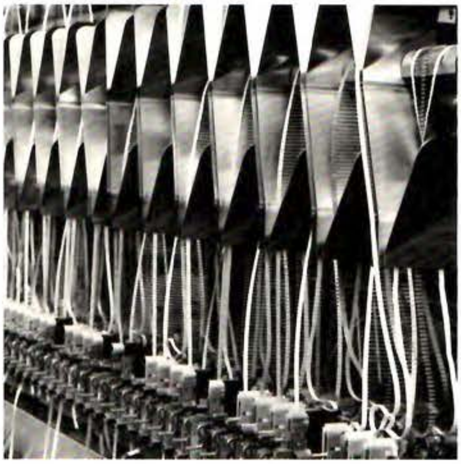
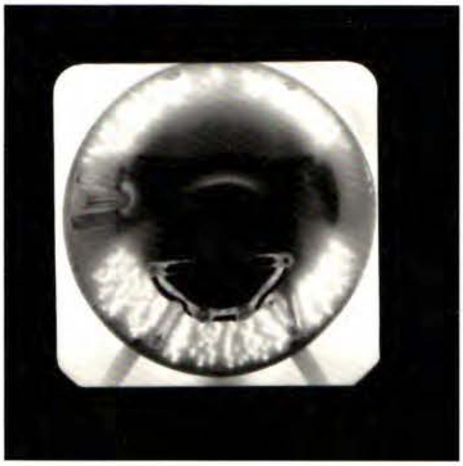
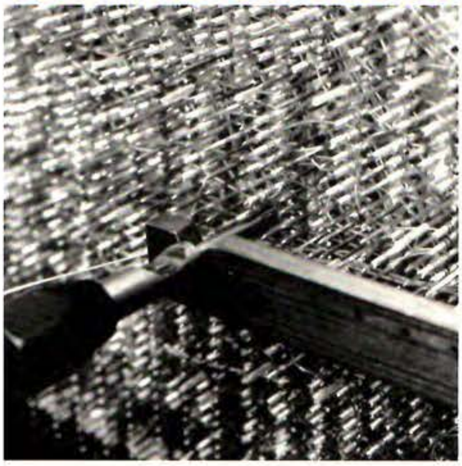
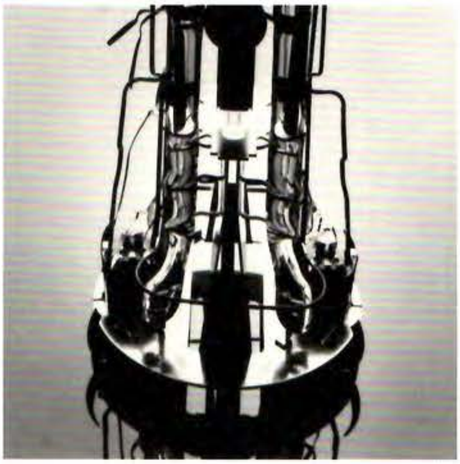
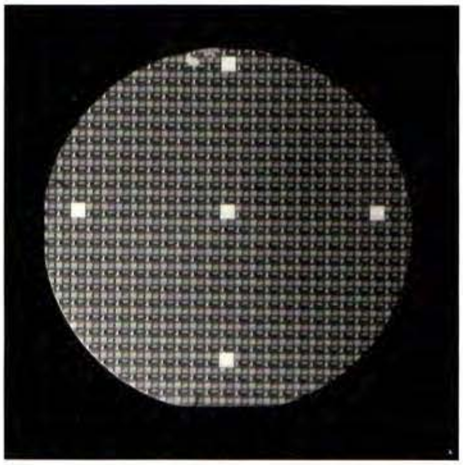
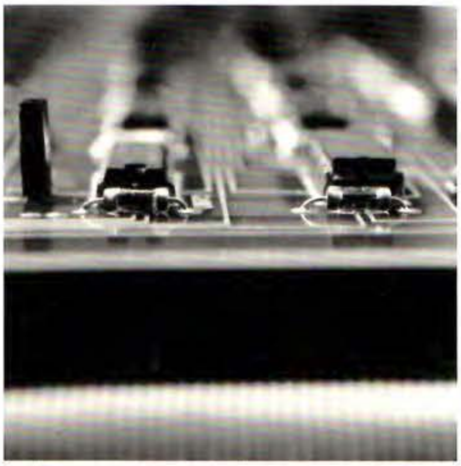
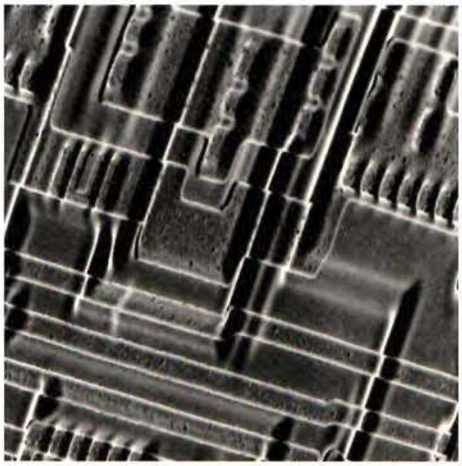
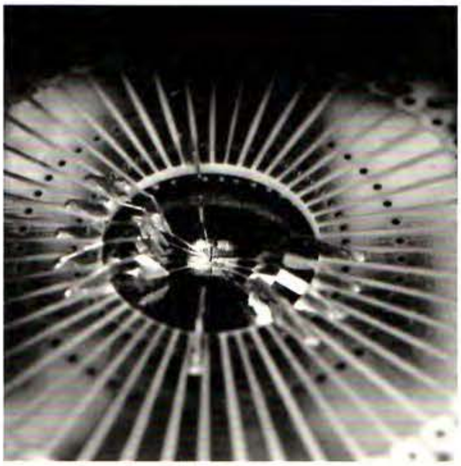
TEKTRONIX, INC./ANNUAL REPORT/34TH YEAR/MAY 31, 1980

Tektronix®

COMMITTED TO EXCELLENCE

Tektronix 1980 Financial Highlights in thousands

1979		1980		Increase		
$847,000	**100%**	**$1,049,000**	**100%**	**$202,000**	**24%**	**ORDERS RECEIVED** from customers, some of which were
239,000	28%	317,000	30%	78,000	33%	UNFILLED ORDERS at year end.
$786,936	**100%**	**$971,306**	**100%**	**$184,370**	**23%**	**FROM SALES** of
606,795	77%	722,060	74%	115,265	19%	TEST AND MEASUREMENT products and
180,141	23%	249,246	26%	69,105	38%	INFORMATION DISPLAY products—sold to
487,172	62%	591,760	61%	104,588	21%	UNITED STATES customers and
299,764	38%	379,546	39%	79,782	27%	INTERNATIONAL customers.
$709,785	**90%**	**$886,234**	**91%**	**$176,449**	**25%**	**LESS COSTS AND EXPENSES** to be paid
381,025	48%	468,380	48%	87,355	23%	TO EMPLOYEES who design, produce, sell and service products as well as those who support their efforts;
253,394	32%	330,333	34%	76,939	30%	TO SUPPLIERS for materials, components, supplies, services and the use of their property and funds;
54,108	7%	57,218	6%	3,110	6%	TO GOVERNMENTS as taxes in the United States and abroad—and to provide
21,258	3%	30,303	3%	9,045	43%	FOR FACILITIES depreciation providing for the use, wear and age of buildings, machinery and furnishings
$77,151	**10%**	**$85,072**	**9%**	**$7,921**	**10%**	**RESULTING IN EARNINGS** to be reinvested in expanding the business and for dividends to shareowners.
52		53				NUMBER OF WEEKS in fiscal year.
$4.28	**100%**	**$4.66**	**100%**	**$ .38**	**9%**	**EARNINGS PER SHARE** based on average shares outstanding.
.60	14%	.79	17%	.19	32%	DIVIDENDS PER SHARE paid to shareowners.

A YEAR ENDED, A DECADE BEGUN

It was some year. It offered something for just about everybody.

For shareholders: Our ninth straight increase in earnings—and our 27th in the last 32 years.

For Tektronix employees: Good operating results from each of our major product areas — strong orders and sales, heartening growth.

For sourpuss economists who'd made a two-year career of crying "Recession": Vindication in their own lifetime. Here it came at last.

For federal monitors: The assurance that Tektronix prices increased only moderately, just as the Government "suggested" they should. (At the same time, costs marched upward, obviously to a different drummer.)

For Monday-morning efficiency experts: Hindsight to "see" how some of our component delays could have been avoided.

And even for Chicken Little: The knowledge that the sky indeed *was* falling. Ice one month, volcanic ash another, punished our area.

The year was difficult, the US economy infirm, interest rates stratospheric, competition on the rise, inflation indexed into just about everything, and our profitability in a nutcracker.

It *was* some year. And Tektronix did all right.

Our sales increased by 23 per cent, earnings by 10 per cent. Incoming orders were strong, a 24 per cent increase. A breakdown of our financial results begins on page 5, plus some other comments to put into perspective many of the other elements in this unsettled and unsettling year.

WHAT'S AHEAD?

Shareowners are by nature futurists; no one invests in the past. All of which makes any annual report at least to some degree academic. Whatever interest an accounting of last year may hold, almost certainly what you really want to learn is what's down the road.

Well, we don't know. The future is uncontrollable and thus in the end unpredictable. We do have some strong educated assumptions, though, and we're betting on them. Some market trends seem unmistakable. And our commitment to certain future product directions is solid. In the second part of this report we'll share some of our expectations with you.

A TRIPLE OPPORTUNITY FOR TEK

"Revolutionary" will do until a better word comes up to describe electronics today. The turmoil is largely the work of integrated-circuit designers and their wonder-working offspring, microprocessors and memory chips. These digital components have brought the power of whole computers down in size to smaller than a dime and in cost to sometimes just a few dollars.

The low-cost injection of computer intelligence into pretty nearly everything has enabled product innovations of the widest variety. And it has added ease of operation and new capabilities to all manner of existing contrivances.

For Tektronix the "revolution" has three benefits:

1. A great expansion of the markets for our existing product lines. More electronic equipment and systems means more (and more-sophisticated) test and measurement products.

2. An exciting and versatile new kind of component: Tiny microprocessors and memory elements, letting us add new product features, "smartness" and more operating ease per dollar. Increasingly, electronic hardware places fewer limitations on the designer; our decision must be, so to speak, where best to place our chips.

3. A chance to contribute substantially with entirely *new* kinds of Tektronix products in the rapidly growing digital domain. That's clearly the cutting edge of electronic technology today.

Beginning on page 15 is an explanation of just what digital electronics is; why it enables the capabilities it does; and why it took the microprocessor to usher in the digital "revolution." Then we'll look at existing and projected market directions; and describe briefly some of our new instruments. They're designed to position us strongly in those growing markets.

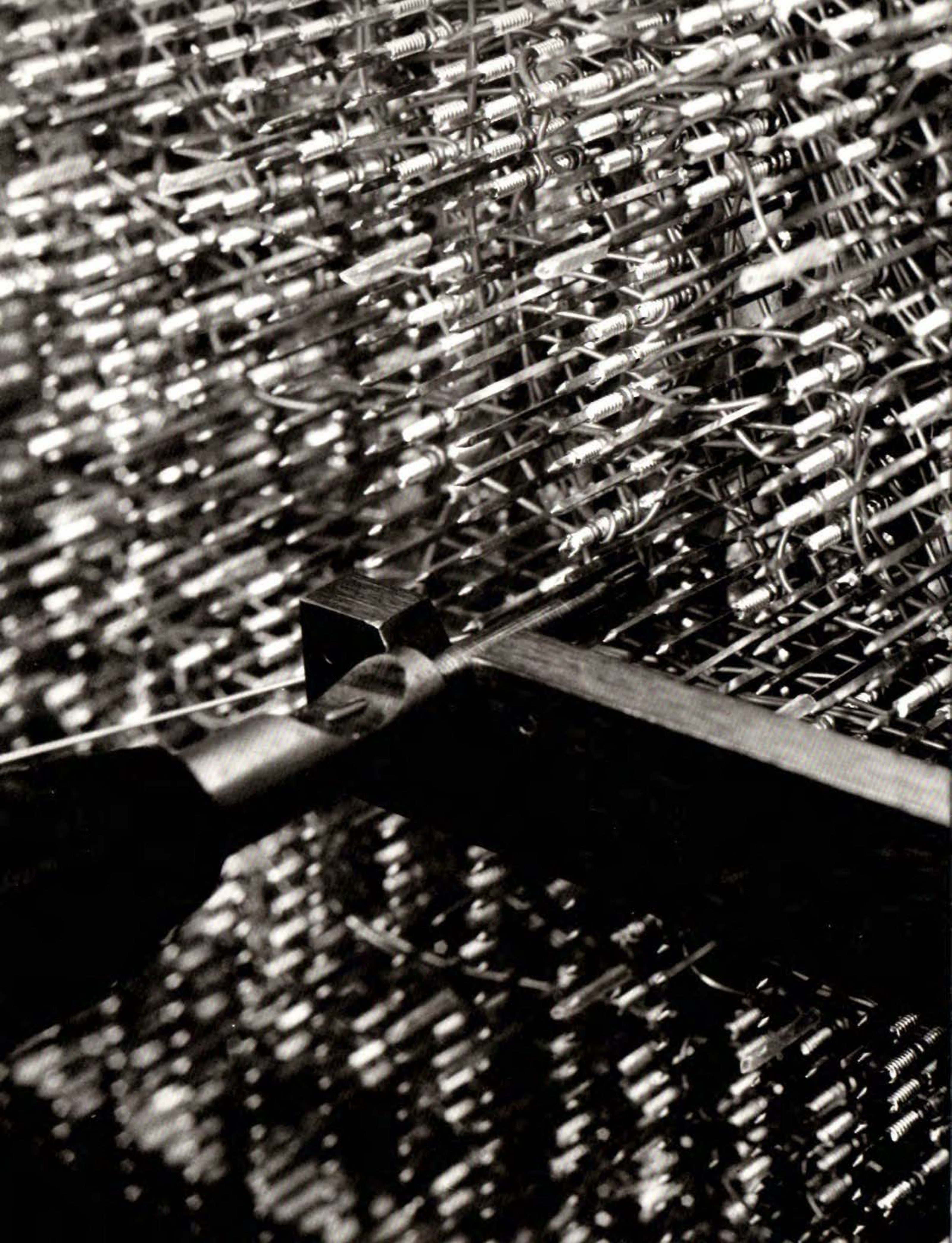
REVOLUTIONS, WHEREVER YOU LOOK

In these days of shortages, one thing *not* lacking is "revolutions." Another one coming up, they say, is the "information revolution." A big cause of that will be television technology. New kinds of distribution channels are fast making broadcasting no longer *the* way to get TV but merely one of many ways. The graduation of your TV set into a true two-way home communications system is nearer than it was. The market for Tek television products will grow.

Lest these burgeoning markets seem like a bonanza there for the taking, they are not. Competition is growing. Aggressive new entrepreneurs and high-quality Japanese companies are among the combatants.

Still, a quality company like Tek with a reputation for high technology has an edge, certainly in its traditional markets. And many of the newer fields are *so* new that leadership is still up for grabs.

Left and above: Automated component sorting, Instrument Manufacturing.



To prosper in the changing environment will require rededication to our traditional strengths. It also will place new kinds of demands on our people; the structure of the organization; our technology; our finances; our imagination, and our willingness to risk.

And it will also require a reaffirmation of the unique set of corporate values that have proved to be the yeast of Tektronix' growth. These human values, very hard to verbalize, have nevertheless been understood, absorbed and transmitted by example during placid as well as turbulent times. They have been the transducer, so to speak, converting our individual competences into a successful collaborative assault on the frontiers of technology.

TEK VS. 1980

Pinned between the rock of unrelenting inflation and the hard place of government-imposed price restraints, Tektronix still managed to conclude its year with an increase in earnings. It amounted to 10 per cent.

But we had to come from behind to do it. A recuperating fourth quarter redeemed a wobbly third one that was plagued by not only annoying ice storms but also the sort of knotty production problems you dream of after overeating herring.

Sales were good. They went up 23 per cent. Orders, too, continued strong, increasing by 24 per cent, and exceeding $1 billion for the first time.

The figures witness the strength of the electronics industry, more than countering the downswoop of much of the US economy. They show also Tek's high reputation as builder of top-quality, essential electronic equipment.

By product line, sales growth ranged from good to excellent. It was even stronger overseas than stateside.

In this, our ninth growth year in a row:

Sales were up 23 per cent from those of a year earlier, moving to $971 million from $787 million. The *international* portion increased by 27 per cent, to $380 million from $300 million; the *US segment* by 21 per cent, to $592 million from $487 million.

Information Display sales increased 38 per cent, moving to $249 million from $180 million.

Sales of *Test and Measurement products*, responsible for the remainder of our business, increased 19 per cent, to $722 million from $607 million.

Earnings were up 10 per cent, reaching $85 million compared to $77 million the year before. *Earnings per share* were $4.66, up from $4.28.

Incoming orders totaled $1 billion compared with $847 million the year before, an increase of 24 per cent. *Unfilled orders* increased to $317 million from $239 million.

We had 2,599 more *employees* at year's end than at its beginning, moving from 21,291 to 23,890.

FOOTNOTE:

Small-screen display monitors have always been part of our test and measurement product line. Now, it seems to us more logical to include them in our information-display product organization. So that's where those sales have been placed in this year's financial summary.

So that this year will be consistent with past ones, we've restated the previous years' figures on the same basis; that is, just as if monitors had been an information-display product all along.

You'll notice, if you compare the figures with those of earlier reports, that it doesn't make a whole lot of difference.

	Test and Measurement	
1976	$298,561,000	81.4%
1977	350,036,000	76.9%
1978	463,184,000	77.3%
1979	606,795,000	77.1%
1980	722,060,000	74.3%

	Information Display	
1976	$ 68,084,000	18.6%
1977	104,922,000	23.1%
1978	135,702,000	22.7%
1979	180,141,000	22.9%
1980	249,246,000	25.7%

ENOUGH GRIEF TO GO AROUND

The third quarter may not have been the most troublesome in Tek history; but it ranks up there somewhere. It was enough to have to deal daily with inflation; and with steeply rising prices of precious metals and of petroleum and its derivatives, such as plastics. Then came an unexpected triple headache.

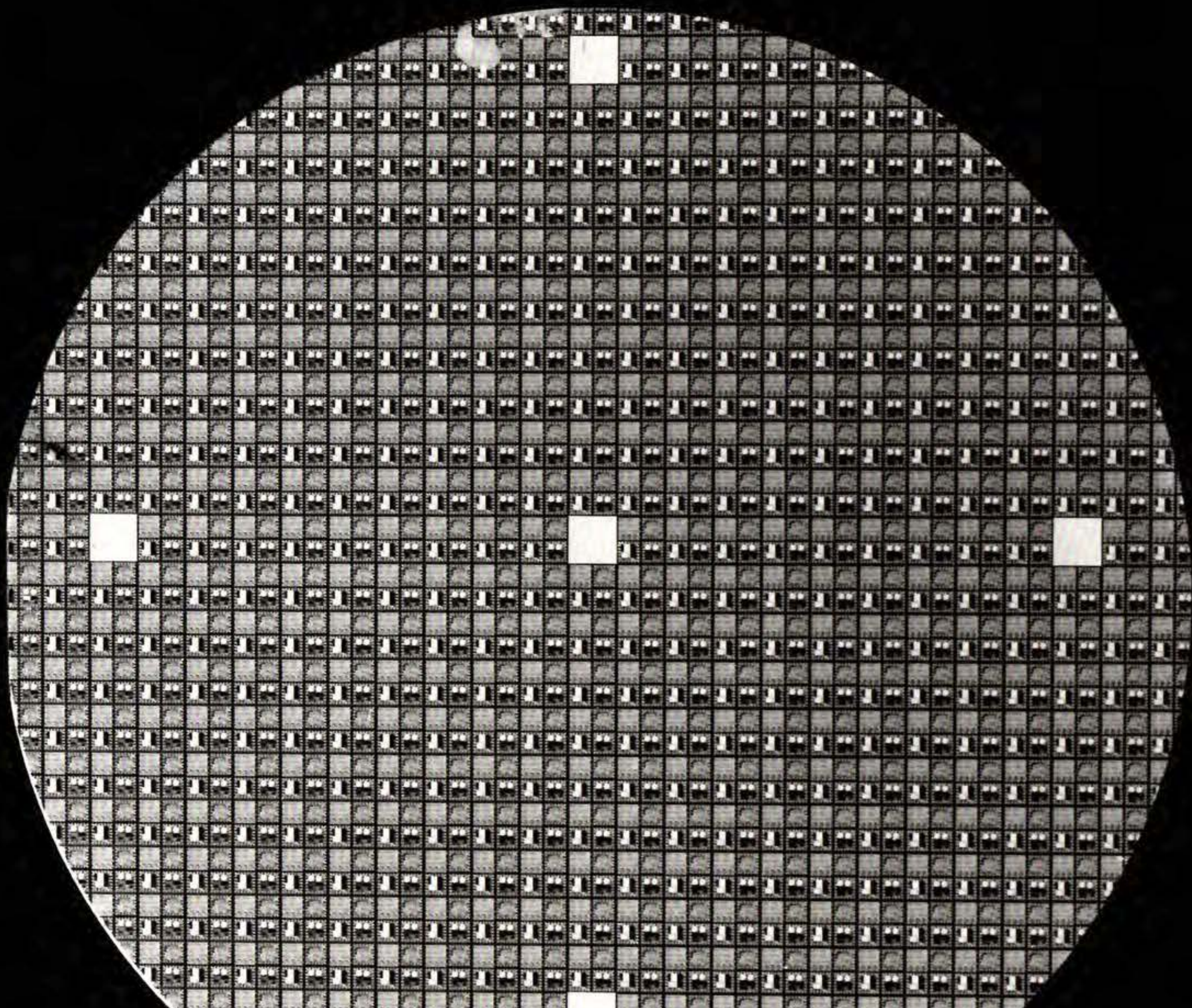
An ice storm, atypical but harsh enough to turn Portland into a federal disaster area, caused production interruptions at a bad time; they came right on top of our traditional one-week holiday shutdown.

Next, a then-record rate of interest coincided with the heaviest short-term borrowing period in Tektronix history.

Third, production problems continued in large-screen storage cathode-ray tubes, in great demand not only for our own graphic terminals but also for OEM display modules. These OEM components are bought by other manufacturers to build into and sell as part of *their* electronic systems.

In a crash effort to double the output of these extremely complex tubes,

Left and above: Wire wrap, Engineering.



we ran into severe yield problems. They caused long delivery delays.

The bad news is that some OEM customers, who couldn't wait without compromising their own product deliveries, switched their orders to makers of non-storage display products. Others, who needed the advantages of direct-view storage, waited — with understandable irritation.

It's true that sometimes, in a company pushing state-of-the-art technology, these things happen. But that's no excuse: no consolation for those customers whose deliveries were delayed — and none at all for Tek. We have always placed particular high importance on maintaining customer trust.

The good news is that yields are up, and deliveries improving — although production still trails the high demand for both the 19-inch and 25-inch tubes.

But the good news goes farther:

In February, the Technology Group was formed, encompassing all design and all manufacture of CRTs, and integrated and hybrid circuitry. Its strong management team is headed by Vice-President Wim Velsink.

The resulting singleness of direction is enabling a smoother transfer of critical process steps from engineering to manufacturing. It may be that the tube difficulties — though costly — will, by calling attention to a situation in need of correction, prove to have been a preemptive disaster; it may do more long-range good than short-term harm.

A SWELL IDEA BACKFIRES

Other problems were less transitory, including an ever more restrictive clamp on profits.

We fought a losing battle against inflation. Who didn't, of course; but our problem was intensified by the size of our unfilled-order backlog.

Tektronix policy has always been to try to ensure long-term employment. We sometimes use backlog management as a means of keeping the workforce busy through expected economic lulls. A more aggressive capacity plan would involve more hiring — but also greater exposure to employee layoff if times should toughen.

In the past this practice worked just fine. What put a crimp in things this time was the very rapid rate of US inflation. Products built at today's higher material and labor rates had to be sold at the much lower prices quoted when ordered. (By contrast, a product built today and ordered today would be more profitable, by better matching current prices to current costs.)

We believe our policy is the right policy. It's aimed at continuity of employment for Tek people rather than a costly workforce fluctuation. But, in this overinflated year, it ate into profits.

COSTS LEAP; TEK PRICES CREEP

Voluntary wage and price guidelines soon became commonly referred to as "voluntary." The quote marks indicate there was little choice for companies doing business with the Government but to try to comply with the welter of complex and changing federal formulas.

We adhered strictly to the guidelines. Some of our suppliers were able to use more lenient formulas; costs of material and parts went up far more than our modest rise in prices.

Some economists, seemingly in a race to be first, were forecasting recession nearly two years ago. We could see no reason then to accept their assays as gospel; but some of our component suppliers did. They cut back on capacity in readiness for the expected downturn. When the recession kept postponing itself, the resulting shortages became just one more pressure for higher Tektronix costs.

Payroll cost also increased, substantially more than our prices. Part of it came as an across-the-board 3 per cent pay raise in December.

Other major factors in increased costs were growth in indirect labor; and steep-angled rises in the price of precious metals, petroleum and plastics.

NO INVENTORY 'PROFITS' HERE

When valuing inventory, one way to go at it is called LIFO. Meaning last in, first out, it is conservative and (we believe) more real, and it offers cash-flow advantages. By assuming that the cost of a part used today is the cost of one you just built or bought, LIFO expunges the effect of inflation on inventories. That makes it a truer reflection of company performance, we believe. Most Tek inventories use LIFO.

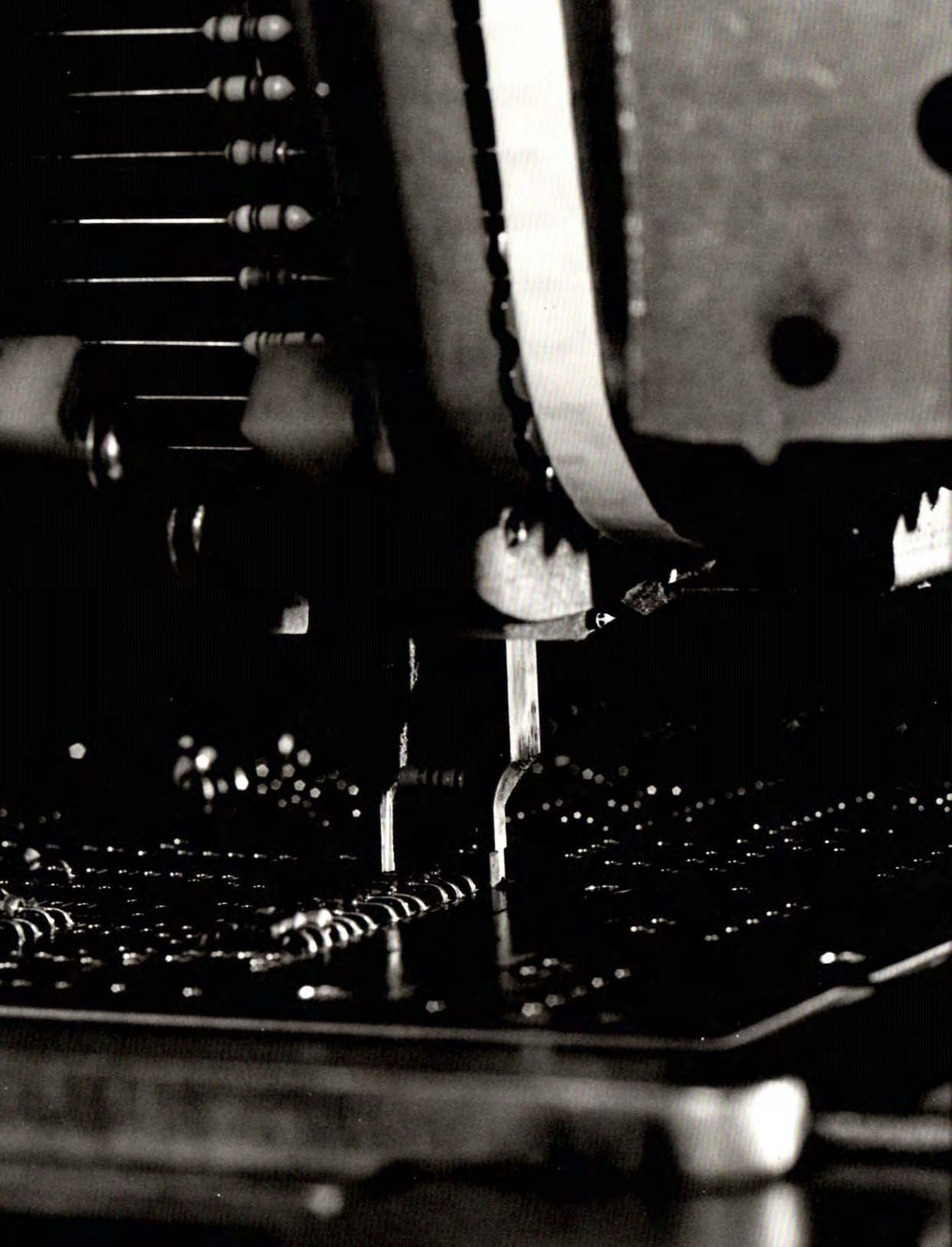
First in, first out valuation (FIFO) figures that the part used is the oldest such part in inventory and calculates its cost that way. Thus inflated inventory values are written up as part of company earnings; you can make a case for that point of view also.

The LIFO method reduces our year's earnings and profit share. But it also causes a substantial deferral of our taxes — a benefit from the standpoint of cash flow.

In a hyperinflating year like the past one, how you value inventories matters quite a bit. The amount set aside in Tek's LIFO reserve this year was nearly twice that of last year: almost $25 million. That figure indicates the current difference between LIFO and FIFO.

Because of our LIFO policy, our use

Left: Three-inch integrated-circuit wafer.
Above: Integrated-circuit die from wafer.



of accelerated depreciation, and our conservative accounting practices, Tek earnings come closer to "real" earnings as inflation rages on.

INFLATION, TAXES AND REALITY

With the dollar buying less and less, it gets harder for us — in spite of our respectable returns on investment — to finance our growth without costly borrowing, as we had to do this year.

In the Notes to Financial Statements (on page 46 in the colored pages), you'll see we've complied with Financial Accounting Standard 33. It deals with the effects of inflation.

The Notes and tables may give you some insights into the problem. Then again, perhaps not; both the concepts and the language are tough going for non-financial folk.

The point, though, is this: Our after-tax dollars buy less than they used to.

Business is particularly hard hit by depreciation allowances under present tax law. They're based on what a building or some equipment cost when acquired — not on the much greater inflated cost of replacement.

The Government's concern about US productivity has overtones of panic. Given that, tax policy ought to encourage productive investment, and certainly not stifle it. At least that's how it looks from here.

ANOTHER FOOTNOTE:

The difference between last year's and this year's earnings figures is partly due, as you may recall, to the settlement in fiscal 1979 of our tediously long lawsuit against the US Government. The payment contributed about 8 cents non-operating income to that year's earnings per share.

Countering that a bit: This year had 53 weeks, last year only 52. (Our fiscal year ends the last Saturday in May, thus the occasional spare week.)

CONCRETE AND STEEL:
COMMITMENTS TO THE FUTURE.

About $62 million went for new buildings this year. That's the largest annual figure we've ever spent for that purpose. (And doesn't count the costs of move-in, operation and maintenance, machinery and furnishings, increased taxes, depreciation or debt expense.)

Completed are our 287,000-square-foot microelectronics building and a 302,000-square-foot automated warehouse, both on our Beaverton park. Also there we added 53,000 square feet to our ceramics plant and 75,000 square feet to our cathode-ray-tube building.

At Wilsonville, a new 231,000-square-foot building now houses Information Display engineering and administrative groups.

Construction has begun on a 489,000-square-foot structure on our 270-acre Vancouver, Wash. site, to be completed by spring of 1981.

Also, Tek added about 350,000 square feet to our rented and leased space. That total now exceeds 1 million square feet, mostly in the Portland area.

Purchases were completed of property in two Oregon locations: 250 acres at Lebanon, in the upper Willamette Valley, and 100 acres at Redmond, in the central Oregon tablelands.

At Forest Grove, 12 miles west of our Beaverton headquarters, we're in the process of acquiring 100 acres.

GROWING WITH THE COMMUNITIES

As our search for property goes on, our future neighbors often wonder why we're buying more land than we need. Here's what we tell them:

Tektronix wants to stay in this part of the country; and good industrial sites are getting harder to come by.

Our intent is neither land speculation nor (in most cases) immediate industrial development. It is merely to ensure that we will have room to grow. As to building sites, the time to prepare for tomorrow is not tomorrow.

Tek's policy is to grow *with* each community rather than impose growth *on* it; to be part of what *they* see as their future; to participate, if possible, in their formal long-term planning; and to provide lasting employment there as we have in other communities where we have made our home.

Also, with energy growing shorter, it doesn't seem smart for people to have to travel ever farther to work. Dispersing our operations will help by moving the jobs to the people. It also lets us attract more first-rate employees.

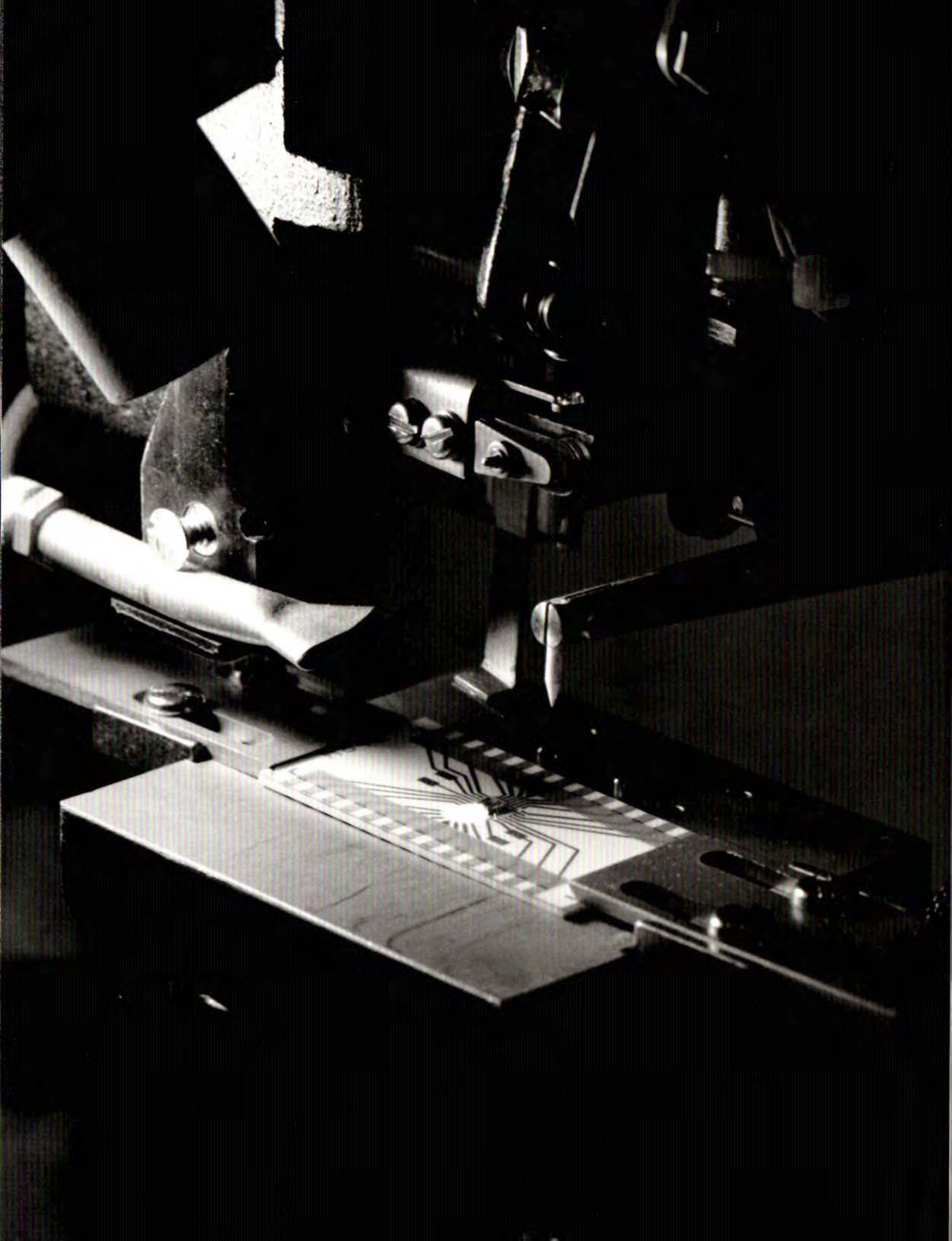
ABOUT THAT VOLCANO:

One disaster that *didn't* happen to Tek was being buried in ash from erupting Mt. St. Helens — although you wouldn't know it from national news reports; the alleged depth of the ashfall here seemed to increase by the square of the reporter's distance from Oregon.

Our operations are a good 55 miles from the disintegrating peak. Our share of the volcanic dust was a skitch of ash a small fraction of an inch deep. We are by no means the new Pompeii.

Not to downplay the seriousness. A little ash goes a long way; it is both gritty and adhesive, and it intrudes into everything. When you consider that some ash particles are larger than the transistors in our microcircuits, you can appreciate the effort it took to keep "clean rooms" clean and processes unimpaired.

Left and above: Automatic component insertion, Instrument Manufacturing.



Credit goes to our hard-working Facilities crew, as well as to the cooperative attitude of Tek employees in adjusting work routines and being super careful.

There was no adverse effect on product quality. Output suffered only to the extent that three buildings were shut down for part of a day to double-check for contamination.

OUR PROBLEMS MATURE

If anything matured this year, our president wryly comments, it was the problems associated with fast growth.

In that "austerity" connotes a time when you traipse around with holey socks, it's not an apt term for describing our industry today, recession or no.

But we *are* in for some easing of past growth rates. That "economic correction" should do us some good.

Continued heavy hiring always is risky — for fear that the curve of employee productivity may someday cross over the order curve — particularly if the latter dips a tad.

Hiring continued brisk into the year; but now, for all intents and purposes, has been cut off. Asterisk: Except for certain skills in very short supply.

Recent years' hiring *has* caused problems. One is obvious: Many of our employees are new to Tek; many are in new jobs created by growth. Many managers also are new, either to managing or to *their* jobs.

As a result, our employee group is lower on the learning curve than we'd like; it shows up in output and cost of production.

The expected moderation of business levels will give our employees the chance to gain needed experience in their jobs. And we'll have the time to address problems that, if they haven't been disguised by growth, have at least taken a back seat to more-insistent ones such as shortages, deliveries and the like.

BOARD ADDS THREE, LOSES ONE

The composition of Tektronix' board of directors changed during the year. Three new members were elected; one member announced plans to retire.

Bill Walker, Tektronix executive vice-president and chief operating officer, became a board member in February. Two outside directors were elected in May: Paul Bragdon, president of Reed College; and Leonard Laster, M.D., president of University of Oregon Health Sciences Center.

Paul L. Boley, board member since 1971, will retire in September. The retirement is in line with board policy. Mr. Boley is 70.

Appointment of Dr. Laster and Mr. Bragdon adds the perspectives of the educational and scientific communities to our present technical and business-oriented board membership.

Both men have wide national reputations in their professional fields, as well as the highest community respect. We welcome their participation in Tektronix' future.

Both are married; each has three children; both are transplanted New Yorkers.

Paul Bragdon has been Reed's president since August 1971, moving there from New York University, where he was vice-president for public affairs. He is 53.

He had served in state and city government in New York, including in top staff positions to the Mayor of New York. He earlier had practiced law with a New York City law firm.

He graduated from Amherst College in 1950 and Yale Law School in 1953.

Mr. Bragdon is a member of many state and national educational associations and councils. He is at present a director of another major Oregon corporation, Evans Products Company.

Leonard Laster, 52, has held his position at U of O Health Sciences Center since 1978. Before that he was vice-president of academic and clinical affairs at Downstate Medical Center, State University of New York, Brooklyn, and later its acting president.

A gastroenterologist by professional training, Dr. Laster received his A.B. at Harvard in 1949 and M.D. from Harvard Medical School in 1950.

He has served in administrative and advisory ways with National Institutes of Health, National Academy of Sciences and many other health, medical and scientific organizations. He is a director of Standard Insurance Company, Portland.

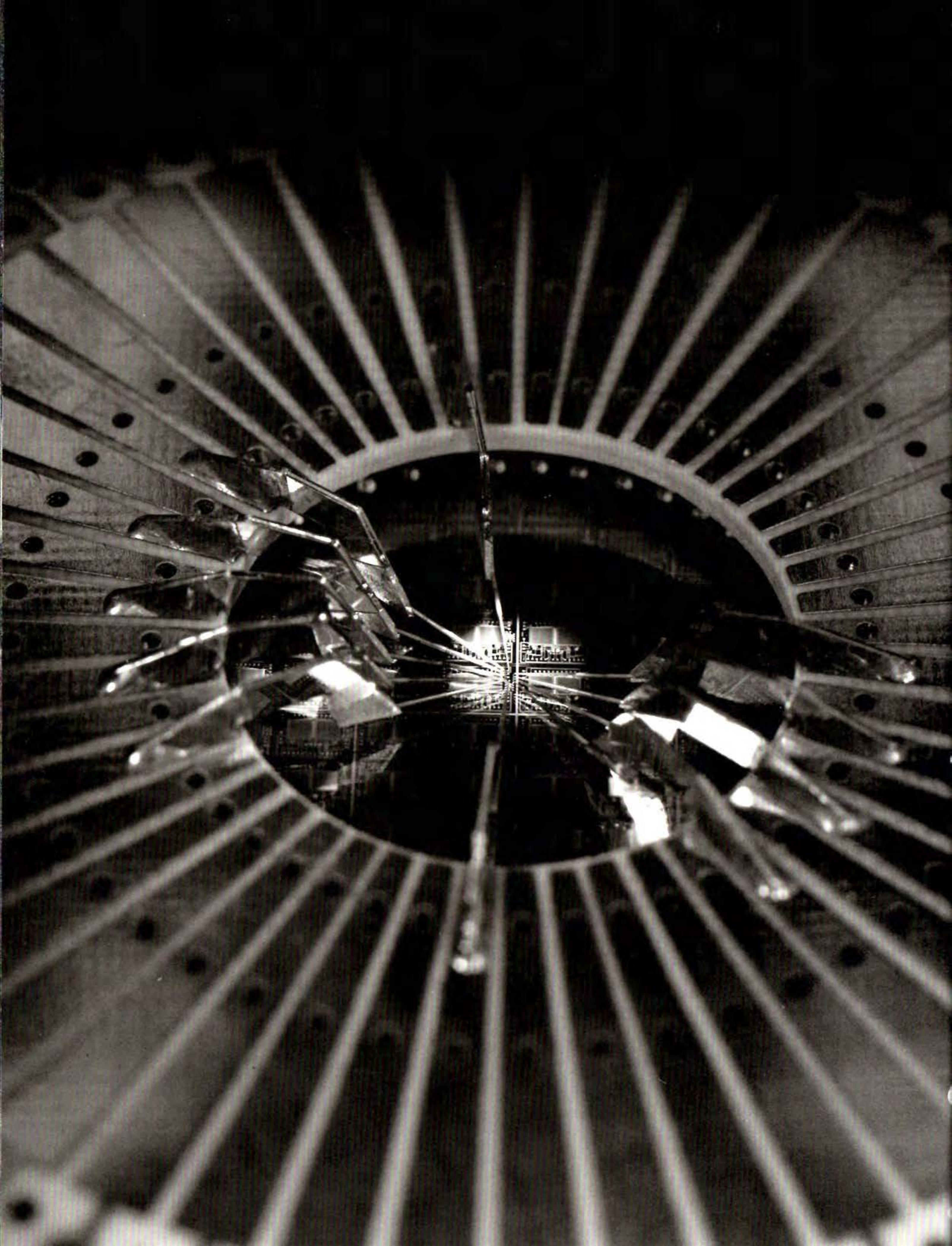
Bill Walker's contributions to Tektronix range widely through the areas of engineering and product development.

Bill, 49, came to Tek as an engineer after serving in the US Air Force. Three years later he was named manager of Manufacturing Engineering, then of Pre-production Engineering. His technical management responsibilities broadened into research and product planning and, in 1971, he was named vice-president of Research and Engineering. In 1975, as group VP, he was given responsibility for the Test and Measurement Group.

Bill was appointed executive vice-president and COO in 1979.

He is a director of Sony/Tektronix and of The Grass Valley Group, Inc., and is a trustee of Tektronix Foundation. Outside of the company, he is also a director of Electro-Scientific Indus-

Left: IC wire bond on a hybrid circuit. Above: Wire-bonding machine.



tries, Inc., Portland, and a trustee of Oregon Graduate Center.

LARRY CHORUBY GROUP V.P.

Larry N. Choruby, 41, was appointed Group Vice-President — Finance by the board of directors in April. He succeeds Les Stevens, who had previously announced his plans to retire early. Les had served with Tek for 28 years.

Larry started as a sheet-metal operator at Tektronix in 1960, while attending college. He had served in the US Marine Corps before that.

His financial career began in cost accounting in 1962. He then became Accounting Operations manager in 1968, manager of Instrument Manufacturing Support in 1970 and budget director in 1971. He became Operations Planning director in 1975, and vice-president and director of Management Information in 1976, combining control and systems functions.

BILL ROBINSON NEW CONTROLLER

Bill Robinson is Tektronix' new controller, having assumed that responsibility June 1.

Bill, 49, has been at Tektronix for 21 years, all of them in the area of accounting. He came to us in 1959 from Crown-Zellerbach.

Bill moved from his job as accountant to become unit manager of Cost Services in 1961. He was chosen budget director in 1962.

In 1971, Bill was named manager of Manufacturing Accounting. He was selected assistant controller in 1976.

Bill has managed all Tek accounting functions for two years. He takes over the controllership from Elwell (Al) Swanson, who has retired after 19 years with Tektronix.

ITALIAN, MEXICAN COMPANIES FORMED; ONE PLANNED IN GERMANY

Continuing our practice of gradually substituting direct marketing for commercial distributorships in other countries, Tektronix opened two new foreign operations this year.

Tektronix S.p.A. began business January 1 in Milan, Italy. It also has field offices in Rome and Turin. It takes over product sales and service from Silverstar, Ltd., our longtime distributor.

A joint venture was undertaken to form Tektronix S.A. de C.V. in April. We own 49 per cent of the company, Mexican interests 51 per cent. Its headquarters are in Mexico City.

In addition, an agreement has been signed whereby we will acquire the distributorship of Tektronix products in Germany from Rohde & Schwarz, who have represented us there for 25 years.

STATUS:

Tektronix is one of the two largest test-and-measurement instrument companies. Of our thousands of commercial customers in science, industry and education, no one of them is responsible for as much as 4 per cent of our business. Of the *Fortune 500* (largest US companies), about 85 per cent are now our customers. The same proportion is likely worldwide.

Our products have widespread use. Somewhere along the line, one or more of them has probably figured in the research, design, manufacture or testing of whatever it is you use or consume.

In spite of strong recent growth in our other business segments, our major product remains our original one, the cathode-ray oscilloscope. Its broad versatility of use has made and kept it the most common electronic instrument.

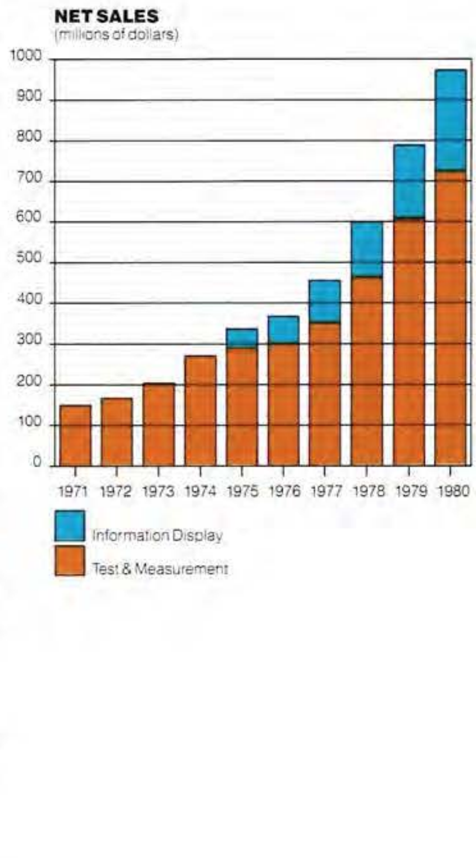
The oscilloscope enables study of electrical events or phenomena converted into voltage (heat, sound, pressure, strain, velocity, nuclear events and biochemical changes) by displaying their waveforms. The waveform is a graph written by a focused electron beam on the phosphor screen of the scope's cathode-ray tube (CRT).

Scopes range from handheld to benchtop size. Some are self-contained; others vary their performance characteristics by interchanging Tek-made plug-in units, including multimeters and counters. Some are coupled to computers or use internal microprocessors for additional analysis of waveform information; we say they have "intelligence." Some retain the graphed waveform after the event it depicts has ceased — either with a storage CRT or through use of digital techniques.

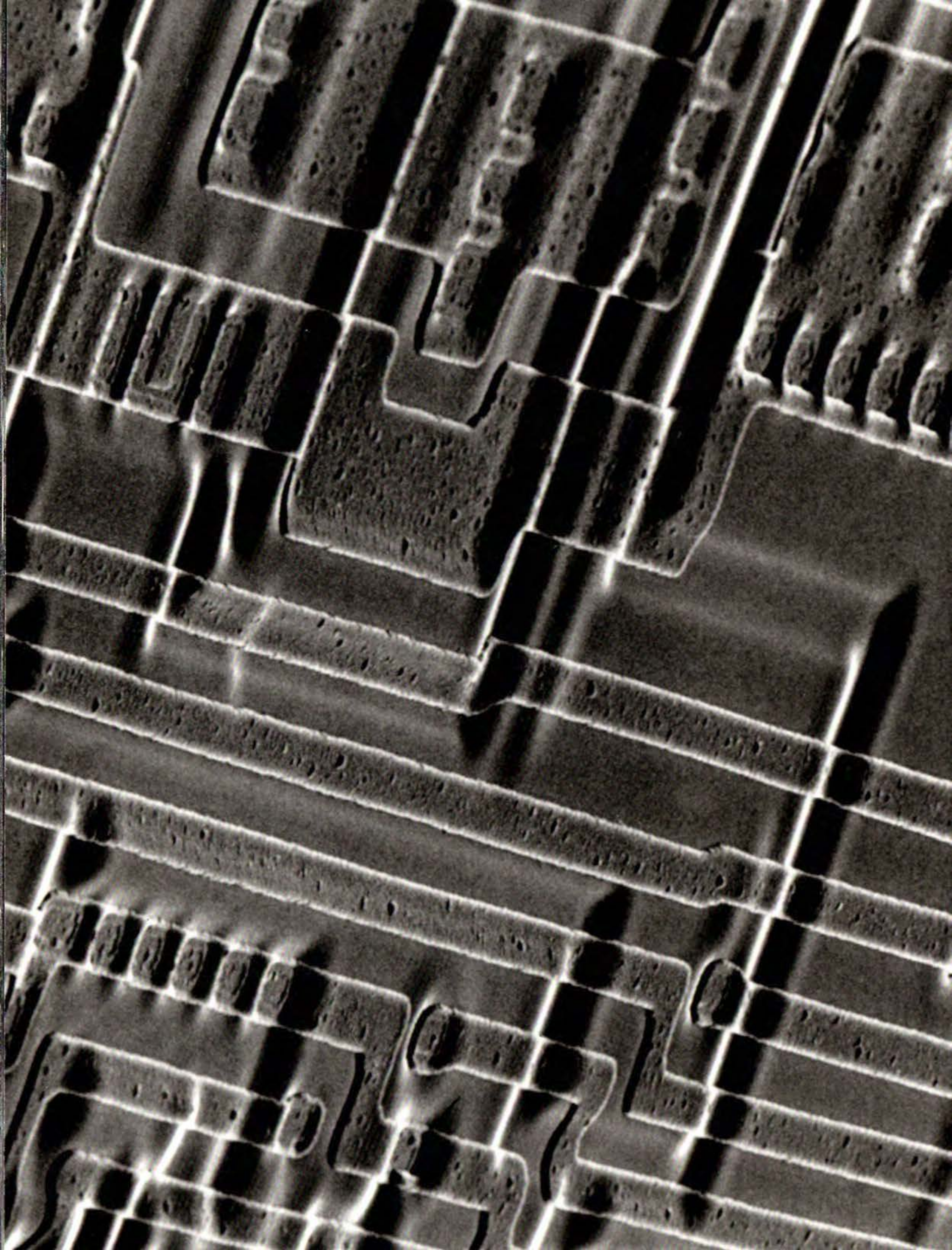
Test and measurement products also include modular plug-in instrument systems, spectrum analyzers, pulse generators, amplifiers, logic analyzers, microprocessor development aids, cable testers, power supplies and physiological monitors. Tek also produces a variety of accessories including probes, attenuators and waveform cameras.

Information-display products include graphic computer terminals, that display not only words and numbers but also maps, diagrams and other pictorial content, in black and white or color; graphic computing systems, which function as desktop computers or interact with a host computer; hard-copy units, which make paper copies of the CRT screen contents; display monitors, and digital plotters.

Most of these terminals, monitors and computing systems use storage



Left: Wafer probe, integrated-circuit testing.



CRTs like those in a scope, retaining the images after they've been "written" only once. Others employ TV-like tubes, which continually redraw the image while it's being viewed.

Specialized products for use in the television industry are waveform and picture monitors, signal generators and vectorscopes, all of which test and display the quality of video transmission. The Grass Valley Group, Inc., our California subsidiary, manufactures TV production and routing switchers and special-effects systems. Both Tektronix and Grass Valley television products are the leading ones.

MARKETS

Tektronix markets, in order of contribution to our sales, are:

Electronic and electrical equipment manufacturers, including industrial controls, radio and TV sets, communications equipment and radar systems.

The computer industry.

Government — US, state, local and foreign. They purchase our standard commercial products.

Education — Graduate labs, medical and vocational/technical schools and classrooms.

Television.

The instrumentation industry.

Other sales are pretty dispersed, and include those to the petroleum, chemical, transportation, medical, and printing and publishing fields.

Tek products are sold in most countries. Our primary foreign markets are the United Kingdom, France, Germany and Japan. Then come Canada, Switzerland, Italy, Sweden and The Netherlands.

PRODUCT DEVELOPMENT

Tektronix' investment in engineering, research and development (excluding profit share) is about 8 per cent of revenues. About 10 per cent of our employees work in those areas; about a third of them have advanced degrees.

Necessity is the mother of our extensive vertical integration. When components are not available that meet our high standards or specialized needs, we often must — or choose to — produce them ourselves. In most cases we can thus achieve optimum performance by designing the components with the product in mind — and the other way around also.

We produce our own CRTs (except for some raster-scan tubes), some semiconductors, integrated circuits, transformers, chassis and cabinets, ceramic hybrid circuits, ceramic CRT envelopes, some phosphors, etched circuitry, potentiometers, switches, precision capacitors and resistors, inductors, relays and oscillators, coaxial cables and plastic parts of many kinds. We supply our overseas plants with many of these parts also.

Our major manufacturing plants are situated in four locations near Portland, Oregon; in Grass Valley, California; in Heerenveen, The Netherlands; in London and Hoddesden, England; on the Isle of Guernsey, and in Tokyo and Gotemba, Japan. The last two are Sony/Tektronix plants.

We market outside the US through 17 solely or jointly owned sales and service companies in major nations, supplemented by 50 commercial distributors serving 60 countries.

DIGITAL ELECTRONICS: A FORCE TO RECKON WITH

Just a few years back, an engineer pondering all the things that might be done with a computer probably didn't include dropping it on the floor and losing it.

But that was before microprocessors. These tiny general-purpose computers, scaled down and designed to fit onto chips of silicon, are now off-the-shelf digital building blocks for almost everything electronic. They have imbedded themselves in many non-electronic products also.

If they are not in truth causing, as is said, a "revolution," they are for sure the driving force behind a very quick-stepping evolution — in everything from product design to information handling to... But you've read about all that already in the popular press.

OLD HANDS IN AN OLD MARKET

We're no stranger to the digital market. A Tek scope was used to monitor the first electronic digital computer, built 34 years ago.

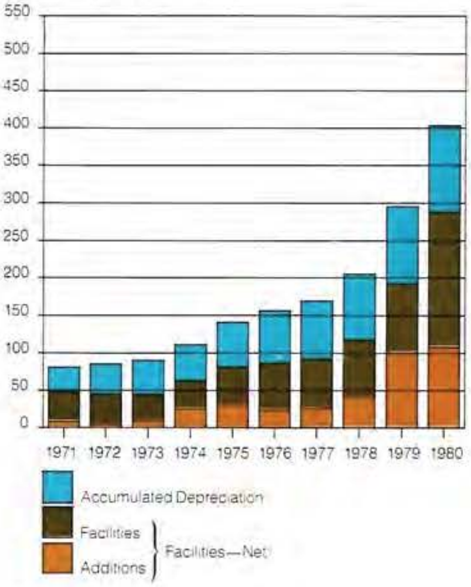
Oscilloscopes are essential in designing and then servicing computer mainframes. We built the first computer-coupled scope system, albeit with digital components that now seem Neanderthal. Our automated systems test integrated circuits; waveform digitizers are among our more advanced products.

So, the most immediate opportunity afforded by the increasing digital market is expanded sales of our traditional product lines.

We now supplement them with products *in* the digital domain. There the concern is with multi-channel relationships, presence or absence of signals and so on.

And microprocessors have quickly become a key component in our new product designs.

COST OF FACILITIES
(millions of dollars)



Left: IC viewed through an electron microscope, 500x magnification.


A VIDEO
PVW KEY
EXT KEY
CHROM KEY
A VIDEO
MATTE
BORDER
SHADOW
CLIP

BIG 'BRAINS' IN SMALL PACKAGES

Not very long ago it would have required room-sized machines to hold the computer power now residing in little microprocessors (μPs) and memory chips. "Little" means *little*: it would take over 1000 semiconductor memories to cover this page (and well over 100 microprocessors.)

Artificial intelligence has come down very fast in cost and size: From hard-wired vacuum-tube assemblages to transistor circuitry to integrated circuits (hundreds of transistors per silicon chip) to large-scale integration (thousands per chip.) On the way soon is VLSI (Very Large-Scale Integration): it will enable a whole computer — processor, memory, input-output, the works — to fit onto a single chip. Next? Maybe something Madison-Avenuish, like ILSI (the "I" standing for "Incredibly").

The speed of digital progress is impressive. Today even a run-of-the-factory semiconductor memory chip contains 8000 binary digits ("bits"), an array of 8000 on-off transistors. Soon 64,000 bits will be common.

A doubling of computer power is happening about every two years. Chips are getting denser, faster, more powerful. . .

THE BOTTLENECK IS SOFTWARE

What are the brakes on this "revolution?" The major obstacle is the frustratingly tedious, slow and costly process of software development. Today, the conversion of a semiconductor company's bright new μP concept to its actual use in a customer's product can take over half a decade.

What gives a digital product its unique character is its software, the coded program of instructions. These may be in the form of thick books, magnetic tape, disc memory — or "burned into" memory chips and embodied in the product as firmware.

To sense the importance of software, consider this: An estimated *10 to 75 per cent* of the development cost of a typical new Tek product goes for software.

Assuming that's also true of our customers, the potential market for software tools seems immense. We are a producer of such tools.

In the last 20 years, the productivity of digital hardware design has increased in a dazzling manner, giant leap after giant leap. By contrast, software design productivity has turtle-plodded upward at 4 to 10 per cent a year, sometimes and sometimes not keeping up with inflation.

A crying need is to accelerate the development of software, as well as digital hardware. To this end, Tektronix has been among the companies leading the way into the field of microprocessor-development aids, logic analyzers and other digital products.

This product area *is* the future for many instrument companies. To understand why, it might be useful to look at some depth into what's known as the digital, or logic, domain.

THE DIGITAL DOMAIN

Early electronic instruments and products were mostly *analog* ones, converting some continuous input—of voltage or something changed to voltage—into some continuous output. (A TV set converts electrical signals into moving images and sound.)

The oscilloscope remains the most common such instrument, because the analog it provides is so useful: The graphed *waveform* of the phenomenon being investigated lets an engineer "see" inside an electrical circuit.

Analog circuitry deals continuously with some changing event. *Digital* circuitry treats it as individual bits, typically a series of binary (on-off, high-low, 0-1) logic circuits.

The first digital uses were mainly on switches and such. There the concern was only with "off"/"on" or with discrete position settings.

Digital techniques required (and still require) a large amount of circuitry to do any given thing: they took time and used space; and specialized digital components weren't readily available. There was no big push to convert things into digits, anyhow, since our world is analog—perceived in images, sounds, and so on.

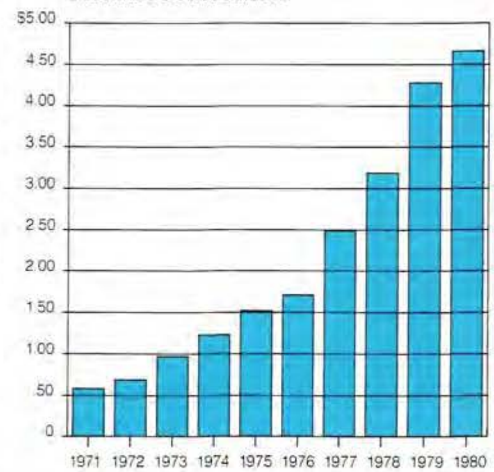
But the push soon came, from the fast-rising computer industry. Computers process data most conveniently when it's fed to them in binary form. Specialized, lower-cost logic components were needed. Soon, solid-state transistors, then semiconductor memories and integrated circuits reduced the cost (and the size and power consumption) of circuitry—and made it more reliable. More and more, circuit design meant choosing from these little solid-state subassemblies. Less and less it required "hard-wiring" discrete components.

But logic designers' needs often were unique, or nearly so. That meant a passel of small orders for short-run LSI chips, each designed for a particular task. Suppliers often had trouble turning a profit.

ENTER THE MICROPROCESSOR

The μP solved that problem. Like any stored-program computer, it can perform all sorts of widely different tasks simply by changing its coded

EARNINGS PER SHARE



Left: Grass Valley Group television-switcher keyboard.

"program" of instructions. Thus semiconductor companies could standardize on general-purpose μP designs and let the unique uses be programmed onto memory chips. One type of μP could now be sold for several thousand different applications. The resulting volume production brought the price rapidly down.

Instructions can be carried anywhere: In the product user's brain, which decides what to push or twist and in what sequence; or built right into the "hardware" mechanically (as in a wash/dry cycle) or electrically (as in interconnections between components). Increasingly, though, they become software — coded into a cassette or disc — or memory-chip firmware. This program is what tells the processing unit what to do.

Although the μP was fostered by the computer industry, the onset of these small, low-cost programmable processors was quickly noted by manufacturers of *all* kinds. They began to sense the vast range of uses for built-in intelligence, for decision-making functions — in scales, gas pumps, ovens, street lights, robot tools ... And, because μPs require no special user knowledge, an untrained person can often run complex equipment; the "knowhow" is programmed into it.

In computers, μPs enable more capability in less space for less cost. But the biggest use may not be in computation but in control or decision-making functions such as noted above. (Consider the brain and *its* uses: How much time do we spend computing compared with the time the old noodle is at work controlling our bodies and environment?)

THE DIGITAL 'EDGE'

Digital circuitry offers still other advantages:

Since each "on-off" circuit recognizes no ambiguities (it can't be "sort of on"), it's relatively immune to electronic "noise" within the circuit or caused by interference. In an analog video circuit, .1 volt of noise can raise hob with your home set's picture. But in digital TV, a .1 volt variation will have little effect; you can't drive a circuit any farther "on" or "off" than it is.

To sense this aspect of digital and analog, compare a musical scale played by a beginner on the violin and on the piano. The violin is less likely to render true tones, because its continuous (analog) strings offer infinite possibility of sour notes; but it's hard to play flat or sharp on (digital) piano keys.

Digital circuitry also is very reliable. A μP replacing 50 ICs does away with 1800 interconnections, where most circuit failures occur.

The difference between analog and digital circuits is like that between a written essay and a true-false test. Essays may be rich, expansive, full of detail — but they may also contain subjective "noise" such as vague wording and extraneous information. By contrast, a true-false test elicits just the information asked for; T-F data is easy to compare, grade and tabulate.

However (as those of you who play Twenty Questions know) dragging out the information by a series of "yes-no" questions can be tedious. And that's how it would have been in electronics, too, except for the digital revolution. It has made this logical procedure low-cost and lightning-fast (certainly a clumsy comparison). It has done more than anything else to make electronics — truly — a household word.

THE SOFTWARE WRITER'S TOUGH JOB

Now, with microprocessors a design component, the hardware designer must be *systems*-oriented, either knowledgeable of software or working in cahoots with someone who is.

In μPs, as with any computer, the most problems arise and the greatest costs occur in writing applications programs. And small wonder.

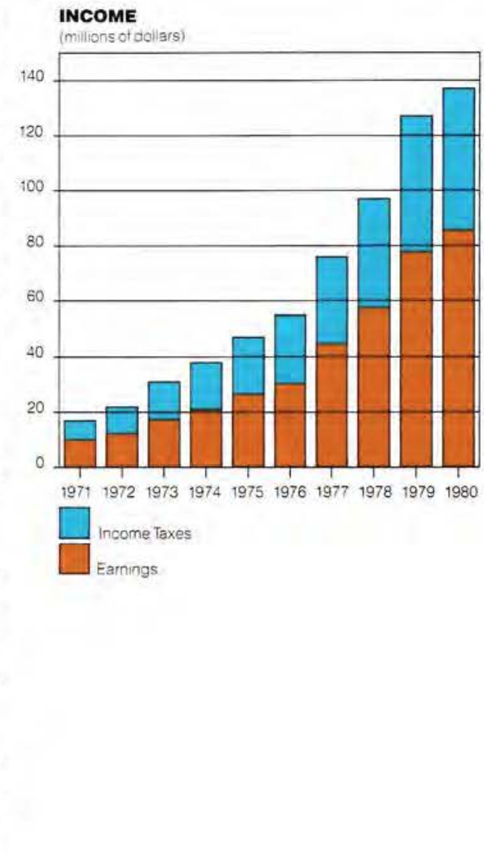
A computer, despite its ability to do a handful of mathematical tricks fast, is not smart. It's dumb. And demanding besides; it insists that the complex program instructions be broken down into tens of thousands of very small "on-off" steps. Most programs require man-years to write, and fill binders with computer-run pages inches thick.

In writing a program, the same kinds of things can go wrong as with any instructions: You get steps out of sequence, or you forget one or two. You give a command the computer doesn't understand, or can't perform. The programmer has to continually visualize *everything* going on in the computer's innards.

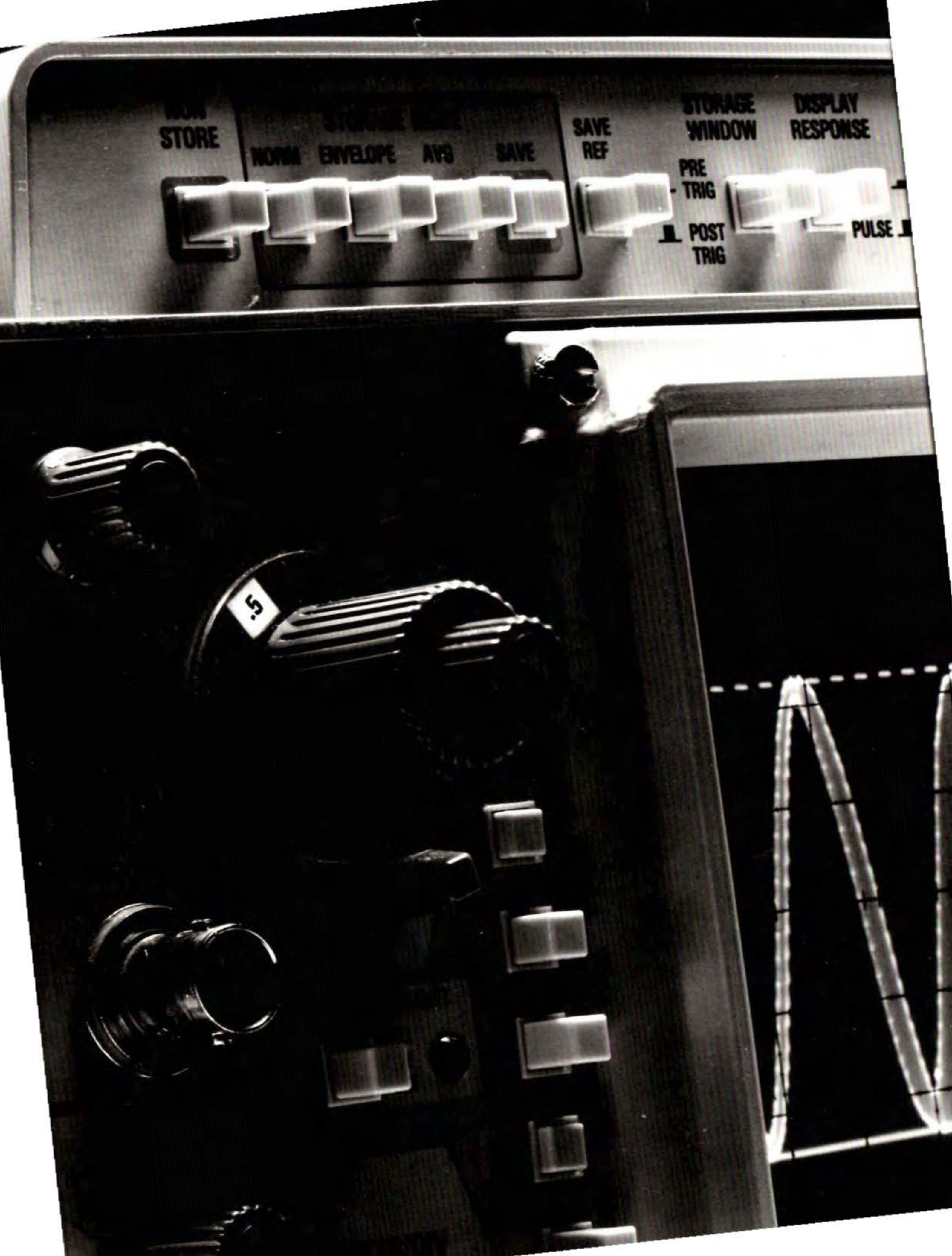
At first, μPs hit designers cold, with almost no tools to help them edit, compile or "debug" the software program. Hand-debugging yielded only about three to five lines of error-free code per day.

Programming was laborious: Draw the complex flow chart; write it out, step by step, in assembly language; hand-translate that into ones and zeros so the computer can get it straight; program those instructions into memory chips; plug the chips into the hardware prototype ... And pray.

All sorts of things could mess up at this point: The software might contain errors. So might the hardware—the μP, input-output circuitry, perhaps hundreds of logic ICs, numerous discrete



Left: IC wafer in the oven.


STORE
NORM
ENVELOPE
AVG
SAVE
SAVE REF
STORAGE WINDOW
PRE TRIG
POST TRIG
DISPLAY RESPONSE
PULSE
.5

components and thousands of interconnections.

The problem was: How do you know just what's to blame? The hardware? Which of its umpty-thousand parts? The software? Which of *its* many steps?

The only tools software designers had at first were time-sharing computers for compiling and editing; then, μP development aids (MDAs) supplied by semiconductor makers.

Time-sharing is slow, and very costly. And a program debugged on a computer might still "crash" when run on the prototype hardware for which it was designed. And MDAs were supplied only for the manufacturer's own chips, and no others. That meant a new MDA (at 12,000 bucks a throw) each time a designer changed μPs, or wanted to comparison-shop.

Scouting this market, we saw a need for a "universal" MDA, able to work with *many* kinds of μPs.

THE μP DEVELOPMENT LAB

Our 8002A Microprocessor Development Lab has a minicomputer-like mainframe; disc storage, and a Tek terminal to enter programs, control the system and display the debugging process. Its use cuts weeks of software design to only days.

It simplifies software writing and editing; you may change part of the program without having to redo it all. The 8002A automatically — and correctly — converts assembly code into 1s and 0s, files the completed sequences and, on command, puts the whole program in order.

The program is then debugged, using the emulator processor, which has a μP identical to that in the hardware prototype. The 8002A memory and μP are error-free, so any glitch at this point must be in the software.

Next the software and hardware are integrated. The 8002A's μP is connected by a probe to the μP socket in the prototype. A piece at a time, program control is transferred *to* the prototype. Only if the program works right at one step is the next one taken.

Final software-hardware debugging is done by firing up the prototype in "real time" — the speed at which it will have to function in a product.

Tek is well-positioned in this marketplace. Our new-product development is moving along well.

The Tektronix MDL has two advantages over competitors:

1. It is a "universal" or multi-vendor product, and supports 23 different microprocessor "families"—the bulk of the commercially available chips. Semiconductor manufacturers' MDLs support only their own chips. Competing "universal" products support no more than four chips.

2. Ours is the only MDL optimized for use with a host computer. Such use is growing, as the trend increases toward multi-person design teams.

The 8002A (and the 8001, for customers who own host computers) meet an important need in a growing market.

A STRONG EFFORT IN LOGIC ANALYSIS

Five years ago an electronics engineer when asked which was the most useful tool would have answered "Oscilloscope." Five years from now, the answer may be "Logic analyzer." (Today he might have to waffle and say, "Both.")

An oscilloscope, a logic analyzer and an MDL would make an excellent Tektronix gift package for the emerging software-hardware "systems" designer — telling him (her) all he ever wanted to know about μPs but never realized until now.

The scope is an analog instrument with broad *general* measurement capability. The logic analyzer, like the MDL, is a more specialized product. The MDL is a tool for software designers (and hardware debugging); the LA is a tool for digital-logic hardware designers (and software debugging).

Computers and computerized things demand rapid signal transmission. "Slow" transmissions, like phone conversations, can be done serially, over a single line. But high-speed transfer of information within a computer requires *parallel* transmission — over many channels at once.

To design, test or trouble-shoot such systems demands that these parallel "bit streams" be captured and displayed. The logic analyzer does this kind of pattern analysis.

Tektronix is one of three major competitors in the fast-growing logic-analyzer market. We are committed firmly to it.

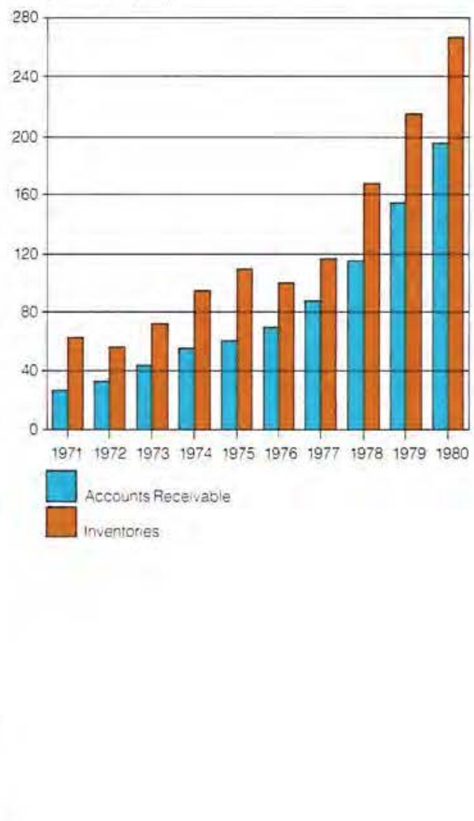
Our first logic analyzer was the 7D01 plug-in for 7000-series oscilloscopes, letting the owner of a 7000 mainframe add LA performance to it at reasonable cost. A recently introduced companion, the 7D02, contains a probe to customize it for specific microprocessors; at first we will support six different μP chips.

A major product, introduced this year, is the Sony/Tektronix 308, designed and manufactured by our jointly owned Japanese company.

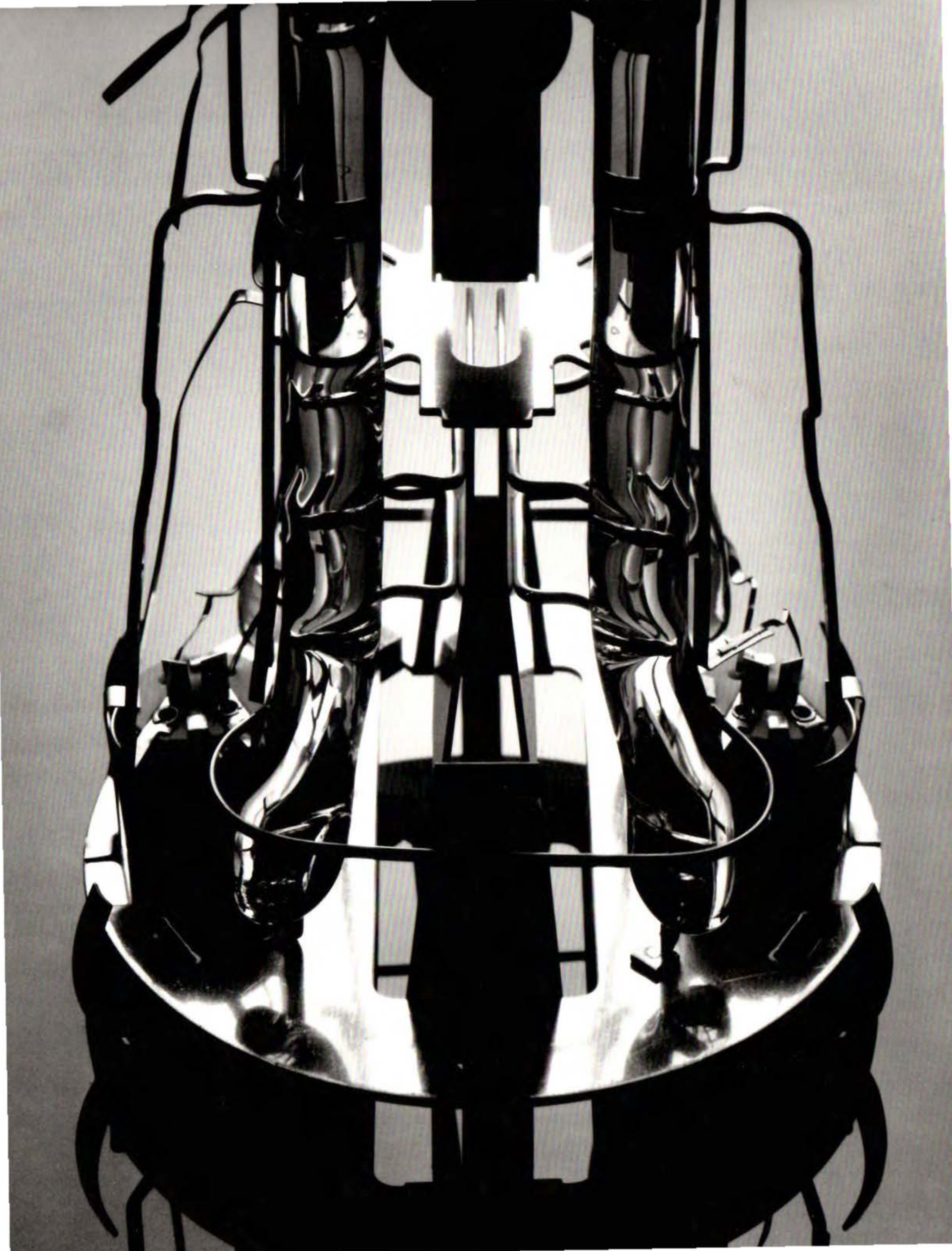
It's called a "data analyzer" because it is a logic analyzer, plus. It also incorporates measurement techniques that normally require separate instruments.

A user would prefer to carry one

RECEIVABLES AND INVENTORY
(millions of dollars)



Left: Type 468 portable digital-storage oscilloscope.



product rather than three — particularly if it weighs little, as this does (eight pounds); offers laboratory-quality performance, and doesn't cost an arm and a leg.

The 308 is a sophisticated, highly reliable, peerlessly crafted portable, in the same format as the familiar S/T 300-series oscilloscopes. Its human engineering is exceptional, its keyboard "friendly" in appearance. It is so easy to operate that a first-time user can run it almost immediately.

It offers parallel timing and parallel state displays, as do many logic analyzers; and adds to them the capabilities of serial analyzers and signature analyzers.

Parallel timing displays show eight lines of data at once, along a time base — acting as an eight-channel oscilloscope depicting "high-low" bit streams.

Parallel state displays show the eight channels as a pattern of 1s and 0s. Someone debugging software would find this the more useful display; a hardware debugger would use a timing display.

Serial displays show one channel only, reading off digital words in a time sequence. This technique is needed in data communications; data is sent from machine to machine serially.

Signature analysis is a trouble-shooting technique, using a probe to test a point in the digital circuitry, and read out that waveform, as a digital code.

The 308 fooled even the optimists. We had re-adjusted our early-order-rate estimate upward, then upward again. And we missed it anyway; even our revised revised revision fell short of the very strong customer demand.

The 308 has attracted two different sorts of user: One is the less-experienced person in such fields as education, service or manufacturing, who has been afraid up to now that a logic analyzer is too complex a tool to learn. The second is the technical expert — say an engineer — who needs only to make basic logic measurements fast and easily.

The 308 costs only about $4000, a pretty decent price for a professional-quality logic analyzer alone.

EAVESDROPPING ON MACHINE TALK

It's only a matter of time until the automated office appears: Word processors, computers, copiers and mail systems will be able to communicate with one another. As computer networking grows, computers also will increasingly chatter back and forth. Their "talk" is entirely digital.

So that these conversations are not merely babel, sophisticated communications techniques will be needed. "Data communications" typically involves computers and other equipment, over 50 feet apart, conversing on phone lines.

Data communications is expected to be among the highest-growth segments of electronics in the years ahead.

When a phone-linked system goes blooey, it's hard to know which component is responsible — computer, terminal or what. *They* won't tell — and each manufacturer is likely to blame the other.

The Tektronix 834 data comm tester is a digital product that solves the problem. It is a finger-pointer rather than a repair tool; it tells the computer manager just where and what the difficulty is.

The 834, essentially a serial logic analyzer, looks at individual blocks of digital information moving along the phone line and sees whether each is being correctly sent.

Unlike sophisticated competing instruments, designed for engineers, ours is aimed at a less knowledgeable user. It is portable; competitors' are pretty heavy. It may be used either for automated testing, with a software pack, or manually. It is low cost. It is easy to use. And it is growing in popularity with those who service computers, terminals and the like.

THE UBIQUITOUS OSCILLOSCOPE

Without any razzmatazz or anyone even noticing, sometime last fall (October, we think it was), Tektronix shipped its one-millionth oscilloscope off to somebody or other.

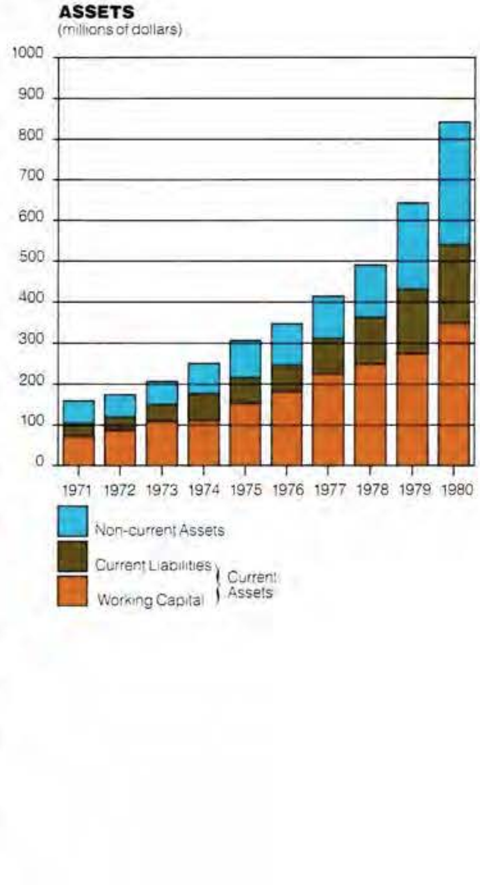
That shipment was no more significant than the one before or the one after. Still, a million of anything is a lot. In high-technology instruments, it's a very large plenty indeed.

Given the long and continuing popularity of the oscilloscope, it's worth recalling that its death knell has been bonged out by "experts" of one kind or another from time to time for maybe two decades now.

The scope is doomed, they let us know, for one or more reasons:

(1) It's too limited in what it can measure. (2) Equipment to be tested will soon contain its own self-diagnostic routines and not need scopes. (3) Special-purpose products will erode the scope's market. (4) Some new black box will come along that will do the scope's job better.

Yet today the oscilloscope remains the most common electronic tool, the instrument of choice for electronics designers. And, for as far ahead as we can see, we expect continued growth in scope sales. It's a very much alive market; witness this year's growing



Left: "Gun" portion of a cathode-ray tube.


SHIFT
RUB OUT
RETURN
BACK SPACE
LF
STEP PROGRAM
AUTO LOAD
MAKE COPY

competition from both US and foreign companies for a piece of it.

Sales of scopes historically track the growth rate of the electronics industry. It remains our major product; we lead the world in its production, and Tek oscilloscopes have set the standard for the industry throughout the globe.

WHERE DID THEY GO WRONG?

The doomsayers were wrong about the scope, just as we expected.

First, they had underrated the great value of an instrument with such broad *general* measurement capability. That breadth of usage has been enhanced and expanded; scopes have employed the latest technology to keep well ahead of the industry's needs for measurement. They have improved in speed and sensitivity, added multiple plug-in modules, on-screen readout and computer power — and incorporated other products; a Tek plug-in oscilloscope can also be a voltmeter, multimeter, logic analyzer, spectrum analyzer. . . .

Second, the critics had overestimated how much self-diagnosis even, say, a computer could do. Diagnostic routines typically point out that some electronic grief exists, and sometimes where. It remains for more sophisticated instruments to analyze what the problem is—and come up with a cure.

Third, the inroads that have been made into scope sales by special-purpose products (some of them built by Tek itself) have been more than made up for by the swelling growth of the electronics industry.

Fourth, the "other technologies" that were to supersede oscilloscopy didn't emerge. From time to time, slicker ways to do some scope functions appeared on the horizon — which is where most of them still remain. Others, like flat-panel displays, which may replace cathode-ray tubes for some purposes, may simply become part of our future oscilloscopes.

As the century wears on, we do expect scope sales to be a smaller *relative* part of our total business — but mostly because of anticipated strong growth of newer product lines, mostly in the digital area. These new products in most cases will add to rather than replace scope capabilities.

As long as there's a need to display waveforms for visual inspection and analysis — and that seems inherent in electronics — the oscilloscope will provide a unique and essential function.

THE SCOPE GOES DIGITAL

Scopes are "smarter" than ever before, and will grow even more computerish. And they must learn to live in the digital world as comfortably as they continue to do in the analog realm.

This year we introduced our first three digital-storage oscilloscopes — more accurately, analog oscilloscopes with digital storage added. One embodies computer technology to an extent never before seen. One is optimized to deal with very small electronic signals. The third is a portable instrument; one of its features is that it's very easy to operate.

The standard oscilloscope storage up to now has been with a storage CRT, which retains the captured waveform on its phosphor screen. Digital storage works differently: The waveform of the electronic event is first digitized—that is, broken down by an A-to-D (analog-to-digital) converter into its individual segments, which are then stored in the scope's digital memory as on-off binary digits, "bits."

In either kind of storage, the phenomenon is the same: The waveform isn't gone after the event it depicts has ceased, but lives on in storage for about as long as you want; there it can be viewed and studied.

Storage scopes of either type enable study not only of single transients (events that happen one time and that's it) but also of very slow phenomena, lasting perhaps several seconds; these events on a conventional scope wouldn't produce a waveform, merely a slowpoking bright dot.

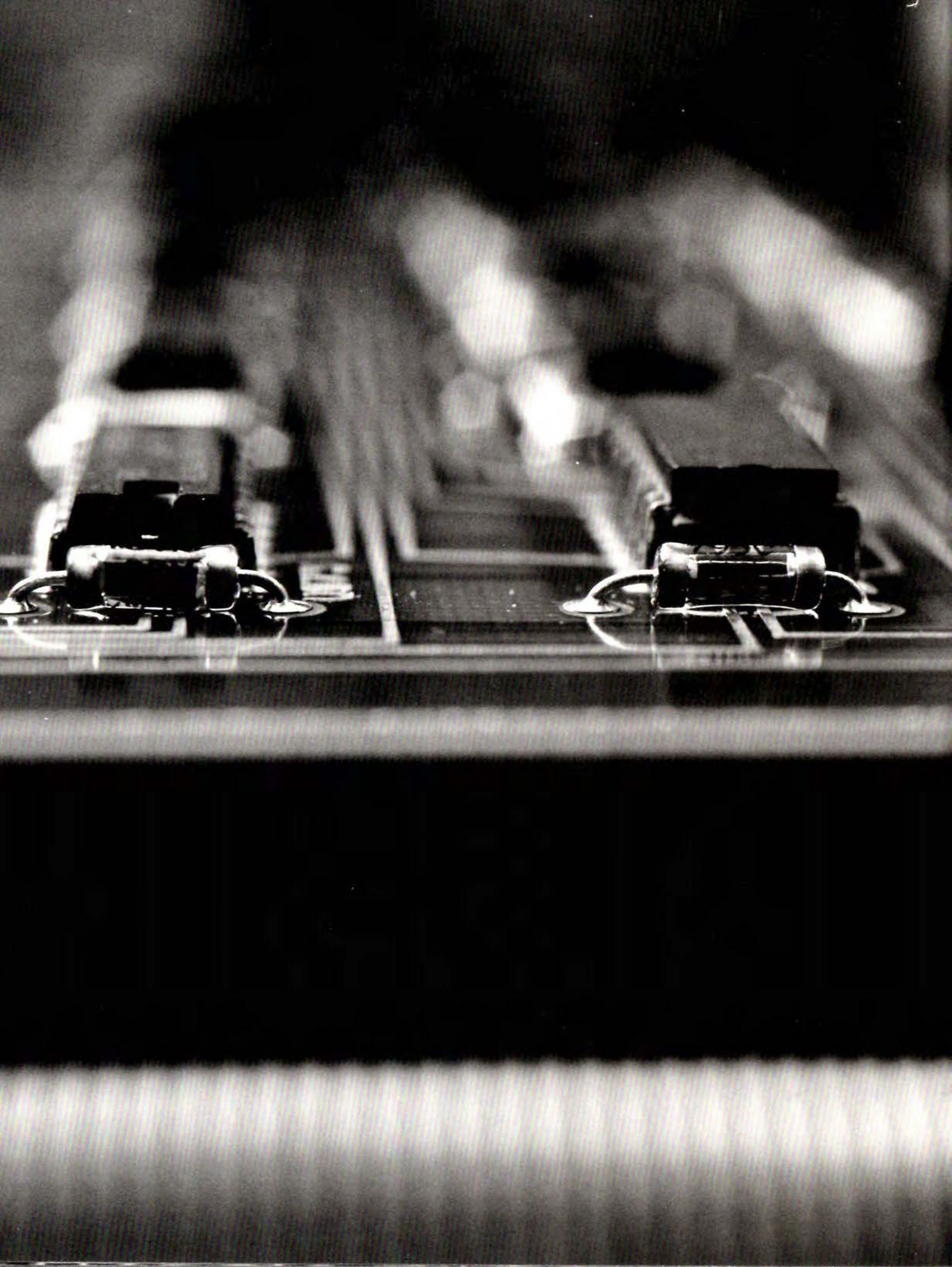
In digital storage, the data in the memory can be read out by the scope circuitry at a fixed rate and reconstructed on the CRT, as a string of dots approximating the waveform. (These dots are connected by a vector generator so the graph is close to an analog display of the same event.)

For the near future, digital storage won't replace CRT storage; the latter is much faster and can thus capture and store high-frequency signals. But digital storage has its advantages also; a main one is the ability it provides, once the digits are stored, to have them processed, or sent on to a plotter or computer. Since what's stored are 1s and 0s, you can do about anything with them that mathematics allows.

• *The 7854,* a state-of-the-art addition to our 7000-series lab scopes, combines computer and scope technology.

Crossbreeding the scope and the computer is something we've been at for years. In 1972 Tek built the world's first computer-linked scope system, the DPO (Digital Processing Oscilloscope). It was, as we then pointed out, an idea ahead of its time—well ahead, anyway, of the existence of optimum digital components.

Left: Keyboard, 4054 desktop computing system. Above: The 4054 in use.



The DPO sandwiched a processor in between the halves of a general-purpose scope, to interact with a powerful minicomputer. It was a precocious product, the first "smart" scope. But it was large; expensive by the time you got all the necessary pieces, and formidable to operate.

It took the development of the 16-bit microprocessor to enable the 7854. "Sixteen-bit" refers here to the μP's "vocabulary," and thus the sophistication possible in its software program.

An eight-bit μP can recognize 256 distinct "words;" that is, there are 256 possible combinations of eight 1s and 0s. In the 16-bit μP, the vocabulary is much more extensive. For instance, 1011011011010111 is one of *65,536* words it can recognize; that's the number of possible ways 16 ones and zeros may be combined.

In terms of measurement resolution, a 16-bit μP is able to resolve one part in 65,536 parts.

The 7854 does just about what the DPO does, and a bit more in some cases. But its "minicomputer" is internal; the 7854 costs a fraction of what the DPO did; it's lighter; and it operates with pushbutton simplicity.

The 7854 can store several waveforms (and words, numbers and symbols related to each) and recall them for display and processing. These manipulations range from very fast simple arithmetic (adding and subtracting waveforms) to complex calculations that otherwise would take up to hundreds of hours.

For instance, it can extract frequency information from a voltage display, or phase information from a spectrum-analyzer display. That's complicated math a conventional scope couldn't do.

Or it can, by rapidly scanning many repetitive waveforms, extract a very small signal from a lot of random noise, since noise eventually averages out to zero. (Typical would be a tiny nerve impulse lost in a maze of biochemical signals within the body.)

Its use may be expanded by combining any four of our 7000-series plug-ins. When in a non-storage mode, the 7854 operates as a high-performance 400MHz general-purpose oscilloscope.

And it's programmable. It can be instructed to automatically run through a lengthy sequence of complex operations; and even to make specific decisions.

• *The 5223* is part of our low-frequency three-plug-in 5000 series of lab scopes. It is aimed at the medical, mechanical, seismic and acoustical fields, which typically are concerned with very small signals: Swelling of the earth; strain in metal, and minute biochemical changes in living bodies — gnat's-eyelash sorts of things.

A valuable feature for medical usage is the "roll" mode, which lets the operator advance the waveform much like a strip chart.

• *The 468* is a high-performance portable scope. In its non-store mode it is identical to the very popular 100MHz Tektronix 465B. At a simple push of a button it becomes a storage scope capable of capturing single-shot events occurring up to 10MHz.

Its uses range from lab work to field servicing. Its bandwidth enables it to test even microprocessor-based products and systems.

Do you need to "educate" customers as to the value of digital storage? Judging from the early order rate of these three products, you do not.

CHOPPING UP WAVEFORMS AND FEEDING THEM TO COMPUTERS

A related, very advanced product is the 7612D. It's the world's first programmable dual-channel waveform-digitizing oscilloscope.

Lest that sound like being the world's smartest 156-pound blond Venezuelan batboy, we should point out that each of the adjectives represents a great deal of technology.

The 7612D counts as an oscilloscope, even though its two CRTs provide no display. It has a specific job: It captures single-shot electrical events, converting them to digits and transferring them to a computer for processing.

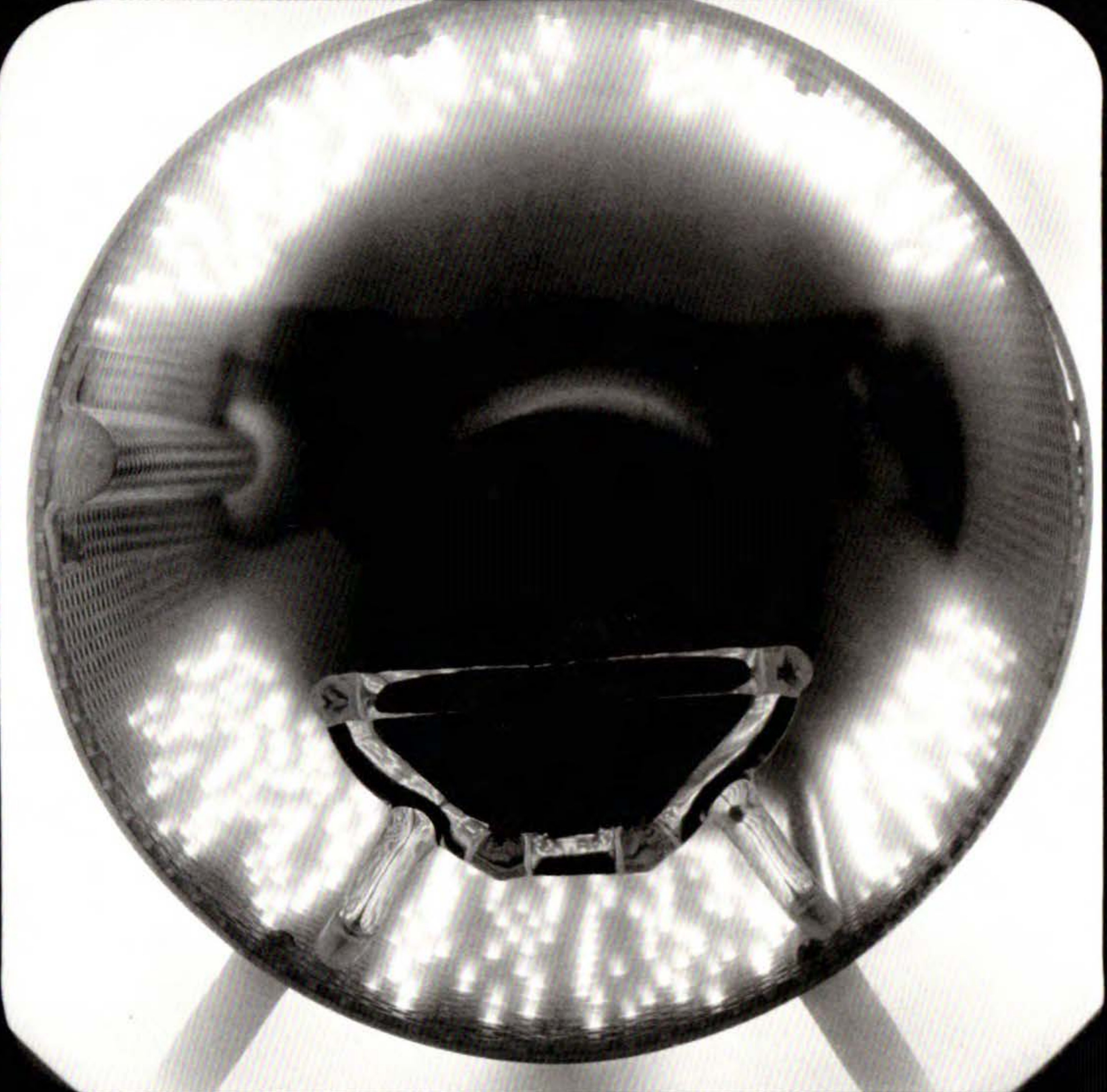
This 200MHz instrument is a companion to our 7912AD, the fastest digitizer on earth, now in wide use in the nuclear industry for fission-related phenomena. The 7612 will be popular there also. But, because of its wider range of performance, it should also attract much the same kind of users as our other 7000-series oscilloscopes; particularly people studying single-shot measurements, such as in laser research and plasma physics.

The 7612D has two cathode-ray tubes, enabling comparative waveform analysis, either of coincident phenomena or of two aspects of the same event.

The CRT arrangement is unique. The tubes are entirely inside the instrument; no external image shows. Also, the electron beam moves only vertically (unlike standard CRTs, whose beam also crosses the screen horizontally.)

The beam is not round in cross-section, as is typical of CRTs; it is flat and wide. It bombards a small Tek-built semiconductor target made of eight adjoining strip diodes, each masked off into binary "off-on" segments.

Left: Circuit board in a Tek automatic video-measurement set. Above: TV product Engineering area.



At each simultaneous strobing of the eight diodes, at a precisely governed clock rate (up to 2048 samples), the CRT reads off an eight-bit "word" representing the voltage at that instant. This data is then sent for processing and analysis, possibly to a Tek 4052 desktop computing system.

Other than for nuclear and a few other fields, the idea of nailing down a waveform and digitizing it for processing is still fairly new. But it's bound to catch on, thanks to advanced instruments such as this.

The 7612D has a GPIB interface. Such instruments (sometimes spoken of as "plug compatible") are designed to tie into a general-purpose interface bus (GPIB). This scheme, agreed on by the electronics industry, enables computers and other equipment to work in networks and automated systems and send information back and forth. All this data must move over a single line, serially; other GPIB lines determine which signals go first and other matters of protocol, to ensure that the conversation is orderly.

The 7612D thus works well in automated measurement systems, such as used in production testing. It is the only fully programmable oscilloscope; every one of its functions can be controlled by software.

Programmability enables the user, once a sequence is set up, to repeat it automatically. It's like the difference between typing a complete memo 50 times and typing it once, then making 50 duplicates of it.

The 7612D has a long memory, enabling study of an event and what came before it or follows it. For example, a spike and its subsequent "ringing" after lightning strikes.

THE GRAPHICS COMPANY

Here on the desk sits a report by an outsider, dated last winter. In its dreary outlook, it's fairly typical of several written this year. These essays forecast a plummet in the sales of Tek information-display products. That dropoff, some of them went on to say, might occur at any moment.

On the same desk is a summary of what actually happened this year in Information Display. Its sales went *up*, not down, and up by a substantial 38 per cent.

The reporters seem to have been unduly morose. Still, they weren't the only ones to express concern. We've been asked a lot of questions this year about our ID activity. The most curiosity surrounds the strength of our direct-view storage-tube (DVST), in the face of products using other display techniques.

The folks with most jitters seem to be those who have just "discovered" the raster-scan tube. A raster tube is what TV sets have used for decades to make their pictures, doing so by continually "refreshing," or rewriting, the screen image. Raster-tube features and fast-dropping cost, some critics warned us, were sure in short order to obsolete the DVST, the heart of many Tek graphics products. A DVST needs to write *its* image only once, then holds it in place on the retentive phosphor of its CRT screen.

To Tek, the revelation that raster-product competitors exist was sort of like pointing out to Jimmy Durante that his nose was big; that is, hardly a surprise to Jimmy.

Matter of fact, we've used the pages of past annual reports to discuss the competitive pros and cons of raster tubes. (What's more, we've built our own high-quality line of raster-based graphics products for years.)

The history of the DVST, over its many years of life, has gone like this: Continually extending its longevity and thus rendering reports of its death, as Mark Twain put it, highly exaggerated.

But it might be well, as the decade moves on, to discuss Tektronix' position in the graphics market, a market in for great expansion.

A MOST COMPETITIVE FIELD

In that regard, you need to be aware of two qualifiers: One, some of the growth will be in market areas Tek has not typically sought out. Two, competition is going to be fierce.

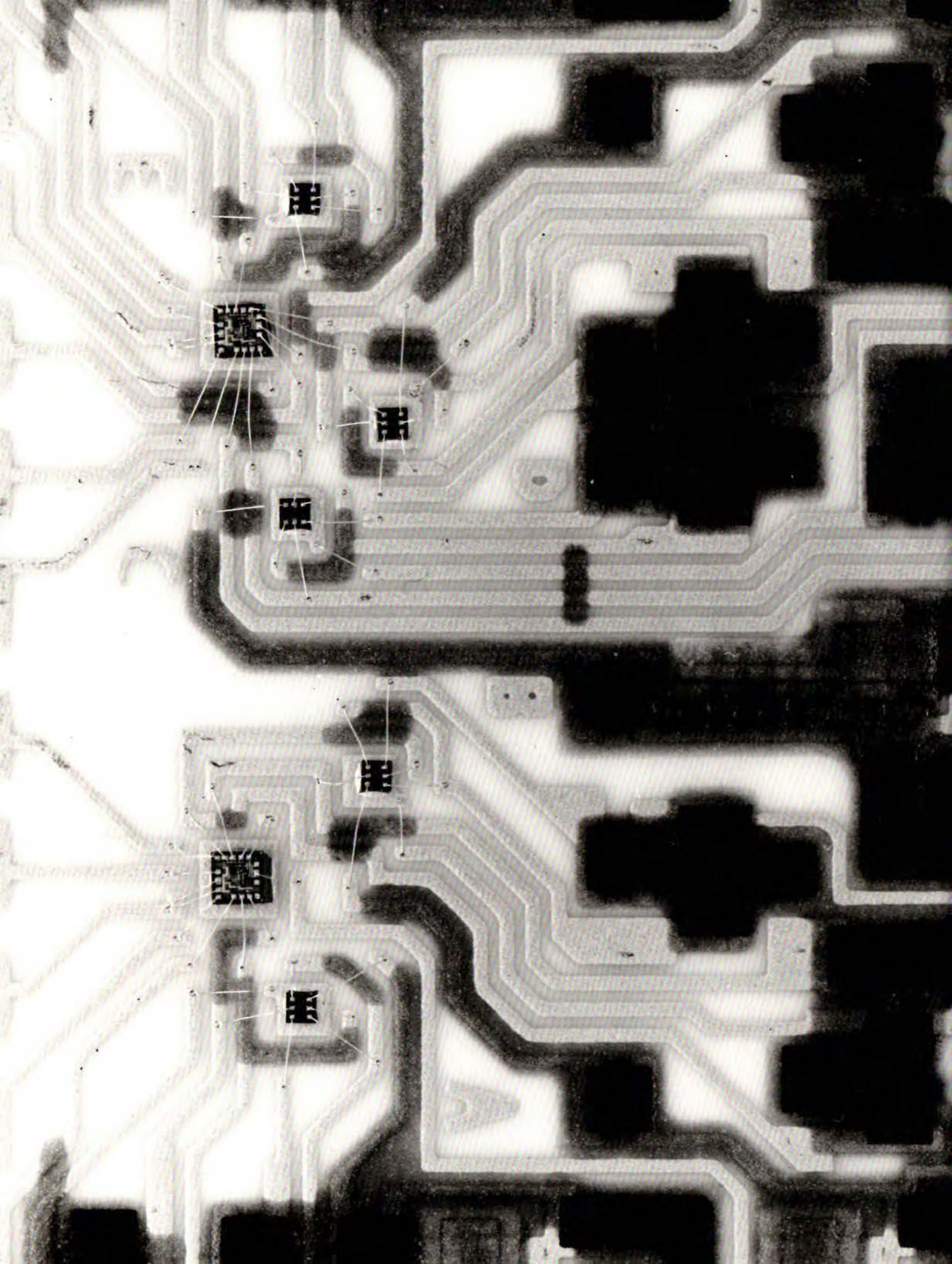
There is to be, we read, an "explosion" (one notch down from a "revolution") in the field of management graphing, as the business world comes to learn what the technical community already knows: A picture can be worth a whale of a lot of words when it comes to making sense of masses of data.

The office environment isn't expected to be a major user of Tek products, since it typically requires far less-sophisticated ones than ours. We expect that market to be a dogfight including U.S. computer companies and strong Japanese challengers.

But competition throughout *all* of graphics will increase. The recent announcement of graphics-product entries from giant computer companies has served to "legitimatize" the market. And it confirms the viewpoint — held at one time by almost no one but Tektronix — that graphics products are important tools. They increase productivity and enhance decision making.

What we foresee is that we will have a somewhat smaller market share, but of an expanded market. In short, con-

Left: Wafer during the integrated-circuit manufacturing process. Above: Exposing the wafer.



tinued growth for Tek graphics products in the years ahead.

And that includes growth in storage-tube product sales. Storage technology is in its robust midlife, far from a doddering old age.

A BROAD, POPULAR PRODUCT LINE

Before reviewing the continuing unique advantages of direct-view storage, we'll point out (maybe obviously) that Tektronix is not a DVST company. We are a graphics company — *the* graphics company, we like to think.

Our non-storage products include successful lines of black-and-white raster-scan terminals and very high-resolution color terminals. New-product development under way is pursuing *all* modes of display.

Other products that contribute in a big way to our profitability include the world's most-popular hard copiers, which make paper duplicates of both storage and video-screen contents; and excellent digital plotters.

Tek software is the standard of the graphics industry; most competing products advertise that they are "PLOT-10 compatible."

We believe no company on earth knows more about CRT display technology than we. (And recall that we've been "in graphics" from the day we introduced our first oscilloscope.)

As world leader in computer graphics — largely responsible for the maturation of that market today — we have a reputation for quality and a solid position. It won't be dislodged by one or two competitive pokes.

PRESSURE FOR PRODUCTIVITY IS DRIVING THIS MARKET

Tek customers in the years ahead will continue to be those in the "high end" of terminal use — engineers and others whose work is inherently graphic, dealing with lines and shapes; scientists; those who analyze data; those who draw maps; and those involved in the rapidly-growing area of computer-aided design (CAD) and manufacture (CAM).

(And, although we don't chase after the office-user segment, many Tek terminals bought for technical environments do double duty as business-management tools also — a "back door" entry into the managerial-graphics market. Also, businesses that need high information density, like banks, are using our products for business managing.)

Most of our customers are technical and manufacturing companies a great deal like ourselves. That gives us an advantage; we know their problems, understand their needs.

What's driving Tektronix' traditional market is the growing pressure for improved productivity. A computer is a major tool in this quest, and graphics an increasingly usable means of seeing what's going on inside one.

We serve our market in two ways: As a supplier of graphic products to other manufacturers, to use as components in their own systems, largely in CAD/CAM; and by providing sophisticated hardware and utility software to customers who own or time-share computer mainframes.

STORAGE: THE EVER-YOUNG TECHNOLOGY

As to why direct-view storage lives on and on:

We may see a shift toward proportionately more sales of our raster-tube products (and combined "refreshed"-and-storage products) and fewer of our storage-tube terminals; but that shift isn't likely to be drastic. The DVST will continue to offer unmatched benefits for users who require very detailed displays, particularly if they also need hard-copy output.

For an old standby, the storage CRT is a charismatic sort of product, continually extending its competitive edge. And not just with retreads, either. Our 4016 terminal, with its huge 25-inch tube, offers a display density that has been termed awesome.

There's nothing like it anywhere. It can present a sharp, stable, nonflickering display of 4096x4096 addressable points. In English, that boils down to 15,394 numbers or letters, or the equivalent amount of fine-line graphics.

For a designer interested in a detail, the difference between a 4016 display and that of a typical raster tube is about like that between a fine pen line and a dull pencil scrawl.

Just as some raster tubes have cut into storage's former cost advantage, so the DVST has added many features hitherto the sole possession of raster: Not color (yet), but dynamic displays and selective erasure.

Where it's needed — and we believe that will be wherever the user would prefer fine-line graphics — the DVST will have a long and useful tenure. It will supplement our growing range of other information-display products — and the additions to it that are still in the mill.

THE HO-HUM MIRACLE

Computers, in some guise or other, are here, there and everywhere. Even so, they've still managed to retain some aura, some mystique. But the same can't be said for television.

Left: IC wafer on a ceramic hybrid circuit. Above: The hybrid circuit then mounted on a printed circuit board.

Today, primitive societies as well as urbane ones take television pretty much for granted. From townhouse to tent—to igloo—the TV set is one of the world's commonest pieces of furniture. Teething infants and rocking oldsters alike find it a familiar companion. And familiarity even breeds contempt; we give the set a whack or boot when the picture isn't just so.

Its universality may easily blind us to the fact that television ranks as one of the century's major technological miracles (if technology hasn't rendered "miracle" a meaningless word by now) — and one of its most potent social forces as well.

THIRD WAVE COMING

Tektronix has grown to become the world's leading supplier of television test instruments; our products serve all the free world's TV systems. As television has gone through successive waves of development, our business has prospered with it. Two such waves have taken place; the third is fast moving over us.

The first "wave" was the arrival of black-and-white television, and its assimilation globally.

The second surge was the advent of color, and *its* dominance world-wide.

The new, third, wave has a different thrust — a great proliferation of distribution channels.

Up to now, most television has been broadcast TV, carried by phone lines and transmitted largely over the air. It was never a tyrannous monopoly or anything like that, but it *was* limiting.

Now, in short order, thanks to improving technology, we can expect a great increase in the number of conduits for TV. That means a truly radical change in who may send or receive what, in what form, and for how much money.

BACKING-UP FORWARD

The airplane wasn't invented just because there were a lot of airports that needed the business. Yet television's latest step forward works something like that.

What's happening is that the number of avenues for disseminating television is growing so very fast that there will be a tremendous pressure to provide programs to *fill* them all.

That will require more programming. Programming means sophisticated equipment. And that equipment will demand more of the kinds of TV test products Tek is the leader in supplying. (That's *existing* types of product; this ignores the impact of newer kinds still to come.)

IT'S EASIER TO USE A SATELLITE THAN IT WAS

It's growing easier and less costly to transmit over, and receive from, satellites. Not only national "superstations" but also local ones in some cities can now afford to build two-way earth stations and use any of the roughly half-dozen existing commercial satellites to send programs to cable-TV viewers. "Receive-only" stations also are coming down in cost.

Introduction of the video disc has extended TV capability in a different direction. These silver-mylar discs look and act much like audio records, but contain video as well as audio information.

Discs will run strong competition against video tape in applications where the user doesn't need to do any recording. The disc contains permanently embedded information, such as a movie, a training program or an advertising message.

Video discs are random-access memories; that is, you can pick out any portion for viewing at the push of a button. On video tapes, you must run through the whole tape serially to find a desired portion.

This random-access capability offers exciting possibilities for education — such as in "branching" learning programs — as well as for industrial and other uses. The day of interactive video is here.

IN-HOUSE USES GROWING FASTEST

Industrial, corporate and educational uses of television have been the strongest growth segment of our strong business year. Dropping prices of both video tape and tape recorders are making TV more cost-competitive with print media for in-house communications programs.

The spread of interactive video will only increase the growth rate: For training, employee information and eventually (if tight energy supplies continue) teleconferencing, moving information rather than people.

CABLE ARRIVES. (THEY MEAN IT THIS TIME)

Cable television, after false-starting for a decade, has apparently "arrived." The premise at first was merely that cable would enhance picture quality. Now the conclusion is that people are willing to pay more for additional programming options.

The computer and TV were obviously made for each other. When the mating finally occurs, home viewers will at last have the long-promised two-way interactive communications system. Your TV will no longer be just an entertainment medium. It may be used to regulate home temperature, guard against burglars, figure bills, laugh at your jokes or aid in many ways in one's self-education.

Teletext is one interesting development. In it, digital information representing written material is transmitted to home TV sets during their "blanking" period — in between the CRT beam's sweeps down and across the screen — and stored in a mass-memory within the set. Then the user may call up the day's front page, or stock quotes; or he/she may (someday) have direct access by cable or phone line to vast computerized libraries representing much of the world's knowledge.

Now, text transmission allows insertion of captions for deaf viewers, or displaying written information during commercials. A related technology enables stereo sound, and presenting television programs in two languages.

TEK'S READY FOR DIGITAL TV

Like the rest of electronics, television is "going digital," but gradually, because of the complexity of digital signals involved. Digital techniques not only allow more flexibility in signal processing, but also enable tape to compete better against 35mm film. It does such things easily as changing picture size or displaying four images at once, effects that are hard to obtain with film. Also, digital signals resist degradation, allowing high-fidelity duplicating of tapes.

Tektronix this year produced the world's first digital test-signal generator, the 1900. It was judged one of the "five most significant" products at this year's National Association of Broadcasters conference.

USERS MAY WALK, NOT RUN TOWARD NEW IDEAS

Of course, nothing happens as fast as technology alone would allow; folks are deliberate, and let new ideas simmer a bit. Nor do increased video options mean radical changes in people's habits. Movie houses still thrive despite TV. And, even in the face of greatly expanded opportunities for self-education, it may be a safe bet that "Dolly and Ninny" will still rank number one in the ratings.

Nevertheless, the explosion in distribution channels will require great growth in programming. There aren't enough old movies to go around. This expansion is bound to be good news for Tektronix.

The years ahead look like exciting ones, ones of solid growth for our TV activities — at Beaverton and at the Grass Valley Group, our California subsidiary; it builds the industry's finest TV switchers and superb special-effects equipment.

THIS SPECTRUM ANALYZER IS SMART AND TOUGH

Television's growth should mean more sales of other Tek products, too. Spectrum analyzers, which allow analysis of complex signals by separating them into their component frequencies, are widely used in TV and throughout the communications field.

The spectrum analyzer market is a big one, shared by a few major manufacturers. In the portable segment, a small but growing part of the market, Tektronix leads. We will increase that gap with our 492P, just out.

The new product is the world's only programmable portable spectrum analyzer; it has a GPIB interface so it may co-operate with other instruments in automated spectrum analysis.

It's also built to hold up and work well in hostile environments and rough handling. This product is expected to take a large share of the military market. Its portability will make it popular also with other users who need to tote it around without wheezing, from engineering to production locations.

Programmability is of great value when you want to make a lot of measurements very fast. It lets the machine spend hours (or even several days) data-logging — running through many thousands of measurements that would be wasteful of human time. The instrument won't get bored, either, and make careless mistakes.

The 492P has another nice feature: It can connect with a Tektronix hard copier, and produce a paper copy of the CRT screen contents.

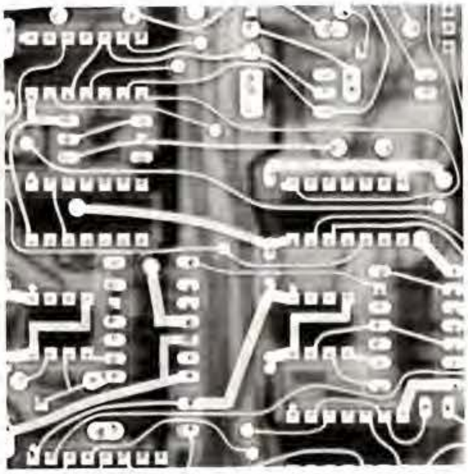
The 492P is an easy instrument to operate despite its advanced features. Outside the military, it should find wide use in communications-equipment manufacture and checkout, in radiation testing and throughout the broad range of other spectrum-analyzer applications.

NOW WHAT?

Ads that announce "New Improved Flavor" can backfire. They might suggest the product used to taste like blotters. Similarly, discussing our plans to improve may imply some amount of self-criticism. And, in that we're never really satisfied, that's correct.

Anyway:

There's a lot of work to be done. We must become better than we are. Not so much because the year ahead looks to be leaner (it does) but because our long-range prospects are very good.



Left: Chemical bath for integrated circuitry. Above: Section of printed circuit board.

The coming year *is* going to be difficult. Major US industries have already felt the juggernaut of recession. As its effects percolate through the economy and reach our segment, we expect some softening of orders. On the other hand, pressures for high costs will continue.

Tek has never faced greater opportunities than in the years ahead. But they'll demand everything we have — plus some things that at the moment we may not.

The new year threatens rough economic seas; they'll require a tight ship. And we'll have that: More-seasoned employees, farther along the learning curve, more productive.

Productivity must increase. And, when it has, it must increase again. Quality must improve — continually. That's what our corporate motto means when it says "Committed to Excellence."

Electronic technology, particularly digital, is changing radically, at least in the speed with which it goes about it. Corporate evolution can't be as leisurely as it once was; the world won't wait. So that our company will be super-responsive to the markets it serves, we'll work this year to bring some of our larger, centralized functions under more-direct influence of our product groups.

WE'RE IN A STRONG POSITION

Today's technological trends are expected to accelerate: More and "smarter" product performance in smaller packages for less money. New markets; and more-intense competition for them, from West *and* East.

Tektronix is strongly positioned.

Our solid base is oscilloscopy. Its sales will continue to grow. Our new digital models — storage scopes and waveform digitizers — are at the very front edge of technology. Microcomputational power will be imbedded farther and farther "down" our scope product line.

The digital-logic domain is stealing the headlines. But don't sell analog products short; visual displays offer a lasting, and a unique, value. (Is it really important, for example, to see the waveform? Well, consider how lost we can feel when in the dark; yet "all we're lacking" is sight.)

Tektronix has made a firm commitment to serve the fast-growing logic area — not only with digital versions of our traditional products but also with *new* kinds: Microprocessor development labs, and logic and data-communications analyzers. These are but the iceberg-cap of our digital-product development.

Telecommunications also are expected to have fast expansion. That's good news to us, being a strong competitor there.

In graphics, new raster-scan displays (in color and black-and-white) will increasingly supplement direct-view storage products. Yet DVST remains a prominent part of our future. Storage offers unequalled high-resolution displays.

Automated design looms as a major growth market for our logic products, computing systems, graphic terminals — and general instrumentation.

DESIGN MUST "AUTOMATE"

The rallying-cry of US industry in the '80s may well be "productivity" — including that of product designers. Software design is in dire straits; slow, laborious, it is the main retardant to product innovation today. Software programmers working in 1-and-0 "machine language" are still at the primitive stage, using the intellectual equivalent of picks and shovels. Either this process gets "automated," an engineer suggests, or the number of software people needed will exceed the population of India.

If software experts are not the new priesthood, at least they are critical to our future—and in great demand. We'll have to scramble to get our share; there just won't be enough to go around. We keep close contact with the computer-science gurus, and intend to attract some of their more-promising disciples. And Tek's own analog circuitry engineers are pretty versatile, too; many of *them* have learned to talk Digital like a native.

Our work is certainly cut out for us. But remember: our competitors must do these things, too. To that contest we'll bring formidable resources:

The allegiance of excellent employees; sound strategic planning and product management; a leadership position; a modern physical plant; technological virtuosity; a strong sales and service organization; land to expand onto, and the ability to finance that growth; outstanding technical and business-unit managers; and a long history of innovative behavior.

All of which doesn't *guarantee* success, of course. But we recall something Damon Runyon said:

The race is not always to the swift, nor the battle to the strong. But that's the way to bet.

Above: Integrated-circuit laboratory.

Tektronix
COMMITTED TO EXCELLENCE

CORPORATE HEADQUARTERS:
Beaverton, Oregon

MANUFACTURING:
Beaverton, Oregon
Portland, Oregon
Vancouver, Washington
Wilsonville, Oregon

United States Sales and Service:

Albany, NY
Albuquerque, NM
Atlanta, GA
Baltimore, MD
Boston, MA
Chicago, IL
Cleveland, OH
Concord, CA
Dallas, TX
Dayton, OH
Denver, CO
Detroit, MI
Fort Lauderdale, FL
Newport News, VA
Houston, TX
Huntsville, AL
Indianapolis, IN
Irvine, CA
Kansas City, KS
Knoxville, TN
Long Island, NY
Los Angeles, CA
Milford, CT
New Orleans, LA
Oklahoma City, OK
Orlando, FL
Pensacola, FL
Philadelphia, PA
Phoenix, AR
Pittsburgh, PA
Portland, OR
Poughkeepsie, NY
Raleigh, NC
Rochester, NY
Rockville, MD
St. Louis, MO
St. Paul, MN
Salt Lake City, UT
San Antonio, TX
San Diego, CA
Santa Clara, CA
Seattle, WA
Syracuse, NY
Woodbridge, NJ

The Grass Valley Group, Inc.

HEADQUARTERS AND MANUFACTURING:
Grass Valley, California

Arden Hills, MN
Atlanta, GA
Dallas, TX
Elkhart, IN
Great Neck, NY
Woodland Hills, CA

AMERICAS-PACIFIC OPERATIONS:
Tektronix, Inc.
Beaverton, Oregon

EUROPEAN OPERATIONS:
Tektronix Limited
Guernsey, Channel Islands
Tektronix International, Inc.
Amstelveen, The Netherlands

MANUFACTURING:
*Sony/Tektronix Corporation
Tokyo and Gotemba, Japan
Tektronix Guernsey Limited
Guernsey, Channel Islands
Tektronix Holland N.V.
Heerenveen, The Netherlands
Tektronix U.K. Limited
London and Hoddesden, United Kingdom

*Joint Venture Companies

International Sales and Service:

Australia—Tektronix Australia Pty. Limited, Sydney, Adelaide, Brisbane, Canberra, Melbourne and Perth

Austria—*Rohde & Schwarz-Tektronix Ges.mbH, Vienna

Belgium—Tektronix S.A., Brussels

Brazil—Tektronix Indústria e Comércio Ltda., Sao Paulo and Rio de Janeiro

Canada—Tektronix Canada Inc., Toronto (Barrie), Calgary, Dartmouth, Edmonton, Montreal, Ottawa, Vancouver and Winnipeg

Denmark—Tektronix A/S, Copenhagen

Finland—Tektronix Oy, Helsinki

France—Tektronix, Paris, Aix-en-Provence, Lyon, Nanterre, Rennes, Strasbourg and Toulouse

Italy—Tektronix S.p.A., Milan, Rome and Turin

Japan—*Sony/Tektronix Corporation, Tokyo, Fukuoka, Nagoya and Osaka

Mexico—*Tektronix S.A. de C.V., Mexico City

Norway—Tektronix Norge A/S, Oslo

Ireland—Tektronix U.K. Ltd., Dublin

Spain—Tektronix Espanola S.A., Madrid and Barcelona

Sweden—Tektronix A.B., Gothenburg and Stockholm

Switzerland—Tektronix International A.G., Zug and Geneva

The Netherlands—Tektronix Holland N.V., Badhoevedorp

United Kingdom—Tektronix U.K. Ltd., Harpenden, Livingston, Maidenhead and Manchester

MANAGEMENT'S DISCUSSION AND ANALYSIS OF STATEMENT OF CONSOLIDATED INCOME

The tables below set forth the increase (or decrease) in certain items of the Company's Statement of Consolidated Income and Reinvested Earnings for the periods indicated and the ratios of those items to net sales. The following discussion should be read in connection with the information in the tables and the Company's Statement of Consolidated Income and Reinvested Earnings and accompanying notes.

Increase (or Decrease) As Compared to Prior Fiscal Year (amounts in thousands)					Ratio to Net Sales		
1979 (52 weeks)		1980 (53 weeks)			1978	1979	1980
Amount	%	Amount	%		%	%	%
$188,050	31.4	$184,370	23.4	Net Sales	100.0	100.0	100.0
143,611	31.0	115,265	19.0	Test and measurement sales(1)	77.3	77.1	74.3
44,439	32.7	69,105	38.4	Information display sales(1)	22.7	22.9	25.7
93,266	35.0	98,724	27.4	Cost of sales	44.5	45.7	47.2
10,729	21.5	17,236	28.5	Engineering expense	8.3	7.7	8.0
26,611	30.6	21,944	19.3	Selling expense	14.5	14.4	13.9
14,981	28.2	20,299	29.8	Administrative expense	8.9	8.6	9.1
15,154	31.2	(234)	(0.4)	Profit sharing	8.1	8.1	6.5
2,182	51.4	9,528	148.2	Interest expense	0.7	0.8	1.6
5,563	91.7	(6,602)	(56.8)	Non-operating income	1.0	1.5	0.5
30,690	32.0	10,271	8.1	Income before income taxes	16.0	16.1	14.1
20,305	35.7	7,921	10.3	Earnings	9.5	9.8	8.8

(1) Sales contributions by the test and measurement and information display product lines for 1978 and 1979 fiscal years are restated to reflect a 1980 shift of certain products from the test and measurement line to the information display line.

1980 compared to 1979

The comparison of the fiscal year ended May 31, 1980 with the fiscal year ended May 26, 1979 is affected somewhat by the difference of one additional week in the length of the 1980 fiscal year.

The increase in net sales for 1980 reflects primarily increased unit sales of both test and measurement and information display products and the effect of price increases. Sales increases occurred in both domestic and international markets, with domestic sales increasing by 21.5 percent and international sales increasing by 26.6 percent. Sales of the Company's test and measurement product line increased by 19.0 percent. Information display product line sales increased by 38.4 percent, reflecting a general increase in product demand.

Cost of sales increased by 27.4 percent for 1980, primarily as a function of higher sales levels, the effects of higher cost of materials, labor, supplies and services, increased indirect labor and added costs associated with product yield problems for certain manufactured components. Cost of sales increased as a percentage of net sales from 45.7 percent in 1979 to 47.2 percent in 1980.

The engineering expense increase reflects the Company's continuing program for the development of new products as well as inflation. Increases in selling and administrative expenses reflect primarily increases in levels of business activity. Although selling expenses increased at a slower rate than net sales, administrative expenses increased more than the growth in business levels, reflecting both inflationary pressures and increased expenses primarily associated with facilities expansion programs and additions to manufacturing and administrative support systems. The lower selling expense ratio for 1980 reflects primarily slower growth in spending levels in the fourth quarter for certain expense categories.

The Company pays cash and retirement profit share based on the income of participating companies before taxes, profit sharing, executive incentive compensation and charitable contributions. Profit sharing expense also includes executive incentive compensation. Profit sharing expense decreased slightly for the 1980 fiscal year, primarily because of a lower accrual in 1980 for executive incentive compensation.

Interest expense increased by 148.2 percent, reflecting principally increased utilization of borrowed funds and, to a lesser extent, higher interest rates.

Non-operating income includes primarily interest income, the Company's equity in the earnings of non-consolidated affiliates, foreign currency gains and losses and charitable contribution expense. Non-operating income declined by 56.8 percent, reflecting principally the receipt during the 1979 fiscal year of approximately $4.5 million in satisfaction of a patent infringement judgment against the United States Government. The decline also reflects a reduction in the Company's share of earnings in dollars of Sony/Tektronix Corporation, a 50%-owned, non-consolidated affiliate, attributable to foreign currency exchange rate fluctuations.

Expenses for maintenance and repairs increased 40.2 percent in fiscal year 1980 over the prior year, reflecting primarily additions of personnel and other cost increases associated with the maintenance of the Company's expanded facilities, both owned and leased. Depreciation and amortization expense for property and equipment increased 42.5 percent for the same period, reflecting primarily additions to fixed assets and the resulting effects of accelerated depreciation. Payroll tax expense increased 33.4 percent in fiscal year 1980 reflecting higher tax rates and higher levels of wages subject to tax for certain payroll taxes, increases in wage levels and increases in the Company's work force. Rental expense increased 50.3 percent for the same period as additional space was rented to accommodate the Company's expanded facilities needs.

The 10.3 percent increase in earnings reflects the increase in net sales reduced by the higher cost of sales, the increase in interest expense and the reduction in non-operating income, discussed above. Earnings were also affected by a lower effective tax rate for 1980 for income taxes (37.9 percent, compared with 39.1 percent for the prior year). The reduction in the tax rate is attributable to additional investment tax credits available to the Company, a reduction in the provision for United Kingdom income taxes resulting from a change in United Kingdom tax law and an increase in the percentage of earnings taxed at rates lower than those applicable to United States earnings. The effective tax rate was also influenced by a lower statutory rate for United States income taxes.

1979 compared to 1978

The increase in net sales for 1979 over 1978 reflected primarily increased unit sales of both test and measurement and information display products. To a lesser extent, price increases also contributed to increases in net sales. Sales increases occurred in both domestic and international markets, with domestic sales increasing by 27.7 percent and international sales increasing by 37.8 percent. Sales of the Company's test and measurement product line increased by 31.0 percent, while those of the information display product line increased by 32.7 percent.

Cost of sales increased by 35.0 percent for 1979, primarily as a function of higher sales levels. Cost of sales also increased as a percentage of net sales from 44.5 percent to 45.7 percent. This increase in the ratio of cost of sales to net sales was attributable primarily to expenses associated with expanding the rate of production, including the hiring and training of new manufacturing personnel, which began in the 1978 fiscal year and continued into the early part of the 1979 fiscal year. Inflationary pressures on both wage and materials costs also contributed to the increase in the ratio of cost of sales to net sales in the 1979 fiscal year.

Increases in selling, administrative and engineering expenses for 1979 resulted primarily from the same factors which occurred during the 1980 fiscal year.

Profit sharing expense increased for the 1979 fiscal year primarily as a function of the increases in operating income before taxes, profit sharing, executive incentive compensation and charitable contributions. The increase was also attributable, to a lesser extent, to employee participation through profit sharing in the patent infringement recovery mentioned in the discussion above of non-operating income for 1980.

The interest expense increase for the 1979 fiscal year resulted principally from an increase in the utilization of borrowed funds.

Non-operating income for 1979 increased principally as the result of receipt by the Company during the period of the patent infringement recovery mentioned in the discussion above of non-operating income for 1980.

Effective tax rates for 1978 and 1979 were 40.8 percent and 39.1 percent, respectively. The reduction in the tax rate for 1979 was primarily attributable to the same factors (other than the reduction in the provision for United Kingdom income taxes) which occurred during the 1980 fiscal year.

Expenses for maintenance and repairs increased 47.5 percent in fiscal year 1979 over the prior year, reflecting primarily additions to personnel and other cost increases associated with the maintenance of the Company's expanded facilities, both owned and leased. Depreciation and amortization expense for property and equipment increased 39.0 percent for the same period, reflecting primarily additions to fixed assets. Increases in payroll tax expense reflected higher payroll tax rates and wage levels, increases in the Company's work force and taxes paid on increases in profit share. Rental expense increased 43.9 percent in fiscal year 1979 as additional space was rented to accommodate the Company's expanded facilities needs.

The earnings increase for 1979 reflected primarily the increase in net sales and, to a lesser extent, the increase in non-operating income and the decrease in the effective tax rate, as discussed above.

AUDITORS' OPINION

To the Shareowners of Tektronix, Inc.:

We have examined the statements of consolidated financial position of Tektronix, Inc. and subsidiaries as of May 31, 1980, May 26, 1979, May 27, 1978, May 28, 1977 and May 29, 1976, and the related statements of consolidated income and reinvested earnings and of consolidated changes in financial position for each of the five years in the period ended May 31, 1980. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying statements present fairly the financial position of the companies at May 31, 1980, May 26, 1979, May 27, 1978, May 28, 1977 and May 29, 1976, and the results of their operations and the changes in their financial position for each of the five years in the period ended May 31, 1980, in conformity with generally accepted accounting principles applied on a consistent basis.

Deloitte Haskins + Sells

Portland, Oregon
July 22, 1980

Tektronix Consolidated Financial Position in thousands

1976	1977	1978	1979	1980	
$248,347	**$310,245**	**$357,704**	**$428,787**	**$540,917**	**CURRENT ASSETS** are cash and assets that should be converted to cash or used in operations within one year
70,451	94,954	66,208	41,788	57,145	CASH AND CASH EARNING INTEREST—bank deposits and short-term securities
70,138	87,292	115,100	153,568	198,069	ACCOUNTS RECEIVABLE — due from customers after an allowance for doubtful accounts
99,145	118,423	163,523	214,533	263,563	INVENTORIES—materials, accumulated manufacturing costs and finished products awaiting sale
8,613	9,576	12,873	18,898	22,140	PREPAID EXPENSES— supplies and services that have not been used, and deposits that will be refunded
60,540	**84,277**	**107,556**	**153,135**	**193,831**	**CURRENT LIABILITIES** are obligations that are to be paid within one year
3,055	5,382	10,351	28,997	45,809	SHORT-TERM DEBT—funds borrowed for less than one year and that portion of long-term debt repayable within a year
17,776	24,087	33,108	42,033	49,034	ACCOUNTS PAYABLE—owed for materials, services, interest, miscellaneous taxes and dividends declared
13,565	19,645	18,458	20,444	27,404	INCOME TAXES — payable to United States and foreign governments
26,144	35,163	45,639	61,661	71,584	ACCRUED COMPENSATION — payable to employees, their incentive and retirement plans, and for related taxes
187,807	**225,968**	**250,148**	**275,652**	**347,086**	**WORKING CAPITAL** is the current assets in excess of the current liabilities
88,563	95,375	119,533	194,454	276,771	FACILITIES—the cost of buildings and equipment, reduced by depreciation, and land
75,114	74,574	83,598	102,976	163,598	BUILDINGS — the cost of structures, parking, landscaping and improvements to leased premises
71,091	83,461	102,122	142,257	193,514	MACHINERY AND FURNISHINGS—the cost of equipment and furniture used or rented to customers
(66,682)	(73,852)	(85,160)	(100,977)	(125,990)	ACCUMULATED DEPRECIATION—for the use, wear and aging of buildings, machinery and furnishings
3,124	4,697	12,462	41,958	30,125	CONSTRUCTION — the accumulated costs for facilities not completed
5,916	6,495	6,511	8,240	15,524	LAND—the cost when acquired
7,950	9,708	13,893	19,666	24,005	OTHER LONG-TERM ASSETS — the equity in joint ventures, accounts receivable not due within a year, and intangibles
38,601	39,783	37,086	62,094	136,196	LONG-TERM DEBT—funds borrowed for more than one year, less that portion due within a year
13,716	14,103	16,029	19,150	23,974	DEFERRED TAX LIABILITY — income taxes which have not become payable
—	3,043	3,763	5,728	4,354	OTHER LONG-TERM LIABILITIES—incentive compensation not payable within one year
232,003	**274,122**	**326,696**	**402,800**	**483,338**	**SHAREOWNERS' EQUITY** is the book value owned by the shareowners
15,696	17,903	24,332	31,950	41,844	COMMON SHARES—the proceeds of shares sold less the cost of shares repurchased
216,307	256,219	302,364	370,850	441,494	REINVESTED EARNINGS — accumulated earnings that have been reinvested in the business

The accompanying notes are an integral part of these financial statements.

Tektronix Consolidated Income And Reinvested Earnings in thousands

1976	1977	1978	1979	1980	
$366,645	**$454,958**	**$598,886**	**$786,936**	**$971,306**	**NET SALES** and rentals to customers and distributors for products, replacement components and services
169,275	196,055	266,474	359,740	458,464	COST OF SALES—the materials, labor and facilities expense related to manufacturing goods and providing services
197,370	**258,903**	**332,412**	**427,196**	**512,842**	**GROSS PROFIT** remaining from sales revenue after production costs
29,704	38,657	49,832	60,561	77,797	ENGINEERING EXPENSE — for research and the development of products and components
51,675	64,045	86,850	113,461	135,405	SELLING EXPENSE — for sales and marketing programs, and the distribution system
31,666	40,290	53,063	68,044	88,343	ADMINISTRATIVE EXPENSE — for general management and supporting services
26,533	39,339	48,528	63,682	63,448	PROFIT SHARING — the incentive portion of employee compensation
57,792	**76,572**	**94,139**	**121,448**	**147,849**	**OPERATING INCOME** remaining from sales revenue after the costs and expenses of operations
4,757	4,129	4,246	6,428	15,956	INTEREST EXPENSE — the cost of borrowed funds and banking services
2,204	3,303	6,068	11,631	5,029	NON-OPERATING INCOME — interest income, joint venture earnings, currencies, and other income and expense
55,239	**75,746**	**95,961**	**126,651**	**136,922**	**INCOME BEFORE TAXES** remaining from sales revenue after operating costs and expenses and non-operating items
25,150	31,775	39,115	49,500	51,850	INCOME TAXES — provision for income related taxes levied by United States and foreign governments
30,089	**43,971**	**56,846**	**77,151**	**85,072**	**EARNINGS** remaining from sales revenue for reinvestment in the business and for dividends
188,375	216,307	256,219	302,364	370,850	REINVESTED EARNINGS — from prior fiscal years
(2,107)	(3,971)	(10,701)	(8,665)	(14,428)	DIVIDENDS — declared for payment to the shareowners
(50)	(88)	—	—	—	OTHER — adjustments to reinvested earnings
216,307	**256,219**	**302,364**	**370,850**	**441,494**	**REINVESTED EARNINGS** at the close of the fiscal year
17,547	17,628	17,808	18,031	18,264	COMMON SHARES — the weighted average number of shares outstanding during the year
$1.71	**$2.49**	**$3.19**	**$4.28**	**$4.66**	**EARNINGS PER SHARE** — the earnings allocated to each of the weighted average common shares outstanding
.12	.22½	.60	.48	.79	DIVIDENDS DECLARED PER SHARE — accrued for payment
.12	.22½	.48	.60	.79	DIVIDENDS PAID PER SHARE — received by the shareowners

The accompanying notes are an integral part of these financial statements.

Tektronix Consolidated Changes in Financial Position in thousands

1976	1977	1978	1979	1980	
$ 43,637	**$ 55,402**	**$ 69,879**	**$ 96,385**	**$117,472**	**WORKING CAPITAL PROVIDED** from operations
30,089	43,971	56,846	77,151	85,072	EARNINGS—the primary source of working capital
11,635	12,781	15,294	21,258	30,303	DEPRECIATION—non-cash charge to income for facilities
(966)	(1,738)	(4,187)	(5,145)	(2,727)	JOINT VENTURE EARNINGS—reduced by their dividends
2,879	388	1,926	3,121	4,824	DEFERRED INCOME TAXES—payable sometime in the future
14,178	**9,481**	**9,396**	**39,258**	**89,192**	**WORKING CAPITAL PROVIDED** from other sources
11,307	1,759	—	28,096	77,604	LONG-TERM DEBT—new borrowings
1,700	2,118	6,429	7,618	9,894	COMMON SHARES—sold to employees
1,171	5,604	2,967	3,544	1,694	OTHER—miscellaneous sources and uses
23,460	**26,722**	**55,095**	**110,139**	**135,230**	**WORKING CAPITAL USED** for
18,812	22,174	41,697	100,351	115,926	FACILITIES—additions of buildings, machinery and furnishings
2,541	577	2,697	1,123	4,876	LONG-TERM DEBT—due for payment within one year
2,107	3,971	10,701	8,665	14,428	DIVIDENDS—declared for payment to shareowners
34,355	**38,161**	**24,180**	**25,504**	**71,434**	**WORKING CAPITAL INCREASE OR (DECREASE)** was made up of changes in
34,179	24,502	(28,746)	(24,420)	15,357	CASH AND CASH EARNING INTEREST
8,869	17,154	27,808	38,468	44,501	ACCOUNTS RECEIVABLE
(9,748)	19,277	45,100	51,010	49,030	INVENTORIES
(2,027)	964	3,297	6,025	3,242	PREPAID EXPENSES
9,694	(2,327)	(4,969)	(18,646)	(16,812)	SHORT-TERM DEBT
(2,271)	(6,311)	(9,021)	(8,925)	(7,001)	ACCOUNTS PAYABLE
(816)	(6,079)	1,187	(1,986)	(6,960)	INCOME TAXES PAYABLE
(3,525)	(9,019)	(10,476)	(16,022)	(9,923)	ACCRUED COMPENSATION
153,452	**187,807**	**225,968**	**250,148**	**275,652**	**WORKING CAPITAL** from the prior fiscal year and the working capital increase above results in
187,807	**225,968**	**250,148**	**275,652**	**347,086**	**WORKING CAPITAL** at the close of the fiscal year

The accompanying notes are an integral part of these financial statements.

Tektronix Consolidated Notes to Financial Statements

ACCOUNTING POLICIES

Principles of Consolidation — The consolidated financial statements include the accounts of Tektronix, Inc. and its wholly owned subsidiaries since dates of organization or acquisition. All material intercompany transactions and balances have been eliminated.

Joint Venture Companies—Investments in joint venture companies, where the Company holds fifty percent or less of the share capital, are stated at cost, plus the Company's equity in their reinvested earnings. All material intercompany profits have been eliminated.

Foreign Currencies — Foreign subsidiary monetary assets and liabilities, as well as any foreign currency exchange contracts, are translated into United States dollars at year-end rates of exchange. Inventories, facilities and related depreciation, and other non-monetary assets are translated at exchange rates prevailing at the time the assets were acquired. Income and expenses, other than cost of sales and depreciation where historical rates are used, are translated at rates prevailing at the beginning of each accounting period. Translation and exchange gains and losses are included in non-operating income.

Inventories—Parent company inventories are stated at the lower of market or cost, with cost determined on the last-in, first-out basis (LIFO). Subsidiary inventories are stated at the lower of market or cost on the first-in, first-out basis (FIFO).

Facilities and Depreciation—Facilities are stated at cost. Accelerated methods of depreciation are generally used both for financial accounting and tax reporting based on estimated useful lives of the facilities which vary from 10 to 48 years for buildings and 3 to 15 years for machinery and furnishings. Leasehold improvements and capitalized leases are amortized on a straight-line basis over the lease term.

Engineering Expense — Expenditures for research, development and engineering of products and manufacturing processes are expensed as incurred.

Pension Expense—The unfunded actuarial liabilities are amortized by the declining balance method over twenty years.

Income Taxes—Investment tax credits are accounted for by the "flow-through" method, which recognizes the reduction in income tax in the year the related facility is placed in service. Tax deferral resulting from Domestic International Sales Corporation subsidiaries is recognized in the provision for income taxes and included in the deferred tax liability.

Per Share Amounts—The earnings per share are based on the weighted average number of shares outstanding during the fiscal year. Common shares, earnings per share and dividends per share are adjusted to reflect a two-for-one share split in May 1977.

Fiscal Year—The Company's fiscal year is the 52 or 53 weeks ending the last Saturday in May. The 52 week years are comprised of 13 four-week accounting periods separated into two 12 week quarters ending during August and November, a 16 week quarter ending during March, and a 12 week quarter ending during May. A 53 week year results in a five-week accounting period and a 13 week quarter at the beginning of the fiscal year. 1980 was a 53 week fiscal year.

FOREIGN SUBSIDIARIES

The Company has 17 foreign operating subsidiaries located in Australia, Belgium, Brazil, Canada, Denmark, Finland, France, Guernsey, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and United Kingdom with a branch in Ireland. The earnings, assets and liabilities of these subsidiaries are included in the consolidated financial statements in these amounts (in thousands):

1976	1977	1978	1979	1980	
$ 7,946	$13,408	$ 16,714	$ 22,853	$ 29,882	Earnings
75,517	88,256	106,098	141,446	169,051	Current assets
15,275	21,685	32,105	39,090	55,483	Current liabilities
12,683	13,273	15,337	18,585	22,185	Facilities less depreciation
584	503	889	1,118	907	Other long-term assets
3,666	4,832	2,222	6,732	7,857	Long-term liabilities

INVENTORIES

The consolidated inventories at year-end consisted of (in thousands):

1976	1977	1978	1979	1980	
$21,977	$ 27,078	$ 32,609	$ 43,989	$ 62,197	Purchased materials
52,044	66,011	96,504	128,926	169,706	Work-in-process
35,534	36,117	46,977	66,567	81,388	Finished goods
(10,410)	(10,783)	(12,567)	(24,949)	(49,728)	LIFO reserve
$99,145	$118,423	$163,523	$214,533	$263,563	Total inventories

SHORT-TERM DEBT

The Company has short-term lines of credit with United States and foreign banks which aggregated $169 million at May 31, 1980 of which approximately $151 million was unused. These lines are fee compensated and the charges are not significant.

The Company began issuing commercial paper in May 1979 and was authorized to issue up to $200 million as of May 31, 1980.

The short-term borrowing summary is (in thousands):

1976	1977	1978	1979	1980	
					Bank Borrowings
					At year-end:
$ 2,517	$4,708	$ 9,352	$17,900	$17,457	Outstanding
10.4%	11.0%	9.8%	11.1%	16.2%	Average interest rate
					At accounting period-end:
$ 7,586	$4,269	$ 6,941	$13,072	$17,541	Average outstanding
10.3%	9.9%	9.2%	10.0%	13.0%	Average interest rate
$14,535	$5,400	$10,494	$20,415	$24,981	Maximum outstanding
					Commercial Paper Borrowing
					At year-end:
			$10,000	$27,700	Outstanding
			10.0%	11.4%	Average interest rate
					At accounting period-end:
			$ 714	$49,763	Average outstanding
			10.0%	15.2%	Average interest rate
			$10,000	$83,100	Maximum outstanding

LONG-TERM DEBT

Consolidated long-term indebtedness at year-end consisted of (in thousands):

1976	1977	1978	1979	1980		
				$75,000	(A)	11% Notes due July 15, 1990
				(467)		Unamortized discount
$35,000	$35,000	$35,000	$35,000	35,000	(B)	8⅞% Notes due May 15, 1983
(214)	(184)	(153)	(123)	(92)		Unamortized discount
			20,000	20,000	(B)	9⅛% Note due November 15, 1981
			3,379	3,626	(C)	10¼% Note due October 31, 1983
			3,262	2,951	(D)	Capital lease
4,353	5,641	3,238	1,673	830		Bank and other borrowings
39,139	40,457	38,085	63,191	136,848		Long-term borrowings
538	674	999	1,097	652		Less current maturities
$38,601	$39,783	$37,086	$62,094	$136,196		Long-term debt

(A) The 11% Notes were issued in May 1980 and may be redeemed at any time at the option of the Company on or after July 15, 1986, at the principal amount together with accrued interest.

(B) The 8⅞% and 9⅛% Notes may be redeemed at any time at the option of the Company on or after November 15, 1981, and November 15, 1980, respectively, at the principal amount together with accrued interest. The agreements relating to these Notes contain certain limitations on the amount of additional indebtedness which the Company may incur.

(C) The 10¼% Note is repayable in French Francs.

(D) The capitalized lease obligation is due in monthly installments of $61,125, through 1985, including interest imputed at 9 percent. At May 31, 1980, facilities includes $3,605,000 in machinery and furnishings and $1,369,000 of related accumulated amortization for assets under this lease.

Aggregate long-term debt principal payments for each of the next five years will be $652,000 in 1981, $20,612,000 in 1982, $35,504,000 in 1983, $4,196,000 in 1984, and $640,000 in 1985.

SHAREOWNERS' EQUITY

Authorized share capital at May 31, 1980 consists of 40 million common shares without par value. Issued and outstanding shares at year-end were:

1976	1977	1978	1979	1980	
17,585,131	17,675,607	17,913,273	18,142,834	18,372,057	Shares issued
311	311	311	—	—	Held in Treasury
17,584,820	17,675,296	17,912,962	18,142,834	18,372,057	Shares outstanding

The common share account was increased $7,618,000 in 1979 and $9,894,000 in 1980, for the issuance of 229,872 shares in 1979 and 229,223 shares in 1980 under employee stock option and share purchase plans.

In connection with the two-for-one share split effected on May 9, 1977, $88,000 was transferred to the common share account from reinvested earnings.

The authorized share capital of Tektronix, Inc. was increased from 20 million to 40 million common shares without par value on September 24, 1977.

RETIREMENT AND INCENTIVE PLANS

Pension—The parent company has a pension plan for its employees which is integrated with Social Security benefits. Charges to payroll expense were $4,968,000 in 1976, $5,569,000 in 1977, $5,714,000 in 1978, $8,475,000 in 1979, and $9,406,000 in 1980. Pension plan expense increased in 1979 and thereafter due to amendments in the Social Security law. The unfunded past service liability at May 31, 1980, was approximately $41 million and fund assets exceeded vested benefits. Most subsidiary companies have governmental and privately insured retirement plans.

Profit Sharing—Most permanent employees receive cash and deferred profit share amounting to 27.5% of income of participating companies before profit sharing, incentive compensation, charitable contributions, and income taxes. Additional profit share of 7.5% is contributed to a retirement trust for parent company employees.

Incentives—The Company has incentive compensation plans for executives. The plans provide for compensation based on consolidated performance over a three-year period. These charges are included in profit sharing and amounted to $450,000 in 1976, $2,493,000 in 1977, $737,000 in 1978, $869,000 in 1979, and $106,000 in 1980.

Employee Share Purchase—Employees of the parent company and a domestic subsidiary are eligible to participate in an Employee Share Purchase Plan in which 3,992 employees were participants, of 20,735 eligible employees, at May 31, 1980. Under the Plan, 498,153 common shares of the Company were reserved at May 31, 1980, and 162,626 at May 26, 1979. During 1980, 164,473 shares, with a market value of $8,863,000 were issued for $7,090,000, while 119,000 shares with a market value of $5,763,000 were issued for $4,610,000 in 1979. The share purchase discount provided in the plan has been charged to non-operating income.

Qualified Stock Options—Under qualified stock option plans for employees, 43,101 common shares of the Company were reserved at May 31, 1980. Shares available for options not yet granted were 14,294 at May 31, 1980, and May 26, 1979. The plans provide that the option price shall not be less than 100% of the fair market value of the shares on the date of grant and that the options are exercisable in four cumulative annual installments beginning one year after the date of grant. At May 31, 1980, there were 29 participants in the plans, with all outstanding options expiring between September 25, 1980 and July 15, 1981.

At May 31, 1980, there were 28,807 options outstanding with an option value of $549,000 (prices ranging from $18.58 to $32.33) of which 28,307 were exercisable with an option value of $533,000. Options becoming exercisable and that were exercised in 1980 were:

Options Becoming Exercisable	Options Exercised	
22,452	61,091	Number of shares
$18.58-32.33	$12.13-32.33	Option price range
$52.70-59.50	$43.60-63.40	Market price range

Option and market values for options which became exercisable and for options which were exercised were (in thousands):

1976	1977	1978	1979	1980	
					Options becoming exercisable:
$1,364	$1,500	$1,938	$1,336	$ 424	Option value
1,387	2,396	4,261	4,081	1,332	Market value
					Options exercised:
1,520	1,246	2,916	1,837	957	Option value
2,533	1,868	5,014	5,165	3,448	Market value

Non-Qualified Stock Options—Under a non-qualified stock option plan for employees, 647,934 common shares of the Company were reserved at May 31, 1980. Shares available for options not yet granted were 224,125 at May 31, 1980, and 373,875 at May 26, 1979. The plan provides that the option price shall not be less than 85% of the fair market price of the shares on the date of grant and that the options are exercisable in four cumulative annual installments beginning one year after the date of grant. All options granted through May 31, 1980, have been at 100% of the fair market price of the shares at the date of grant. At May 31, 1980, there were 450 participants in the plan, with outstanding options expiring between August 29, 1984 and September 20, 1989.

The non-qualified stock option plan allows stock appreciation rights to be granted to optionees under the plan. When granted these rights allow the optionee to surrender all or part of an option and to obtain payment or shares in an amount equal to the difference between the aggregate exercise price of the surrendered option and the fair market price of the shares subject to the option on the exercise date. The stock appreciation rights are exercisable at the same times and to the same extent as the options to which they relate.

Options for 15,481 shares (option prices ranging from $35.90 to $44.00) were surrendered through stock appreciation rights in the year ended May 31, 1980. This resulted in the issuance of 484 shares. Cash payments of $324,000 in 1980 and $250,000 in 1979 for options surrendered (market prices ranging from $50.90 to $63.90) are included in profit sharing. In addition, $2,116,000 was accrued and included in profit sharing for the increase in market price over the option price during 1979. No accrual was necessary in 1980.

At May 31, 1980, there were 423,809 options outstanding with an option value of $17,849,000 (prices ranging from $12.13 to $59.45) of which 111,645 were exercisable with an option value of $3,240,000. Options becoming exercisable and that were exercised in 1980 were:

Options Becoming Exercisable	Options Exercised	
64,436	3,659	Number of shares
$18.58-55.00	$12.19-44.00	Option price range
$47.65-59.50	$50.90-63.25	Market price range

Option and market values for options which became exercisable and for options which were exercised were (in thousands):

1976	1977	1978	1979	1980	
					Options becoming exercisable:
$229	$232	$232	$1,258	$2,582	Option value
325	542	672	1,891	3,578	Market value
					Options exercised:
24	61	73	18	65	Option value
42	160	223	23	194	Market value

NON-OPERATING INCOME

The non-operating sources of income and expense which are included in non-operating income were (in thousands):

1976	1977	1978	1979	1980	
$3,118	$3,332	$4,180	$ 3,448	$4,593	Interest income
998	1,773	4,249	5,222	2,930	Equity in joint venture earnings
(859)	(544)	(15)	435	1,729	Currency gains and (losses)
—	—	—	4,507	—	Proceeds from litigation
1,053	1,258	2,346	1,981	4,223	Other expense—net
$2,204	$3,303	$6,068	$11,631	$5,029	Non-operating income

The equity in joint venture earnings is the Company's share, 50% or less, in the current earnings of joint venture companies after translation into United States dollars. Joint venture companies are located in Austria, Japan and Mexico. The proceeds from litigation are the satisfaction of a patent infringement judgement against the United States Government.

INCOME TAXES

The provisions for income taxes consist of (in thousands):

1976	1977	1978	1979	1980	
$17,894	$21,837	$28,342	$33,422	$34,468	United States
2,095	3,050	3,855	7,122	7,483	State
5,161	6,888	6,918	8,956	9,899	Foreign
$25,150	$31,775	$39,115	$49,500	$51,850	Provision for income taxes

The above provisions were less than the amounts which would result by applying the United States statutory rate to income before income taxes, which was 46% for 1980, approximately 47% for 1979, and 48% for earlier fiscal years. A reconciliation of the differences is (in thousands):

1976	1977	1978	1979	1980	
$26,515	$36,358	$46,061	$59,779	$62,984	Computed income taxes based on statutory rate
(706)	(3,067)	(4,591)	(5,879)	(7,986)	Effect of foreign subsidiaries taxed below statutory rate
(479)	(851)	(2,040)	(2,465)	(1,348)	Tax effect of joint venture earnings
1,090	1,655	2,013	3,754	4,052	State income taxes, net of United States income tax
(957)	(991)	(1,926)	(3,786)	(5,296)	Investment tax credits
(313)	(1,329)	(402)	(1,903)	(556)	Other—net
$25,150	$31,775	$39,115	$49,500	$51,850	Provision for income taxes

Undistributed reinvested earnings of foreign subsidiaries and Domestic International Sales Corporation (DISC) subsidiaries amounted to approximately $183 million at May 31, 1980. Except for accumulated deferred income tax provisions of $23 million, primarily for DISCs, relating to approximately $54 million of such reinvested earnings, no provision has been made for additional United States income taxes which could result from the transfer of undistributed reinvested earnings to the parent company. The Company has no present intention of transferring such earnings. If the undistributed reinvested earnings were to be transferred, foreign tax credits would be available to partially offset the amount of United States income taxes otherwise payable.

Equity in reinvested earnings of joint venture companies amounted to approximately $19 million at May 31, 1980. No provision has been made for United States income taxes which could result from the transfer of such earnings because foreign tax credits would be available to offset the amount of United States income taxes otherwise payable.

Deferred income taxes included in the provisions for United States income taxes are (in thousands):

1976	1977	1978	1979	1980	
$3,202	$1,587	$2,340	$1,040	$3,946	On undistributed earnings of DISCs
(428)	(1,199)	(414)	2,081	878	Other—net
$2,774	$ 388	$1,926	$3,121	$4,824	Provision for deferred income taxes

COMMITMENTS

The Company is committed under building and equipment leases, which are accounted for as operating leases, in the aggregate amount of $45,724,000; this is payable $9,894,000 in 1981, $7,849,000 in 1982, $6,363,000 in 1983, $4,988,000 in 1984, $3,411,000 in 1985, and $13,219,000 thereafter.

Rental expense charged to income under operating leases, including short-term rentals, was $4,976,000 in 1976, $5,505,000 in 1977, $5,699,000 in 1978, $8,199,000 in 1979, and $12,322,000 in 1980.

At May 31, 1980, contractual commitments under construction programs for additional facilities approximated $41 million. In addition, the Company has agreed to acquire a West German distributor of its products for approximately $9 million.

BUSINESS SEGMENTS

The Company operates predominantly in a single industry segment; the design, manufacture and sale of electronic measurement and display instruments used in science and industry.

Geographically the Company operates primarily in the industrialized world. Sales, income and assets in the United States, Europe and other geographic areas are (in thousands):

1978	1979	1980	
$413,414	$534,339	$649,565	United States sales to customers
107,590	147,414	185,772	Transfers from United States
521,004	681,753	835,337	United States Sales
160,663	225,388	288,630	European sales to customers
2,580	1,665	577	Transfers from Europe
163,243	227,053	289,207	European Sales
24,809	27,209	33,111	Other area sales to customers
(110,170)	(149,079)	(186,349)	Inter-area eliminations
$598,886	$786,936	$971,306	Net sales
$ 79,952	$102,702	$123,170	United States income
21,374	28,506	34,002	European income
578	1,418	2,139	Other area income
(3,496)	(6,025)	(5,529)	Inter-area eliminations
98,408	126,601	153,782	Area operating income
(4,269)	(5,153)	(5,933)	General corporate expense
(4,246)	(6,428)	(15,956)	Interest expense
1,819	6,409	2,099	Non-operating income
4,249	5,222	2,930	Joint venture earnings
$ 95,961	$126,651	$136,922	Income before taxes
$324,657	$464,330	$607,686	United States assets
85,942	120,525	156,444	European assets
9,720	11,554	13,203	Other area assets
(5,026)	(8,685)	(11,027)	Inter-area eliminations
415,293	587,724	766,306	Area assets
12,152	17,144	19,761	Joint venture equity
63,685	38,039	55,626	Corporate cash
$491,130	$642,907	$841,693	Assets at year-end

Area operating income includes all directly incurred and allocable costs, except identified corporate expenses. Identifiable assets are those which are specifically associated with the operations of each geographic area.

Inter-area sales of products and services are made at arms-length prices between the various geographic segments. The profit on sales between geographic areas, primarily on products manufactured in the United States, is not recognized by the manufacturer until sales are made to unaffiliated customers. The geographic classification of sales above is based upon the location of the seller. The classification of sales as reported elsewhere in this report is based upon the location of the purchaser, United States or International. Export sales to customers, which are included in United States sales above, were $31,949,000 in 1978, $47,167,000 in 1979, and $57,827,000 in 1980.

Joint venture companies operate predominantly in the same single industry segment as Tektronix.

Net sales to United States and foreign government agencies did not separately total as much as 10% of consolidated net sales in 1978, 1979 and 1980.

IMPACT OF INFLATION (unaudited)

The effects of inflation are not apparent in traditional financial statements which are based on historical costs. The Company has attempted to identify the financial effects of changing prices through two different methods involving estimates, approximations and assumptions.

The first method measures the effects of general inflation by changing the unit measurement of the historical cost financial statements to units of general purchasing power, constant dollars, using the average Consumer Price Index—All Urban Consumers during the fiscal year.

The second method, current costs, measures changes in specific prices for the goods and services actually used in the Company's operations. This measurement reflects the current cost of these same goods and services rather than the historical cost amounts actually expended. The effect of this change was determined by using published government price indexes which approximated changes experienced in construction costs and vendor prices. Current costs of inventories and net facilities were $319,198,000, and $367,566,000, respectively, at May 31, 1980.

In 1980, the Company's earnings are reduced by fourteen percent when the income statement is adjusted for general inflation and by fifteen percent when adjusted for changes in specific prices. These reductions resulted from restating cost of sales and depreciation expense in constant dollars and current costs.

Since parent company inventories are valued on the LIFO method, the parent company cost of sales approximate constant dollars and current costs. The adjustments for cost of sales are a result of subsidiary inventories which are not based on the LIFO inventory valuation method.

The depreciation adjustments were determined by indexing historical cost depreciation. The restatements are based upon the same depreciation methods, useful lives, and salvage values used in the income statement. Constant dollar depreciation was indexed by units of general purchasing power. Current cost depreciation was indexed by published government indexes for major asset classifications.

Taxes based on income have not been adjusted for inflation as current tax laws do not recognize the effects of general inflation or changes in specific prices. This results in an eleven percent increase in the 1980 effective tax rate, from 38% to 42%, when comparing inflation adjusted income before taxes with that reported in the income statement.

Changes in the general purchasing power of the dollar give rise to gains or losses in the purchasing power of monetary items. Monetary items are money or a claim to receive or pay a sum of money in an amount which is fixed or determinable. Since the Company owes more to its creditors than it holds in cash and has due from customers, a gain occurs as these creditors will be paid later in dollars that have declined in purchasing power.

Selected financial information adjusted for the impact of inflation is (in thousands except per share amounts):

1976	1977	1978	1979	1980	
					Constant Dollars
$509,932	$598,369	$738,251	$889,025	$971,306	Net sales
				$85,072	Earnings as reported in the income statement
					Adjustments for general inflation:
				(2,177)	Costs of sales (excluding depreciation)
				(9,519)	Depreciation
				$73,376	Earnings
				$604,359	Shareowners' equity
				$4.02	Earnings per share
.17	.30	.74	.54	$.79	Dividends declared per share
40.93	43.12	48.17	52.88	$47.07	Share price at year-end
				$5,387	Gain from decline in purchasing power of net monetary liabilities
165.3	174.8	186.5	203.5	230.0	Average Consumer Price Index for year
					Current Costs
				$85,072	Earnings as reported in the income statement
					Adjustments for specific price changes:
				(3,065)	Costs of sales (excluding depreciation)
				(9,371)	Depreciation
				$72,636	Earnings
				$586,427	Shareowners' equity
				$3.98	Earnings per share
				$79,721	Effect of increase in general inflation
				48,248	Increase in specific prices of inventories and facilities
				$31,473	Excess of increase in general inflation over specific prices

QUARTERLY FINANCIAL SUMMARY (unaudited)

In the opinion of management, the unaudited quarterly financial summary includes all adjustments necessary to present fairly the results for the periods represented (in thousands except per share amounts):

12 Weeks to Aug. 19, 1978	12 Weeks to Nov. 11, 1978	16 Weeks to Mar. 3, 1979	12 Weeks to May 26, 1979	52 Weeks to May 26, 1979	
$158,850	$179,786	$237,799	$210,501	$786,936	Net sales
84,140	99,455	129,190	114,411	427,196	Gross profit
23,835	30,689	34,267	32,657	121,448	Operating income
24,958	31,987	38,612	31,094	126,651	Income before taxes
14,164	18,296	23,162	21,529	77,151	Earnings
.79	1.02	1.28	1.19	4.28	Earnings per share
.12	.16	.16	.16	.60	Dividends paid per share

13 Weeks to Aug. 25, 1979	12 Weeks to Nov. 17, 1979	16 Weeks to Mar. 8, 1980	12 Weeks to May 31, 1980	53 Weeks to May 31, 1980	
$207,468	$221,933	$285,933	$255,972	$971,306	Net sales
113,722	119,497	146,259	133,364	512,842	Gross profit
31,285	39,410	36,564	40,590	147,849	Operating income
30,458	34,079	34,872	37,513	136,922	Income before taxes
18,488	21,329	20,767	24,488	85,072	Earnings
1.02	1.17	1.14	1.33	4.66	Earnings per share
.16	.21	.21	.21	.79	Dividends paid per share

The payment of dividends is discretionary with the Board of Directors. Future dividends will be declared by the Board based upon earnings, financial condition and capital requirements among other considerations.

COMMON SHARE PRICES

The Company's common shares are traded on the New York and Pacific Stock Exchanges. The market price range and close are composite prices as reported by the Wall Street Journal until January 23, 1976, and before then New York Stock Exchange prices. With the exception of the third quarter of 1980, which is reported through July 31, 1980, prices are for calendar quarters (rounded to full cents per share):

1976	1977	1978	1979	1980	
					First calendar quarter:
$30.25	$34.25	$37.63	$57.00	$64.25	Highest trade
22.13	28.13	32.50	47.13	45.00	Lowest trade
30.00	29.63	34.63	54.25	49.25	Closing share price
					Second calendar quarter:
32.13	36.63	45.50	56.00	51.75	Highest trade
28.00	28.25	32.75	46.88	41.63	Lowest trade
32.00	35.88	41.50	52.00	49.75	Closing share price
					Third calendar quarter:
34.25	38.50	50.50	61.00	64.88	Highest trade
29.00	33.88	40.13	51.75	50.00	Lowest trade
32.00	38.00	47.25	60.50	64.63	Closing share price
					Fourth calendar quarter:
37.44	40.00	49.00	64.00	—	Highest trade
28.88	35.00	39.00	53.25	—	Lowest trade
34.25	37.88	47.13	59.88	—	Closing share price

Tektronix Consolidated Performance

1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	
8.2%	**8.9%**	**11.4%**	**12.9%**	**13.9%**	**13.9%**	**17.4%**	**18.9%**	**21.2%**	**19.2%**	**RETURN ON EQUITY**
6.6%	7.0%	8.3%	7.9%	7.8%	8.2%	9.7%	9.5%	9.8%	8.8%	Earnings Margin
1.2x	1.3x	1.4x	1.6x	1.8x	1.7x	1.8x	2.0x	2.2x	2.2x	Equity Turnover
7.7%	**8.4%**	**10.8%**	**11.9%**	**12.6%**	**12.3%**	**15.4%**	**16.9%**	**18.4%**	**15.8%**	**RETURN ON CAPITAL**
6.9%	7.2%	8.4%	8.0%	8.3%	8.7%	10.0%	9.8%	10.1%	9.4%	Preinterest Margin
1.1x	1.2x	1.3x	1.5x	1.5x	1.4x	1.5x	1.7x	1.8x	1.7x	Capital Turnover
145,000	**174,000**	**232,000**	**297,000**	**329,000**	**376,000**	**513,000**	**650,000**	**847,000**	**1,049,000**	**CUSTOMER ORDERS**
−14.2%	20.0%	33.3%	28.0%	10.8%	14.3%	36.4%	26.7%	30.3%	23.8%	Increase
10.3%	12.1%	22.8%	24.9%	18.5%	18.6%	25.0%	27.5%	28.2%	30.2%	Orders Unfilled at Year End
149,442	**167,482**	**202,855**	**271,428**	**336,645**	**366,645**	**454,958**	**598,886**	**786,936**	**971,306**	**NET SALES**
−11.5%	12.1%	21.1%	33.8%	24.0%	8.9%	24.1%	31.6%	31.4%	23.4%	Increase
45.3%	48.3%	49.4%	49.9%	51.4%	53.8%	56.9%	55.5%	54.3%	52.8%	Gross Profit Margin
11.7%	11.9%	14.2%	14.2%	15.1%	15.8%	16.8%	15.7%	15.4%	15.2%	Operating Income Margin
11.2%	12.5%	15.0%	14.2%	13.9%	15.1%	16.6%	16.0%	16.1%	14.1%	Pretax Margin
41.1%	44.0%	45.1%	44.5%	43.8%	45.5%	41.9%	40.8%	39.1%	37.9%	Income Tax Rate
9,904	**11,764**	**16,739**	**21,353**	**26,329**	**30,089**	**43,971**	**56,846**	**77,151**	**85,072**	**EARNINGS**
−34.0%	18.8%	42.3%	27.6%	23.3%	14.3%	46.1%	29.3%	35.7%	10.3%	Increase
.58	.69	.97	1.23	1.52	1.71	2.49	3.19	4.28	4.66	Earnings Per Share
—	—	.10	.10	.10	.12	.225	.48	.60	.79	Dividends Per Share
157,808	**173,743**	**206,599**	**251,061**	**306,616**	**344,860**	**415,328**	**491,130**	**642,907**	**841,693**	**TOTAL ASSETS**
1.0x	1.0x	1.1x	1.2x	1.2x	1.1x	1.2x	1.3x	1.4x	1.3x	Asset Turnover
5.3x	5.6x	5.3x	5.5x	5.8x	5.6x	5.8x	5.9x	5.9x	5.5x	Receivable Turnover
1.4x	1.5x	1.6x	1.6x	1.6x	1.6x	1.8x	1.9x	1.9x	1.9x	Inventory Turnover
3.0x	3.5x	4.3x	5.1x	4.7x	4.3x	5.0x	5.6x	5.0x	4.1x	Facility Turnover
138,092	**148,376**	**167,330**	**199,461**	**244,906**	**273,659**	**319,287**	**374,133**	**493,891**	**665,343**	**INVESTED CAPITAL**
8.5%	6.7%	7.0%	12.0%	17.4%	15.2%	14.1%	12.7%	18.4%	27.4%	Short & Long-Term Debt
91.5%	93.3%	93.0%	88.0%	82.6%	84.8%	85.9%	87.3%	81.6%	72.6%	Shareowners' Equity
9,091	8,334	10,580	12,693	12,664	12,970	14,637	19,147	21,291	23,890	Employees
15.7	19.2	21.5	23.3	26.6	28.6	33.0	35.5	38.9	43.0	Sales Per
2,329	2,429	2,612	2,940	3,420	3,705	3,906	3,987	4,935	5,921	Square Feet in Use
67.3	70.4	80.5	97.8	105.9	102.9	119.6	151.8	176.4	178.9	Sales Per Thousand
17,176	17,204	17,302	17,302	17,458	17,585	17,675	17,913	18,143	18,372	Shares at Year-End

Returns, ratios, turnovers and sales per are based on average assets, capital, employees and square feet. Amounts are in thousands except per share and employees.

BOARD OF DIRECTORS

HOWARD VOLLUM, *Chairman of the Board*
PAUL L. BOLEY, *Partner, Stoel, Rives, Boley, Fraser and Wyse*
PAUL E. BRAGDON, *President, Reed College*
JAMES B. CASTLES, *Vice President and General Counsel*
JOHN D. GRAY, *Chairman, Omark Industries, Inc.*
LEONARD LASTER, *President, University of Oregon Health Sciences Center*
LOUIS B. PERRY, *President, Standard Insurance Company*
WILLIAM D. WALKER, *Executive Vice President and Chief Operating Officer*
EARL WANTLAND, *President and Chief Executive Officer*
FRANK M. WARREN, *Chairman, Portland General Electric Co.*

OFFICERS

HOWARD VOLLUM, *Chairman of the Board*
EARL WANTLAND, *President and Chief Executive Officer*
WILLIAM D. WALKER, *Executive Vice President and Chief Operating Officer*
LARRY N. CHORUBY, *Group Vice President-Finance*
LEWIS C. KASCH, *Group Vice President*
LAWRENCE L. MAYHEW, *Group Vice President*
WILLIAM J. POLITS, *Group Vice President*
JAMES B. CASTLES, *Vice President and General Counsel*
FRANCIS DOYLE, *Vice President*
DON A. ELLIS, *Vice President*
JOHN L. LANDIS, *Vice President*
WILLEM B. VELSINK, *Vice President*
R. ALLAN LEEDY, JR., *Secretary*
KENNETH H. KNOX, *Treasurer*
BILL J. ROBINSON, *Controller*
N. ERIC JORGENSEN, *Assistant Secretary*
EDWARD J. LEWIS, *Assistant Secretary*

SHAREOWNERS' MEETING

The annual meeting of shareowners of Tektronix, Inc., will be held on Saturday, September 27, 1980, at 9 a.m. Pacific Daylight Time, in the Assembly Cafeteria Building, S.W. Karl Braun Drive, Tektronix Industrial Park, near Beaverton, Oregon.

Transfer Agents
Morgan Guaranty Trust Company of New York, New York
United States National Bank of Oregon, Portland

Registrars
Citibank, N.A., New York
First National Bank of Oregon, Portland

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Tektronix®

COMMITTED TO EXCELLENCE