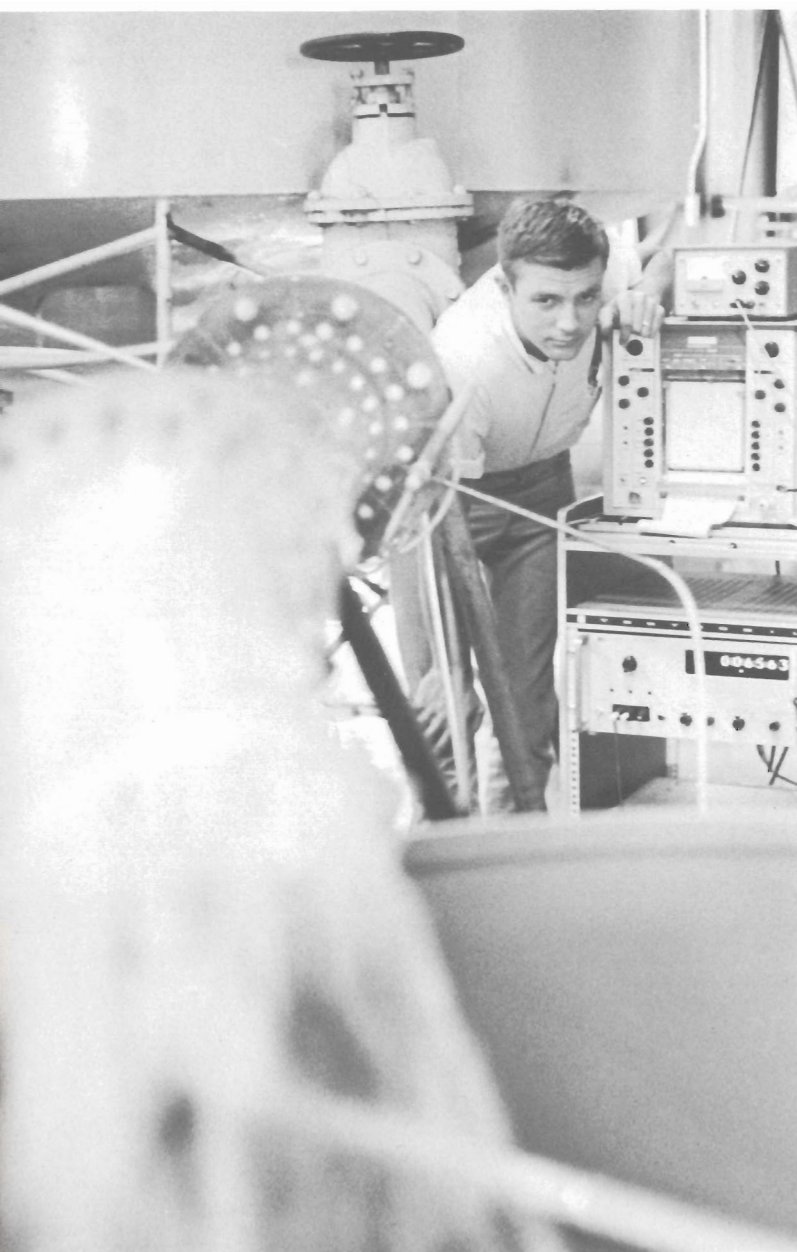




Measure

For the men and women of Hewlett-Packard / OCTOBER 1967



Engineering phases of California's gigantic water plan are tested in a special laboratory on the Davis campus. Ken Thompson, a graduate student in water sciences, checks HP instruments used in calibrating water flow characteristics. Included are a Harrison Division 855C power supply unit, a Sanborn Division 320 recorder, a Loveland Division 2401C integrating digital voltmeter, 562A digital recorder, and testmobile.

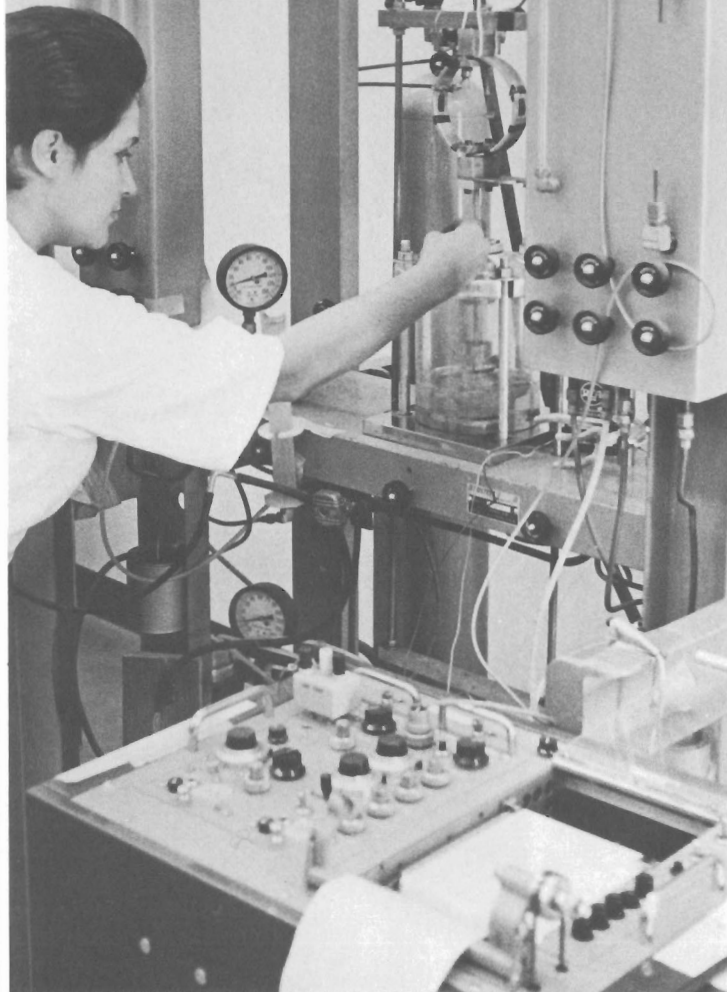
Solving the problems of human hunger and misery is not only the key to a better tomorrow — it will probably determine, in fact, whether or not there is a tomorrow.

To many observers, the problem of adequately feeding the world's growing population has become more than a challenge. It is, in their minds, close to being an international nightmare in which the cycle of poverty, hunger, illiteracy, sickness, and social decay spiral endlessly ahead into the futures of too many countries. And every answer they propose — such as land reforms, crop diversification, birth control, pest abatement, or increased use of fertilizers — seems doomed by the onrush of too many new millions of open mouths and empty stomachs.

In spite of this pessimism, which is reinforced by many of today's ugly headlines, the experts know that answers must be found, so the search for solutions goes on in many ways and in many places. Because scientific agricultural research is obviously one of the more important elements in this search, MEASURE undertook to sample some of the work being done in this field. It did this by going to the Davis campus of the University of California and meeting with researchers in a variety of departments. The choice of Davis was no accident. As an acknowledged leader in worldwide agricultural development, California has benefited hugely from the outpouring of knowledge and skill from this 4,000-acre campus located about 13 miles west of the state capitol in Sacramento.

Mission: TOMORROW.

"maker" method of harvesting fruit, an example of applied engineering efforts at Davis, is under continuing refinement in the electronics laboratory supervised by Merle Sprock at left. Basic studies into the properties of deformed soil are doctoral thesis material for Awatif El-Domiaty, an Egyptian woman who has been six years on Davis campus. A Sanborn Division 269 recorder is used in this test.



□ The emerging nations of today should take heed of the fate of ancient Egypt. While the moral decline of the pharaohs may have hastened national failure, for the most part they allowed their soil to become so salty that once-fertile lands gradually became desert.

In the estimate of Dr. Donald Nielsen, associate professor of water science, and his associates, water is second only to the sun's energy as a vital element in man's environment.

One hydrosience project under Dr. Nielsen's supervision is directly related to the worldwide problem of how to store and move water efficiently. This project involves the passage of gamma rays through soil samples to measure the movement of its water content. Another phase of the project deals with the way subterranean gases travel, react, and affect soil fertility.

Lakes, they have found, provide very inefficient water storage. In fact, more water moves underground than is contained in all of our lakes and rivers.

"The thing we have to find out is how it moves underground, where it moves to, and how best to use it," Dr. Nielsen said.

"We also need to know many properties of the water and soil. Temperature, for example. Some crops use water not to drink but to keep cool during germination. So we need to find out the heat capacity of the soil. We also need to determine

how soil additives, pesticides, fumigants, and industrial waste products from the atmosphere interact with the soil. Improvements in gas chromatography have given us a greater ability to measure these interactions."

If water rates number two on the natural resource list, then certain flies, beetles, moths and other bugs — about five percent of the million species of insects known to man — hold top billing on agriculture's black list. Their viciousness in terms of crops lost and forests despoiled has been estimated at \$3.5-billion annually, while their cost to the health of mankind is said to be beyond computation. Yet man has learned recently that he must take real care when attacking these marauders that he does not poison either himself or his environment. The mission of the agricultural toxicology and residue research laboratory at Davis is to help insure that this does not happen.

One of the most promising approaches under study at the lab is similar to "the pill." Chemicals related to the anti-cancer drugs are individually administered to male members of an insect species, causing them to lose potency. When swarms of these sterilized creatures are released into a normal population of their kind they create a big gap in the reproduction cycle. The eggs of many of the female insects simply do not hatch.

Dr. Wendell Kilgore, a specialist in the "natural" approach to toxicology, says the method really works. But much



Hydroscience project involving gamma rays to measure the movement of water in soil sample is conducted by Keith Cassel in Davis soil water sciences laboratory. Harrison Division power supply unit is used in test. Many field tests are also conducted on 4,000-acre campus. Everett LaRue, a graduate student, checks gauges used in soil-water flux tests. Hundreds of such instruments are linked to a recording and computer center to provide comprehensive data on complex interaction of water, soil, crops, heat, and additives.

work remains to be done on methods of sterilization to achieve lower costs and greater effectiveness. In these studies, and other parallel research programs, the toxicology lab makes use of such instruments as an HP 810 gas chromatograph. In fact, quite a number of analytical GC tests developed at the lab have become standard throughout the world in testing pesticides.

However, no matter how well the scientist helps the farmer master his environment, planting and harvesting still remain the time-honored tasks. The approach of agricultural engineering researchers is to make new mechanized methods available to the farmer—to help him put his hand on a push-button instead of a plow.

Mechanical shaking, for example, has proved to be a very efficient method of fruit harvesting. But many problems need to be researched before the farmer applies brute force to his valuable trees. He needs to know what level of vibration will drop the fruit, preserve the foliage, and not damage the bark. Davis researchers are at work on many aspects of these problems.

Mechanization of the farm also includes some very sophisticated radiation techniques. Ag engineers at Davis who recently developed a lettuce harvesting machine are testing the use of gamma rays to tell the thickness, size, and density of lettuce heads without touching them. A small computer linked

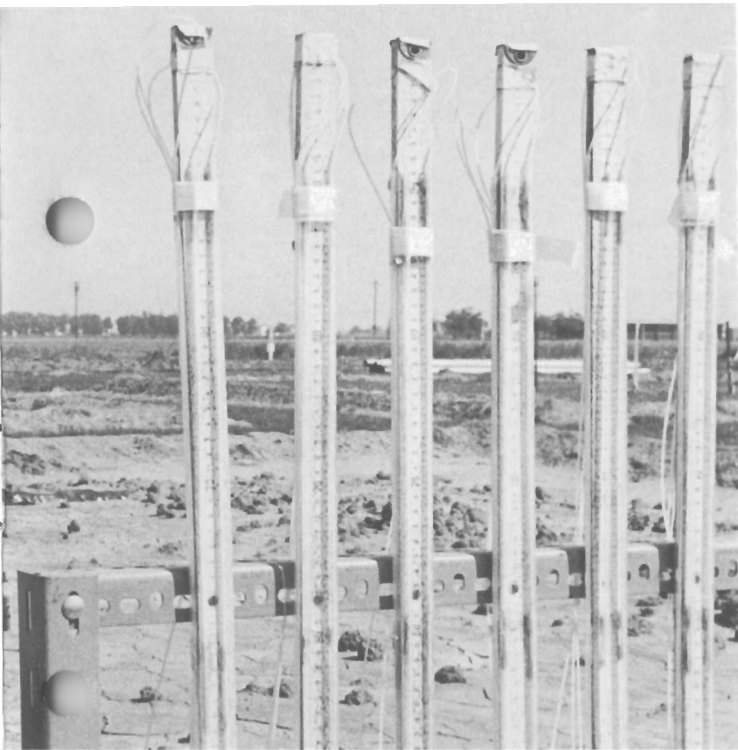
to the device makes instant decisions—off with its head! Or pass it up to allow further growth.

A wide range of electronic instruments plays a vital role in these studies. Fruit shaking tests in a special electronic section, for example, use a six-channel Sanborn Division recorder with transducers and strain gauge, as well as an HP 141A variable persistence scope. A 296 Sanborn Division recorder spends most of its time bumping about in the field studies related to the firmness of lettuce heads. A Moseley Division x-y strip-chart recorder puts in much field time, too, in engineering tests of spray drift. A Dymec Division digital recorder will be the heart of an environmental research laboratory housed in a large trailer now under construction by the Davis agricultural engineers.

The big, busy Davis campus, of course, abounds with many other scientific and engineering projects. The veterinary school, the department of viticulture (grape growing) and enology (wine making), the institute of ecology, the international agriculture center—these and others are all making basic and practical contributions to man's ability to feed and clothe himself.

Perhaps the necessary answers are in the making there, or in other laboratories around the world. Perhaps the gap between productivity and population will be closed by today's discoveries. There really is no alternative. □

Mission: TOMORROW *(continued)*



Mechanized harvesting represents an important advance in agricultural productivity resulting from research. But many farsighted researchers look beyond the soil to the day when men must harvest the ocean for its almost unlimited supply of minerals and protein, and when chemical farms will provide a continuing harvest of perfected produce. Actually, such seemingly visionary schemes are well within the capability of today's technology, but their exploitation will require expenditures of money and time far exceeding the space programs of this decade.





Perspective: Mountain View Division

The view from Mountain View

□ It seems pretty clear now that the so-called "information explosion" touched off by computerized data processing is really a chain reaction. One result is that the \$8-billion-per-year computer industry appears destined to mushroom ever larger at a rate well in advance of the industrial average.

It is on these assumptions, amply supported by evidence, that HP's Mountain View Division bases its expectations for future growth. Certainly the division's two principal product lines, digital and analog magnetic tape recorders, are very much in the mainstream of data processing development.

The digital recorders, which came to HP through the acquisition of Datamec Corporation in 1965, are not instruments in the usual HP sense. As one Mountain View engineer noted, they have no measurement function of their own and are, in fact, slaves to the commands of the computer.

"Write this!" says the computer, and the digital recorder duly adds the information in magnetic code to the tape. "Read that!" says the computer, and the data — perhaps the record of a payroll or a bank's roster of accounts — can be reproduced in a matter of minutes.

Digital tape recording has proved to be one of the most efficient and economical methods of storing bulk information for computer use and the Mountain View Division, with its

Models 2020 and 3030, is a leading supplier to this market. Because of the need to be associated with computers, the digital products are marketed for the most part to customers who resell them as parts of complete data acquisition systems — what is known as the OEM or original equipment market.

Where the digital products are wedded to computers and deal in coded data, the analog tape recorder, on the other hand, records and reproduces information directly in the form in which it originated. Its tape track can also handle a wide variety of signals simultaneously. These capabilities make analog recorders particularly suited to instrumentation systems — aerospace telemetering and medical monitoring systems, for example, in which information flows in from varied sources.

The analog line was transferred to Mountain View from the Microwave Division early this year in order to bring the two related recorder lines under one roof. Sanborn Division has also had substantial experience in producing analog recorders, but is now a customer for Mountain View transports.

Expectations for growth, both in shipments and new products in 1968, are high inside the new Mountain View plant.

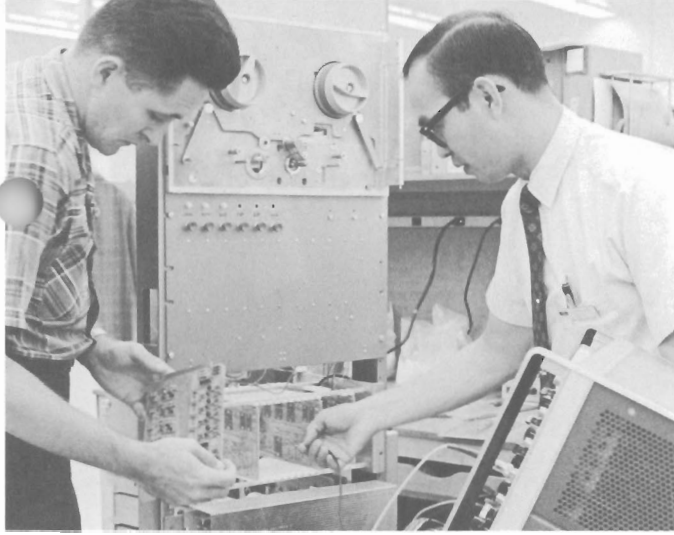
Gordon Eding, division general manager, anticipates that 1967 shipments will beat fiscal 1966 shipments by 40 per-



Sanborn Division will market the analog tape transports being assembled here at Mountain View. Because they can record such activity as pulse, heart sounds, brain waves, nerve impulses, and blood flow simultaneously, they have wide application in medicine. This same ability is valuable in scientific and industrial instrumentation systems.



Engineering design for new disc recorder is discussed by (from left) Jerry Ainsworth (analog engineering), John Leslie (digital engineering), and Bill Girdner, Mountain View engineer who started with HP in 1940.



Major challenge facing young Mountain View Division is development of five new digital and analog recording products. A new incremental digital tape recorder is now in advanced stage of development. Working on tape transport unit are Gene Baisch and Jim Hui. The incremental recorder adjusts taping to rapid stop-and-start speeds.

cent and is forecasting a further 40 percent increase in 1968.

"Our emphasis now is on engineering new and improved products to add to the growth in fields we now are in and to open new markets," said Eding.

New product plans include a new line of digital recorders with a higher range of recording speeds; an incremental recorder which can adjust to rapid stop-and-start speeds; disc recorders which greatly reduce the "access time" in locating discrete items of information; and a significant new analog product, a portable recorder now well under development.

Strictly a scientific instrument, the portable recorder has potential use in such areas as hospitals, or perhaps in automobile track tests and aircraft flight testing. Certainly, getting these new products engineered, produced, and marketed is probably the biggest challenge ever undertaken by the young division and its 225 people. If they live up to their own expectations, they will end 1968 with twice the number of basic products, shipments up nearly 50 percent, a substantial backlog of orders for the following year, and a set of new markets.

Whether or not they hit all targets, there is a definite feeling that the recorder group is already solidly hooked into the HP organization — "on line" as they say in the computer business. □



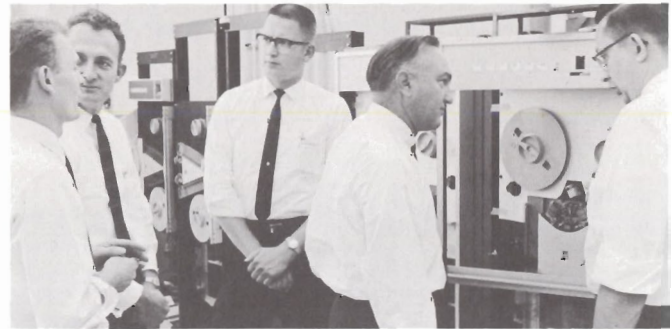
New punch tape controlled machine performs milling and drilling on prototype base casting of HP's new modular cabinet. Operator is Ron Renouf. Mountain View machine shop has 18-man staff.



Because recorders often become parts of more complex systems developed by customers, Mountain View has to match colors to customer specifications. Here Wayne Chapp formulates a special color.



Capability of developing and manufacturing tape heads is significant factor in the tape recording industry. On assembly line at Mountain View are, from front, Virgie Schindler, Margaret Tinsley, Helman, and Jean Busch. At rear, Sue Weller operates coil winding machine.



Informal management conference gathers in front of a line of Model 3030 digital recorders, part of a single order by Cubic Corporation for 74 units valued at \$700,000. From left are: Hank Taylor, finance; Ed Daw, marketing; Ray Smelek, manufacturing; Gordon Eding, manager; and Jim Gillette, quality assurance.

CONSOLIDATED STATEMENT OF SOURCE
AND APPLICATION OF FUNDS
For the year ended October 31, 1966

Funds were provided by:	
Net income	\$17,445
Depreciation and other non-cash charges	5,960
Issuance of common stock	
Stock plans and service awards net of insurance expense	1,527
Issuance of long-term debt	324
	\$25,256
Funds were applied to:	
Purchase of property, plant and equipment, net	\$18,664
Dividends on common stock	2,431
Increase in securities	219
Deposit on leasehold	1,087
Increase in other assets	366
Decrease in working capital	4,511
	\$27,312

ACCOUNTANTS' REPORT

Main Lafrentz & Co.
Certified Public Accountants
255 California Street, San Francisco

To the Board of Directors
HEWLETT-PACKARD COMPANY:

We have examined the consolidated balance sheet of Hewlett-Packard Company and subsidiaries as of October 31, 1966 and the related statements of income, paid-in surplus, retained earnings and source and application of funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures

as we considered necessary in the circumstances. In our opinion, such statements present fairly the financial position of Hewlett-Packard Company and subsidiaries as of October 31, 1966, the results of their operations and the source and application of funds for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

December 16, 1966
San Francisco, California

MAIN LAFRENTZ & CO.

“In our

□ Saturday, September 30, HP plants and sales offices around the world opened their doors not for business but to let in dozens of strangers. Once inside, these people began checking odd corners and shelves of supplies, occasionally consulting the long lists they carried with them.

Strange? Not really. September 30 was HP's inventory-taking-day in preparation for the close of the company's 1967 fiscal year on October 31.

The strangers were independent auditors spot checking the accuracy of inventories taken by HP people, so that they can with clear, professional conscience tell the HP directors, shareowners, managers, employees, the public, and the government that the figures compiled were indeed correct.

However, much more than spot checking the inventories goes into the service and assurance they provide.

In effect, the role of the outside auditor in modern corporate accounting practice is to provide a kind of warranty to the accuracy of all financial statements. That warranty is expressed openly and publicly in the form of a letter published in corporate annual reports. In each case, the auditing firm stakes its reputation on the opinion it gives that “the statements present fairly the financial position” of the company.

In Hewlett-Packard's case, the firm signing the letter is Main Lafrentz & Co., one of the 10 largest accounting firms in the world.

One of the auditing firm's first steps was taken in August when statements were mailed to each account receivable—those owing money to the company—asking them to confirm their status by return mail. Main Lafrentz will use these statements as evidence to confirm that HP ended the year with some \$42-million in accounts still owing.

Although George Grabe, a manager in the San Francisco office of Main Lafrentz, spends a good share of his professional time on the HP account, it is not until the last few months before publication of the annual report that he spends full time in the HP accounting department. During this period three other Main Lafrentz staffers assist him, and all four men work closely with HP's George Grammater, consolidations manager.

Both accounting teams work to a tight schedule. Reports coming in from the manufacturing and marketing divisions need to be thoroughly checked and verified. For example, a report from Hewlett-Packard S.A., which reports for all European subsidiaries, measured 18 feet in length when it came off the TWX recently.

The objective is to consolidate all the reports and have the company's annual report ready for printing on the day before Christmas. There's no whimsy involved here—it's a matter of getting the report out within 90 days of the close

pinion..."

of the year's business in accordance with regulations of the Securities and Exchange Commission.

In all of this activity, the Main Lafrentz role is to follow the flow of the company's accounting procedures, test the accuracy of the results, and yet not impede the necessary progress.

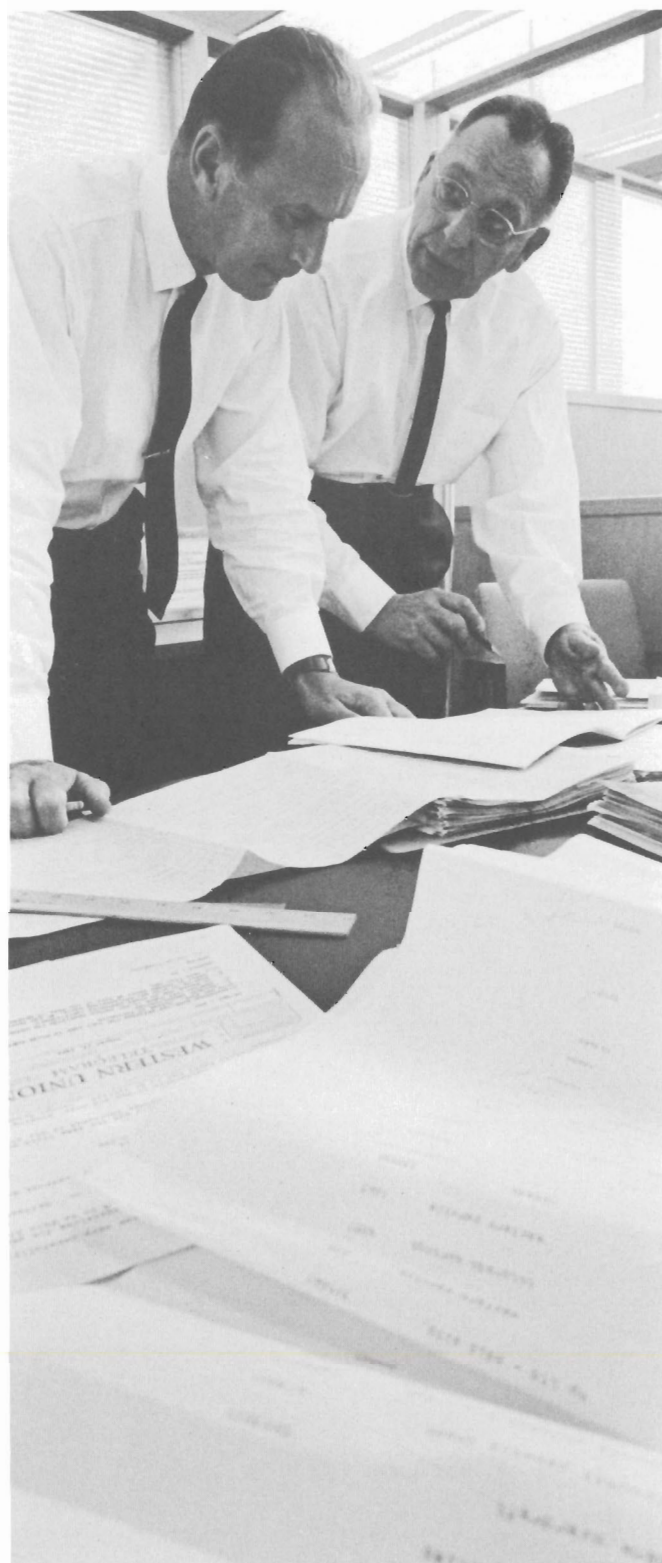
Is anybody really worried that HP would not give out accurate information about its financial condition?

There was a time—before the advent of the SEC and standards set by the American Institute of Accounting—when the visit of an auditor was cause for suspicion. Many thought that the firm in question surely must have been embezzled or bankrupted to start such action.

Today, however, it's standard practice for any well-run business to contract for independent auditing.

As George Grabe put it, "I see our chief function as making an evaluation and rendering a report to the shareholders and the government agencies as a disinterested third party.

"We are also available for consultation and assistance in accounting procedures and tax matters. The important thing, though, is that we render an opinion that is fair and accurate, helping insure a healthy atmosphere in which to do business." □



The long count leading up to publication of HP's annual report is under way for HP's George Grammer (left) and George Grabe, a manager in the worldwide auditing firm of Main Lafrentz & Co. Independent auditors play an important role in modern business by providing third-party opinion on accuracy of financial statements.

Avondale, Pennsylvania — Effective November 1, Emery Rogers is being appointed general manager of the Avondale Division, formerly the F & M Scientific Division. Rogers' appointment enables Noel Porter, who has been acting division general manager in addition to his broader responsibilities as HP's vice president for eastern operations, to devote his full time to overseeing the operations of the four eastern divisions. Rogers, formerly a vice president of Varian Associates, joined HP earlier this year in Palo Alto to manage the company's chemical instrumentation activities.

Waltham, Massachusetts — Sanborn Division is observing its golden anniversary. Sanborn Company was founded 50 years ago, in September 1917, by Dr. Frank B. Sanborn. A leading firm in the field of medical instrumentation, it was acquired by HP in 1961.

Palo Alto — Effective November 1, HP is establishing wholly owned subsidiary marketing companies in Argentina, Brazil, and Venezuela, and HPIA's sales manager for South America, Arnold Staufer, is relocating from Palo Alto to Buenos Aires. HP Argentina S.A.Ce.I., Buenos Aires, will be managed by Luis Brennan. HP do Brasil Ltda., Sao Paulo, will be managed by Carlos Barbosa and will have a branch office in Rio de Janeiro. HP de Venezuela C.A., Caracas, will be under Manager Mauricio Groshaus. Each of the subsidiaries will market all three HP product disciplines.

Oklahoma City — Field Manager Glen Stotts will open HP's newest domestic sales office here on November 1. The office, which will handle electronic instruments, will be in the Harold Jones Building, 2919 United Founders Blvd.

Palo Alto — HP has purchased a building adjacent to its Stanford Industrial Park headquarters facility in order to provide additional space for corporate offices. The 10,000-square-foot, Spanish-style building formerly housed the Addison-Wesley Publishing Company.

Palo Alto — At their September 22 meeting, HP directors appointed Jean Chognard general counsel of the company. He had been HP's patent counsel since 1958.

Colorado Springs — Stan Selby, Colorado Springs Division general manager, has been appointed assistant to the vice president for western operations, Ralph Lee. In the newly created post, Selby will handle a number of assignments, including recruiting, marketing, and public affairs for HP in the Mountain States from his headquarters at Colorado Springs. Bill Terry, division marketing manager, succeeds Selby as division general manager.

Palo Alto — If you were hired between November 1, 1963, and October 31, 1964, and your employment is uninterrupted through the end of this month, watch your bulletin board! Local bulletin boards are listing the names of 300 to 400 new participants in HP's retirement program; they will join 2,114 employees now enrolled in the plan.

New participants will be introduced to the pension plan at meetings to be held in the near future.

Geneva — HPSA is establishing, effective November 1, subsidiaries for direct marketing of electronic, medical and chemical lines in Denmark, Norway, and Finland. John Beyerholm will manage Hewlett-Packard A/S, headquartered in Naerum, a suburb of Copenhagen; Ian McGeorge will manage Hewlett-Packard Norge A/S in Baerum, a suburb of Oslo; and Pentti Halinen will manage Hewlett-Packard O.Y., Helsinki.

Palo Alto — Two HP divisions are being renamed to reflect their location, in accordance with the company's practice of naming its divisions geographically when practicable. F & M Scientific has become the Avondale Division, and Dymec becomes the Palo Alto Division on November 1. Already designated geographically are the Colorado Springs, Loveland, Mountain View and Rockaway Divisions.

People on the move

Corporate — Bob Aikin, to systems engineering, corporate Marketing, from manager, field service engineering. Dymec; Ernie Bennett, to exhibits designer, corporate advertising, from publications staff, F&T; Skip Bizjack, to supervisor, addressograph section, corporate advertising, from printing services supervisor, Dymec; Stan Kowalczyk, to exhibits manager, corporate advertising, from production engineering, Microwave; Tom Smith, to Customer Service Center, from product training; Neils Tonnesen, to exhibits coordinator, from exhibits designer, corporate advertising.

F&T — Aldo Falossi, to marketing staff, from corporate product training; Bob Shields, to marketing staff, from government sales, corporate Marketing.

International — Karl Döring, to manager, VGmbH, from sales manager; Joe Palladino, to import marketing, from export marketing.

Microwave — Jerry Chamberlain, to production engineering, from quality assurance; Martin Edgar, to R&D, from production engineering; John

Guthrie, to tool engineering, from corporate process engineering; Ben Helms, to production engineering, from R&D; Reed Ogden, to computer systems manufacturing, from Palo Alto Personnel.

Eastern Sales Region — Dan Bernoske, to nuclear instrumentation engineer (Fort Lee), from nuclear marketing staff, F&T; Marshall Hiner, to regional repair center manager, from regional sales manager, Moseley.

Midwest Sales Region — Ron Dopke, to order processing manager, from instrument order processing manager; Don Janas, to assistant order processing manager, from parts manager; Jim Liozzo, to branch service manager (Indianapolis), from systems field service technician (Skokie); Ralph Mele, to electronics field engineer (Cleveland), from same position (Indianapolis); Ed Pulsifer, to data systems engineer, Eastern area (Skokie), from electronics field engineer (Cleveland).

Southern Sales Region — Del Kittendorf, to field engineer, from staff engineer.



from the chairman's desk

Some months ago I reported that our plants in Europe and Japan were making good progress in establishing their own product development programs to supplement our development efforts in the United States. I pointed out that this was an encouraging trend, and that ultimately we hoped to achieve a continuing two-way flow of products and product ideas between the U.S. and our overseas locations.

The recent Wescon show in San Francisco indicated that we are well on the way to reaching this goal. Included in our display of new products were five instruments that originated in our overseas laboratories — a milliohmimeter from Japan, two pulse generators and a loudness analyzer from West Germany, and a noise generator from Scotland.

These well-designed, useful devices attracted considerable interest at the show, and we anticipate they will find a good market in the U.S. More than that, they give further evidence of the increasing maturity of our overseas operations and their mounting contribution to our total corporate growth.

Over the past few years we have spent considerable time and effort in strengthening our position in overseas markets, recognizing that in the long run, these markets are as important as those we have here at home. We have tried to make our European and Japanese manufacturing operations more efficient and productive. We have set up our own marketing organizations in several countries, and introduced sales techniques used successfully in the U.S. We have broadened our training programs to provide our 1,500 people overseas with the necessary skills to do a more effective job. And, in all countries and in all phases of our operation, we have tried to build in those concepts of quality and excellence that will gain wide acceptance for our products and enhance our overall reputation.

This has been a difficult and challenging job, particularly for our overseas managers. But it is quite apparent that their efforts, plus those of our corporate international staff, are being rewarded. In Japan, for example, we established Yokogawa-Hewlett-Packard in 1963, only four years ago. Since then, largely because of our intensified effort in the country, our sales volume in Japan, including instruments exported from the U.S., has risen more than four times. Moreover, because we now have a fully integrated operation in Japan, with our own product development, manufacturing, and marketing, we are better able to attract promising young engineers and scientists, and have a solid base for future growth.

Our expanding activities in Japan, in Europe, in Latin America, and elsewhere indicate that we are truly a multi-national corporation, and that our success or failure in one part of the globe affects our operations in other parts, some perhaps several thousand miles away. This is why it is so important that all of us "think internationally," that we generate cross currents of ideas and technology that will make our company stronger, more dynamic, and better able to take advantage of the exciting opportunities that are bound to come our way.

David Packard

Measure

EDITOR
Merle Mass

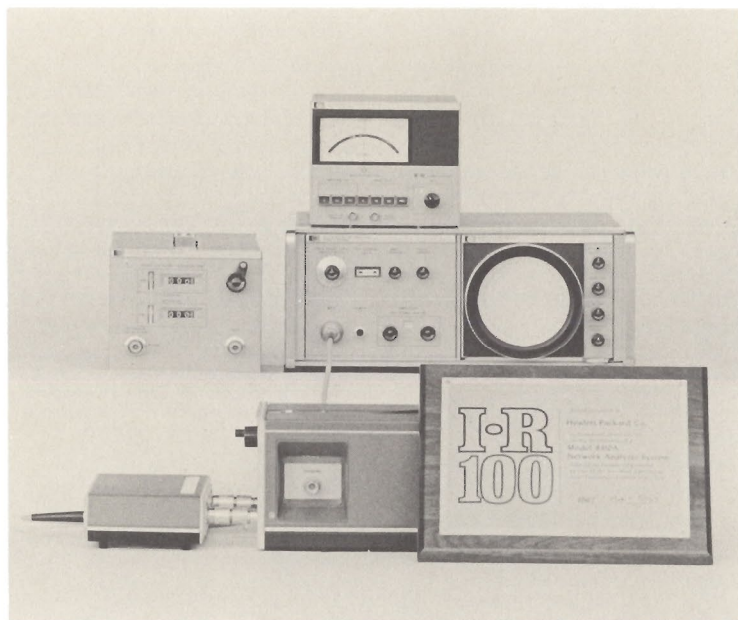
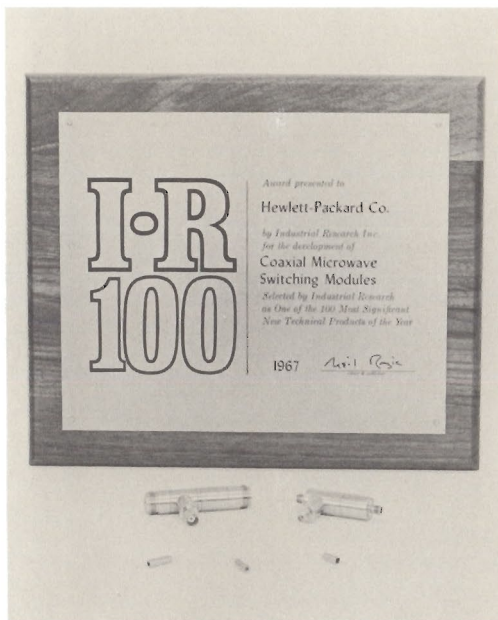
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**Again
and again
and again...**

Considering the thousands of brilliant new technical products that come onto the market each year, the odds would seem slim for any one company to win more than one award annually in contest with the top products in the U. S. Moreover, doing so for the fourth consecutive year would seem to really stretch the odds. Yet, with its 8410A network analyzer system (Microwave Division) and its coaxial microwave switching modules (HPA), HP has brought off just such a repeat performance in the I-R 100 competition. The selections were made by an independent panel of renowned scientists and engineers on behalf of *Industrial Research*, the magazine sponsoring the competition. HP won four top spots in 1966 and two each the previous two years. Overall, a rare if not unique achievement.