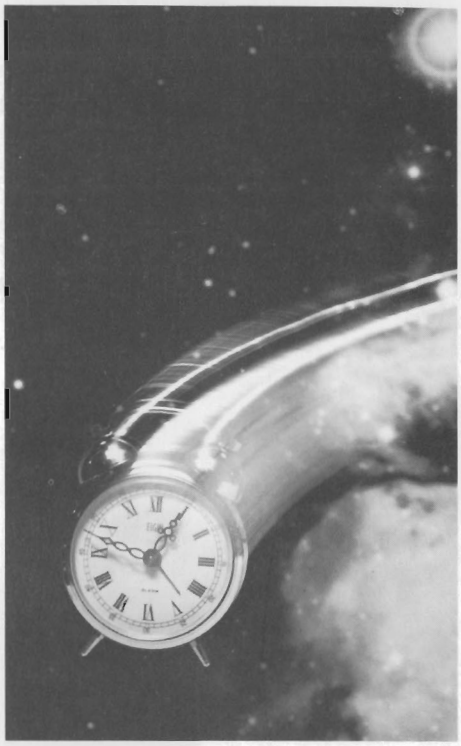
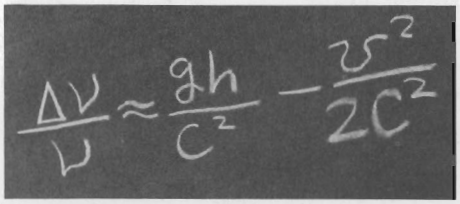
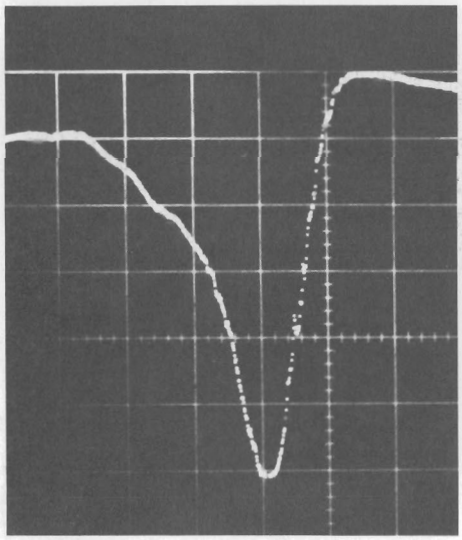
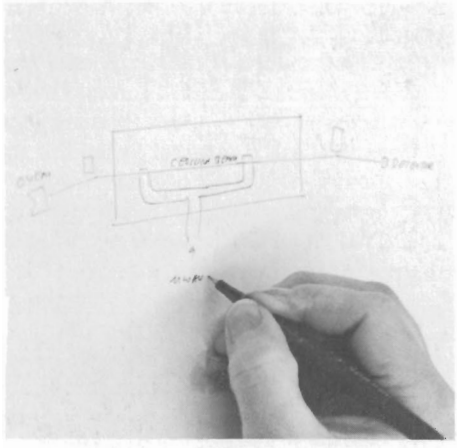
Measure

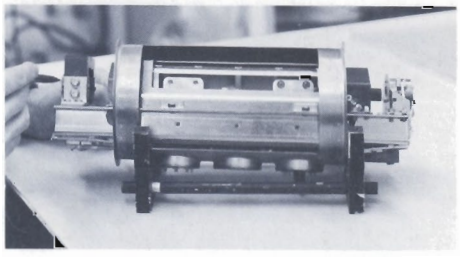
For the men and women of Hewlett-Packard / APRIL 1977











Another proof for Einstein...

Lab director Len Cutler and HP atomic clocks help prove general relativity theory

☐ The theories of Albert Einstein are nearly 75 years old now, and several generations of scientists have relied on them. With the exception of a few skeptics, modern-day physicists and astronomers generally accept the curvature-of-time-and-space concept as fact. Widely held beliefs about the evolution of the universe are based on relativity theory, and Einstein's hypotheses are considered "a cornerstone of modern cosmological thought," as one scientist put it.

But can these theories, involving the effects of velocity and gravity on the passage of time, be proven in a laboratory? For Einstein himself it would have been impossible, but with today's technology the effects are definitely measurable. Some experiments using HP's super-accurate atomic clocks support the view most scientists hold — that the "time-warp" effects theorized by Einstein are very real.

The effect of velocity is to slow down or stretch time for the object in uniform motion. This is a prediction of "special" relativity. General relativity theory, in addition, maintains that clocks run faster in regions of high gravitational potential. Therefore, since the potential increases as one moves away from the Earth, clocks should run faster in the air than on the ground. On a flight into space the two effects would be working against each other. But, as any science-fiction buff knows, velocities approaching the speed of light would age an interstellar traveller very slowly in comparison with his friends on Earth.

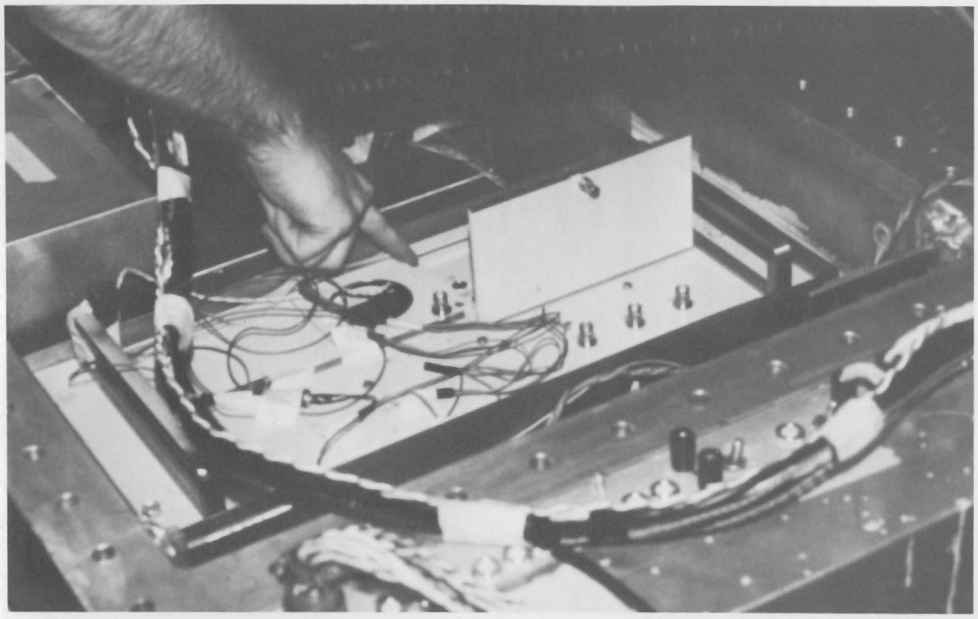
Experiments conducted in 1971 tend to bear that out. Under the direction of Professor Joseph Hafele of Washington University and Richard Keating, an astronomer with the U.S. Naval Observatory, HP atomic clocks were flown around the world in jet airplanes and then compared with identical stationary clocks at the observatory. The time differences were as predicted, and although they were infinitesimal, it's all in a day's work for an HP atomic clock to measure accurately in nanoseconds — that is, in billionths of a second.

These so-called "atomic clocks," made by HP's Santa Clara (California) Division, are actually cesium beam frequency standards. Since HP introduced the first such instrument in 1964, they have proven so accurate and reliable that they've replaced celestial methods for keeping international standards of time.

The technology is based on the fact that the cesium atom will resonate or oscillate exactly 9,192,631,770 times per second. The HP instrument tunes in on that resonance and measures it so precisely that it would take about 30,000 years for the clock to gain or lose even one second. The U.S. Bureau of Standards, the U.S. Naval Observatory, and similar agencies in other countries rely on HP atomic clocks. In fact, the official definition of a second is now based on the oscillations of the free cesium atom. Santa Clara Division also makes rubidium standards, which have different characteristics but are also quite stable and accurate.

The experiments in the early seventies tested the effects of velocity, but the flying clocks were also subjected to higher gravitational potential during the flights. Last year another experiment — set up by Professor Carroll Alley and his associates at the University of Maryland, and supported by the U.S. Navy — went a step further in studying the gravitational effects that could be predicted by Einstein's general theory of relativity. Again, the Naval Observatory participated. The plan was to carry the clocks to a high altitude, circle slowly for an extended period of time, and bring them back to confront the identical clocks on the ground.

Dr. Len Cutler, director of the Physical Research Laboratory of HP Labs, had played a role in the earlier Hafele-Keating research and was to serve as co-investi-



An elaborate "clock box" provided a benign environment for the HP cesium standards used in the University of Maryland experiment. The clocks were protected from vibration, magnetism and changes of temperature to reduce these influences so they would not mask the effects being looked for — that is, the phenomena predicted by Einstein.

gator with Professor Alley. Len was one of the principal designers of HP's first cesium standard, and has been closely involved with the technology ever since.

"One of the things I did was help design a box for the HP clocks," Len said of his association with Professor Alley. "The clocks had to be in a benign environment. The temperature had to be constant within one or two tenths of a degree Farenheit, they had to be isolated from vibration, and they needed magnetic shielding. I also modified the cesium standards, which already had the new high-beam flux tubes, to further improve their performance."

A Navy P-3C aircraft was outfitted for the tests, and the equipment on the ground was installed in a temperature-controlled van. Two hydrogen masers were used in addition to the ensembles of HP clocks. Besides face-to-face comparisons of the clocks, a system for directing laser pulses at the airplane in flight would measure the drift as it occurred.

Another major contribution Len made to the success of the experiment was formulating the best theoretical methods of analyzing the enormous amounts of data acquired.

Five fifteen-hour flights were made at an average altitude of 30,000 feet. The flight path was a racetrack pattern flown

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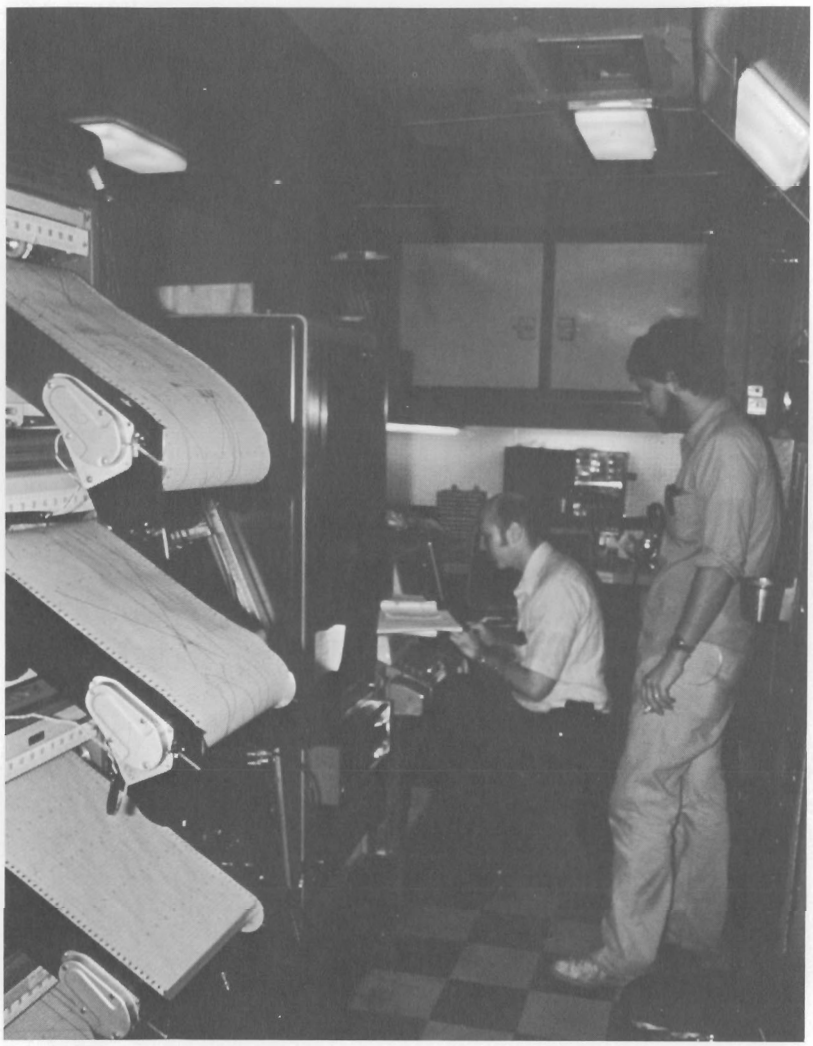
Physicist Len Cutler, director of the Physical Research Laboratory of HP Labs and one of the world's foremost authorities on the technology of atomic clocks, has participated in several experiments that tend to confirm Einstein's theories.

proving Einstein



Students and scientists worked inside an air-conditioned van (at right) to monitor the experiment and handle the reams of data acquired during the five flights. The Patuxent Naval Air Station (at left), where the aircraft and van are shown side by side, served as home base for the research team.

inside an area restricted to military aircraft, and the plane was tracked by radar to measure its position and velocity every second.

The distortion in time, or the difference between the air and ground clocks, turned out to be typically 50 nanoseconds gained from the gravitational effect and 5 nanoseconds lost due to the plane's velocity. The airborne clocks thus moved ahead 45 nanoseconds — almost exactly as predicted using Einstein's hypothesis. The precision of the experiment, according to Len, was about 1½ percent of the effect. Since the effect is very small — about one part in a trillion — it required measurement accuracy and stability of about one part in 100 trillion. For some idea of the time interval involved, consider the fact that light — which travels at 186,000 miles per second — moves only one foot in a nanosecond.

Professor Alley reported his findings to a committee of scientists last June. At the same time, he pointed out that the importance of these studies goes beyond the laboratory. "We now have clocks so stable," he said, "that we have to make allowances for the general relativistic effects described by Einstein in normal human affairs. These views of Einstein are not just relevant to theorists, they are now becoming relevant to engineers."

Len Cutler calls the experiment "a very powerful convincer." The effects of velocity, he feels, are generally accepted by scientists. "But the general theory of relativity is less believable, because the predictions are unusual and the experiments are so difficult to perform. These results definitely make it more believable."

Preparations are underway for some additional flight experiments supported by the United States Navy and Air Force. These will look at other general relativistic effects.

Both Alley and Cutler hope the National Aeronautics and Space Administration will allow additional relativity experiments to be conducted aboard Skylab II. If that happens, it will be the first time HP atomic clocks have been carried into outer space, where they can be subjected to both high velocity and high gravitational potential.

It may finally put to rest any doubts still remaining about Einstein's theories. □

Renegotiation Act:

A wartime necessity becomes a peacetime pain — and the ache may get much worse for industry and U.S. taxpayers . . .

☐ "The proposed Renegotiation Reform Act of 1977 (the so-called 'Minish' bill) poses a very serious threat to the way HP and many other non-defense companies do business. It will give the government the dubious satisfaction of controlling profits and profitability. The price the government will pay for this control will be higher prices for the products and services they buy."

—Jack Beckett, director of government relations, Hewlett-Packard.

"There seems to be a naive belief by the proponents of renegotiation that

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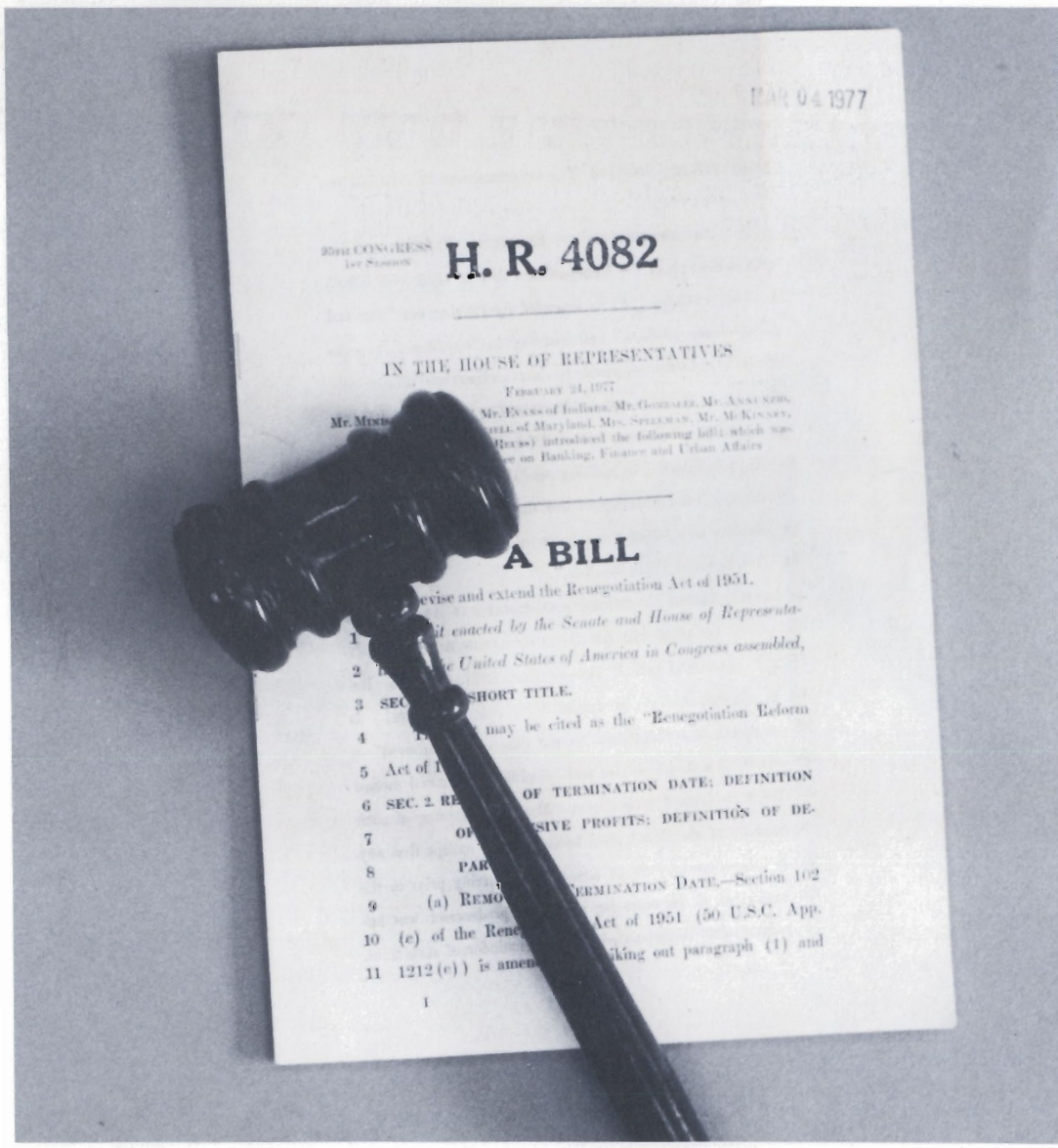

Renegotiation Act

industry's administrative cost burdens can be absorbed without any impact on the economy. These costs are passed along in the form of higher prices to all customers, including the government. Added to such non-productive dollars is money spent by government to regulate, legislate, provide administrative oversight, and the like. To conclude that the renegotiation process pays for itself and makes a profit for the government is incorrect. This act does not even merit the time and consideration of a zero-base budget review. It should simply pass away like all dinosaurs."

—W. M. Schofield, director of government relations for Financial Executives Institute (Financial Executive, Dec. 1976).

"Congress and proponents are totally mistaken if they think renegotiation protects the government against excessive profits by the major defense and aerospace contractors. Most of these contracts, such as those on a cost-plus incentive fee, already are or can be made subject to redetermination of profits; there's absolutely no need to employ the Renegotiation Act on their account. It's the smaller firms producing commercial products purchased off the shelf by the government which are burdened by renegotiation."

—Ed van Bronkhorst, vice president-treasurer, Hewlett-Packard.

"The bill would make renegotiation permanent. The cost of administering such an expanded renegotiation process would far exceed any recovery of excess profits."

—WEMA, association of the electronics industry, bulletin of Feb. 15, 1977.

"The most important weakness of renegotiation is that it focuses on 'excessive profits' rather than excessive costs. HR 4082 adds substantial reporting costs and auditing costs, and increases the cost of doing business with the Federal Government. Other specifications and regulations already make it more expensive to produce a product for the Federal Government than for the commercial market, and HR 4082 will add a substantial increment to these costs. Thus, while the renegotiation act may recapture some profits in the future, it is almost certain that added costs will be larger than any possible recovery of profits."

—Dave Packard, chairman, Hewlett-Packard.

Any legislative act that draws such fire and which offers such opportunities for misunderstanding and mischief merits some explanation:

Historically, renegotiation of government contracts was first legislated by the U.S. in 1942 at the peak of war-production frenzy. The law was designed to allow the government to purchase large quantities of mass-produced products and bulk foodstuffs "right now" without first having to verify cost estimates or price data; that would come later during the renegotiation process, and in time a charge would be levied by the government if it found profits had in fact exceeded certain standards. Even so, products that could show 35 percent "commercial article" sales were completely exempt from the process because, it was held, such sales established a fair market price which the government could accept.

The wartime law was allowed to lapse with the ending of hostilities. But a new version was enacted in 1951 at the outbreak of the Korean War. The exemption level was set at 35 percent commercial sales. This version remained in effect until 1968 when the exemption was raised to 55 percent; this law technically expired last September, but the process goes on because of a backlog of four or five years! A much tougher substitute, virtually identical to the proposed 1977 bill, failed to pass the Senate in 1976.

In the course of working with the Renegotiation Board over the years, Hewlett-Packard made the last of very few repayments in 1953. Yet we still must go through the process which, according to a recent study, has come to cost the company some $200,000 per year in extra administrative expenses. HP management sees that cost as a tolerable, if unneces-

sary, burden. In almost all cases, HP product lines have qualified for exemption because of their predominantly commercial sales—well over 55 percent. Overall, sales during the past several years to the U.S. government—DOD (Defense), NASA (Space), ERDA (Energy), FAA (Aviation) and GSA (General Services)—have averaged about 15 percent of total HP shipments.

Now for the bad news: The 1977 bill would require audits of *all* product lines sold to the government. The "commercial article" exemption under the new bill would be set at 75 percent, and the process of determining excess profits would apply to all product lines below that percentage. It would not exempt product lines above that percentage from being tested for profitability. This, too, would involve annual auditing, so that even if an HP product line has one percent or less of its sales going to the government, audit by government auditors would be essential to verify profitability.

The new act also would abolish the reasonable practice of "averaging" profitability among various product lines. Each line would be assessed on its own, thus exposing the higher profit items to higher levies without any compensating allowance for less profitable business (nor, it should be noted, taking into account those very favorable deals that the government has made from time to time and which HP has been able to accommodate by "averaging").

The implications in all of this for HP —and obviously for many other firms— are all too clear:

Costs—HP estimates the expense to the company for administering the requirements of the Minish bill at close to four times the present cost. Government auditors would become fixtures at virtually all of HP's U.S. divisions. Cost-accounting requirements far in excess of HP's own needs would be specified by the government. The ranks of the Renegotiation Board itself would swell from about 400 people to more than 3,000.

Disclosure of information—Under the Freedom of Information Act, proprietary information vital to HP would become available to competitors. In past dealings with the government, Hewlett-Packard has vigorously opposed attempts to open its books to the advantage of competitors and others. The company invests an average of 10 percent of every sales dollar in developing hundreds of new products whose success is wholly dependent on a combination of technical innovation as well as cost benefit to customers, and intimate knowledge of its markets. Any disclosure of such information, intended or not, could clearly jeopardize the hoped-for successes.

One likely result is that government business could become less and less attractive for HP and many other firms in the small to medium size range. Ironically, most of the larger firms doing government business will be almost totally unaffected by the Minish proposals. Defense and aerospace contractors already are subject to almost total audit, including price adjustment clauses in their contracts that give the government a "second chance" at curbing excessive profits. Many large commercial companies have created special subsidiaries or divisions for the purpose of conducting all government business, effectively buffering their commercial products from the cost burden of renegotiation.

Prices of products — Government should get the fairest possible deal in its purchasing. But, because of the probable effects of renegotiation, it stands to pay considerably higher prices for those commercial products it presently buys from predominantly commercial firms. If these firms stand still and "take it," their costs will inevitably be higher and be passed along in the form of higher prices to everyone.

If they isolate government business in a government-products division, the price to the government will be higher (though the profit may be less). Or, if many of these firms find government business not worth the risk, the field will be left open to others whose ability to deliver quality products—especially in higher technology areas—is uncertain. Either way, the government will lose far more than it can reasonably expect to recoup in excessive profits. A recent study by the Defense Science Board concluded that the U.S. government would be able to save $80 million annually by buying electronic test equipment "off-the-shelf" compared to present purchase practices.

In effect, renegotiation gives the government a second crack at figuring its bill. Yet, its peacetime purchasing process need not be hasty, and it can do all the shopping it wants via competitive bidding. Commercial customers don't get to renegotiate, nor do they seek to do so.

Fortunately, many members of Congress to whom the Minish bill's weaknesses have been revealed are ready to challenge it. Short of its outright defeat in upcoming House and Senate sessions, a wise disposition of the bill would seem to be that proposed as an amendment (HR 5257) by Congressman Pete McCloskey (R. Calif.). This amendment would make renegotiation necessary only during periods of national emergencies. In the thinking of many citizens, that's where it belongs. □

"We do the whole thing!"

In search of improved productivity, HP divisions find ways of giving people greater responsibility for their work — and their workday.

☐ At long last, some of the more influential as well as farsighted business and industrial organizations are beginning to grasp a fundamental fact about the way people adapt and react to various forms of organizing large-scale work activity.

These organizations find that when they treat their people as adults ("This is the goal; can you help us reach it?"), they get back adult responses ("We can do it — and do it better!").

This new style, which has been recognizable as a movement for about 20 or 30 years, flies straight in the face of age-old beliefs that you have to exert parent-like powers ("Do as you're told!") to get things done. Of course, the doers in this case have little choice but to respond as children ("Tell us what to do!"). And that, naturally, further reinforces the feeling that you have to run the show with a strong voice of authority sounding from on high.

Simple, straightforward and preferable as the new style may seem when contrasted with the old authoritarian way, in reality it is far from easy to bring off. So much agreement from top to bottom is involved. So much understanding of the economics of the business at a low level. So much goodwill and dedication. So much practice and experience. So many barriers to lower. And by no means least, is it really more efficient and productive? If it works for jobs A and B will it necessarily work for jobs C and P?

Those are all very practical concerns that arise when organizations attempt to make changes in this direction. Hewlett-Packard has been very much involved in the process of exploring various answers of its own almost since its founding.

In the earlier years, that participation was spontaneous and undefined. There was no "Management by Objective," no "Job Enrichment" programs, no "vertical integration" of production, and the like. There was simply the desire to give HP people the opportunity to make their jobs more interesting and productive by encouraging them to make some basic decisions about how they went about their work. That's still a fundamental concept underlying the "HP way." But it continues to take some new and interesting forms as HP divisions expand and explore the concept. The following is a review of some of their recent undertakings in several manufacturing areas:

Lena Chestnut of the printed-circuit assembly area at Waltham Division just about sums it all up when she says: "We do the whole thing — right from scratch." By this she means that about 20 people in the department individually take a job from start to finish. Previously the work progressed from person to person, and station to station. Now it's been "verticalized and integrated," expressions widely used to describe the new approach to product assembly (as opposed to "functionalized" or "fractionated" which more or less describe the kind of specialized production lines set up by Henry Ford).

Well, what's so neat about *that?* Eric Wlodyka who works with Lena, says, "It's much more interesting. You feel like you want to do a better job — because you're going to have to check it out and be responsible for it. You learn all the steps, and when you do, you can find easier ways — because you know the reason for doing things. The days seem to go much faster."

"Learning the whole job was a necessity for us," indicates p. c. assembly night supervisor, Basil McCulloch. "Five years ago when the second shift was instituted in p. c. assembly, the entire group, including myself, were neophytes. We all sat down to find out how the work should be done. What has now evolved? A compatible team of confident, self-reliant individuals performing all aspects of the job from decision-making to documentation."

Similar thoughts are expressed by people in the Waltham instrument (patient monitoring) assembly area, which also changed over to work integration last year. Supervisor Paul Sullivan credits the step with several important improvements in productivity and savings. First, with people taking responsibility for obtaining their own information and parts, the lead people — Eileen Loring and Jeff Clare — have been freed to take on some of Paul's records keeping and planning work. Paul, in turn, has been able to broaden his responsibilities to include supervision of the systems cabling and test departments. The net effect has been a significant reduction in the overall need for direct supervision.

Productivity in the integrated areas has shown a significant upturn. Most telling, the time required to assemble a finished instrument is going down.

As mentioned before, it's not something you rush into unprepared. John Dockstader, the division's productivity-improvement coordinator, worked very closely with the various participating

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we do the whole thing

departments in setting up what he calls the EPIC program — Enlarging Productivity Improvement Capabilities.

The essential ingredient, says John, is that people be given all the information needed to plan and execute their individual growing responsibilities. That takes considerable planning and training and evaluation. The flexibility of the new system accommodates people who prefer the old format of work. The EPIC experience is providing transition from routine assembly to making work more interesting and is moving along strongly at Waltham with expectation of further benefits. It should be well worth following.

The basic principle of individual responsibility for work has been developed and applied with special vigor by HP's manufacturing operations at Boeblingen in the German Federal Republic. It was there, for example, that flexible work hours got its first big test. Srini Nageshwar, manager of calculator operations, recalls that the idea came up during a coffee break meeting: "Someone wondered why a notorious late riser on the administrative staff should have to be at his desk at exactly the same time as the early bird in the metal shop turned on his lathe. We discussed the idea further, and in 1967 introduced flexible hours."

Wolf Michel, manufacturing operations manager, opens discussion on other applications of work responsibility by taking exception to Lenin's cynical statement, "Trust is good, but control is better." Says Wolf, "Here, everyone is personally responsible for the quality of their work. In the metal shop, for instance, each employee must find out which machines are available and how he can best go about fulfilling each work order. Once set up he tests the first part himself. If later work turns out not OK, he must correct it himself. Of course he's paid for that too, so it's all really a moral responsibility."

Other departments follow the general principle, including calculator assembly. There, every assembler has their own bench and assembles complete units — work you can really get your hands on!

Though each of the four Waltham Division printed-circuit assemblers shown above has an individual work station, each works as a member of a team. Each can do all of the work required to complete a work order, including production testing. They back each other up on work without having to be asked. Under this system of "integrated" work organization, locally called EPIC, productivity has improved substantially. Another improvement has been a reduction in the overall need for supervision. Below, supervisor Paul Sullivan consults with leads Eileen Loring and Jeff Clare. By being able to give his lead people more administrative responsibilities, Paul has been freed enough to take on supervision of other departments as well.

Individual initiative, based on trust, is a very significant factor in the success of HP's operations in the German Federal Republic. The Boeblingen facility pioneered flexible work hours, and wherever possible organizes work to give the greatest degree of self responsibility.

What in the United Kingdom is called "job re-design" has been underway at HP's South Queensferry, Scotland plant for more than two years. It involves about 60 people in the instrument assembly area. Prior to re-design, their work was organized along functional lines — separate stations for printed-circuit loading, instrument assembly, and touchup and rework. All products moved through these stations, step by step and from person to person. The change involved linking up these functions then separating the department along product lines. At the present time there are four product lines of about 15 people each. An order coming to a line is handled by one person who takes it all the way from loading to production testing. On completion, the product is "signed" with the employee's number. In other words, each employee puts together whole assemblies, and takes responsibility and credit for same. According to Dave Brodie, production services manager, the people say it is a much more satisfying work experience than the previous approach. Not least, it has boosted efficiency an estimated 10 percent, and reduced the reject rate between 10 and 15 percent.

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Growth of various product lines, including both transferred lines and its own developed products, has permitted South Queensferry, Scotland, plant to reorganize along product lines. Previously, assembly was on a functional basis. According to observers, both job satisfaction and productivity have shown good gains.

we do the whole thing

Still under review, but with some very promising data, is the pilot program in optional part time launched last year in Loveland Instrument Division. The project involves four production jobs, each of which was split between two daytime shifts. Each employee works a fixed five-hour shift in the morning or afternoon. The program was developed in answer to employee requests for part time work. Another goal has been to increase the use of facilities — buildings and equipment — that represent such major items in our balance sheet and capital budgets.

According to Bill Brunelli, who supervised the project, the basic three month test itself went well, meeting the needs of the eight participants and the objectives of the division. Accordingly, it is being continued while full evaluations are being assessed.

Appealing and simple as the concept seems, it raises a number of important considerations. Some of these would include work efficiency versus the standard 8-hour shift, apportioning of the employment benefit package, employee performance evaluations, adjusted pay scales, costs, does it add or delete jobs, sharing work stations and work orders, and how it affects fulltime employees.

The pilot program is now being evaluated against these and other considerations, but for the most part, optional part time looks like an idea worth sharing. □

Splitting work shifts as a way of providing some part time employment for people wishing it and increasing the use of capital facilities has been tested for about the past six months at Loveland. Here, Jackie Findley at left and Ada Gaines discuss a work order that Jackie will take over from Ada. Each works five hours per day. Six other assemblers have been involved in the Loveland pilot program.

The great HPSA 1977 Winter Olympics...

While the lucky losers of HPSA's second annual all-Europe ski race were being awarded donated round-trip tickets to Turkey, the winners received more traditional prizes. Above are seen, from left, Dominique Golaz (3rd), Albert Rott (1st), meet organizer Irene Hubmann (Personnel), and Herve Rivoal (2nd). The three winners are all HPSA computer operators!

☐ As an example of team spirit and international cooperation, the running of HP's 1977 Greater European Ski Race in February lacked only one thing — decent weather. A mixture of snow, rain and fog plagued the drive to Flaine, a French ski resort normally within easy reach of European headquarters near Geneva. But it didn't stop the 101 employees and family participants who showed up in teams from Germany, France, Italy and Switzerland, plus a few individuals visiting Geneva in the course of business from Sweden, Spain and the U.S.

In spite of the shivering conditions, 94 contestants completed the 40-gate slalom course, described as a real Darwinian test of survival of the fittest. HPSA emerged as the winning team. The fact that it took the slowest competitor almost six minutes to thread the gates in contrast to a winner's time of 1 minute, 12.53 seconds detracts not one whit from the overall achievement. In fact, that slow time won one of two "worst" prizes consisting of a week's trip (donated by HPSA's travel agency) to Turkey, land of non-skiers. ☐

HP News

James Hodgson elected HP Director

PALO ALTO—James D. Hodgson, former U.S. Secretary of Labor and U.S. Ambassador to Japan, was elected to the Hewlett-Packard board of directors at its meeting on March 18.

Hodgson's background includes a 27-year career in the industrial and labor relations side of the aerospace industry. He was senior vice president-corporate relations with Lockheed Aircraft Corporation, Burbank, California, before entering government service.

After serving as Undersecretary of Labor from 1969 to 1970, Hodgson was appointed Secretary of Labor and served in the Cabinet from 1970 to 1973. He was ambassador to Japan from July, 1974, until March, 1977.

Upon leaving government service, Hodgson plans to divide his activities among private enterprise, public service and lecturing.

Chance heads Computer Group Marketing; Holmes takes new position

CUPERTINO—Doug Chance, former general manager of HP's Santa Rosa Division, has been named group marketing manager for the Computer Systems Group.

Ben Holmes, who had been group marketing manager, has taken a new assignment to develop compatible policies for the company's wide line of computational products.

Chance will have worldwide sales, service, advertising, promotion and application services responsibility for HP's computer products.

Chance was appointed division general manager in 1973, and was responsible for the start-up of the company's Santa Rosa, California, Division. He joined HP in 1966.

Holmes became group marketing manager in 1974. He joined HP in 1960 as a field engineer.

Edmondson heads Santa Rosa, Riggen to manage Colorado Springs

PALO ALTO—Hal Edmondson, former general manager of Colorado Springs Division, was named general manager of the Santa Rosa Division, replacing Doug Chance.

John Riggen, formerly cathode-ray-tube manufacturing manager at Colorado Springs, was named general manager of the division, replacing Edmondson.

Edmondson joined HP in 1955 and held a series of engineering and management positions in Palo Alto and Colorado Springs before being appointed Colorado Springs marketing manager in 1967. He became division general manager in 1971.

Riggen joined HP in 1960, moved to Colorado Springs as an engineer in research and development in 1964, and was appointed CRT manufacturing manager in 1974.

New Corvallis IC Facility represents calculator commitment

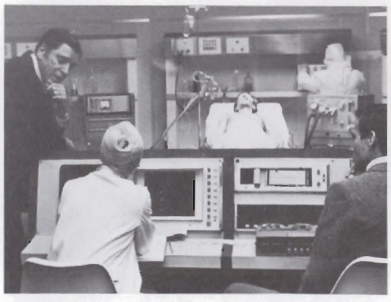
CORVALLIS, OR., March 15—Operations began last week in the second building to be completed for HP's Corvallis Division. The division is responsible for the HP line of pocket and personal calculators. The new, two-story, 154,000 square-foot building will house the division's large-scale integrated circuit manufacturing and research activities.

"This new facility represents a major investment and is an example of our continuing long-term commitment to the pocket and personal calculator business," said Bob Watson, general manager of HP's calculator products group.

New Medical Line transfers to McMinnville

McMINNVILLE, OR., March 17—A just introduced line of HP systems for cardiovascular and respiratory resuscitation will be transferred from the company's Waltham (Massachusetts) Division to be manufactured here.

"Transfer of the new line of products to McMinnville reaffirms Hewlett-Packard's commitment to the area," said Bill Craven, general manager of the McMinnville Division. The expected growth of the resuscitation operation can be accommodated easily at the recently expanded McMinnville facility.



"The Cassandra Crossing," *a recent entry in the great disaster category of movies, had two interesting HP connections. While filming in Rome, the producers arranged the loan of a truckload of HP medical and analytical equipment. Then they asked Gino Leoni, Medical service engineer, to operate the equipment "on camera," with stars Burt Lancaster and Ingrid Thulin. Unfortunately for his future in show business, they completely covered his features. Nevertheless, that's Gino in the background at right.*

From the president's desk

Back in 1970 in one of my MEASURE letters I discussed the functions and responsibilities of a board of directors, and briefly highlighted the background and experience of the directors serving on the HP board. Since that time, our employment has doubled, sales have tripled, and there has been almost a 50 percent turnover in board membership. Greater responsibilities, both explicit and implicit, have been placed on the board by the government. Additionally, a new director was just recently elected to the board. It seemed, therefore, that it might be appropriate to again recap the role of the board, and talk a little about its present composition.

The board is the body elected by the shareowners as their representatives with the responsibility to see that the company is run properly and profitably. Obviously they cannot achieve this function directly, so typically in a large company the board selects a top management team, headed by a chief executive officer, and delegates the day-to-day management of the company to this team. The board still provides policy guidance, and traditionally approves certain types of action such as dividends, major capital expenditures, appointments and compensation of key officers of the company, and the like.

Who are the current HP board members? How are they selected? Why does the composition of the board change?

As to the last question, there are several reasons. First, we have a mandatory retirement age of 72 for outside directors (that is, directors who are not members of HP management). This provision caught Dr. Russel Lee and Harold Buttner in 1970, as it did Dr. Frederick Terman and John Fulenwider in 1973. Because of their very long association with the company, Directors Terman and Buttner were elected emeritus directors following their retirements. We have a mandatory retirement age of 65 for inside directors, which was the reason for Frank Cavier's retirement from the board several months ago.

Resignations are also a factor. This was the case with Bill Eberle when he received a Presidential appointment for U.S. Trade Negotiations; with Ed Littlefield because of a possible conflict of interest with another directorship; and with Dr. Philip Lee who, as chancellor of the University of California Medical Center in San Francisco, was faced with an irreconcilable time conflict between the meetings of the HP board and the University's Board of Regents.

Death claimed three of our directors in recent years — Noel Eldred, Noel Porter, and H. I. Romnes.

One important criterion in evaluating and selecting new members for the board is area of expertise. It was obvious that Dave should resume his membership on the board following his return from Washington early in 1971. Bill Doolittle, vice president, International, was added to the board because of the increasing importance of our international business, and the election of Barney Oliver, vice president, R&D, reflected our strong commitment to technological innovation. John Young and Bob Boniface were added to the board when they became members of the executive level of HP management.

The medical and analytical markets are important to HP, and for that reason it is highly desirable to have outside directors who are knowledgeable in these areas. It was for this reason that we added to the board Dr. Robert Glaser, former Dean of the Stanford Medical School and vice president for medical affairs, and currently chief executive officer of the Kaiser Family Foundation; and Dr. Antonie Knoppers, a consultant and retired vice chairman of Merck & Co.

Our most recently elected outside director is James Hodgson. Jim was with Lockheed Aircraft for a number of years before entering government service as Secretary of Labor and later as U.S. Ambassador to Japan. Thus, he brings to the board a combination of industrial experience, government experience, and experience in the international area.

In addition to myself, the other directors on the HP board not previously mentioned include Luis Alvarez, professor of physics, University of California; Thomas Pike, honorary vice chairman, Fluor Corporation; Ernest Arbuckle, chairman, Wells Fargo & Co.; Ed van Bronkhorst, vice president and treasurer for HP; Robert Minge Brown, attorney; Francis Moseley, technical consultant; Ralph Lee, executive vice president for HP; and George Bennett, president and chief executive officer, State Street Investment Corporation.

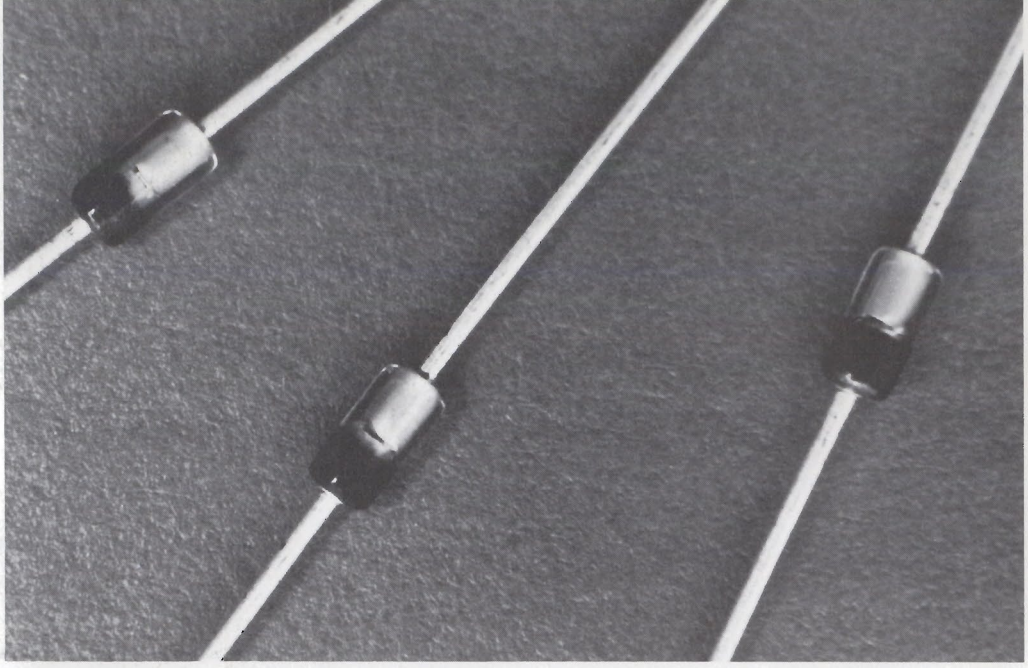
I mentioned earlier that additional responsibilities have been placed on the shoulders of the board. One such responsibility springs from the Employee Retirement Income Security Act (ERISA). The basis for this legislation was derived from the abuse with respect to many employee retirement funds both in industry and in labor unions. The Act requires more exact definition of many benefits (not just pension plans) and holds the directors legally responsible for proper funds management. This law has real teeth and most boards of directors are greatly concerned about many of its provisions. In fact, many boards with which I am familiar have set up a special committee to insure exact compliance with ERISA.

A second area of added responsibility is a direct result of the wave of illegal payments disclosures recently reported in the press. Although the actual number of such incidents has been relatively small or minor in effect, some have been so flagrant that they have been an embarrassment to both industry and government alike. Again, as in the case of ERISA, most boards have a special committee to work with management, and often its outside auditors, on this problem. These committees carefully review the multitude of transactions that their companies are engaged in to uncover and disclose any irregularities that may have occurred.

Now, a final word about your own board. Our inside directors are HP people with long experience in the company who hold key positions of management. Our outside directors have been carefully chosen, and are of great value to the company. Not only have they had wide experience in the business or scientific community — not only do most of them bring special skills to the board — they also have demonstrated a very great interest in HP, and have made a personal investment in time and study of the company, its goals, and its key people. We are fortunate indeed to have the help and counsel of these fine people.

For your interest, a future issue of MEASURE will feature photos and brief biographical sketches of the HP directors.

Bill Hewlett



An HP component that's taken to heart

HP components are at the heart of many electronic products of other companies, including at least one that helps some *human* hearts function better —the pacemaker. The HP Schottky diode from Microwave Semiconductor Division is used in almost every brand of heart pacemaker on the market.

A pacemaker keeps the heart beating at a steady rhythm by transmitting pulses to a device implanted near the heart. It's a consumer product, so it can't be too costly, but it must be highly reliable at the same time, since a malfunction could be a matter of life or death. This combination of requirements makes MSD's high-volume line of Schottky diodes ideal for this application.

The Schottky, a metal-on-silicon diode named for the man who discovered the principle involved, is used in two different ways in the pacemaker. One is in the power pack, where the HP diode prevents one weak battery from draining the others. In its other application, in the heartbeat timing generator, the Schottky sets the reference voltage of the timing pulse. Its low, stable forward voltage produces a very accurate reference.

In both applications the diodes are used in circuits that are outside the body, but their operation is critical because those circuits control the implanted unit. HP Schottky diodes were chosen for the job because of their proven reliability and low price.

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