal circuitry to meet these requirements. I'm happy to say this rather formidable challenge was met.



Loveland Division designed a special system, built around the HP 2116A computer, to test the calculator's printed circuit boards. Ed Miller is shown with the system, which simulates the calculator's operation and provides test results, locates any faulty components, and prints the information on a teletype.

Programming the calculator involves no special computer language, only use of pushbuttons with ordinary English or algebraic labels. Programs may be stored on and re-entered from credit-card size magnetic cards. These are erasable and reusable. Each card will carry two, 196-step programs, and cards may be inserted successively to link programs.

In the past, machines capable of working with 20-digit numbers have been considered large. The HP calculator, on the other hand, will accommodate numbers as small as 10^{-99} (a decimal point followed by 97 zeros before the number 1). Or, on the other end of the scale, it will deal with numbers as large as 10^{99} (the number 1, followed by 99 zeros). Numbers may be entered and displayed with up to 10 significant digits.

As Barney Oliver pointed out at the press conference, "this is beyond the reach of some full-scale computers. It is a big advantage to be able to deal with very small and very large numbers at the same time, without having to carry decimal points in your head. It's also an advantage to know your calculations are very unlikely to be halted because the machine has overflowed its capacity."

A final plus for the user will be a silent printing device that will make permanent records of calculations. This optional, add-on unit will be available sometime after the calculator reaches the market.

This market is relatively new, but rapid in growth. It's obvious that HP fully intends to play an important role in its further development. □

waiting for SPRING

That itch begins in the fingers or the toes, the arms or the legs. Breathing gets harder. The heart pumps faster. It isn't long before you have a real old-fashioned case of spring fever. It happens anytime about now, on a day when it's a bit warmer, the wind is light, and there is a blossom or two showing.

These HP people are going through one of the well-known symptoms of this contagious infection, namely the compulsion to get ready, to do something, and go somewhere.

Thank goodness their suffering will soon be over. Then they can get out there and hike and swim and sail and garden and cycle and fish.

Some of us, of course, have another approach. If we wait long enough the fever will subside. For many, in fact, the best antidote for spring fever is spring itself.

Late winter months aren't particularly good times for mountain fishing. The water generally is high and murky from the snow runoff. But, to an avid fisherwoman such as Peg Julian of Colorado Springs Division, there's always something that can be done while waiting for spring. Tieing your own flies, for example. Peg, an assembler in the sampling oscilloscope production department, acquired her interest in fly-tieing from the boyfriend of one of her three daughters. Pretty soon it will be off to Taylor Reservoir just about every weekend of the long, sweet Colorado summer.

When spring arrives, Elfi Rahn will have put away the ski boots that took her to victory this year as Boeblingen ladies' ski champion. Then it will be on with the hiking gear as she demonstrates here. Elfi, a member of GmbH's order processing department, joined HP at its plant in Boeblingen, Germany, two years ago. For her, and many other avid walkabouts, there is no better way to satisfy a case of wanderlust than a long hike to parts unknown. However, Elfi also finds time to swim and play tennis.

For green thumbs, spring is preceded by some very serious rites that include planting and pruning. Here Don Loughry of the Palo Alto Division explains the care and feeding of pansies that line the family driveway to his daughter Lynn. Don started with bare ground in 1961, planned and planted everything — except a carnation bed that eight-year-old Lynn supervises. Soon, Don's Los Altos home will again blaze with spring-time blooms and blossoms, many of which will show up in the division lab where he is a section leader, and in the homes of friends.

Pat McFarland, order coordinator at Neely Sales Region in North Hollywood, can hardly wait for the swimming season to start. Naturally, this calls for trying on some of the new styles in suits which she models very adequately. Pat says she has been a swimming fan all of her life, since her parents have always had a pool. Husband Bill is likewise a swimmer, and their two youngsters, Billy and Nicole, stand a very good chance of sharing the family's enthusiasm.

Getting ready to come out of hibernation is Rockaway Division's Joe Knott and family. Weather permitting, the Knotts make as many as four cycling trips per week, averaging about five miles each. Joe, a line leader in the Rockaway manufacturing department which he joined in 1952, took up cycling as therapy for a back injury suffered in a combat paratroop jump in the Korean war. His wife, Marion, and their four children needed no urging to adopt his program just for the fun of it.

Yes, spring wins out again. The snows are melting, and soon it will be time for Ken King of Waltham Division to put to sea. Ken, manager of manufacturing at Waltham, learned his seamanship on San Francisco Bay. Last summer, racing his Cal-28 class boat out of the New Bedford Yacht Club, Ken placed in numerous races, winning the Midget Ocean Racing Series for Southern Massachusetts.

TARGET FOR '68

Cutting Overhead Costs

Undermining overhead with systems that save

Scene: The midtown office of a famous yogurt manufacturing firm. A senior officer is querying a junior executive about the recent performance of his department:

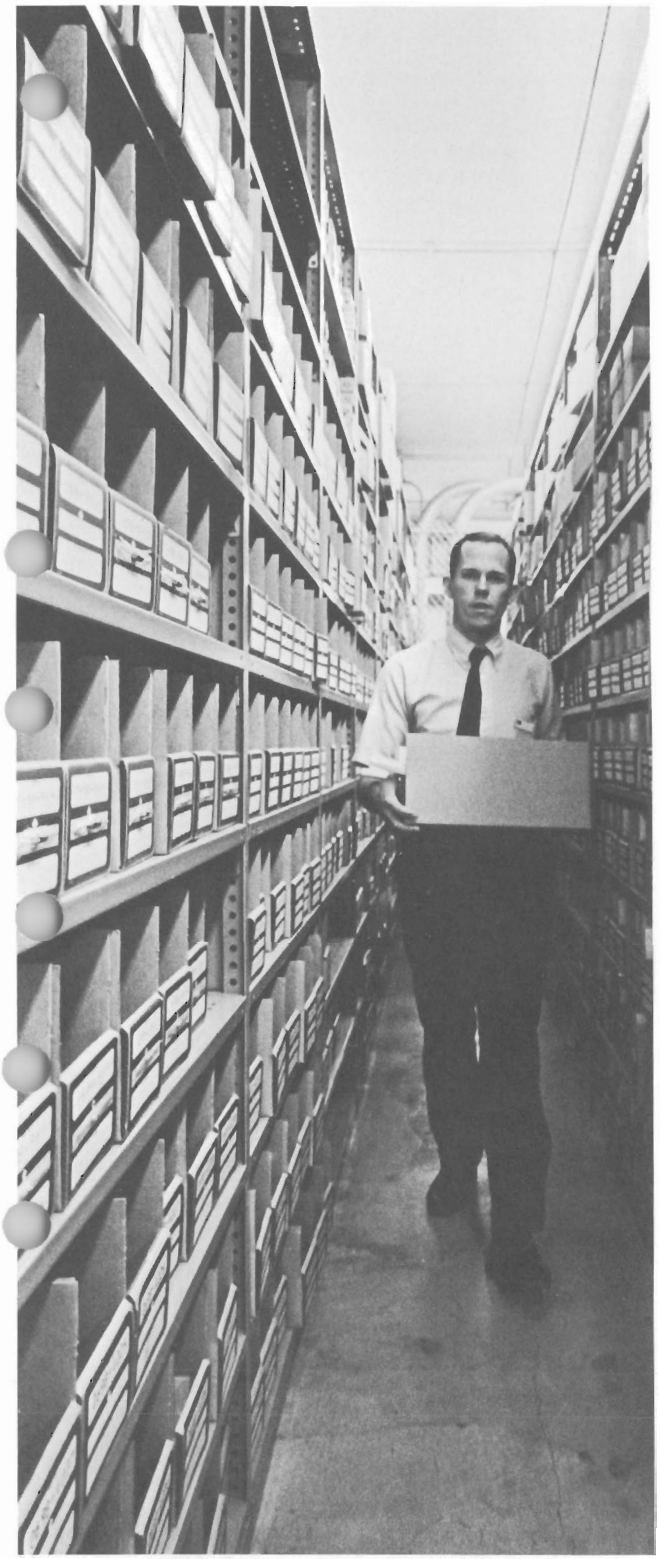
> "How are you doing budgetwise, Ted?"
> "Right on target, J. B.!"
> "Fine, Ted. How about shipments?"
> "Sorry you mentioned that, J. B. Fact is, we've slipped a bit there. About 20 percent off. But our spending is right on the button!"

For radio listeners familiar with the Ted-J. B. dialogue, the conclusion is inevitable. For the hundredth time, J. B. will fire Ted. In so doing he will temporarily reduce overhead costs in an effort to bring them back into line, in relationship to the shipments bottleneck.

Funny as the yogurt drama may seem, letting Ted go obviously represents the negative approach to reducing overhead costs. For a real-life organization, there are many positive alternatives. And HP, facing up to recent declines in profit margins (and profit sharing) as discussed in the past two issues of MEASURE magazine, is working positively in a number of areas to reduce costs and restore company-wide profitability to its former level.

In the corporate group, generally accounted for as "corporate overhead," a two-fold approach is under way. One is the classic "let's cut costs" theme calling for basic economies in all areas of corporate expense that are controllable. This includes office and operating supplies, travel and long distance communications, and new items of expense that can be deferred or delayed without harm to efficiency and profitability.

The second is what might be termed a "systems" approach. Here, a number of corporate departments are creating new opportunities for more profitable operation throughout the company by offering improved methods of doing business. These directly affect the operating divisions, as the following examples show:



Tom Murphy, member of Corporate Materials Engineering group and developer of HP's corporate lab stock program, holds carton containing one of 1,900 parts purchased at bulk prices and made available to divisions at prices well below what they would pay buying separately. Lab stock parts are used in "breadboarding" new products.

The price of breadboards: In recent months the cost of the parts used in engineering R&D projects went down a notch or two thanks to a new system of lab stock purchasing introduced by the Corporate Materials Engineering group. In some instances those notches were pretty big. At the Colorado Springs plant, for example, stocking of a new divisional lab stock area would have cost some $35,000 with the old system of purchasing. Under the new system, the cost came all the way down to approximately $3,500. Reductions of a one-to-ten magnitude such as this are not often possible, and no doubt there were special circumstances involved in this case. Nevertheless, the corporate lab stock program was set up to bring the benefits of bulk, company-wide buying into an area normally geared to specialized parts purchased in limited quantities.

Tom Murphy, whose responsibility it was to develop the lab-stock program, says his area now has more than 1,900 parts representing "a little bit of everything." Every three months his group publishes a catalog of these parts so that engineers in the divisions know what's on hand.

According to Murphy, the corporate program furnishes up to 95 percent of the needs of some division labs, whereas others rely more on their own production stocks. He sees one of the program's functions as an economical source in setting up new lab stock areas, such as that at Colorado Springs.

Price is not the only consideration. Engineers are assured of ready supplies of many specialized parts. And if an item is in short supply, the company-wide purchasing power as represented by the Corporate Materials Engineering group can provide a high-level expediting service.

A systematic system: If a customer is offered extra services at no extra cost, it's not likely that he will look too closely at the bill. Then too, if a customer is charged for services whether he uses them or not, he will probably use those services even though he may not need them.

To a certain extent that's the situation that existed in the Palo Alto Electronic Data Processing center in servicing the home-based manufacturing divisions. The center's costs were prorated among the divisions on the basis of their size and sales.

Over the years EDP costs had become increasingly significant, so early last year the center embarked on an extensive study to review its method of doing business. The results of the study were clear — put the center on a service bureau basis and distribute costs on the basis of jobs actually performed for each user. What this meant was that based on detailed work estimates provided by the center, the manufacturing divisions could do their own evaluations and make realistic decisions as to whether they would buy the services offered by the center.

The new concept was put into effect in November, and Matt Schmutz, manager of the center, feels the new approach has already produced results.

"Some of the center's computer programs were dropped when the divisions concerned evaluated the actual costs versus the estimated value received. One result of this is

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A new relationship now exists between BAEDP programmer Bob Johnson, left, and Microwave's Dennis Paboojian. Under the service bureau concept recently adopted by the corporate EDP center, the latter is now a customer in the real sense of the word.

undermining overhead

Any spare test instruments for sale? That's what Mary Ann Hansen of Corporate Engineering wants to know. She operates the company's Surplus Equipment List—better known as the Surplus Pool. Keeping older but still useful items of equipment in action by interdivisional sale helps reduce overhead costs.

that more computer time was made available, eliminating the need for additional equipment."

BAEDP (Bay Area Electronic Data Processing), the center's new name, also has two interesting coordinating functions. Computer program preparation costs money, and to avoid duplicated efforts from division to division, the center serves as a central information source concerning available divisional programs.

It also coordinates training in the use of the various computer program languages and makes from two to three hours of computer time available each day for individual programs. Hopefully, these computer hours will lead to improved products and processes that will have company-wide benefits.

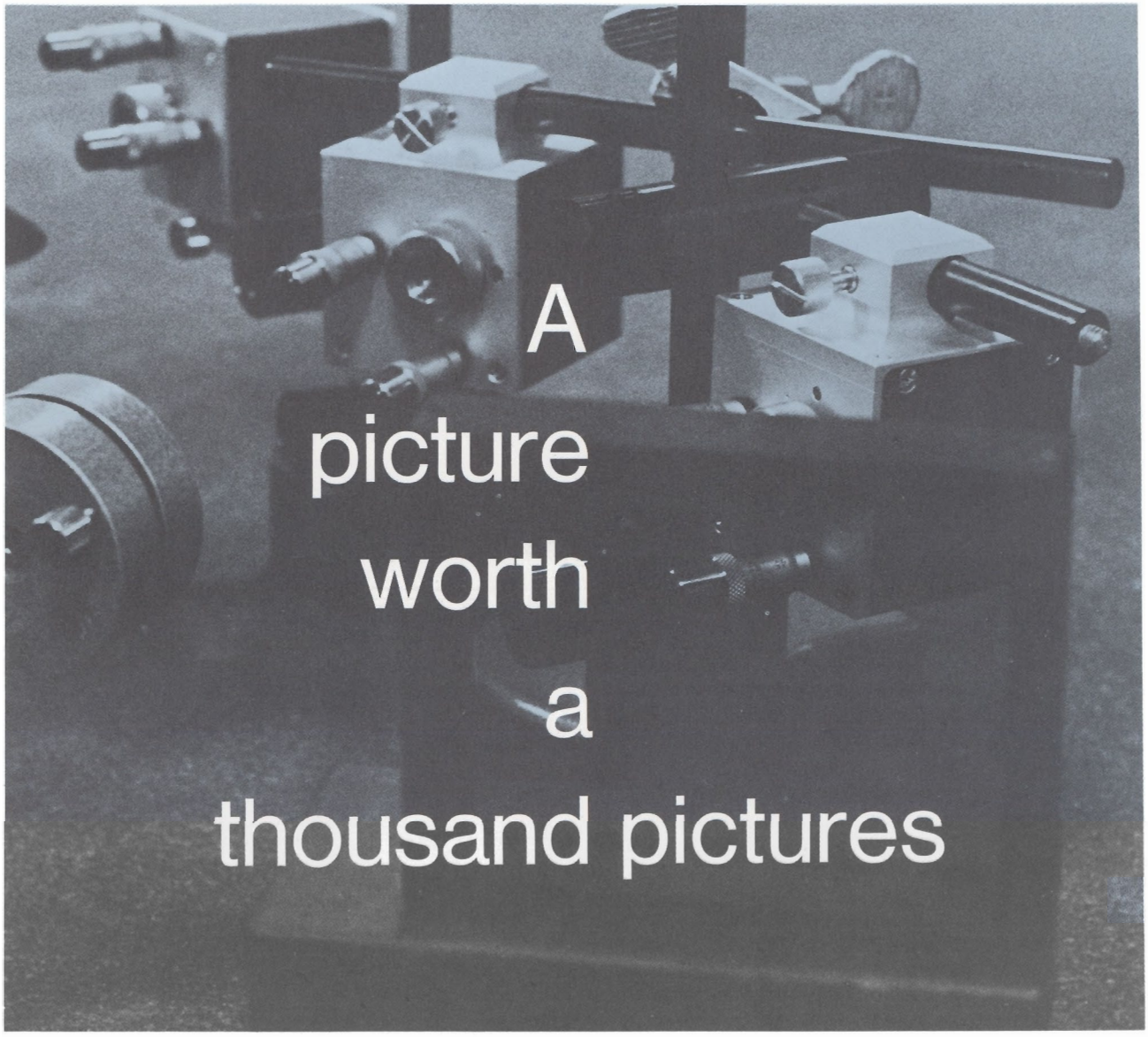
Off the surplus shelf: This year, throughout the HP organization, there is greater reason than ever to take a close second look at upcoming purchases. Any spending decision that can be delayed — without harm to efficient operation — will automatically contribute to an improvement in the financial picture for 1968. In particular there could be many opportunities to review scheduled replacements of obsolete equipment.

Actually, "obsolescence" is often an accounting concept rather than an engineering fact. In the dynamic electronics industry, the Internal Revenue Service permits tax writeoff of test equipment over three years. Yet engineers recognize that much of this equipment has many more years of useful life. The real problem in a large organization is finding someone, somewhere, who can take advantage of those years.

HP's answer is the Surplus Equipment List developed by the Corporate Engineering group.

In operating the surplus pool, Mary Ann Hansen of Corporate Engineering keeps in touch with key contacts at 23 HP locations. They regularly advise Mary Ann of available surplus items, and every three months she sends each of them a computer readout compiling this information. Purchases are initiated by an "IPR" — an interdivision purchase request form. In 1967 the list resulted in the interdivisional exchange of more than 300 test instruments classified as surplus by their original owners among domestic divisions and sales regions.

The buyers, of course, get the instruments at depreciated prices that can range all the way from 30 percent off to practically free. The savings are twofold: Buyers don't have to pay full replacement price; sellers get some dollars back on items that might otherwise waste away on a shelf.



A picture worth a thousand pictures

"Frozen" lightwaves that yield true 3-D images appear to have a brilliant future as a technological tool of science and industry as well as an entertaining toy. HP is very close to putting this technique, called holography, to work as a new means of measurement . . .

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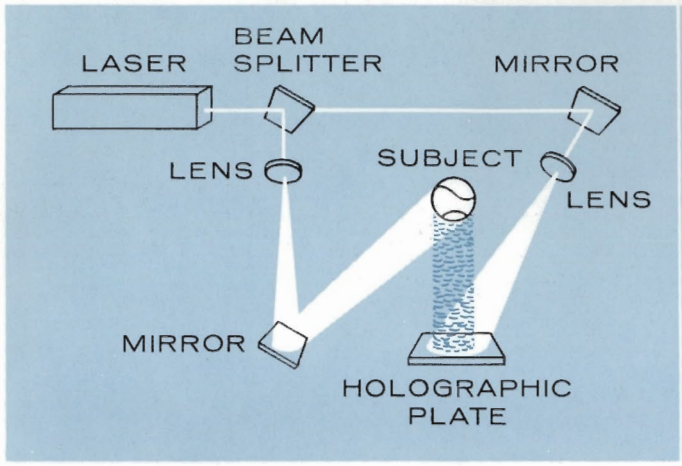
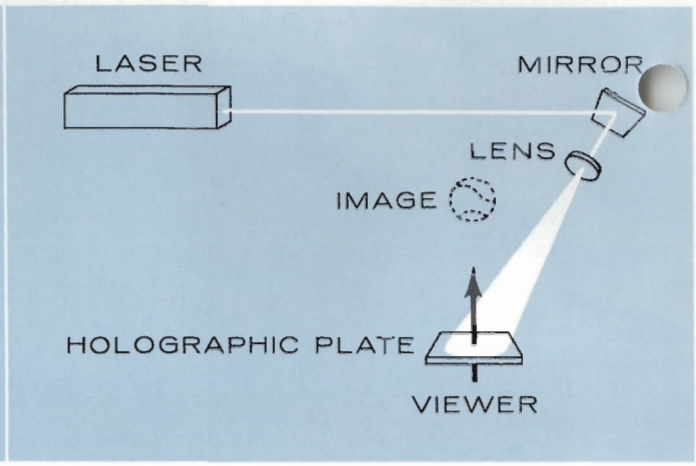
picture worth a thousand pictures





To make a hologram, a laser light beam is split, with one or more beams directed at the object being recorded and one beam — the reference beam — reflected directly to the holographic plate. Here (at left) the reflected light and the reference light "interfere" to create a fine, wavy pattern that is recorded in the plate's emulsion.

Then, as shown above, to see the holographic image of the subject, the viewer directs a laser beam (or sometimes ordinary light source) on the developed plate. This reconstructs the lightwaves, and the image appears in full three-dimensional perspective in its original position. You can see it, but you can't touch it.

□ Probably nothing that has come out of the laboratory in the past 50 years has created quite so much interest as the laser. The laser (Light Amplification by Stimulated Emission of Radiation) provides a beam of the purest, strongest light known. A laser beam recently sent from the earth to the moon, a distance of about 240,000 miles, was clearly visible as a spot on the surface only a half-mile in diameter.

Of all the promising uses to which lasers are being put, nothing generates quite so much excitement as the hologram. The laser provides the intense, coherent light needed to record holographic images.

On seeing their first hologram — a true three-dimensional image of an object, apparently floating out there in space just the other side of a clear plate of glass — many people just plain refuse to believe it. They laugh skeptically, try to poke and grab the image and make it go away. They think it's just some clever kind of stunt done with mirrors.

In fact (as the diagrams on page 12 show) mirrors do play an important role in creating a hologram. But the science of holography has in the past three or four years advanced far beyond the photographic stunt stage. Already it is making a serious impact on scientific research, medicine, and industry. Estimates are that in the U.S. more than 500 organizations this year have underway holographic research or development programs valued at some $350 million.

Very little of this effort and money will be spent researching the entertainment potential of holography, such as movies and television in 3-D. Most experts in the field rate these developments far down on their lists of priorities.

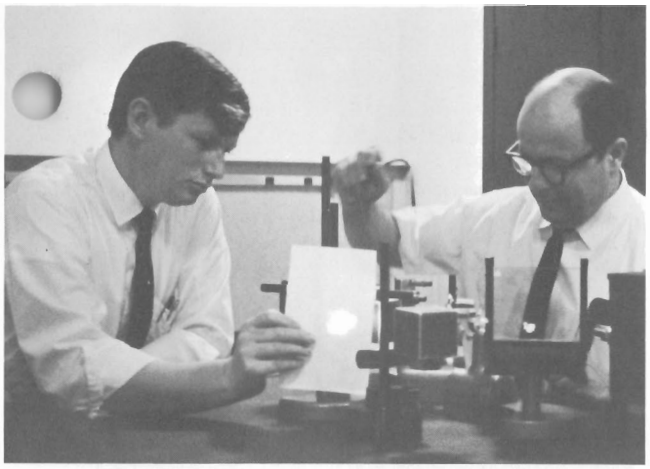
In fact, some of the more promising applications make little or no direct use of the hologram's three dimensional properties. Engineers, for example, have obtained very revealing results in studying the effects of stress on materials by double-exposing holograms. The stress or disturbance shows up clearly in the form of an "interference fringe" that results from the very slight differences between the "before" and "after" holographic images. Holograms are also being used to study shock waves and other atmospheric motions.

In yet another application, excellent images of distant objects (such as satellites) can be observed in spite of atmospheric turbulence. The technical description of this approach is "two-dimensional wavefront reconstruction," and it may someday be an essential tool of the astronomer.

Still another variation of this technique (James Bond take note) could be the creation of a highly sophisticated information security system. The secret message on the first holographic exposure would be obscured by a diffusion grating of some sort. To read the message would require correlation of the grating image with the original grating. Thus the possessor of the grating is assured exclusive privacy.

However, by far the greatest potential of holography in information systems lies in data storage. Wright Huntley, who heads the holographic program in HP Labs' Physical Electronics Laboratory, pointed out that one four-by-five-inch holographic plate could store the entire contents of the Encyclopaedia Britannica with room to spare.

This ability arises from a somewhat fantastic property of holograms, namely that the whole picture of an object can be reconstructed by using only a tiny piece of the original holographic plate as a window. (This same property, of course, is directly related to the 3-D appearance of a hologram and to the ability of the observer to move in relation to the image and see it change in perspective just as it would in real life.) The project Huntley and others in the lab are presently working on is broadly related to the



Wright Huntley, left, and Dominick de Simone adjust device [illegible] to filter laser light in HP Labs' holography area. They [illegible] working on specific product application involving very tiny holograms as the basis of a new technique in data storage. Holography was discovered 21 years ago, but required the advent of the laser's coherent light some dozen years later to become practical.

eral area of information processing, and is well along in prototype development.

Notable among applications today are medical uses.

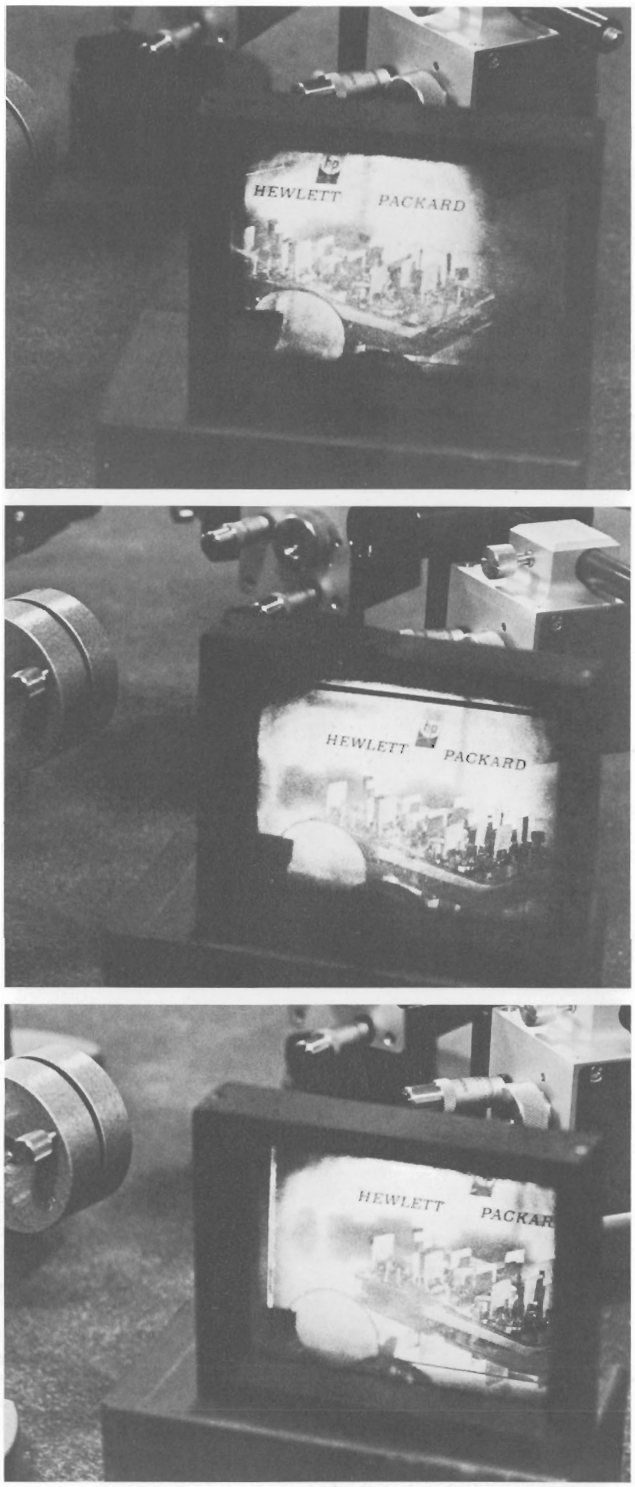
Dr. R. C. Rosan of Stanford had this to say: "By using a single hologram a pathological specimen can be viewed [illegible]most any angle, and since it has all of the qualities of the object, you can magnify it. If you have a hologram of a microscopic section you can examine it without any microscope at all — with just the hologram of the microscopic field.

"The use of the hologram for storing teaching material, [illegible]pecially visual teaching material, could drastically change the training of medical students in morphological sciences of the future."

Medical displays of this kind already have been made [illegible] specimens which otherwise could not be moved or shown [illegible] medical gatherings. Another kind of possibility is the creation of a visual vectorcardiogram, in which a variety of related ECG patterns of a heart victim would be displayed simultaneously on a multiple exposure hologram (replacing a complex mathematical approach).

In spite of the prospects that seem to be in store for holography, it is proper at this stage to be somewhat cautious. A great deal of work remains to de done, for example, in capitalizing on its capability in data processing. Also at the present time there are real limitations to the holographic process itself: objects to be holographed generally must be small; and near-perfect laboratory conditions must prevail with minimum vibrations and noise to disturb the wavefront interference patterns reaching the holographic plate.

Still, holography is a young science and the first fundamental breakthrough in the field of optics in more than 100 [illegible]rs. Its image is certain to grow much bigger and brighter [illegible]ore and more of its fascinating possibilities unfold. □



This photo series shows hologram created by HP's Wright Huntley to demonstrate basic principle of holography. When laser beam is switched on, a 3-D image of electronic component and company insignia appear on the other side. Note how the HP symbol changes position in relation to the name as the viewer or camera moves. Also note the magnifying glass image. While this is only an image, it will still magnify any point in the scene — because the hologram is a true reconstruction of all of the original optical events and properties.

News in brief

Palo Alto — The HP Employees' Scholarship Fund's annual fund-raising campaign this year will be March 13-29. Last year employees contributed about $20,000 to the fund, the company added $10,000, and $500 cash scholarships were awarded to 32 HP sons and daughters. Approximately the same number of scholarships is expected to be awarded this year, depending upon fund drive results. Scholarship applications should be received by division personnel departments by March 28; winners will be announced in late May.

New York — Eleven HP divisions will exhibit several dozen new instruments and systems plus a number of new components at the 1968 IEEE show in the New York Coliseum March 18-21. HP's introductions will be in the areas of communications, computers, converters, frequency, microwave, scopes, power supplies, recorders and data systems, signal analyzers, signal sources, standards and calibrators, circuit modules, diodes, and wideband coaxial products.

Palo Alto — At HP's annual shareowners' meeting February 27, John J. B. Fulenwider was elected to the company's board of directors. With the recent retirement of James L. Jenks, Jr., and Robert L. Garner, Fulenwider's election brings the number of HP directors to 14.

Nicosia, Cyprus — Kypronics of 19 Homer Avenue, Nicosia, has been appointed Cyprus distributor for HP's three product disciplines.

Palo Alto—Microwave Division has gone to market with thin-film hybrid microcircuits. Although the microcircuits—amplifier modules—were developed by the division for use in HP instruments, their potential applications are so much wider that it was felt that systems manufacturers and other quantity users would find them very attractive. With performance, reliability, and cost advantages, these microcircuits cover broader frequency ranges in smaller sizes than others commercially available.

Waltham, Massachusetts—In April, Project Engineer Alan Binder will receive a patent on a radical new design for automobile carburetors, for which he won a $1,500 award in a 1966-7 student engineering design competition while in college. The carburetor, which is based on the technology of fluidics, has only one moving part, the throttle. The carburetor responds more quickly than others, and its simple design reduces manufacturing and maintenance costs. It also is expected to reduce hydrocarbon emissions, thus reducing air pollution.

Palo Alto — During the first quarter of fiscal 1968, HP's earnings declined about 11 percent to $3.8-million despite a seven percent sales gain to $59.1-million. Orders reached $66.5-million, the highest yet for any quarter. Chairman Dave Packard pointed particularly to a "disappointing level of shipments" as a factor in the reduced earnings. "However," he said, "we now have the highest backlog in the history of the company, we have a strong effort underway to reduce costs, and we believe we have a good base for improving profit margins during the year."

Loveland — Astronaut Stuart A. Roosa, a major in the U. S. Air Force, toured the Loveland Division plant February 28. Roosa traveled from NASA headquarters in Houston to address Loveland service clubs and schoolchildren.

People on the move

Corporate — Ray Tatman, to applications engineering manager, corporate systems marketing, from manager of publications and advertising, Mountain View Division.

F&T — Bill Killen, to line leader, synthesizers, from in-plant engineering.

International—Jerry Gross, to Export Marketing (temporary assignment with HP GmbH), from sales engineer, Frequency & Time; Neil Carlson, to electronic product specialist, HPIA, from product training, corporate Marketing; Al Hannmann, to Far East sales manager, from electronic product manager, Export Marketing.

Loveland — Jerry Bauer, to inventory control manager, from production control manager; Wayne Clay, to manufacturing control, from production control, Colorado Springs; Gary McCormick, to manufacturing control, from purchasing, Colorado Springs.

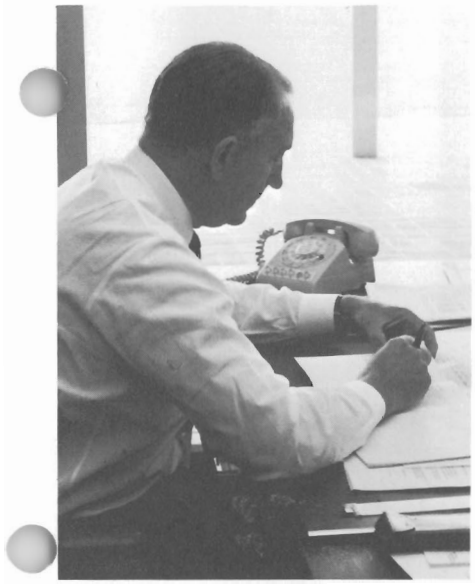
Microwave — Dick Lyon, to R&D staff, from production engineering; Jim Green, to sales engineer, marketing, from environmental test supervisor, quality assurance; Alan Seely, to manufacturing supervisor, from R&D staff.

Mountain View — Walt Slater, to publications manager, from technical writer; Doug Hanson, to advertising and sales promotion (in addition to regional sales engineering duties).

Eastern Sales — Transfers from West Conshohocken office to Cherry Hill: Jerry Chappell, to field engineer, digital products; Jim Fagan, to medical service rep; Lee Frank, to staff engineer; Tom Richey, to district service manager; Pete Roddy, to field engineer, analog products; Toi Toivonen, to field engineer, microwave products.

West Conshohocken office changes: Steve Band, to field engineer, analog products, from field engineer; Stroud Custer, to field engineer, analog products, from staff engineer; Herb Farrell, to medical sales rep, from staff engineer; Walt Friedrich, to field engineer, computer products, from field engineer; Joe Groves, to field engineer, digital products, from field engineer; John Grubb, to group leader from senior service technician; Jay Halprin, to district manager from field manager; Don Lewis, to field engineer (Navy) from field engineer; Roger Parmenter, to field engineer (Army) from staff engineer; Lou Reveron, to field engineer, microwave products from staff engineer; Bill Robinson, to field engineer, analog products from staff engineer; Russ Smith, to demo supervisor from shipping-receiving; Matt Tausz, to repair supervisor from group leader; Jerry Tully, to account manager from field engineer; Tony Tumolo, to group leader, medical service from medical service rep; Howard Volin, to staff engineer from chemical service rep; Dick Yanko, to account manager from field engineer.

Southern Sales — Haskell Gray, to staff engineer, Dallas, from contract sales, Microwave Division.



from the chairman's desk

A few weeks ago we announced our decision to start construction of a new manufacturing plant in Santa Clara, California. The Santa Clara site, which we acquired in 1966, is about 15 miles from our facilities in Palo Alto. Plans call for the construction, initially, of three buildings with a total of 300,000 square feet of space. Eventually, we will have a six-building complex on the 55-acre site, and an employment of about 3,500 people.

Deciding when and where to build new production facilities is difficult because so many factors come into play. Site selection is a fairly well defined procedure since we do have some very definite criteria to guide us. For example, when considering a location we look very closely at land costs, tax structures, housing availability, educational facilities, projected area growth, utilities, recreational and cultural opportunities, and transportation.

As a general rule, we try to avoid large cities and when we can we like to have our plants near residential areas rather than out of town in industrial parks. It seems to us that rather than having residential communities packed tightly with houses and everyone traveling long distances to and from work, the better alternative is for people to work close to where they live.

Deciding when to expand production facilities is very critical, and unfortunately we don't have a clear-cut set of guidelines to follow as we do in site selection. Because of the time lag between the decision to build and the completion of construction, we have to project current knowledge about markets and market potential, company and individual division growth, our financial position, and the social and economic environment of the country. We make our estimates of these and other factors as reliable as we can, so that our decision will hold as little risk as possible.

The Santa Clara plant is a big step for the company but it is a necessary one since our Palo Alto facilities are becoming overcrowded, and our projections indicate that continuing growth will demand additional space. The first phase of construction at Santa Clara will be completed in about 18 months, and at that time we expect our Frequency and Time Division will move there from its present location in Palo Alto.

It's not clear yet whether F&T will need the entire plant, so it is very likely that we will be making some reassignments of products and people among the Palo Alto divisions when the move is made, in order to gain the most efficient utilization of the new facilities. As a matter of fact, I'm convinced that reassignment between divisions of both people and products is a desirable thing from time to time. I feel particularly that a person who has had experience in several divisions might have a broader understanding of his job and therefore more potential for future growth than someone who has spent his entire time in one division on one job.

But, regardless of the final organizational and product alignment at the new facility, we are looking forward to becoming a community neighbor in Santa Clara. We are doing everything possible to make the new plant one that will be an asset to the area, both in terms of appearance and in its support of community affairs. Santa Clara is a fine, progressive city, and we will make every effort to contribute in a meaningful way to its future progress.

A man for all seasons

Waltham Division's Ken King is torn between conflicting claims of winter and spring. How he resolves this conflict — fun now in the snow or get that boat ready for the water — is revealed on page 6.

Measure

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