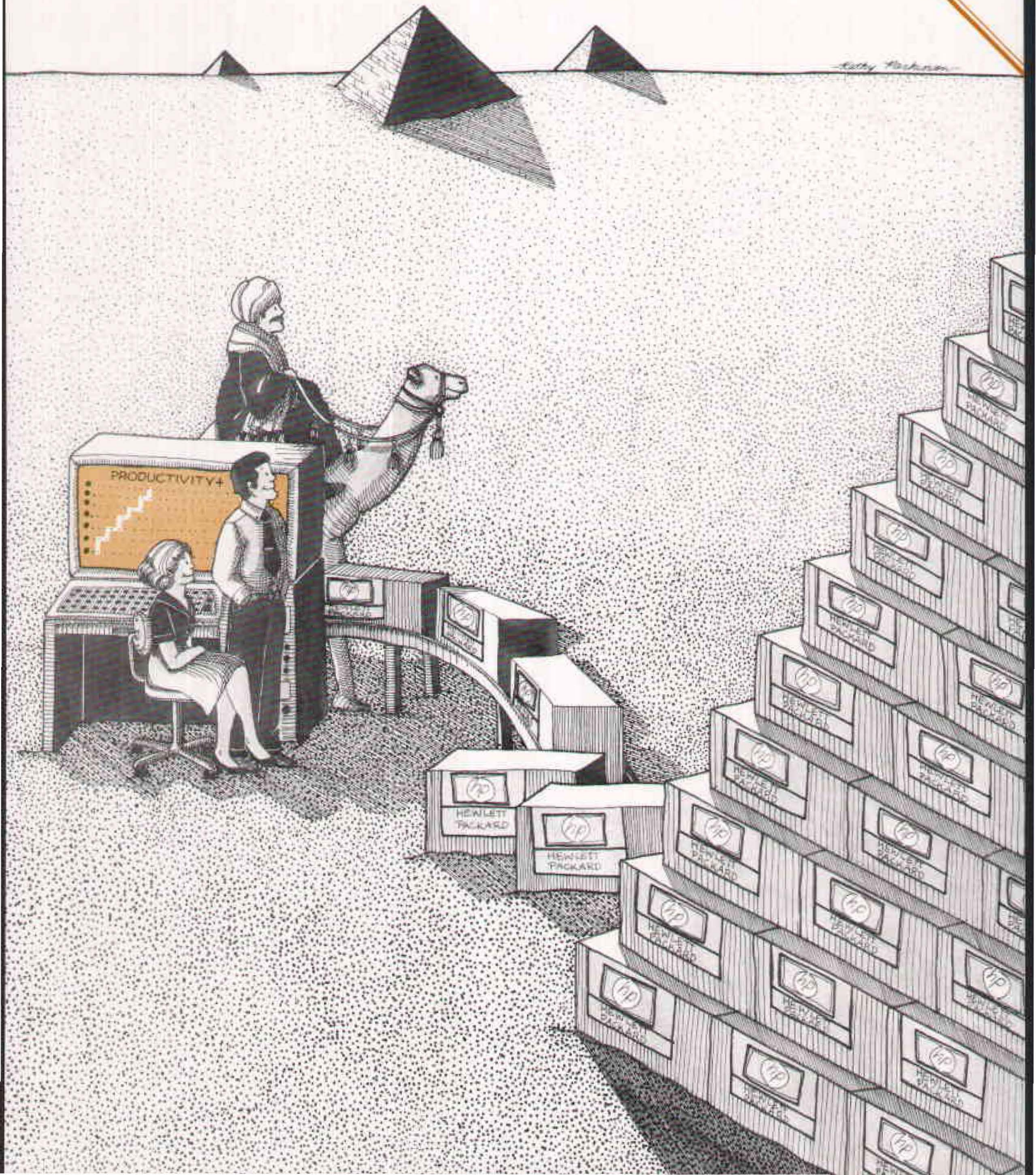
Measure

For the men and women of Hewlett-Packard/OCTOBER/NOVEMBER 1979

SPECIAL REPORT



Working smarter

☐ In your view you work just as hard today as ever you did—and with more skill, experience and resources. Most of your friends and neighbors also seem to be pretty busy and hard at work. Yet, you are beginning to hear that where Western productivity is concerned, the sky is about to fall—if it hasn't collapsed already.

Some of the specific messages have an ominous ring:

"Respect for the 'work ethic' is dying . . ."

"Industrial plant and equipment are obsolete . . ."

"Smarter machines displacing workers . . ."

"We're falling behind in R & D investment . . ."

"Government regulations are stifling investment and enterprise . . ."

"Only the giants can afford to invent . . ."

"High-technology industry is too capital-intensive for the small company . . ." And so on.

You also can hear that while U.S. productivity has slowed almost to a no-growth rate, productivity in other parts of the world shows significant and sometimes dramatic improvement.

That last observation has to be good news, if it means less poverty in the world—an economic catching up. On the other hand, a halt or a slide in U.S. productivity represents a turnabout in the wrong direction.

It's alarming because productivity is the best single indicator of total economic vigor. It tells us whether we are going to be able to compete successfully in our national and international markets, pay our way, balance our budgets, and support a rising standard of living.

In its makeup, productivity is quite complicated, the end product of all the goods and services produced by a business, an industry, or a nation. As an index, though, it's quite simple to calculate: divide total output in dollars or units produced by total input (labor, materials, capital and energy) in a given period.

Using that definition (there are others, such as direct-labor productivity, asset productivity, productivity per salesman, etc.), it's clear that every item of economic activity either contributes to or detracts from a given standard of productivity. Investment makes a big difference. National policies are a major influence—negative in the case of government regulations. Invention adds a big contribution. People add to it by working smarter and working together.

working together...

In fact, in a company such as Hewlett-Packard, with its particular philosophy of management-by-objective, it can be argued that people are the biggest influence on productivity through their collective decisions.

In some very real ways, in fact, improving productivity is a way of life at Hewlett-Packard. Individuals pay lots of attention to it because of the good things that come with it—profit sharing, personal satisfaction of a job well done, employment stability, pleasant working conditions, and opportunities for advancement and growth. The corporation pursues it as a goal because it's the key to profitability which in turn is the key to self-financing of future growth and of meeting other corporate objectives. And as producers of a wide range of electronic products, we are increasingly involved in helping solve the productivity problems that customers have.

In the following report MEASURE attempts to explore that picture. Since all parts of the company affect productivity in some way or other, examples were selected on the basis of a specific and/or measurable contribution. In particular, they were chosen for the way they exemplified "working smarter" and "working together" which, in most cases, amount to the same thing:

Above and beyond the bottom line...

The growth cycle...

Checking a chart that shows total annual revenue per employee for the years 1974 into 1979, Ralph Lee, executive vice president, quickly calculates (on his HP41C handheld machine) that HP's overall productivity has been growing at an average of 11.4 percent per year.

Ralph points to a couple of flat spots on the employment curve, noting that productivity went up at a faster rate during those periods: "It's the learning curve. Fewer new and inexperienced people are being hired, and more attention is being paid to training and development."

Ralph's chart shows the reverse is true for fast-growth periods, the productivity curve tending to flatten in proportion to the increase in employment. "I think we've reached a point where we won't be hiring as many people as in the past few months. Then we'll see productivity begin to climb again."

A matter of teamwork...

John Doyle, vice president-Personnel, pondered the question of "What makes the difference in HP productivity?

"I think people genuinely do try to do a better job," he said. "Some of it has to do with profit sharing and the like. But the real secret is getting people to work together. It's probably easy to get people to work hard. But getting them to work together is much harder. That's what management-by-objective is all about—forming teams that work together. Of course, training is very important in doing that, and so is leadership.

"You might also point out that, in measuring HP's productivity, it would probably be more realistic to measure the productivity of direct labor, and of capital assets. That's because our products have changed so much. They cost more, and offer many more functions and greater sophistication. Yet because of new technologies, the use of direct labor as a percentage of finished products is less. In other words, our products are becoming more asset intensive and less labor intensive."

The three pillars of productivity...

Are the effects of productivity for "real"? Or is it just another economic abstraction—shorthand for "work harder"?

Fred Schroeder, HP's director of Corporate Development discussed some ideas he recently offered on that question to a World Affairs Council meeting in San Francisco.

By way of preface, Fred affirmed a long-standing principle of economics which holds that changes in the level of a nation's productivity produce direct and dynamic changes in the purchasing power of its currency or in the volume of its trade. He cited the weakening of the U.S. dollar as an example in which reduced productivity growth is a factor.

The solution Fred recommended is that of "working smarter" through a balanced combination of research, investment and innovation. The goal would be highest possible employment and minimum inflation (in contrast to economic dietitians who say: "a reasonable amount of starvation is good for the health").

Is that reasonable and attainable? Yes, he said, providing a nation is willing to insist on practical and affordable economic and social programs. In particular, government should foster research, investment and innovation in its realm of civil service, meanwhile letting market forces operate as freely as possible.

Fred introduced figures to show how the average annual increases in spending for social programs and government operations in the U.S. have consistently exceeded increases in national income and productivity. Because it is essentially non-productive in an economic sense, such over-spending can only contribute to inflation and other economic problems. He pointed out that it is the electorate at large which drives many programs, so it means that each individual must take steps to improve productivity by scaling down one's wish-list of public spending.

According to Fred there are many opportunities for working smarter. Unemployment programs, for example, could emphasize job training and placement rather than benefits. Many of the "intermediate technologies" such as construction, automobile engineering and appliance design need updating. And organized labor could contribute by recognizing that productivity improvement is a useful goal that benefits overall employment and economic stability.

Fred added that U.S.-style democratic capitalism possesses enormous economic strength and vitality. Because of that basic good health it tends to react merely to crises rather than to economic foresight. The challenge is to sharpen awareness of and preparation for economic crises before they happen.

A program for productivity...

Because of the continuous turnover in our products, it is difficult to measure trends in overall productivity at HP, noted Ray Demere, vice president-Corporate Manufacturing Services. But if all of us put our effort into making better use of the four input elements of productivity—labor, capital, materials and energy—the output result would greatly improve our performance and ability to compete:

- *Labor*—Generally we've been successful in improving our labor efficiency through training, sharing ideas, improved tools and new techniques. There continue to be excellent opportunities for working smarter in all activities, be it designing circuits, cleaning floors, writing software, secretarial and clerical work, moving materials and selling products as well as production tasks.
- *Capital*—This year we've been working together to improve the management of balance-sheet assets such as land, buildings, machinery and equipment, inventories and accounts receivable. Approaches include better use of space and equipment, second and third shifts, increased subcontracting where practical, and more efficient buildings. Many divisions are cutting inventory by improving production planning, shortening the manufacturing cycle, and better inventory management.
- *Material*—Efforts to minimize the amount and cost of parts in our products are underway through value analysis, expanded companywide purchasing agreements and parts standardization.
- *Energy*—Since the 1973-74 energy crunch, we've made great strides in reducing our energy consumption by every measure—per person, per square foot of floor space, or per dollar of shipments.

According to Ray, significant improvements in quality and reliability of products have resulted from increased emphasis on product assurance. Yet we've only scratched the surface of opportunities here.

The major challenge, he said, is to change our attitude about quality. We have always tolerated a "reasonable" percentage of bad-quality parts throughout the manufacturing cycle. For example, about two-thirds of production test time is spent troubleshooting bad quality—usually related to semiconductors—which has become built into the product. We need to develop an intolerance of bad quality, starting in the product development laboratories and on into the manufacturing cycle so that every product operates when switched on in test.

The results could be dramatic:

- Labor saved in not installing bad parts, in reducing re-work and scrap handling, in production test and field repair.
- Asset saved by not inventorying bad materials, by less safety stock, by less work-in-process inventory, by using less floor space and test equipment, and by needing fewer assets in the field for service and support.
- Less material used due to reduced scrap and reduced need for replacement parts as well as less obsolescence.
- Less energy needed for heating, cooling, lighting and power.

Warranty leverage...

What is quality worth? More specifically, what payoff can you expect by improving the reliability of HP products and reducing the cost of warranty?

Paul Baird, Corporate Assurance Engineering manager in the Corporate Manufacturing Services, notes some interesting correlations: "It seems reasonable to assume that an increase in productivity should result in an increase in profits. An additional factor is that warranty costs—that is, the cost of repair or replacement of malfunctioning products and parts under warranty—also relate statistically to profit. We see this in recent studies which show that a reduction in warranty cost of $1.00 corresponds to a pre-tax profit increase of anywhere from $2.00 to $6.00.

"It's hard to establish an exact cause-and-effect relationship here, but it probably can best be taken as an indicator of how well the total customer-satisfaction system is working—how productive it is. This system starts with design and carries through manufacturing to field support and customer training.

"The fact is that about half of warranty problems relate to design complexities. A new HP product almost invariably reflects the newest technologies in its field, and often its market life is relatively short. So it's probable that some re-work problems will arise. By the time we get all the bugs out, a new product will most likely replace it.

"What do we do to shake down that new product and minimize rework?

"Most divisions now do a lot of life testing and stress testing, intentionally abusing the product in all the ways that might happen in a customer environment. That's good human engineering and good reliability assurance."

Product and technological innovation at HP is essentially a team effort organized as projects with specific goals and timetables. Broadly speaking, the ultimate objective of each team is a product that will enhance customer productivity.

Managing innovation...

Of all the basic functions that make up HP's business, the first among "equals" must surely be product innovation. It was the basis for the company's start 40 years ago, and it's still the prime mover of growth and development.

But what a change over that time! Then, Bill Hewlett and Dave Packard could transform Bill's Master's thesis into a finished product with a capital outlay of several hundred dollars for a lab-factory housed in a one-car garage. In 1979 we invested something like $200 million for R & D and product engineering. It involved the talents of thousands of engineers, scientists, mathematicians and their many skilled associates working on hundreds of future products ranging in size from microcircuits to major systems and exploring scores of emerging technologies.

How to manage that kind of effort and assure its productivity is a never-ending search at HP, a science in itself. The following are some observations on the subject:

"Our goal is industrial automation..."

"Productivity is of special significance to the Computer Systems Groups," according to Marco Negrete, R&D manager for CSG and chairman of HP's Engineering Council. "It not only cuts the cost of doing things internally but also is an indication of how effective our products will be in the market place. With close to a hundred HP 3000s, over a thousand 1000s and fifteen thousand 9800 desktop computers in use throughout the corporation, computers have been a major factor in significantly increasing productivity throughout HP. Judging from the acceptance our products have enjoyed in the field, our customers have benefited as well.

"One measure of productivity in computers is performance per dollar," said Marco. "Performance per dollar of our products has increased steadily at a rate of about 30 percent per year, even in the face of large increases in the cost of labor and materials. As impressive as this increase in performance per dollar is, it is only part of the answer in that much of the improvement in productivity derives from using computers in entirely new ways. This is where engineering comes in, creating change, bringing together market needs and technological innovation. For example, by making our products more accessible and easier to use, we have significantly reduced the amount of effort required to develop applications and get these applications up and running.

"Productivity in engineering, usually measured in terms of the growth in sales generated for a given level of investment in engineering, has also increased," Marco noted. "Although leveraging our engineering investments, keeping projects on schedule, etc., are important, selecting the right projects in the first place is still the most important factor in increasing engineering productivity. Unfortunately, there is no ready-made formula to go by except perhaps for the emphasis on making unique hardware and software contributions in each of our products, a goal that we share in common with other divisions throughout HP. Perhaps the most significant difference, compared to what we have done in the past, is the fact that divisions within the Computer Systems Groups are highly interdependent. The end product, a computer system, is really a combination of products coming from several divisions. In selecting products then, a computer-group division must find ways in which its product can combine with products from other divisions to make a system-level contribution. This means that in the Computer Systems Groups, we have had to focus our activities on an inter-group basis and implies a certain structuring and coordination of effort. The outcome has been a renewed emphasis on selecting a few key things and doing these well.

"As we follow HP's progress in the computer business over the years, we find that our range of involvement has increased greatly over time. Starting with technical computers, we have expanded into business computers and have filled out our total offering so that today we are able to supply complete systems in both technical and business applications using HP peripherals and software. What may not be so visible is the degree to which we have been able to leverage projects to gain the maximum return on our engineering dollar. The key has been maintaining compatibility with what we have done in the past and broadening the application of technology across the entire group. Leveraging our technology starts at the lowest level with the use of SOS technology throughout our product line in the form of general purpose chips such as the phi chip, a standard HP-IB interface used in virtually every product, special pur-

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pose processor chips, which have been adapted through microcoding to a variety of applications, etc. At the high end, it is evident in the use of common peripherals for both technical and business applications. Finally, at the user level, it is visible in the emphasis on developing common languages and common applications interfaces to minimize the investment required to move from one computer to another.

"Probably the most important thing we have done is to gradually narrow our focus, concentrating on the development of products which utilize the full range of HP's capability—extending from the technical to the business—for those customers, like us, who need both. Broadly defined, our goal is industrial automation, the key to higher productivity."

Selecting the right product...

"Like most of HP, Loveland Instrument Division has maintained price increases below the general level of inflation during the past few years and has simultaneously rewarded its engineering staff with real improvements in purchasing power. At the same time, our growth has been at an all time high for the period of FY'76 through FY'79 while also maintaining an R&D funding level at or below our long-term targeted level. This favorable situation rests heavily on the real improvements in engineering productivity that have taken place during that time."

Bill Kay, formerly engineering manager at Loveland Instrument Division and recently named manager of a new instrument division (presently slated for the Lake Stevens-Everett, Washington area), was responding to a MEASURE request for a review of approaches to productivity in division R&D.

"At LID," Bill continued, "we have been focusing on four areas that directly impact engineering productivity. These are the product selection process, scheduling (particularly during the latter phases of the project), developing an improved set of design tools, and utilizing our major investments (such as in IC technology) in more than one product. We continue to learn as we go about how to improve our productivity, but we have been pleased with our recent results.

"Of the four items mentioned above, we view the product selection process as being by far the most important. The leverage of having the 'right product' is phenomenal. Such standard HP phrases as 'make a contribution', 'know the application', and 'design with your customer's needs in mind' are a basic part of our approach. In addition, we have developed a conceptual model that plots the uncertainty of a product definition as a function of time. This model has proven to be quite useful in establishing a framework that encourages creative (often divergent) thinking early in the product selection process, and it also serves to reduce the anxiety levels that can occur when schedules are becoming ever more important while the definition is being refined.

"None of this is intended to say that schedules are not important. They are! And they become ever more important as the product enters the latter phases of its development cycle where the investment rates are rapidly increasing and the manufacturing area begins to gear up. As a result, we place a very heavy emphasis on meeting schedules during the last half of the development sequence. One key item in improving our schedules has been to have the product meet all its major specifications prior to beginning the production prototype cycle. You might say we 'rediscovered' a basic HP tenet. Too often in the past we have yielded to the schedule pressures in the preceding cycle and have entered this last phase with 'known' but unproven solutions to design problems only to have them create far more expensive delays at a later date.

"Design tools are taking on a new importance with the rapid shift in design tasks. Today software-development systems, integrated-circuit development systems, and computer-aided design tools represent a key element in our strategy to improve engineering productivity. These tools tend to be expensive both in terms of initial cost and support. However, their leverage can be quite large. The recent HP 64000 software development system from Colorado Springs is one good example of this type of equipment and the Hewlett Packard Integrated Graphics System (HPIGS) that is aimed at IC design is another.

"The multiple usage of high cost investments may be obvious as another means of improving engineering efficiency. This does mean more than simply re-utilizing IC designs or hardware, however. In a more general form, it can be used in conjunction with 'family planning' within a product area to enhance the return on the investment that has to be made in a new technology. One good example here was the leverage that centered around developing the microprocessor technology for instrument control just a few years ago.

"We have had some notable successes in improving our engineering efficiencies but a lot remains to be done. I'm glad to see the focus on this important area."

Winner of a Boise Division "bright idea" badge is Wesley Meyer for his part along with Reggie Sellers in suggesting a new automated soldering process that has saved almost $20,000 in 1979. According to Allan Gross, Production Engineering manager, the Boise Improved Methods and Products program (B.I.M.P.) has produced close to $500,000 savings during the year.

That's a good idea!

Getting people involved in improving their own work methods is a very common practice around Hewlett-Packard. Sometimes it's formalized as "Methods Improvement Programs" providing awards of recognition and the like. But in many cases it is simply a matter of capitalizing on an idea growing out of experience on the job or even borrowed from elsewhere. Probably thousands of such improvements are made each year. They add up to a significant contribution to HP's productivity gains.

Ideas unlimited...

Several months ago—with a bit of fanfare—Delcon Division launched its first Methods Improvement Program. Everyone was invited to contribute ideas: "Take a moment for a good look at your work environment. Analyze your job duties. Is there any way you can increase efficiency and/or decrease cost in these areas?"

A lot of people thought so, including those in manufacturing, marketing and even the security guards. In the first couple of months they sent 39 specific ideas to the program's originator, Chuck Fikes, Quality Assurance manager. Each was first reviewed by the local supervisor as a way of maximizing support and of obtaining a measure of the saving that would flow from it. Most often the ideas were installed first then written up for purposes of entering the contest.

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According to Chuck, the range of savings is wide: "Some ideas don't really save measurable amounts of money, but they might contribute to quality or safety which are equally important. Others are pretty big savers, including one that looks good for about $16,000 the first year."

All are eligible for recognition and awards. Every contributor receives a tee-shirt reading HP Delcon. All entries are dropped into a hat for a drawing that brings various prizes, and a yearly prize will go to the largest money saver.

Of course, such programs are not at all new around the company. Some have been in place for years and have produced some notable ideas. But what's interesting about the Delcon program is that—being new—it shows how effective a formal idea vehicle can be. Prior to the program no one at Delcon knew how, where or by whom new ideas—if any—were being generated. Today it's everybody's business—and a lot of fun at that.

Methods Improvement Program at Delcon Division is typical of many others employed by HP manufacturing divisions as a means of stimulating new and smarter ways of doing things on the job. Connie Turrey improvised a method of inserting nuts in tight spaces by loading them in pieces of shrink tubing at the end of a brush handle. Lewis Meline developed a system for riveting "card cages" at $1 each instead of former spot welding subcontracted for $4 including extra handling and transportation.

Something extra...

Joe Silva is a fabricated-parts cost estimator for Stanford Park Division who believes in keeping his eyes open for opportunity. Wherever he goes around the shop Joe writes notes to himself and others about things that he feels could be improved.

According to Jorgen Hagglof, SPD's manufacturing engineering supervisor, Joe's notetaking has produced an impressive list of savings—over $170,000 in the first eight months of 1978. Asked if that wasn't Joe's job, Jorgen allowed that it was but that Joe puts something extra into the effort.

As an example, a lot of that saving came from challenging what had become accepted practice of making most parts in-house. Putting some of these out to bid, Joe found that many could be produced or processed for half or less the HP cost.

Joe's attitude is expressed in the following: "As a fab estimator I'm exposed to a large volume of part-process sheets and run times. Though not my primary job, when I observe an area that could be improved through a change in process, I make a suggestion to the proper department."

Plastic slurry is carefully injected into mold where it foams up and hardens to create a highly protective package at lower cost for shipment of San Diego products.

For safety's sake...

It seems like a simple packaging improvement, employing a foamed plastic to protect instruments during shipment. But, as described by Al Shirley, San Diego Division packaging engineer and a 23-year HP veteran, it emerges as an almost totally synergistic development—one good thing leading to another. The primary purpose of the molded foam containers is to provide a tightly fitted protective enclosure for the sensitive electro-mechanical products—printers and plotters—produced by the division. It does that job well: since the introduction of foam packaging at San Diego one year ago, warranty problems related to shipping damage have diminished significantly. At the same time it eliminates the need for a lot of the double boxing used previously, and has reduced the number of carton sizes needed from 36 to 6.

In addition to warranty savings, the program figures to save $80,000 per year in direct material costs (down from $11 per instrument to $6), reduce boxing time by 40 percent, lower freight charges, and clear warehouse space. The cost of doing this properly is a rigidly controlled health and safety program. Foaming does produce some toxic by-products which require such care. In fact, Al Shirley hesitated for a couple of years to follow the lead of other HP organizations which had switched to foam packaging. Now, with all precautions in place, he's sold on it.

Training continues to be one of the basic means of bringing people up to speed in new jobs, especially in developing a sense of HP teamwork which is one of the keys to improved productivity.

Getting our act *together*

Ways of organizing work have a profound impact on productivity.

While that may seem like a statement of the obvious, the fact is that Hewlett-Packard is constantly seeking new ways of shaping its organization to meet the increasingly complex needs of its customers. The recent restructuring of the computer organization is an example of such change, bringing about a new alignment of product teams better able to capitalize on new opportunities. Examples of new and experimental forms of teamwork can also be found at almost every local organization or between organizations, encouraged because we manage by objective and want people to take a chance in testing their ideas for doing things better:

Catching up in a hurry...

One thing that almost all HP products have in common besides being electronic —is documentation, the detailed descriptions and illustrations of circuitry that tell both HP and customer people how to maintain and service these instruments. As Tom Ely, service publication manager at Loveland Instrument Division, recently outlined in a trade magazine article, the task of documenting a product has grown in complexity equal to the great growth in instrument sophistication. Today, an operating/service manual can easily run between 250 and 300 pages heavily illustrated. Yet, too often, he said, the preparation of such technical publications is done in a laborious way unchanged in 20 years. In particular, talented technical illustrators are often required to perform highly repetitive work, drawing and redrawing the same shapes over and over as change orders come in or to show new aspects.

In 1978 Tom's department faced the need of quadrupling its technical illustration staff—if enough such creative people could be found, let alone their salaries and space. The upshot was an intensive search for a computer graphics system adaptable to technical illustrations.

What they came up with was an interactive system that allows illustrators virtually to draw directly on a CRT display. Changes and addition became easy. Frequently used figures could be stored and called up when needed. Productivity expanded to the point where the existing staff could readily handle and even speed up the growing volume. Today they are the system's biggest boosters.

Wired for speed...

Some psychologists say that boredom can serve a useful purpose by setting the stage for outbursts of creative effort. People in the cabling department of Andover Division might agree with them. There, the task of shielding some 50,000 lengths of wire each year had become tedious, requiring 6.5 minutes for each wire.

Working as a team, the cabling department set about finding ways of speeding the operation. First, they modified the wire-cutting machine to condense several operations into one. That knocked off 3.15 minutes per wire. Then they developed a new method of attaching the drain wire which cut the time for this operation in half. It also eliminated the problem of burning wires during soldering, a problem that sometimes resulted in electrical shorting. So troubleshooting time was reduced, too. The final result was to free two people for more challenging work.

Cause for celebration...

One sure sign of a productive period around HP is the beer bust, or its equivalent. A MEASURE representative visiting the Boeblingen plant in Germany last May discovered one such event in progress. Next day, on a tour of the machine shop with its manager, Siegfried Dippen, several examples of contributions to productivity typical of manufacturing departments were uncovered:

First example was a punch press designed by the engineering-manufacturing department. Its purpose is to perform experimental and short-run production that would be too expensive on the larger automated machines. Yet the home-made device does precise work, is safe and

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Beer bust at Boeblingen—one happy payoff of improved productivity.

Heavy emphasis on coaching, training and process improvement at South East Asian plants in Singapore and Penang has resulted in new high production standards.

working *together*

quiet, and uses the same system as its big neighbors.

Further down the line is a setup for handling PC boards through various board-production phases. With it, Giuseppe De Lauso can quickly stack up a half-hour's supply for automating handling. Otherwise someone would have to stand by hour after hour, feeding them in one by one. Cost of the equipment was easily returned in a year.

Back in the transformer winding department, supervisor Max Hertkorn was asked to demonstrate his solution to a difficult and generally expensive problem. Max shows how his system is able to impregnate the transformer coil and fill its container all in one operation. Siegfried describes it as "a good and simple solution" to a problem that is usually both difficult and expensive.

Managing the territory...

Although HP field sales representatives are the focus of a lot of sophisticated support programs, much of their effectiveness comes down to some pretty basic concepts—like knowing the territory, and covering it regularly.

HP veteran Rudy Poucher, district manager-Instruments in the Sacramento, California, office, pointed out some of these sales basics:

"You have to have a plan. It's important to customers to know that you'll come by on a regular basis and that you'll have a certain amount of time to devote to their problems."

Rudy described a recent trip to Elko, Nevada, a once-a-year trip because of the distance involved: "We picked this time of year because the utility company there is preparing budgets for 1980. We took along a spectrum analyzer to show them, and now they have one in their budget. We saw everybody we had to see, and even stopped off at the hospital to leave some medical products literature."

Growth and change in the HP organization make it more important than ever for sales people to maintain connections with customers, says Rudy: "The way I look at it, over the years I've made an investment in time on behalf of the company. If I'm going to take on a new assignment, it's essential that my connections be transferred properly so that we don't lose them. Otherwise the new sales engineer is going to be no better off than a competitor.

"Overall, I'd say we need to pay more attention to the concept of time and territory management. What is most important, however, is for field engineers to be able to feel that they are productive members of the HP team with a strong line of communication and support to the factory organizations."

The curve of confidence...

The "learning curve"—perhaps better known as job experience—can produce dramatic results in terms of individual and team productivity. That's particularly true where efforts are concentrated on a few products rather than many and where special attention is paid to building confidence. HP's plants in Singapore and Malaysia make a good case along these lines.

HP Singapore, for example, began producing oscilloscopes in mid-1978 following their transfer from Colorado

Springs. During the first pilot run it took 33 hours to assemble and test one 1220 and 36 hours to build a 1222 scope. In less than a year they were down to 11.64 hours and 12.2 hours respectively, several hours below the standard time in each case.

Several factors are recognized as contributing to that success. First was better training: areas of common skills and processes were grouped together, and special skills for these jobs were identified and developed through training. Later, process and product improvements enhanced producibility and reliability while making assembly and testing go faster.

In the Malaysia plant near Penang, back in the mid-1970's when core memory stringing was a big operation there, a vast gap was noted in the relative productivity of various people. A very fast operator could complete a memory stack in 35 hours, but a slow stringer needed 170 hours! Skill alone could not account for such a difference, the supervisors concluded. They began looking for more subtle factors, ways of building confidence among people who somehow felt that skill was inborn. How could they overcome that?

A lot of encouragement was given to slower individuals to break their best personal stringing time and that of others. Personal improvements were held up as examples, gradually dispelling the psychological blocks they may have had. A competitive spirit entered the picture. Within a year the average stringing time was slashed in half, from 135 hours to 62 per stack.

Quality was also emphasized. As speed and skill grew, errors were reduced. In time the reduction in re-work helped reduce the average to 35 hours, and process changes added still further savings.

So, although core-memory stringing is just about a memory now, a lot of people learned that they can be just as productive as the best.

Decisions, decisions...

To automate or not to automate a manufacturing process? That is often a question at HP divisions. It gets down to a whole series of questions about length of production runs, standardization of parts, availability of equipment and money, and so on.

At Data Systems Division in Cupertino, manufacturing manager Gaylan Larson and his team in the printed-circuit loading area pondered just such questions recently and came up with a "go for it" answer.

One key to the answer was availability of a new series of boards standardized by size—an unusual situation until now. Normally, the PC team is called on to handle the more than 400 different board models individually, using typical hand-loading methods. The series, designed for a new line of products featuring HP's silicon-on-sapphire (SOS) chip technology, is modular in size, favoring automatic loading.

But how about the economics of doing that? As Gaylan noted, HP's usual pattern is not to stretch out the life of a product too long. Reasonably soon after it passes its peak sales point we'll probably replace it with a better product. So, unless a high volume can be achieved in that particular life span, the opportunities and need to automate are often limited.

In the case of the new computer series, however, opportunity grew from the fact that each product will use at least three printed circuit boards of similar size for the key functions—central processing, memory and Input/Output interface cards.

As a prerequisite to speeding up the board-loading process an extensive program of pre-testing of components was begun. This greatly improved the "yield" —or the chances of a completed board working after loading—and accelerated the total production cycle.

Gaylan noted one further condition: the opportunity for managers to devote time to such matters. When divisions grow fast the managers and supervisors are running just to keep up. As growth slackens they can better attend to the fine tuning of areas such as reducing inventories—getting ready for the next growth cycle.

At Data Systems the new automated PC loading line will have a dramatic impact on work-in-process inventory. Instead of the standard two-week cycle to hand load a board (90 percent of the time spent queued up waiting at various stations), the new system will complete work in one day. That's going to look very good on the asset-productivity ledger.

Checking the installation of a new automatic PC board loading machine at Data Systems Division are Gaylan Larson, manufacturing manager at left, and Wally Johnson, supervisor of the board-loading area. Automation was made economical largely through standardization of board sizes.

Talking in circles can improve quality

A U.S. quality control concept that was imported and successfully adapted by Japan is now working its way back across the Pacific and into HP's U.S. operations.

Quality Control Circles—a special form of worker participation in small group problem-solving—has been a critical ingredient in Japanese manufacturing for a number of years. The basic "ancestral concept" for the circles was brought to Japan in the post-war period by such prominent American business consultants as W. Edward Deming and J.M. Juran. Their principles were enthusiastically adopted and adapted by the Japanese to that country's unique cultural setting, and have been in part responsible for propelling Japan into its current position as world leader in productivity and quality assurance.

The idea behind Quality Control Circles is to make rank-and-file employees part of the production problem-solving process. Small groups of people doing similar work meet regularly to identify, analyze and solve product quality problems. Overall objective of the QC Circle is to enhance job satisfaction while at the same time making improvements in product quality.

"Employees have a lot to offer the company in terms of ideas and problem-solving," explains Alicia Maciel, production supervisor for Desktop Computer power-supply assembly at HP's Fort Collins Division. She is also facilitator for the two Quality Circle pilot programs at Fort Collins which began operation in April of this year. Division management instituted the pilot project after studying the success of QC Circles in Japan and in several American companies.

"Production people are the people who do the work and are most familiar with aspects of production problems," notes Alicia. "It seems reasonable to use their expertise and ingenuity in identifying and solving problems."

The Fort Collins Quality Circles (the term "control" is dropped in the HP version) have six to eight people each, including a designated leader. The groups meet one hour per week on company time on company premises, although Alicia adds that some workers are so interested and motivated that they do work outside on their own time as well.

Circle members receive special training in such areas as problem analysis, brainstorming, sampling, check sheets and cause/effect analysis. They also learn techniques for making successful presentations.

"Coming up with a solution to a problem is only half the battle." says Alicia. "Circles must be able to present the solution to management in a convincing way."

So far the Quality Circle program has been very successful. Perhaps the best indication of this success is the reactions of circle members.

Says Ann Ross, Fort Collins production worker, "I get a real sense of accomplishment from being in the circle. It makes my job more interesting and I feel more a part of the company. We also get to meet and interact with a lot of people we ordinarily wouldn't. For example, in connection with a project we're working on now, we've talked with production engineers, solder wave people, process engineers and maintenance people."

Betty Sutton, also of Fort Collins, echoes these sentiments.

"The circle lets you be an individual using your personality to contribute to a group idea," she says. "It allows you to help solve problems and you get a real sense of accomplishment. The leader helps keep us on track, but we actually come up with the solutions."

Loveland Instrument Division started up its two Quality Circles in March. As at Fort Collins, circle leaders are first-line supervisors. Circle members—who volunteered for the project—receive training similar to that described above. John Scohy, LID supervisor of test support and facilitator for the circles, reports the groups are working so well that he is planning to recommend that the program be expanded.

"It's too early to evaluate the dollar savings resulting from the circles," he says, "but there have already been a lot of pay-offs in other areas. People have really been enthusiastic about the circle projects and a lot of teamwork has been evident."

At the Manufacturing Division in Palo Alto, three Quality Circles involving 24 employees in the Printed Circuit Shop have been in operation since March. Procedures are pretty much the same as at Fort Collins and Loveland, except that facilitator Fred Riley (he's also Manufacturing's quality assurance manager) wrote a training manual for the circles to use.

Already the Manufacturing circles have accomplished a number of tasks. One group has rewritten a training program, and another came up with a process sheet which standardized one of the PC board manufacturing processes, resulting in a decrease in scrap.

A Quality Circle gets down to some problem-solving discussions in the Printed Circuit Shop of Manufacturing Division in Palo Alto. Three circles involving 24 people have been organized since March.

Quality Control Circle at YHP prepares for annual awards program.

Fred Riley feels that Quality Circles are "an excellent concept that helps us manage the way HP says we should manage. They provide a vehicle to make sure we are involving employees at all levels in problem solving."

Other divisions interested in trying the Quality Circle concept will soon have help in setting up programs. Currently, Shelly Content in Corporate Training is putting together materials, including a QC Circle leaders' guide, participants' guide and facilitators' guide.

The real experts in Quality Control Circle practices, of course, are the people at Yokogawa-Hewlett-Packard, HP's joint venture in Japan. Nearly 75 percent of production workers at the Hachioji plant have been organized into Quality Control Circles. YHP has been using circles since 1975, and this year they were expanded to include employees in such non-production areas as personnel, order processing, general administration and so forth.

Circles in Japan operate somewhat differently from their pilot project counterparts in HP's U.S. facilities. YHP circles choose their own leader from their ranks, and they meet twice a month after work for two hours, but are paid for the time they spend. When necessary or desirable, they can meet at lunch time, and the company also allows them to meet up to two hours per month during working hours.

Each year a company-wide contest is held to recognize the outstanding Quality Control Circle. Top company management, fellow workers and outside observers gather in the Hachioji cafeteria to watch the finalists representing each block present their ideas. Managers judge the presentations, and the winning circle receives a two-day trip to visit top-ranking Japanese industrial plants, with a sidetrip to a hotsprings spa. This year's winners, the "Young Sisters" circle from the Transfer Production Division, originated a method for reducing the number of steps in producing the 141T spectrum analyzer.

Three top QC Circle people each year also have the opportunity to go on a two-week seminar/cruise sponsored by the Nihon Kagaku Gijtsu Renmei (Union of Scientists and Engineers). Various classes are offered aboard the organization's luxury cruise ship, and the ship makes calls in the Philippines, Taiwan and Hong Kong in order to visit "model" foreign firms.

Quality Control Circles are credited with bringing about a number of improvements at YHP. For example, direct labor hours for assembling the 141 T Spectrum Analyzer dropped from 9.2 to 4.5 hours, the process defect rate in the machine shop has dropped from 2 percent to .01 percent during the past year and a half, and the dipping defect rate on printed circuit board assembly has been reduced from .4 percent to 0.007 percent.

Japanese industry in general has registered great gains thanks to Quality Control Circles and to other forms of worker participation in small group problem-solving. Total membership in both registered and unregistered QC Circles in Japan is estimated at over eight million. An estimated one in eight Japanese workers participates in a Quality Control Circle.

Companies world-wide are also adopting the QC Circle concept. An estimated three million workers are involved in South Korea, with other programs reported in Hong Kong, Taiwan, Singapore, and Brazil. The approach is under study in New Zealand and India. Firms in Sweden, long known for their use of worker participation programs, are using QC Circles, and a Norwegian university is helping install QC Circles in three major firms there.

American companies have also jumped on the bandwagon in recent years. Large firms like International Harvester, General Motors, American Airlines, TRW, Hughes Aircraft, Northrop, Westinghouse, and Singer have instituted QC Circle programs with impressive results.

Management at International Harvester's Solar Turbines Instruments Division in San Diego estimates that the average direct savings from their 30 QC Circle projects is about $10,000 per project. An overall savings of $600,000 has been registered in the first eighteen months the circles have been in operation. At TRW, after three years of QC Circle activities in several divisions, employee absentee rates have dropped by as much as 50 percent, turnover has been reduced five-fold, and productivity increased by better than a third, says James Hamerstone, manager of organizational development at TRW's Marlin-Rockwell Division.

While HP people are impressed by such information and believe the company's fledgling Quality Circle Program may eventually bring similar gains in productivity and quality, they also believe there are more important benefits to be gained from the program.

Says Fred Riley, "The concept should be accepted for what it is—a way to improve communication and to improve people's feelings about their work. The direct savings that come from the solutions Quality Circles originate are an extra bonus."

working *together*

In the Medical and Analytical sales support area of the Atlanta District office, Michelle Allison (right) and Mary Jo Flatt share the same terminal on a special swivel base as they use the SODA system to get rapid answers for customers about order status.

Coping with sales growth...

In a sales and service office, time saved means money in the HP till:

- time that the field engineer is freed from routine paperwork in the office in order to concentrate on customers;
- time saved in sending an order to the factory through the automated systems for instruments, for service and parts;
- time spent checking the status of an order when a customer calls for information;
- time that money due HP for goods or services is still uncollected and therefore not available;
- time saved in having the right parts on hand for a customer's service order.

Today, with the statistics which pour off the automated systems as a by-product of processing orders, it is easy to tell right down to the branch office, product group or individual coordinator how many orders are handled during a certain period of time and how accurately. "Productivity" is therefore measurable in a number of quite specific ways. Even though comparative numbers are less readily available from earlier days, it is clear that throughout the four U.S. sales regions, admin productivity has enabled the field to deal with an explosive increase in orders between 1972, when the major systems were introduced, and 1979.

The Southern Sales Region is typical in charting an increase of two and one-half times the number of orders during that period with an increase in order processing allocation of only 20 percent. Here's a sample of some of the sales support activity in both region headquarters and the Atlanta District office which share a building.

Frontline view of systems...

"Atlanta District office has been a test site for just about every system that's come along in recent years," says Milo Kincaid. As district administrative manager, he holds a position that was created in sales offices several years ago to absorb the pressure of managing the support activity.

He admits that serving as a pilot site does affect the performance figures which are spun off by automated systems in a variety of reports.

"Any time you're a test site and learning something new, your error rate goes up temporarily," he points out. "After the learning curve, you do have increased productivity or capability as the error rate goes down." Atlanta District served as the guinea pig for the Sales Office Data Access system (SODA) which was developed by Corporate Marketing in 1977 to put on-line information on order status, product price and availability, and open invoices right at the order coordinator's desk for quick reference when a customer calls.

While microfiche readers and the weekly *Availability Schedule* haven't disappeared from sales office desks, they are now used mostly for backup since their data is less timely and slower to look up than the information on SODA.

"SODA has given us a savings of 75 percent of searching time," says Milo. "It has also made us change our office structure and allowed us to make the change." Order coordinators who were formerly located in a separate room have now been dispersed through the product groups, taking along their terminals to share SODA's fresh information.

The Atlanta District office is experimenting with going a step further—most product groups have integrated the traditional order processing functions of order coding and data entry with the front-end sales support performed by sales secretaries in quoting and getting orders into the house.

Dorothy Jegen in Instrument's DSA/laser group and Michelle Allison with Analytical have combined the sales secretarial and OP functions for their respective product groups since joining HP about a year ago. They like seeing the entire process of an order from the first contact with the customer through any post-delivery problems.

SODA, they agree, is great "when it's running." (Until more processing capability was available, the system sometimes couldn't be used for data entry during usual working hours while updating its own files—a problem that is decreasing since parallel use is now possible.) "When you have to resort to microfiche you might as well not function," adds Michelle.

Since Milo also oversees seven small satellite offices in the region, he is quite aware that an office with only one or two support people may face a saturation point in learning and using complex systems such as four new service systems introduced in quick succession several years ago. The region has placed heavy emphasis on training for the past five years, developing its own materials and scheduling regular four-day training sessions in Atlanta.

Telling the computer

Now Milo is waiting eagerly for Atlanta District's next go-round as a test site for the quote capability which is being added

to SODA this fall. "Instead of typing and retyping long quotes with a built-in chance for human error, we'll tell the computer which products, options and customers we want, and it will print out a quote." The new system is expected to create considerable interest among field engineers.

"I'm a great believer in letting a system do the routine work so people can do the thinking and decision making," says Milo. "In any event, it would be impossible to do the amount of work necessary today to support sales and service without the help of systems."

Instant order information...

Alongside Leanne Wilford's desk in the Atlanta Instrument Service Center is a terminal that she shares with 26 service technicians.

As each tech completes a job, he stops to type in a quick update—"on shelf to be shipped," "delay on parts" and so forth—that is immediately entered into the region-maintained Service Open Order System (SOOSY), the equivalent of SODA on the service side of the house.

That up-to-the-minute information on service orders is immediately available to Leanne as she answers telephoned inquiries in Atlanta, and is transferred the next day to a dozen other major instrument centers around the HP world where SOOSY is installed.

For Leanne, the system is a major timesaver. "When a customer calls in about a service order and can only tell me, 'It's a meter', SOOSY keeps me from running up and down the aisles talking to techs to see if they have the order on the bench or if it has been shipped elsewhere for service. SOOSY can locate the order by customer name alone if no other information is available."

Before SOOSY was developed by Corporate three years ago, instruments had to be manually logged in two ways, an order typed out, and a daily status log kept by each tech. Now the basic information goes into SOOSY once and is automatically entered in all three logs and an order printed out. In Atlanta, the computer now processes 500 to 700 customer orders a month which formerly had to be typed by hand.

"With SOOSY, I'm looking up the job on the terminal while I'm talking to a customer asking about his repair," says Leanne. "If it weren't for SOOSY, it would take two or three of me to handle this desk."

The same terminal used for SOOSY also provides information from the Field Inventory Control System (FICS) about the parts on hand. FICS, a distributed system with a data base controlled locally, was given its trial run in Atlanta early in 1977 before worldwide installation.

At the Instrument Service Center, parts are still kept in bins in random order but the terminal replaces a card file to indicate the exact location. FICS also tells automatically when a part should be reordered and keeps a history of use—or non-use—so that just the right inventory can be maintained. With FICS, a tech has the part he needs on hand 70 percent of the time instead of 30 percent in the old days.

Credit at a glance...

Until two years ago, crediting cash from customers on their accounts kept Sara Wynn of Southern Sales Region's accounts receivable group busy filling out forms for keypunch to enter into the computerized Accounts Receivable System.

Then she was rescued by a new data-entry package developed by Corporate Marketing that makes it possible to enter the application of cash directly into the computer by terminal.

"It not only saves one-third of my time but it cuts out 30 percent of keypunch's load," says Sara.

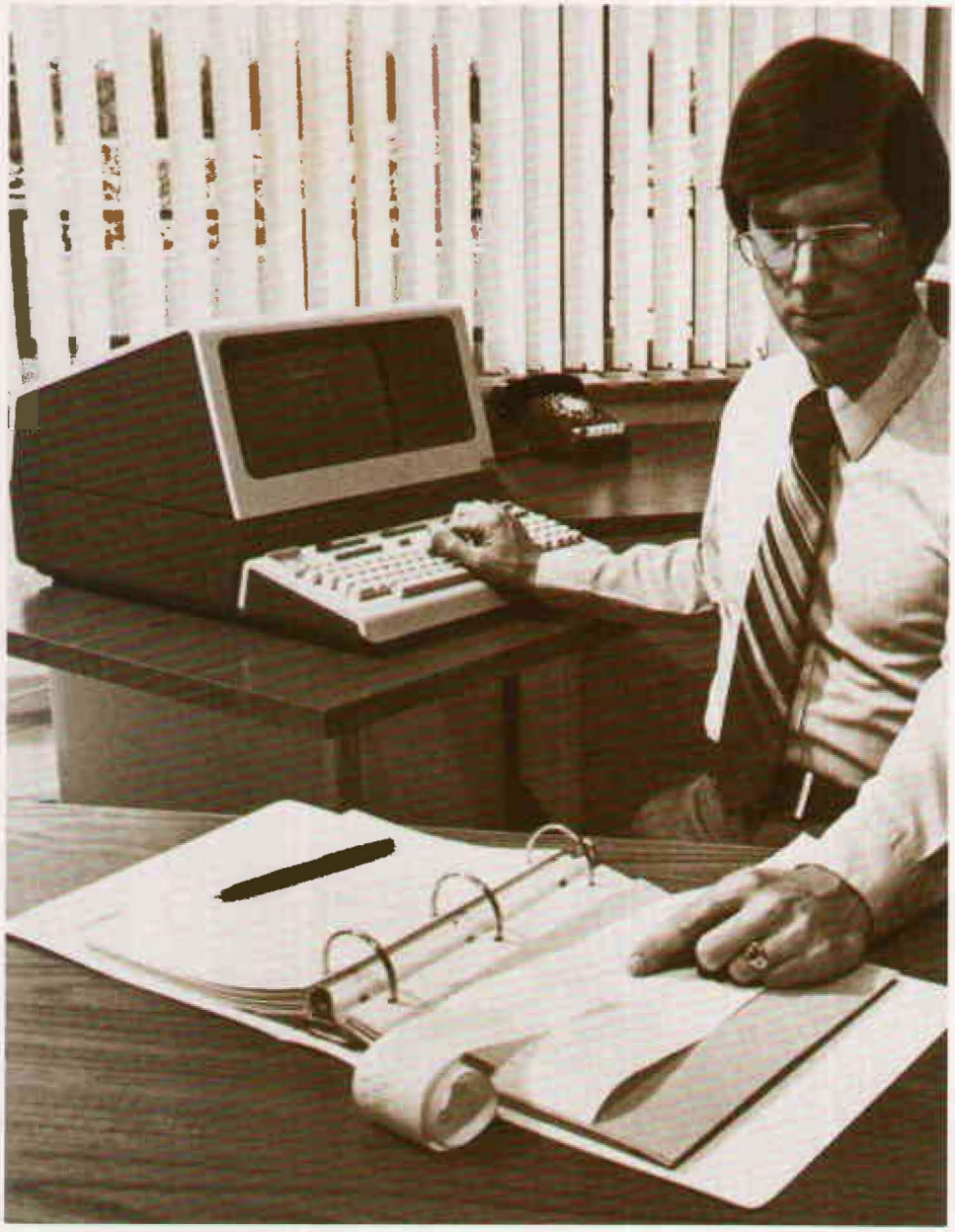
The new package has a batch balancing capability which won't let any remittance or adjustment batch pass by if the individual items don't add up to the batch total.

According to A/R supervisor Debbie Tatum, SSR has gone from handling 9,500 line items to 13,000 line items a month in the same amount of time and with the same number of people in the department.

Now the region is getting a preview look at an addition to the SODA system which will give branch offices on-line access to open invoice and customer credit information. Designed to provide credit people with a total look at a customer's credit exposure at all stages from initial order through actual payment, the new open invoice feature has already proved useful in A/R activity as well.

"When the bank sends along the paperwork that accompanies payment of an invoice to the lockbox, we've often had to go through a lot of microfiche to figure out who the customer was," says Sara. "Now the computer will search for the match by any clue I have: customer name, HP order number, and so forth. It's already saving me a lot of time."

At the terminal, service tech Ren Palmer of the Atlanta Instrument Service Center enters his progress on a job so Leanne Wilford (foreground) may give inquiring customers a current report on their repair work.



HP products contribute to the productivity of customers in many ways. Here a manufacturer uses a new HP software package—SPC/3000—to calculate the standard cost of putting a final product together. It not only helps price the product realistically but also analyzes performance based on cost, determines profitability, establishes the budget, and aids in developing new products.

The sale is the HP solution...

HP customers buy HP products because they have problems.

One has a problem in computation.

Another needs extremely accurate time measurement.

This customer is concerned about improving hospital-patient care.

The other is in trouble over chemical contamination of a process.

And that big manufacturer is looking for better ways to manage its operations.

Each of these can be related in one way or another to a problem in productivity (although there may be other goals of equal or greater consequence in particular fields such as medicine). Let's look at some specific cases:

The contribution of HP products to productivity has become the central theme of major product exhibits and seminars. Last June 750 potential manufacturing and business customers in the Chicago area were brought together in the scene shown here. In 1978 the target audience was the automobile industry at Detroit.

Electronic tools for better answers

In Atlanta, a surgeon is at home after a long day in which he conducted a delicate open-heart operation. When he left the hospital his patient's condition was stable, but still critical—and now the doctor's own condition borders on exhaustion. Before he retires for the night, however, he dials a phone and places the receiver in an acoustic coupler, linking a CRT terminal at his bedside with an HP 5600A computerized patient monitoring system. The system is designed to handle the complex data management of all the hospital's intensive care units, and the patient's vital signs and trends over the last four to eight hours are as easily displayed at the doctor's bedside as the patient's.

The information collected is highly accurate, and with the exhaustive analysis the HP equipment can perform, staff members are able to recognize problems earlier and respond more quickly. In other words, the patient receives better care while doctors and nurses make more productive use of their time, which helps keep medical costs down.

Health care is just one of many fields in which HP products are helping customers increase their productivity. In manufacturing and service industries, in research laboratories, in civil engineering—even in education, where productivity is not one of the usual buzzwords—people are doing more and better work in less time using HP instruments and systems.

In Lynchburg, Virginia, General Electric uses a computer-controlled automatic test system to boost productivity in its Mobile Radio Department, which manufactures high-performance multichannel two-way radios. Before implementing the automatic systems, highly trained technicians did each test manually at benches loaded with different instruments. Now each station is equipped with a desktop computer linked to various instruments through the standard HP Interface Bus, and an HP 1000 computer connects all the stations to form a network of these systems.

Products from a number of HP divisions contribute to the efficiency of the GE operation. They include the computers, several data collection terminals, line printers, disc drives, transceiver test systems, and various bus-compatible instruments. "The improvement in testing speed, analysis, and quality has been dramatic," reports Steve Nattsas, GE quality information equipment engineer in Lynchburg. "We have speeded testing by a factor of ten to one, reduced both testing and repair costs, and significantly improved the outgoing quality of our equipment."

Because HP's product lines cover such a wide range of problem-solving technology, the company has begun to stage special conferences in major cities on the theme of increasing productivity. Last June, for instance, 750 potential customers in the Chicago area were exposed to product exhibits showing practical approaches to improving productivity in manufacturing and business operations. And they were able to attend twenty different seminars on such subjects as distributed data processing, materials planning, and computer-generated business graphics. An earlier show in Detroit was targeted specifically to the automotive industry. You might say that HP's business is selling productivity, and the company is now promoting that strength in its marketing communications.

The civil engineering field presents a striking example of productivity increases through electronics. Before HP introduced its first civil engineering instrument in 1970, surveying had been done in basically the same way, using optical instruments and plotting individual distance and angle measurements, for hundreds of years.

The newest HP device for surveyors, the 3820A electronic total station, is a far cry from those horse-and-buggy days of just a few years ago. In one compact unit the 3820A combines a distance meter—which measures a beam of light returning from a distant reflector—a digital theodolite and microprocessor. It automatically measures horizontal, vertical and slope distances of more than three miles. It compensates for the Earth's curvature, for refraction, for environmental conditions and even for its own position if the instrument isn't level. It automatically computes and displays information for the operator in any desired units of measurement.

Tremendous productivity boost

Data from the instrument can be processed and organized by a computer either in "real" time or at a later time, so that the operator can move quickly to take all necessary measurements and leave the rest to the computer. The boost in productivity over non-electronic surveying methods is tremendous.

HP often draws upon its own experience to boost productivity for its customers, and nowhere is this illustrated more clearly than in the use of business computers. Much of the software offered to customers for use with the HP 3000 computer systems is based on HP's own experience in materials management, cost control, order processing and production planning.

A leading manufacturer of air cleaning and water treatment systems—a subsidiary of Koppers Company called Environmental Elements Corporation—uses the HP 3000 and associated software in a new computerized, on-line purchasing and receiving system. "We buy more than $25 million a year in raw and finished materials," explained a vice president of the company. On some days as many as 400 purchase orders are initiated, and about 10,000 are being tracked through the system at any one time. By providing expeditors with timely, well-organized lists showing when certain materials are due and which are past due in delivery, the system has increased shop efficiency while also reducing the workload in departments such as purchasing and planning.

The ultimate in computerized manufacturing control may well be the assembly plant nearing completion at British Leyland. In the village of Leyland itself, the company's Heavy Vehicles Division is installing systems which will make it the most technologically advanced vehicle

(continued)

the HP solution...

assembly plant in Europe, if not the world.

Most of the operation is structured around small computers, including HP 3000 Series III systems and HP 1000 systems in a distributed processing network. Five HP 1000s are actually on the factory floor—two dedicated to an automatic warehousing operation and three controlling the assembly lines.

Unlike cars, very few long-distance trucks are the same. From the color of the paint to the type of engine, the purchaser can specify an almost infinite variety of combinations. Consequently the production process is so complex that it requires a very well-organized assembly line. The company's intention is to produce 425 vehicles a week instead of the present 170, and to improve quality at the same time. The computers synchronize the flow of materials, plan each operation, control the assembly line, and spell out the parameters needed to conduct the variety of tests on each vehicle.

Computers are not the only HP products that contribute to higher productivity, but they're often married with other products to form automatic systems for electronics applications, analytical chemistry or medicine. A system may enable a technician to analyze chemical samples, for instance, freeing a chemist for other work. A pulmonary function test system, controlled by a desktop computer, may allow a doctor to make a more accurate diagnosis of a patient's lung condition and actually spend far less time doing it.

The growing "friendliness" or ease of use of HP products—whether computers, handheld calculators or sophisticated instruments—has increased productivity dramatically for HP customers in recent years. A new microprocessor-equipped spectrum analyzer introduced recently has twice the speed and accuracy of the model unveiled in 1973. It reduces operator hours to about a sixth the time required with the 1973 model—and it costs about a fourth as much. Moreover, given the state-of-the-art advances in all product lines today, this is not just an isolated example.

Machines or instruments are not alternatives to people, however, and automation has historically been shown to create more jobs than it eliminates. People can be augmented by electronic tools, and jobs can be made routine so they require less skill or training. The result is that—freed of the drudgery—people become more creative and productive. And what could be more satisfying?

HP as its own best customer is clearly reflected in these views at the Grenoble, France, factory. Shown above are the Manufacturing Specifications and Purchasing departments, with virtually every desk equipped with an HP terminal linked to the Facility Management System. At the same time, the factory serves as a training ground and showcase for customers.

Factory showcases...

When it comes to making full use of products, HP seems to have gone one up on meat producers: we've even found a way to package and sell the "squeal." As an example, let's look at the Grenoble Division plant in France, where an HP Facility Management System (FMS) ties virtually all operations together.

The system was designed by HP with HP computational products for HP's own use. In turn, our use provided a testing ground for FMS as a product of great interest to other manufacturers. So now, as at Grenoble, we employ our factory-based systems as showcases, inviting customers there and elsewhere to see it in action performing real tasks.

A feature of the Grenoble system, for example, is the product-tracking program utilizing interactive data-capture terminals developed and manufactured by the French division. As products move through the various stages of assembly and test, they are logged in and out by inserting product-identification cards into the local terminals. The result is availability of a complete and up-to-the-minute description of the status of all work in process.

Anchored by HP computers, chiefly HP 3000s and HP 1000s, FMS is a prime example of HP's philosophy of "distributed" processing, putting a very comprehensive range of data services at the fingertips of those who need them.

For manufacturing departments, FMS is used not only for tracking production but also for generating software, automatic testing of printed circuits and subassemblies, and final testing of finished products. Administrative people tie into it for order processing, parts-inventory control, materials requirements, cost accounting, marketing statistics, and personnel.

Each division FMS also contributes to and shares in the company-wide information system in support of administrative functions, accounting systems, and the communications network (Comsys).

Working together, they create a very powerful flow of information that helps make almost every HP job more productive. No wonder other manufacturers like their looks. □

From the president's desk

Productivity is a subject that has generated considerable attention in the U.S. press and public commentary over the last year or two. The definition of productivity is deceptively simple: the ratio of output to input. For the country as a whole, it's expressed as the output of all the goods and services compared to the quantity of human effort that makes it possible.

Why the concern over this ratio? Two reasons primarily. The U.S. still has the highest absolute level of productivity of any country, but the rate of improvement has slowed down dramatically. In the 50's and 60's the annual improvement averaged three to four percent. In the 70's it dropped below one percent, and in the last few years has shown little improvement at all. Other major industrial nations, notably Japan, Germany and France, have kept up their growth rates and narrowed the gap considerably. So, the first reason for concern relates to a substantial decline in the competitive strength of many U.S. products in world markets.

A second concern has to do with people's economic well-being. Over the longer term, improved productivity is the only way to increase the real standard of living. Otherwise wage increases are simply eaten up by offsetting inflation. This has clearly been the situation in the U.S. recently.

The obvious question is: What is causing the decline in U.S. productivity growth rates, and what can be done about it? The answer is exceedingly complex and is being studied by teams of economists representing many organizations. Elements most frequently identified are the rising costs of government regulations, changes in the tax laws in the 60's that have reduced the investment by business in modern, more productive equipment, and a more cautious attitude by most businesses (not HP, however) toward investing in R&D and using new technologies.

A detailed analysis of national productivity problems is well beyond the scope of this MEASURE issue, and major changes in national policy may well be involved in solutions. But there still is a great deal that we can do and are doing to improve productivity right here at HP.

Obviously we must increase our productivity as rapidly as our competitors or our costs will rise and our sales and profits will suffer. Conversely, if we are able to achieve steady improvements in productivity, we can turn this into a competitive advantage.

This past year we have put strong emphasis on increasing the productivity of our assets, striving to achieve optimum inventories and more efficient use of our buildings and equipment. As I reported at the end of the third quarter, we have made considerable progress in this area. It illustrates that there are many opportunities to improve once we focus our attention on the need and begin to understand in detail how to reach desired objectives.

I hope each of you will take the time to read this issue of MEASURE and think about ways you can improve productivity in your location. Many divisions such as Boise have well organized programs that have achieved significant results in just a few months. But I'm sure that in every area of the company there are ways we can work smarter by using better methods, equipment, and techniques to get the job done more productively. With the rapid inflation in all costs, there's a real need to take action now.

These days more people are asking: "How's the business outlook?" That's not surprising considering the gyrations in the stock market and interest rates, as well as the conflicting press reports on the course of the U.S. economy. Although our rate of growth in orders has slowed recently, our business is still growing at a reasonable rate, with our international orders somewhat stronger than in the U.S. We have added a number of people during the last year, so our productive capacity is in good balance with projected orders.

The recent changes in U.S. monetary policy add uncertainty to the business outlook. 1980 will be a year in which real time management (i.e., responding to changes as they occur) will be especially important. We have had four years of strong growth in our company starting in 1975. It's worth keeping in mind that one-third of our employees have been on board less than one year, and two-thirds have been hired within the last four years. This means that, so far, these new people have experienced only the growth phase of our traditional business cycles. While our targets for next year indicate a reasonable rate of growth overall, individual divisions and geographical areas may experience varying results. Managing a change in growth rates is a significant challenge in itself requiring a rebalancing of many parts of the organization. This will require close attention in the months ahead.

John Young

On your marks– lift off!

Each in its individual and often novel way, HP divisions and regions around the U.S. took strong leads in supporting local United Way campaigns during recent months. Several were official pacesetters—with notable results. San Diego Division, for example, campaigned to the slogan that "Money can buy happiness," and increased employee—and matching company—contributions to community agencies by 75 percent over last year. At Boise, 2,100 employees turned out to witness a United Way liftoff via hot-air balloon. Boise division manager Ray Smelek, who served as chairman of Ada County's campaign, said he anticipated an even bigger HP participation than 1978 when 90 percent of employees contributed!

Meanwhile, in Massachusetts, Waltham Division kicked off its campaign by staging its version of The Midnight Ride of Paul Revere combined with the Boston Marathon. The result: a 24 percent increase on top of last year's 46 percent increase!

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