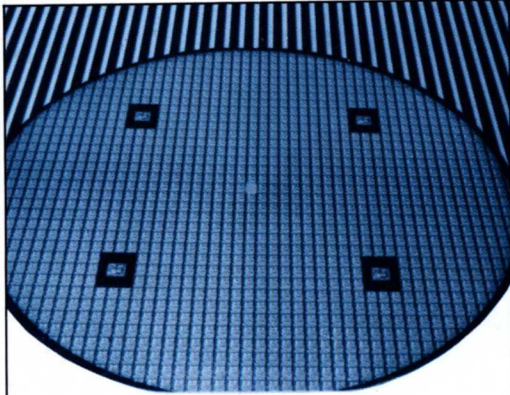
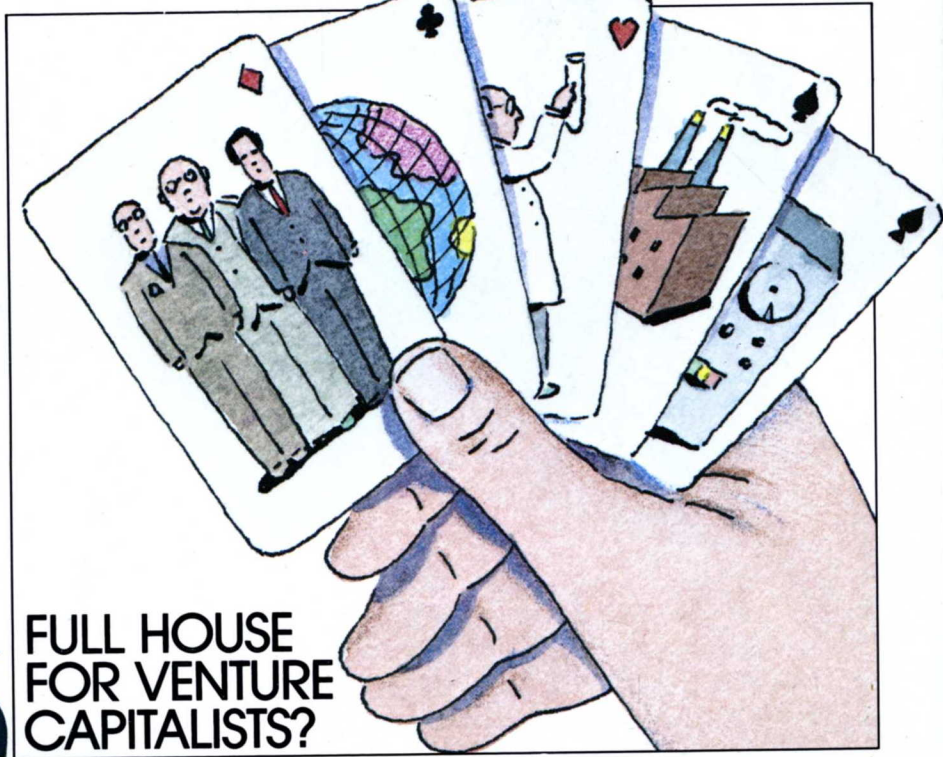


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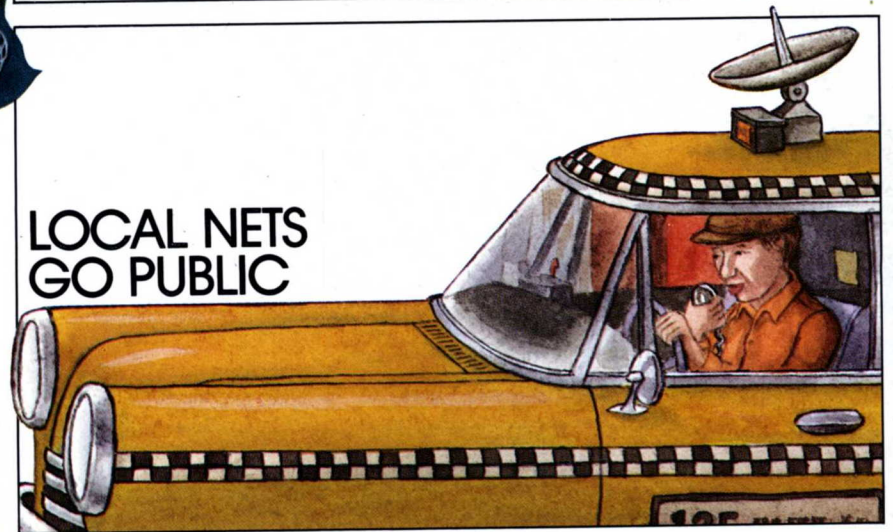
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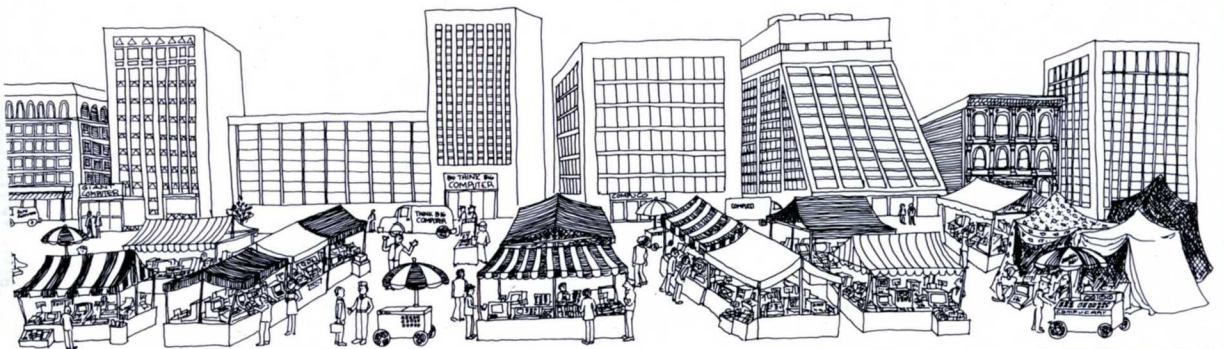


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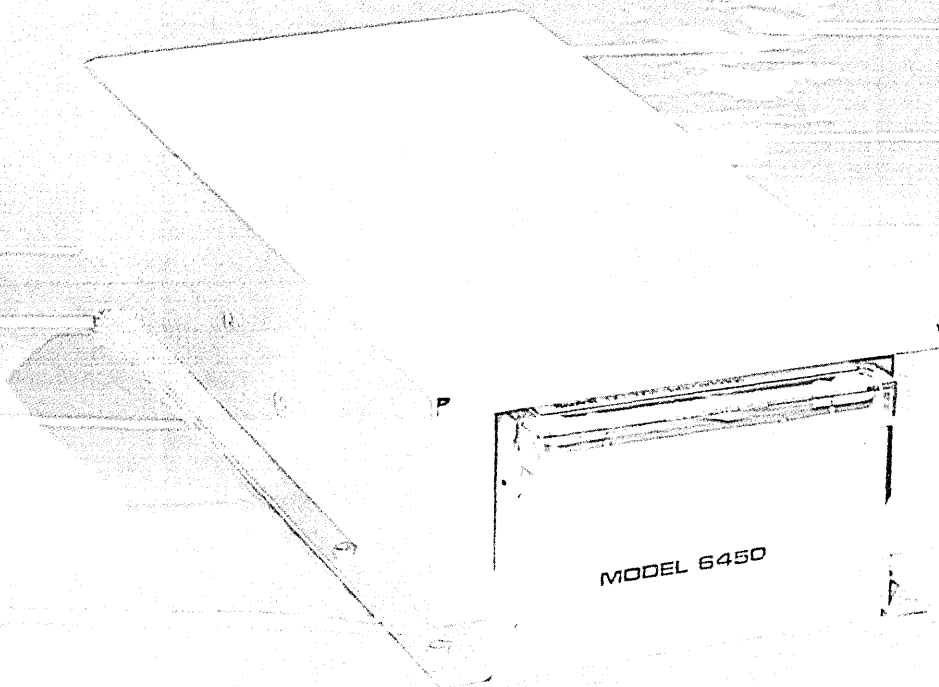
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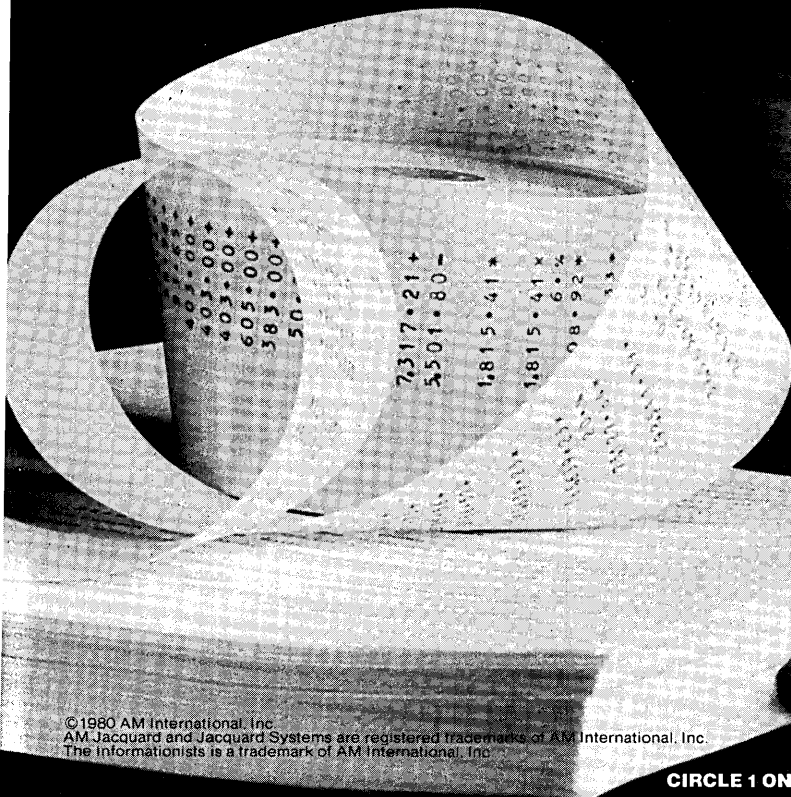
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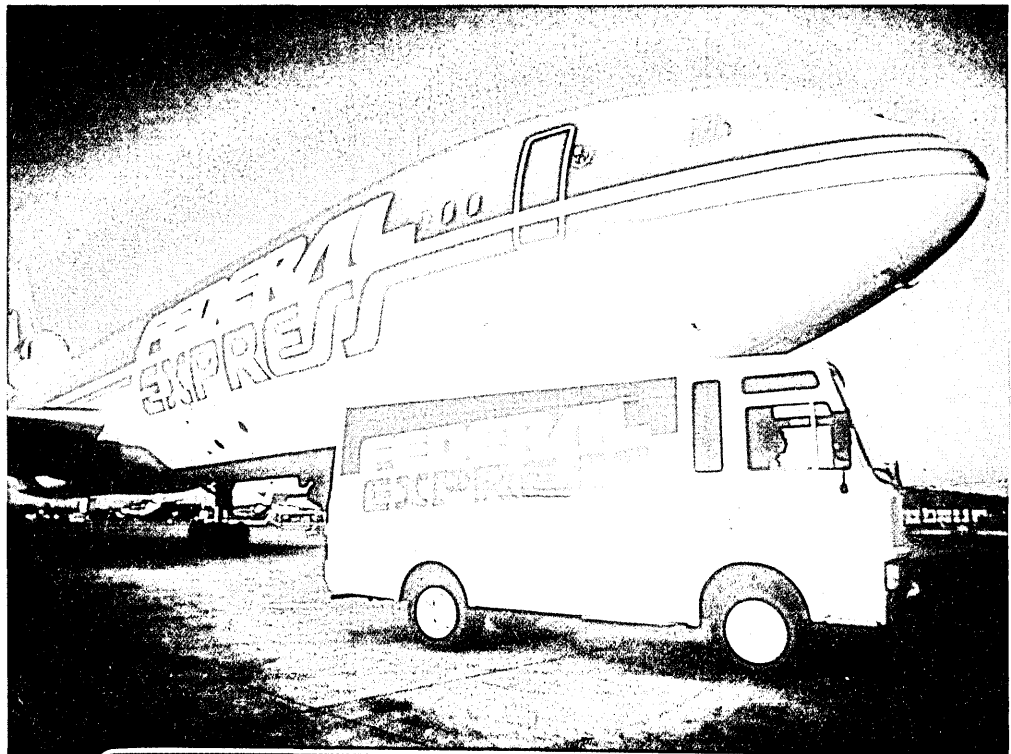
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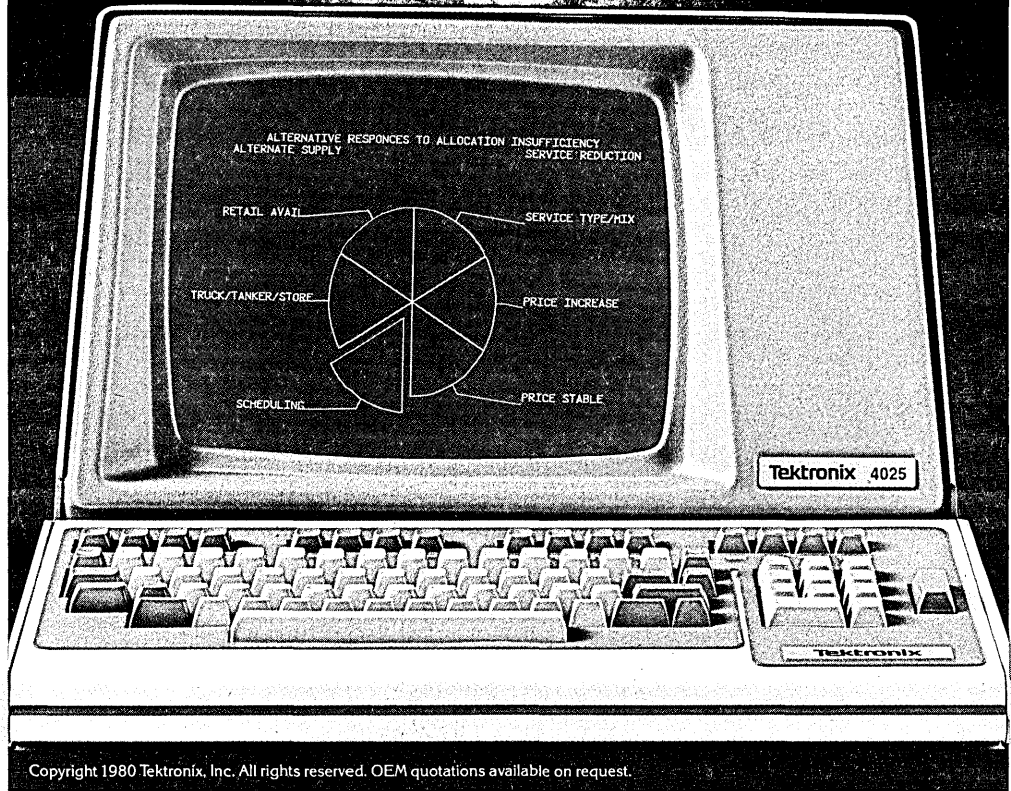


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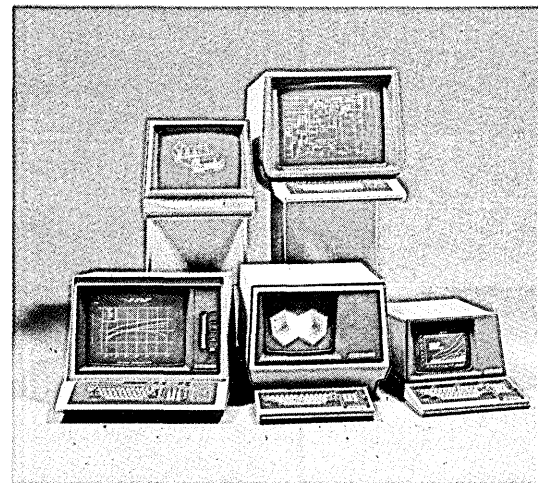
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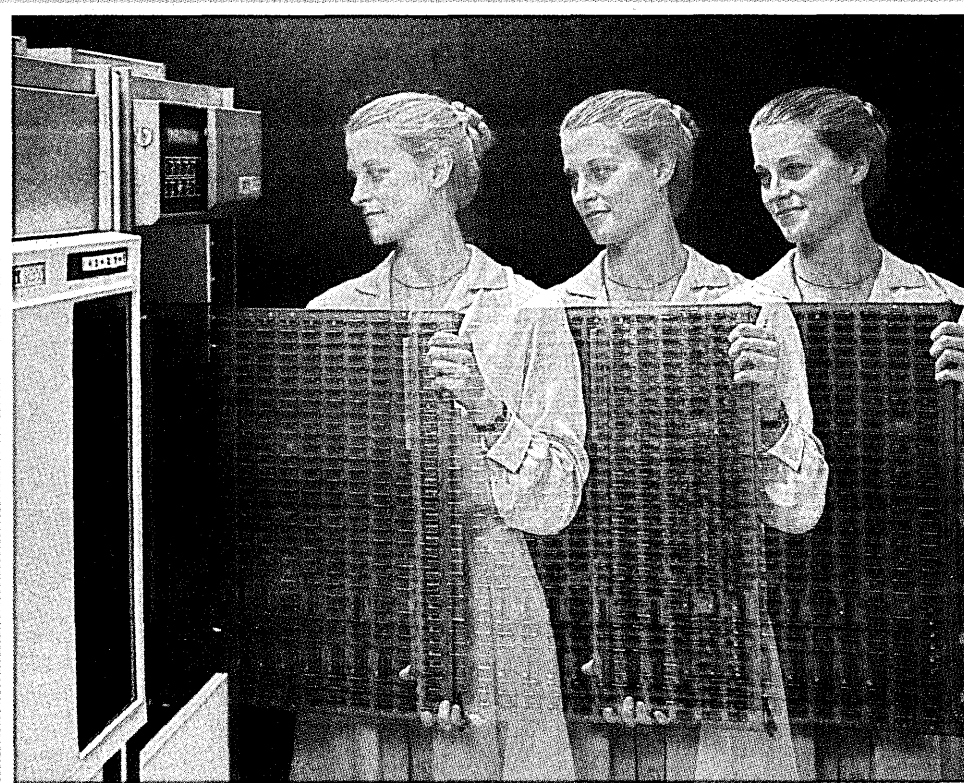
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Technical Publishing

DB a company of
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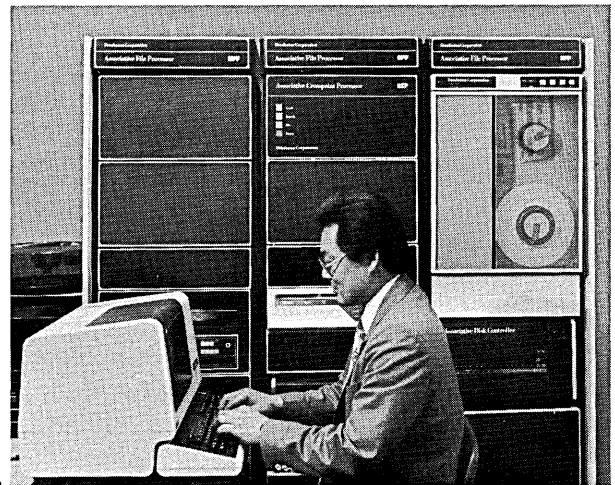
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ABP Member American Business Press, Inc.

DATAMATION (USPS 508-290) Magazine is issued monthly on or about the first day of every month, with the exception of December, which is semimonthly. Published by Technical Publishing, a company of the Dun and Bradstreet Corp., 1301 South Grove Ave., Barrington, IL 60010; James B. Tafel, Chairman; John K. Abely, President. Executive, advertising, editorial offices, and subscription department, 666 Fifth Ave., New York, NY 10103. Published at East Greenville, Pa. Subscription rates: \$36 (U.S. and Possessions), \$45 (Canadian). Reduced rate for qualified U.S. students: \$18. Foreign subscriptions: £43. Additional charge for airmail: £40. Japan, Australia and New Zealand: £47 (air-shipped). Sole agent for all subscriptions outside the U.S.A. and Canada is J. B. Tratsart, Ltd. 154 A Greenford Road, Harrow, Middlesex HA13QT, England, (01)422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Controlled circulation postage paid at Bethlehem, PA 18016. Copyright 1980 by Technical Publishing Company, a Division of Dun-Donnelley Publishing Corporation. All rights reserved. * "Datamation" registered trademark of Technical Publishing Company. Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, Michigan 48106. Printed by Brown Printing Co., Inc. POSTMASTER: Form 3579 to be sent to Technical Publishing Company Circulation Office: 666 Fifth Avenue, New York, NY 10103. ISSN: 0011-6963. Single copy: \$4.00 in U.S.A.

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FOREWORD

DATA GLUTTONS

If you've been in the computer industry for any length of time, you're probably suffering from information indigestion.

Because of the constant changes in this business, most dp professionals receive great gobs of information from innumerable sources, many of them printed. DATAMATION adds its share every month—several hundred pages of articles and advertisements that cover everything from chips to mainframes, from 1401 conversion aids to data base management systems.

Reading every page of every publication that assaults your in-basket would be like having Thanksgiving dinner every day. Without question you would be the most informed dp pro around. But you would not only be suffering from information indigestion, you would also be out of a job, since every minute of every working day would be spent digesting the unending stream of

analysis and reportage.

So, you read selectively and sporadically. And the picture that's painted is often chaotic, unconnected, and incomplete.

Hence, this special issue. We feel that every now and again it's helpful to pause, catch one's breath, and analyze what has been and what is yet to come.

This necessarily means selection, and the editors of DATAMATION have done just that: from the mass of information dealing with the industry over the past year, we have culled facts and opinion about what we consider the significant events, trends, mar-

kets, products, and people.

We note the appearance of data base machines and the spread of remote diagnostics as vendors cope with the high cost of field maintenance.

AT&T's official entry into the unregulated competitive ranks is also discussed. And, while looking at moves into marketplaces, we also comment on the European manufacturer's hungry glances at the lucrative American user market, and Japan's stepped up drive toward dominance in the semiconductor arena.

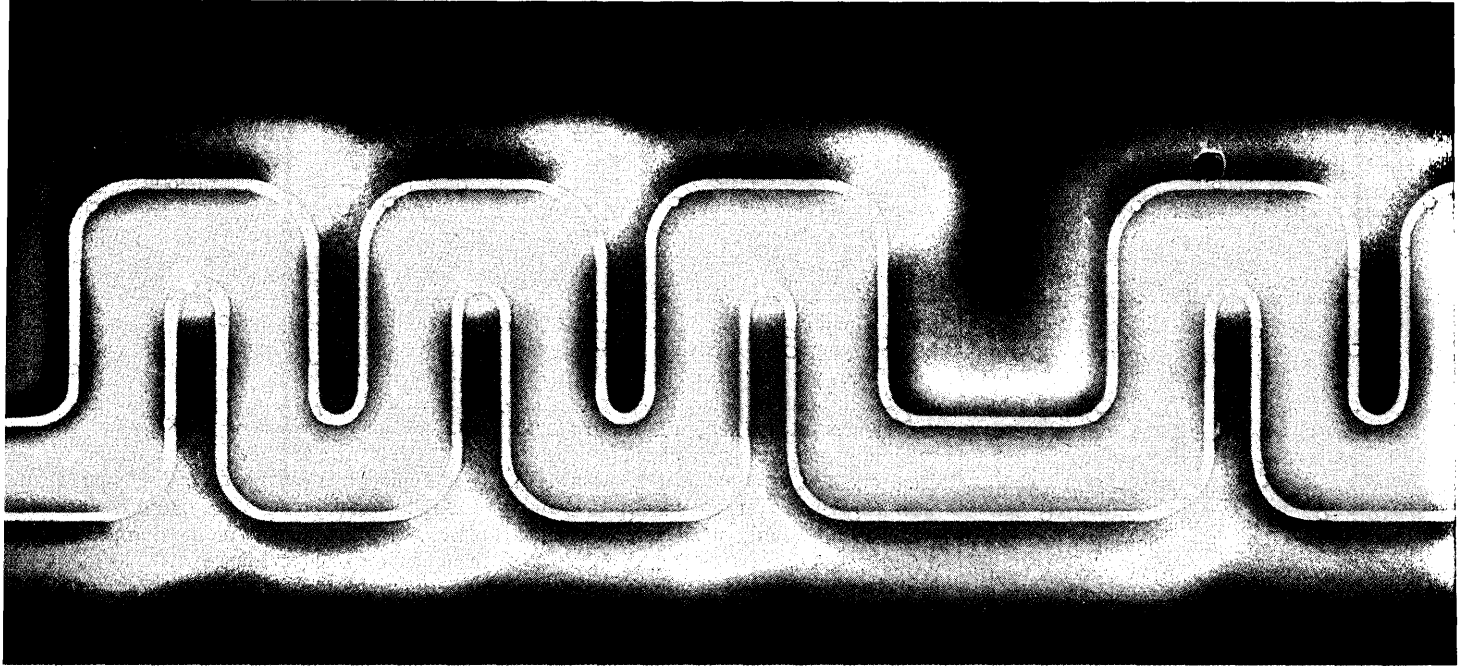
Venture capital, the companies that will be the new industry leaders over the next decades, the products, the problems, and always the people . . . all this and more is capsuled and neatly packaged in the following pages.

We think you'll find the mix quite digestible with a light and clear aftertaste; we'd recommend a dry California white as the perfect accompaniment to this issue. Good reading and bon appetit.

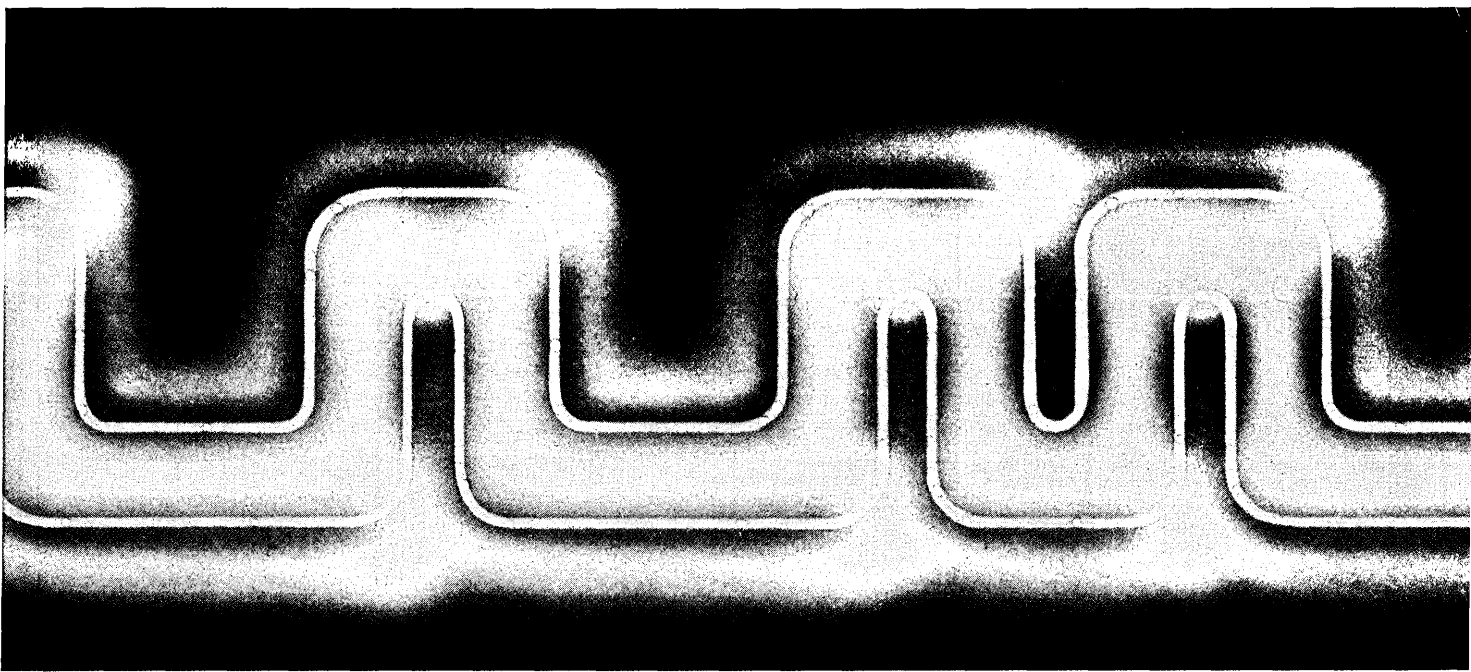
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ILLUSTRATION BY RON LOGAN



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MARKETS

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MOST OF THE TOP 50 ELECTRONICS MANUFACTURERS HAVE A CAPTIVE IC FACILITIES; THE INVESTMENT/ACQUISITION BINGE SHOWS NO SIGNS OF EASING.

Despite the burgeoning market for semiconductors, the number of manufacturers is on the decline. Some of the so-called merchant suppliers, the largest of which is Texas Instruments, are either going out of business or merging with others. Indeed, there's a trend toward takeovers of, or substantial investments in, semiconductor companies. This involved 28 companies in the last decade, according to Benjamin M. Rosen, president of a research company bearing his name. According to Rosen, the reasons for the acquisition/investment binge are obvious. The IC industry by the end of the century will be a \$100 billion business, and ICs will be the basis of everything technological, he told a gathering of the American Electronics Association earlier this year.

"Many foreign countries—France, Germany, the U.K., Japan, and probably soon Italy—are making ICs an instrument of foreign policy," he added.

But if the number of merchant suppliers is diminishing, the slack is being taken up by the in-house facilities of companies such as IBM, which buys ICs from merchant companies but which is also the world's largest maker of semiconductors. Of the top 50 electronics manufacturers, something on the order of two-thirds have their own captive facilities, says Howard Bogert of Dataquest.

Bogert last year counted 43 captive manufacturers in the U.S. and says they produce 16% of all the wafer starts in the country. Their output is about 20% that of the merchant suppliers, he adds, and that percentage is increasing. "So it's a very strong trend," he says. "And I think it would be stronger except that there's such strong competition for people." With the shortage of personnel skilled in the technology, if the semiconductor industry were to lay off any people, they would immediately be absorbed by the captives.

The 10 largest captives are IBM, Western Electric, Delco, Hewlett-Packard, Honeywell, NCR, Burroughs, Data General, Digital Equipment, and Tektronix, according to Integrated Circuits Engineering Corp. The consulting firm, in its latest report on the IC industry, notes that one of the motivations for developing an in-house capability is to ensure a supply of parts when shortages develop in the open market. The desire to provide more of the value-added is certainly a factor, as is the ability to make only a few units. Explains Dataquest's Bogert, most semiconductor houses don't want to make a mere 10,000 custom



Chance: Chip Capability

chips for you, but that could be handily accommodated by an in-house facility. There is, of course, the added advantage of being able to develop and produce proprietary circuits.

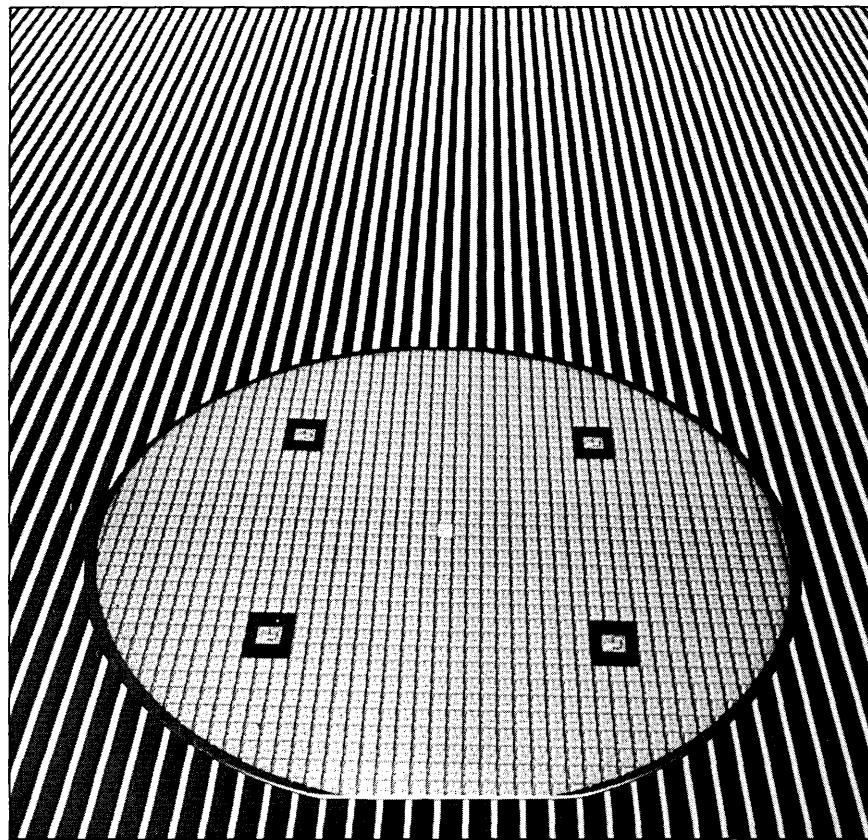
"How do you differentiate your product and how do you add the features that your customers want if you don't have some in-house capability?" rhetorically asks Hewlett-Packard's Doug Chance. He feels there will always be general purpose components that companies will continue to buy outside. But he adds, "If you have to wait until the other people introduce the chips, then you're going to have a two- or three-year lag behind the person who can develop the chip himself."

Chance, who is general manager of H-P's Technical Computer Group, says the technology in 1980 allows 30,000 transistors on a chip. He sees this reaching a half million in 1985 and 10 million in 1990. And at H-P they still see the performance of computers increasing by 30% each year, or maintaining the same level of performance while dropping prices by 30%. He says handheld calculators and the technology they represented led the way to new developments in the decade of the 1970s. In the '80s, that same excitement will be led by computers, in his opinion. And with very large scale integration (VLSI), there will be computers on a chip, desktop personal computers will become very powerful, and terminals will get smaller and more powerful.

Dataquest's Bogert, who heads up technology activities in the consulting firm's Semiconductor Industry Service, says, "Our rule is: Make what you can't buy." That would apply whether your need is for a special process or a special set of masks on a standard process. "Then you have a chance of being a winner."

GATE ARRAYS PROSPER

If these factors explain why more and more equipment and systems makers are becoming captive semiconductor suppliers, they also help to explain why so many companies have become users of gate arrays. These ICs, as the name implies, are arrays of logic gates that the equipment maker can, with relative ease, link up to perform his application. The IBM 4300 series computers are said to be heavy users of gate arrays. And this, says Fred K. Buelow, president of STC Microtechnology Corp., the captive of



Storage Technology Corp., has given respectability to gate arrays overnight. "Now you see every major company has a funded program on gate arrays."

The gate array, in the form of a partially complete wafer, awaits the customer's logic requirements. This means the user need design only the last two masks or layers to complete the fabrication of his wafer. It thus allows the equipment maker to reduce systems costs, decrease IC design costs and design time. And gate arrays can also be more cost effective than a full custom chip, especially if the need is, say, for only 5,000 or 10,000 units. Dataquest's Bogert adds that it also provides a low cost way for an engineer to gain experience in actually designing a chip.

"The gate array business is very hot," Bogert says. He thinks that if you implement a computer in gate arrays you can cut the system cost by roughly a factor of four. It's not the cost of the components, he explains, for there may not be any savings there. But it's in the cost of associated things like printed circuit boards, connectors, cabling, power supply, and the box.

Advances such as these are what helps bring costs down; capabilities up. It is possible to buy logic chips and arrange them on circuit boards. But this requires testing and debugging after the boards have been stuffed, not to mention the cost of the board and the labor to stuff it. The costs climb. And thus the impetus is to such things as gate arrays.

"As you put more and more of the system on the chip, the chip is a greater and greater fraction of the manufacturing cost," explains Bogert. And if all this is being

done by a merchant supplier, the value added by the computer maker or the terminal maker is less and less. At Dataquest, they believe that IBM's component usage in dollars is growing twice as fast as the value of the equipment it ships—and this at a company that is virtually self-sufficient in chips. But semiconductor prices, like most other things, are also set by the forces of supply and demand.

"Over the last 12 months, the most significant thing that has happened is the price drop in 16K RAMs," says Will Strauss of Integrated Circuit Engineering. "And that's because there's now a glut in

The Japanese are competing successfully... in the '80s, they will be even more competitive.

supplies." IBM is widely blamed or credited for that glut. The company, which was forced to go to outside suppliers for its 16K memory chips, has suddenly not ordered additional quantities. This leads people to believe that 64K chips are now in production at IBM's plants. But the many merchant suppliers to IBM suddenly have a surplus of 16Ks and have reversed the price trend on the best selling item.

On the open market, says Strauss,

the 64K memory chips are "still fairly low in volume." The systems companies will have to get their hands on a few evaluation units so they'll be able to design the new chips into their products. Once that happens, "you'll see it balloon, like the 16K market did." According to the ICE staff consultant, yields on 64K chips are still low, prices are still high, and the industry will not get into volume shipments of the component until late 1981 or early '82.

But one can easily imagine the advantages to the equipment maker and the user. With the 64K chip, one circuit will suffice where previously there were four. And that means "reduced square footage on the printed circuit board," as those in the industry are wont to say. But this in turn means getting by with smaller cabinetry, a decreased requirement for cooling, and lower power consumption. And all these things cost the systems maker and the user money. Adds Strauss, in communications applications where the equipment must remain running for 24 hours a day, "power consumption gets to be significant." He cites the example of telephone switching equipment with, say, a 12-year life span. Over that lifetime, the power consumed could cost more than the equipment. "So energy costs are significant now."

Because of inflation, prices of some components are rising. Certain standard circuits, referred to as jellybeans because one can picture them being stamped out by the millions, are the victims of higher materials costs. "Any product that is assembly intensive probably is not going to go down in price at all," says Dataquest's Bogert. "It probably will go up at something less than the inflation rate" because companies tend to substitute cheaper materials as prices go up. Standard TTL logic parts, he adds, have very little semiconductor costs in them; the expense is mostly in the packaging. And these things sell for 50 cents or so. If the circuit is priced in the \$5 to \$10 range, the price conceivably could come down, Bogert says. And the 16K RAM is priced at about \$5. But the 64K RAM is considerably above that.

Perhaps the price situation is best expressed by Fred Buelow at STC Microtechnology. He says the price per function of ICs continues to decline. And this is because the makers put more functions on a chip and make that chip smaller. "That pattern, to me, shows no sign of decreasing." He explains that it is difficult to discuss prices on the basis of a chip because that ignores the content of that chip. The cost of producing a wafer is going up, he says, and the size of wafers is going up, and they're putting more functions on a wafer. "Therefore the price per function still seems to be steadily declining." Further, when the user of that chip configures it as part of a system, he's spending less today. "And every indication is that that trend will continue through the decade."

An unfortunate trend in the industry is capital intensity. The IC manufacturing

If your company asks you to recommend a financial planning and modeling system, tear out this page. Instead of your hair.

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process, now sliding into the VLSI phase, has become highly complex and sophisticated. Making those little marvels brings into play ever more precise instruments bearing price tags many times that of the machines they replace. This was traced by Ben Rosen in his talk to the AEA.

HIGH CAPITAL COSTS

He said the semiconductor industry in 1976 spent 8% of sales on capital expenditures; this year it will reach 20%. Last year, he added, U.S. companies increased their capital spending by more than 60%—this in an industry growing by 36%. The manufacturing plant that cost \$1 million in 1965 will set you back about \$50 million in 1985. And the \$20,000 contact printer used previously has been replaced by something called a wafer stepper that costs about \$600,000.

But the industry trend that's been getting more popular press than any other has been the Japanese competition. In IC product category after IC product category, the Japanese are competing successfully. And in the '80s, Rosen warned, they will be even more competitive. He said that in touring U.S. semiconductor companies he is amazed at the number of new quality improvement programs being quietly implemented. "Although they deny it," he said, "I think it's clearly in response to the Japanese quality offensive."

Rosen attributes the success enjoyed by the Japanese not only to all that's been said about their work ethic and the cooperation between government and industry, but also to the fact that they outproduce the U.S. in electrical engineers and computer scientists. Compared with the U.S., he

said, they are graduating 35% more electrical engineers. In 1971, the U.S. graduated 17,000 EEs with bachelors, masters, and PhD degrees. This year, despite the passage of a decade when demand has grown very substantially, we will again have graduated about 17,000. This shortage of engineers is one of the factors that limits the growth of our industry, he said, adding, "It's also an impediment in our competition with them."

But when it comes to the competitive threat posed by the Japanese, few have been as vocal and combative as Charles E. Sporck, president of National Semiconductor Corp. In testimony before a House Ways and Means Committee last summer, Sporck

IBM will be the leader —but with only 25% of the market."

referenced the support provided to the electronics industry by the Japanese government. "As much as \$2 billion is being spent on this effort," he said, "much of it in the form of accelerated depreciation, investment reserves, and special treatment for R&D expenses."

But he said the Japanese competitors are also able to get more of their needed capital through low cost borrowing, their cost of capital allegedly being almost half that of their U.S. counterparts. Sporck cited a study commissioned by the Semiconductor Industry Association, which found that

"Japanese semiconductor companies are able to employ high debt-to-equity ratios because of their affiliation with large industrial groups, Japanese lending practices, and a supportive government policy." And these lower capital costs give the Japanese a substantial competitive edge.

Speaking on behalf of the SIA, Sporck said the study by the Chase Manhattan Bank found that while American semiconductor companies had debt-to-equity ratios (leverage) of less than 25% on average, four of the Japanese firms maintained ratios of 150% to 230%. Said the bank study, "... leverage of this magnitude would not be available from conventional banking or (other) capital market sources in the U.S." The study also found that the cost of capital was 17.5% for U.S. companies but only 9.3% for Japanese companies—almost 50% less.

Less concerned, however, is STC's Fred Buelow. As he sees it, one can prepare a well thought-out plan for penetrating a mature market, such as that for automobiles. "The Japanese are noted for very good planning, long term strategy planning, and careful implementation of that strategy," says Buelow. "But when the market is very dynamic and requires significant readjustments, it seems to me their long planning cycle would be at a disadvantage."

He thinks the dominance of IBM 370 architecture argues for a state of maturity in the computer market and this gives the Japanese a chance to penetrate that market. But the semiconductor industry is much more dynamic. And therefore, over the long pull, he says, "I think it'll be much harder for them to penetrate it."

—Edward K. Yasaki

SURVIVING THE SHAKEOUT

A LESS COMPETITIVE MARKETPLACE COULD BE CREATED BY A SOONER-THAN-EXPECTED INDUSTRY REEVALUATION.

IBM moved aggressively to regain lost market share in word processing and office automation with the introduction last summer of its low priced Displaywriter.

The building-block Displaywriter System can be custom ordered from more than 20 separate components, features and options. A basic system will sell for \$7,895 and lease for \$275 a month. A licensed program, which rents for \$15 a month, is required to operate the system. A basic configuration consists of a display with a typewriter-like keyboard and a logic unit, a printer, and a device that records and reads diskettes which can store more than 100

pages of average text each.

It's been termed "dirt cheap." Many see it as a direct move to get back market share lost to such wp giants as Wang and CPT. It's generally agreed that users will benefit initially from heightened competition and lower prices but there is the potential for a less competitive marketplace which could be created by a sooner-than-expected industry shakeout. A lot depends on the health of the national economy.

If there is a shakeout, CPT Corp., with some 20,000 systems installed in the U.S. and Europe, doesn't expect to be one of the casualties. When asked if IBM was going to

put his company out of business, CPT chairman and ceo Dean Scheff replied simply, "of course they can't."

CPT's 6000, selling for \$11,000 with a 45 cps printer, is the product that could be impacted by Displaywriter.

Traditionally, CPT has sold its systems outside the areas in which big Fortune 1,000 companies are located. Dick Eichorn, the company's vp of corporate development noted: "It's the big IBM-oriented buyers who will hesitate to make a buying decision if IBM seems to be coming along with a similar product." So, he reasons, CPT is reasonably immune.

CPT hasn't announced any price reductions but Scheff does see some impact on other word processing systems manufacturers.

Xerox was quick to cut the purchase price of its Xerox 850 display typewriter though the firm declined to say whether or not it was due to the market impact of Displaywriter. Previous price of the 850 was \$9,800; the new price is \$7,650.

Reg Parker, national word processing manager for Lanier Business Products, Inc.

STC's Disk Subsystems turn capacity problems into

When you choose STC high-performance disk subsystems, you get all the increased capacity you need, without the problems you don't need. Many of today's high-performance disk subsystems can provide you with greatly increased capacity. But, if this data cannot be accessed when required by your CPU, overall system performance suffers. STC eliminates these problems by offering disk drives which not only deliver high capacity, they incorporate architectural features designed to provide you with enhanced system performance.

Consider the 8650 high capacity disk drive where, for even more responsiveness to your configuration and up-time needs, we offer three powerful enhancements. One provides you with a choice of mapping options for greater flexibility in data set placement and subsystem tuning. Another, STC's optional Media Interchange Switch, reduces the period of time data is inaccessible during hardware outages. Then there is STC's Dual Port feature, which substantially increases both per-

formance and data availability.

Or take STC's 8360 High Performance Disk Drive which combines 18ms access speed with Dual Port to make your subsystem the fastest available today.

Mapping your way to higher performance.

STC's optional volume-interleave mapping places the logical cylinders of primary and secondary volumes onto alternating physical cylinders. This approach greatly simplifies migration, tuning and management, since the high activity data sets of each volume will fall on adjacent tracks — minimizing intervolumne seek contention.

Thanks to the high-speed servo, seek times will be better than those offered by single density spindles.

Given these attributes, volume-interleaved 8650 spindles are ideally

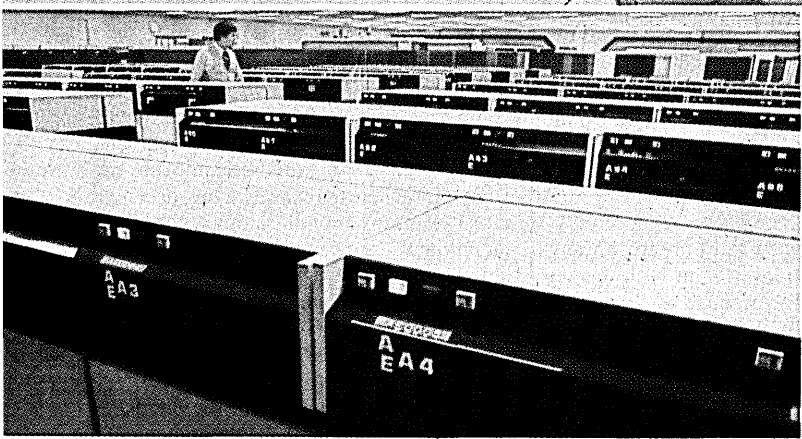
suited for the majority of user DASD storage such as tape file automation, mass storage applications, on-line systems, and low-to-moderate activity data.

STC's back-to-back mapping consolidates the logical volumes in two, separate regions. This approach takes maximum advantage of the dense track spacing and high-speed servo to slash intravolume seek to a mere 18 msec, average.

With these characteristics, back-to-back mapped 8650 spindles are best

*Average seek time is 23 Msec
for either volume.*

*Volume interleaved mapping
alternates cylinders of primary
and secondary logical volumes
to minimize arm
contention.*



performance opportunities.

for special applications which can be closely scheduled and managed. For example, use the primary volume for TSO catalogs and TCAM queues with high prime-shift activity, while allocating the secondary volume to batch data sets run second or third shift.

The Media Interchange Switch: Portable fixed media.

Industry-wide statistics show that most problems occur in the drive electronics, not in the HDA. STC's new Media Interchange Switch (MICS)

Media Interchange Switch lets you recover data quickly in the event of hardware failure.

reduces the impact of electronics-related problems by cross-connecting the HDA of spindle A with the electronics of spindle B (or vice versa). This means that if one spindle goes down, you can access your data through the companion spindle's electronics.

Or you can reserve one or more of your secondary logical volumes as a low-cost subsystem spare, and let MICS give you data portability that approaches that of the old disk pack in convenience.

More paths for your data.

STC's Dual Port option provides path redundancy and improves accessibility. It permits your CPU to access data from any two spindles simultaneously.

Back-to-back mapping places logical volumes in two contiguous regions.

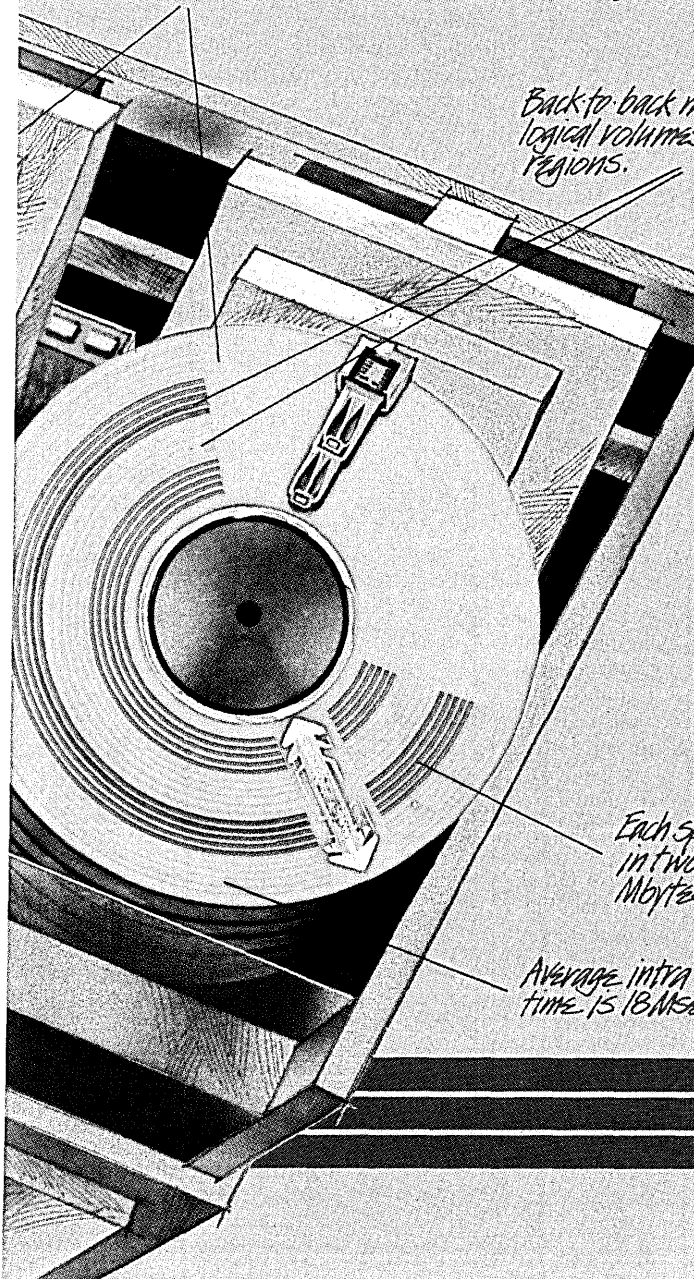
regardless of their location. This produces a data availability factor of 94% and virtually eliminates disk subsystem single point failures.

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Backing up your STC disk subsystem performance are the uncompromising STC Systems Engineers. Using software tools, they'll examine your SMF data and assist you in placing data across channels, strings and volumes for maximum results on your job mix. Once your subsystem is up and running, they'll continue to provide ongoing consultation to ensure your long-term satisfaction.

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STC's 8650 and 8360 are available for immediate delivery. For more information, including our Mapping and MICS Data Sheets, contact your local STC sales office. Or write: Storage Technology Corporation, 2270 S. 88th Street, Louisville, CO 80027. Phone (303) 673-5151.



Each spindle stores 635 Mbytes in two logical volumes, or 1270 Mbytes per unit.

Average intra volume seek time is 18 msec.



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CIRCLE 7 ON READER CARD

WP GEAR GETS SAVVY

THESE DAYS,
WORD PROCESSORS
LOOK A LOT LIKE
FULL-FLEDGED MINIS.

Dr. George Champine went from Univac to Vydec, from big mainframes to lean word processors—but he was surprised at how much technology came with him.

The extent to which mainframe technology has been adopted by wp designers is still not generally recognized, says Dr. Champine, and the ramifications are still not understood. "Essentially all the word processing systems on the market today, even the standalones, are fully general purpose machines and they're getting some fairly sophisticated operating systems with them."

Champine, for over 20 years director of research at Sperry Univac, moved into Vydec as senior vice president for research and product development. Early next year, Vydec will deliver its Pascal based Network system, the first general purpose computer system out of Parent company Exxon's newly formed Office Systems Co. (The \$200 million unit also includes Vydec's sib-



Champine: Sophisticated

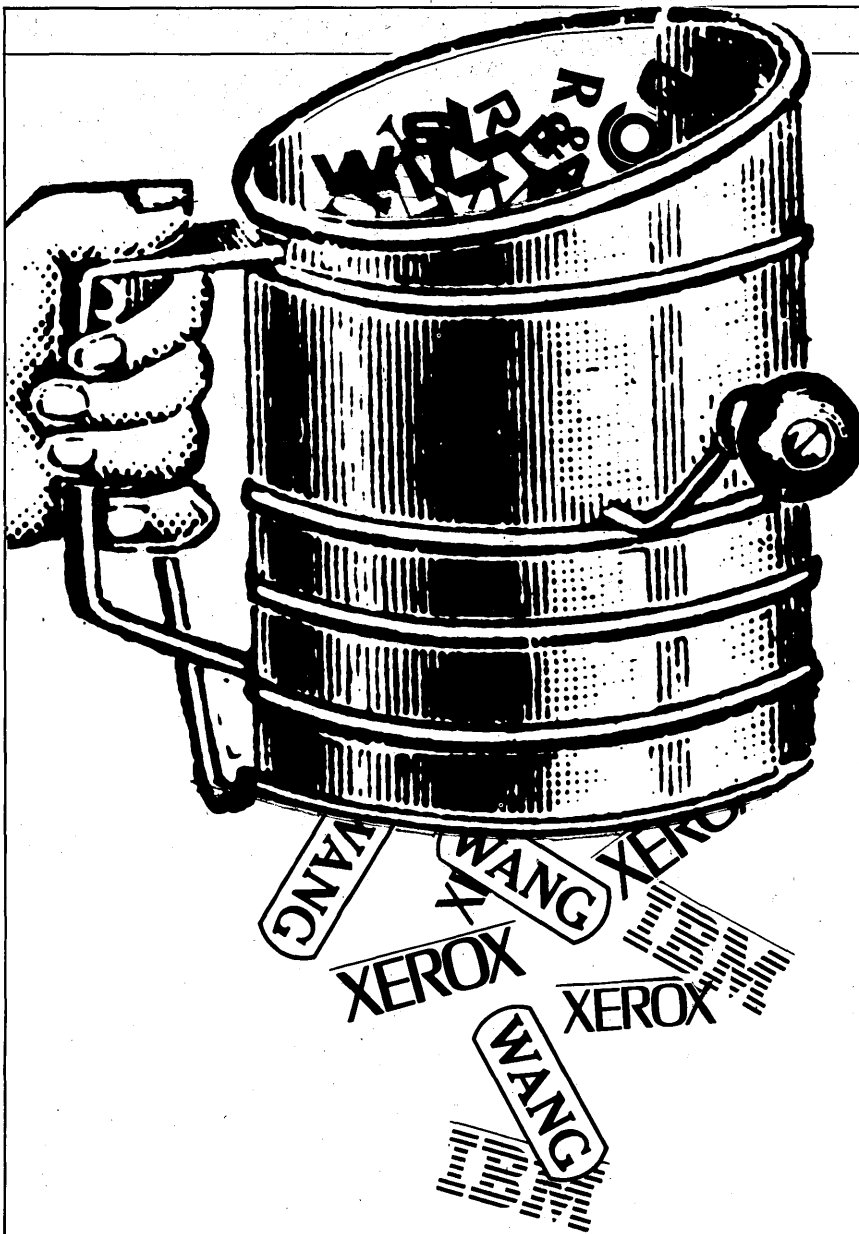


ILLUSTRATION BY RICHARD BECKER

said his company's Solution One, priced at \$12,300 with a 45 cps printer, will not come down in price because "right now all we're doing is comparing apples and oranges. IBM has a low price but Lanier has more features."

A spokesman for AM Jacquard Systems said Displaywriter might impact that company's Model 425 which is priced at around \$13,000, but which has a full screen and a higher speed Qume printer (55 cps).

NBI, Inc. isn't worried about Displaywriter because, said a spokesman, "it's aimed at plain vanilla applications," whereas NBI is selling "growth" systems that enable users who have moved from experimenting with standalone stations to larger systems "to do so by adding on NBI features."

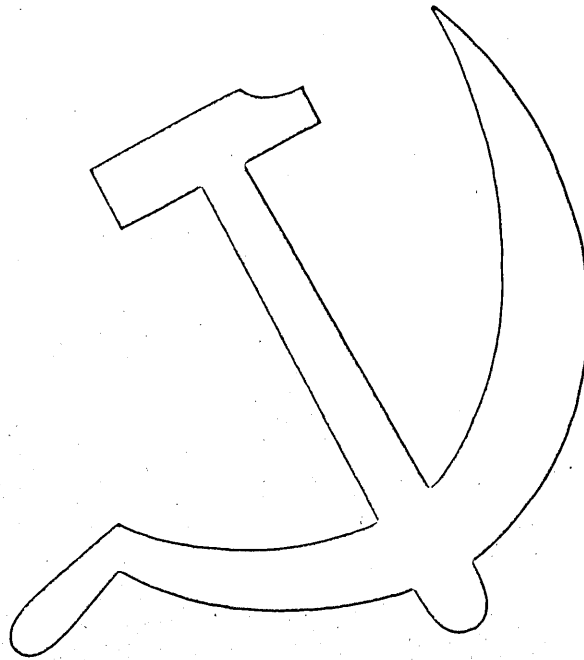
The firm is more concerned with what IBM may do later. "I've predicted that IBM will be the leader in office automation systems," said vp of business development, David Klein, "but with only 25% of the market, not 80% talked of in the early '70s."

At the time of its Displaywriter announcement, IBM did offer a glimpse into the future in a "statement of intent" released to customers. The statement told how the giant will begin tying its various products together, beginning with communication of text documents. Cutting across divisional lines, the integration plans include: the System/370 Distributed Office Support Systems, the 8100 Distributed Office Support Systems, the 5520 Administrative System, the Displaywriter, and the 6670 Information Distributor.

IBM said its three divisions—Office Products, General Systems, and Data Processing—will begin working together more closely. The divisions have competed in some markets and, in some areas, have duplicated product development work.

And as for Displaywriter's price tag, it isn't so low when you add capability. A system of three video display screens sharing a single printer and an automatic paper handler costs \$26,185.

—Edith Myers



The Russians offered a \$500,000 bribe to steal a DBMS.



That DBMS is ADABAS.

Of course, they didn't succeed in stealing our source code. With the help of the FBI, we stopped them. But it was front page news—both in Computerworld and The New York Times. And we think it's dramatic proof of the value of ADABAS.

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Operating system _____

CIRCLE 8 ON READER CARD

MARKETS

lings Qwip-telephone facsimile transceivers—and Qyk—electronic typewriters.)

"This is a little office computer, but it will have a fairly sophisticated multiprogramming operating system with all the normal resource management functions you'd find in a large mainframe—reasonably good file management, security, multilevel directories, and so forth. And the whole system is going to sell for about \$20 with a 20 megabyte hard disk in it."

In advanced systems like the IBM Displaywriter, another standalone word processor, there is a depth of functionality that has not yet been appreciated, Champine says. "At this point, all they are doing is rather mundane text editing functions. But these devices are really general purpose minis, and they have operating systems, and there is going to be just an awful lot of functionality hooked into those operating

systems over the next couple of years."

The potential of these systems is just being hinted at today, declares Champine. "I don't think people understand that in a couple of years when they buy a word processor from *anybody*, they're going to get a full-fledged operating system, a quarter meg of main memory, and a rather sophisticated set of peripherals to go along, including hard disks. And the whole thing is going to cost \$15,000 or \$20,000.

"I think people are going to be astounded at the capability they're going to get. I'm talking about data communications, file management, foreground and background operations with quite sophisticated resource management. I'm talking about security and an impressive range of attachable peripherals."

"Exciting," says Champine. "Quite exciting."
—V.B.M.

"Interface with management to determine its requirements, design the product, and modify the product as management's needs change and technology advances."

link which turns machinery into useful problem solving tools. Teleprocessing networks make this possible on a real-time basis.

The big service firms today, notably National CSS and Automatic Data Processing, are combining several or all of the elements of data communications, hardware, distributed processing, and software into a neat package for their growing list of customers.

A late entrant to the hardware market is giant software vendor Informatics, which will debut its Informaticom work station, essentially a small computer system geared to distributed processing.

Commenting on this trend, one services vendor said, "The real strength of the data services companies . . . resides in their expertise in both specific applications and processing techniques. Producing a total product demands far more than processing transactions in a computer. It involves interfacing with management to determine their requirements, designing the product, and later modifying the product as management's needs change and technology ad-

SOFTWARE & SERVICES

WITH THE ACQUISITIONS OF MINICOMPUTER CAPABILITIES, THE LINES BETWEEN SOFTWARE AND SERVICES HAVE BECOME BLURRED

It's generally agreed that software is what it's all about in the markets of the '80s.

But the image of the software and services market is becoming blurred and fuzzy, particularly with the traditional software and services companies getting into hardware.

It started in the '70s when semiconductor technology and volume production

dropped hardware prices to the point that for a medium-sized user, owning a computer cost about the same as using remote computing services.

In response, service companies entered the hardware business. Today about 2,000 service firms, large and small, offer hardware, usually turnkey systems. For many users, the service firms are the vital

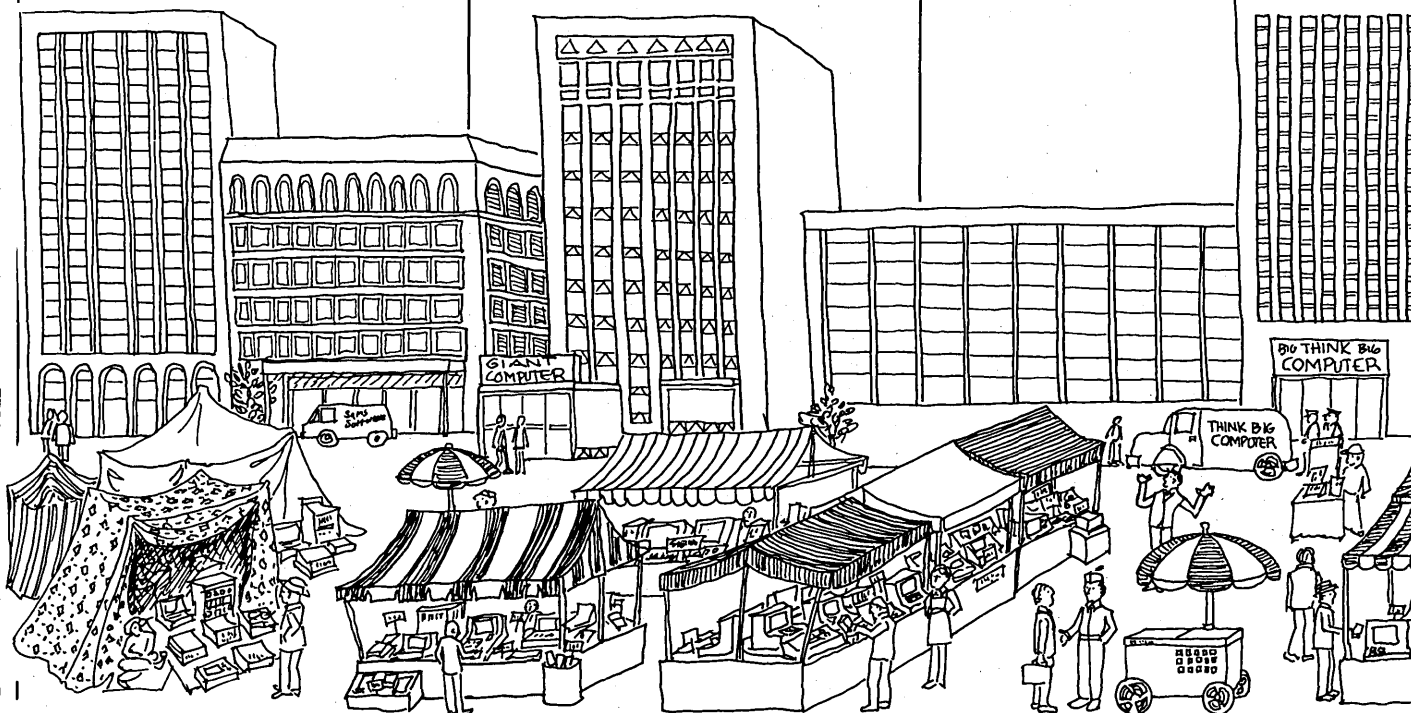


ILLUSTRATION BY SUSAN HUNT YULE

vances.”

Even the smallest bureaus are offering hardware and installing turnkey systems they service and maintain.

“On your computer system or ours,” says the yellow pages ad of tiny Advanced Data Systems, Inc., Long Beach, Calif.

New opportunities are also reshaping the low end of the software and services market—the reemergence of the garage shop. These one- or two-person programming companies have come back because the price drop in hardware has opened computer resources to more than a million small firms who otherwise would only be able to afford accounting machines or outside service bureaus.

Not even the large companies have the resources to tailor applications software to the varied needs of small businesses. Few offer applications programs at all and those that do usually offer highly generalized programs that must be modified to suit the particular needs of a business.

“If every businessman ran his business the same way, we would only need one applications software package for all businesses,” said Dr. Ben Wang, president of Rexon Business Machines. “Not all businesses are the same, however. Each business has its own unique information input, processing and output requirements. This means that each business needs its own unique applications software package, which requires the development of customized software and drives software costs continually upward.”

Rexon and other vendors have gotten around the problem by using what often are called software library networks—packages developed by dealers and made available on a license to other dealers. —E.M.

SMALL SYSTEMS THRIVE

AN UNTAPPED MARKET FOR 1.5 MILLION COMPUTER SYSTEMS IN THE SMALL BUSINESS WORLD

The small, first time user of computers and/or automation equipment is being avidly wooed on many fronts.

Some 100 vendors now offer about 300 makes of computer hardware ranging in price from \$100,000 all the way down to a few thousand dollars. More expensive systems are directed at companies with annual revenues of \$25 million and higher. The very low priced systems are being aimed at an estimated 1.2 million firms with sales of less than \$500,000.

Basic/Four Corp., Tustin, Calif., a major small business computer supplier, would add to this two categories in between: businesses with sales ranging from \$1 million to \$25 million, the market that Basic Four serves and in which it has installed the bulk of its 12,000 computer systems, and businesses with sales from \$500,000 to \$1 million.

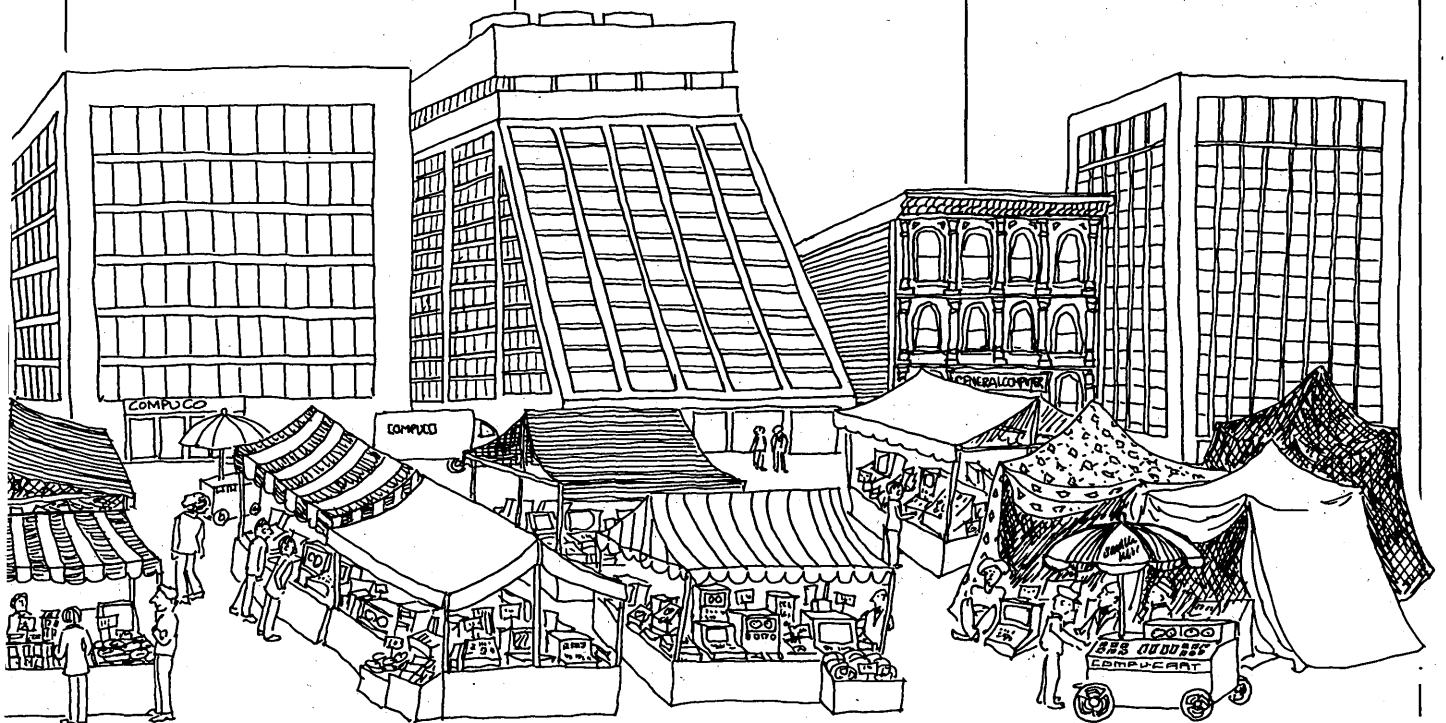
The company said its market studies indicate that in the very small computer class, those with sales under \$500,000, only 9% of that market has been penetrated by the computer. Only 12% of the 400,000 companies in the next class and less than half of the 250,000 companies in the \$1 million to \$25 million class have been penetrated. And there's a market in the very big class of small computers where 30% of the 10,000 companies with revenues of more

than \$25 million still don't use computers.

All this would indicate an untapped market for a million and a half computer systems in the small business market.

Rexon Business Machines, another small business systems supplier, said a study it made last year showed the average price for a larger system with more than one work station was \$43,000. A Pertec Computer Corp. study showed the average price of a smaller system to be about \$18,000. This would mean a market of about \$48 billion, or considerably more than double the worldwide revenues of \$21.8 billion that IBM reported in 1979. And these figures do not take into account the revenues small business computer vendors will receive from customers who will expand their systems.

In its simplest configuration, a small business computer system consists of a central processor, a crt and a keyboard, disk storage and a printer. Size of memory varies widely from 4,000 characters to more than 512,000 characters. Disk storage size also varies widely. The top of the line model 730 sold by Basic/Four has a disk system that will hold from 150 million to 60 million characters. But it's big enough to accommodate up to 32 work stations. A smaller system, such as a low end single station system offered by Cado Systems, comes with



MARKETS

disk storage capacity of 1.2 million characters.

And today's buyers of small business systems want more than computing power. They are savvy enough to know the key to their business is letters and they want word processing.

At least 40 suppliers are now offering word processing programs on computing systems, taking advantage of a strong sales incentive: computer users don't have to duplicate equipment in order to add text editing capability.

It isn't just computer manufacturers that are adding this word processing software. Software houses and oem systems companies are programming computers to incorporate word processing, even though the operating systems of the computers for which they're designed are data processing-oriented and make word processing programming a tricky proposition that con-

sumes excessive amounts of money.

Some computer manufacturers do the same thing. In their haste to take advantage of the word processing sales appeal, they simply write word processing software without modifying their operating systems to accommodate it efficiently. As a result, most of the word processing software today is limited to simple text editing and requires material to be entered as a continuous string of text, including imbedded instruction codes, in a specific area of the screen.

Large computer suppliers, so far, seem only to be offering word processing software on their large systems intended for a multi-user environment.

Standalone or distributed computer suppliers, whose primary market is the small business or the functional department of a large corporation, are rushing to add word processing software, usually as an option.

—E.M.

From "caveat emptor," to "the customer is always right."

Not quite. But computer and office automation markets are moving from being technology driven to being more turned on to the needs of the users.

A clear manifestation of this is the move by a number of big manufacturers into retailing.

Digital Equipment Corp. started it all when it opened its first retail store in a mall in Manchester, New Hampshire in July, 1978. "It's been a learning experience for us," said a DEC spokesman. "We're sitting back now and digesting the data on how to reach the small first time user. We're learning how to staff and how to sell; that we need more applications software."

DEC was up to a high of 27 retail stores coast to coast and now has 25. "We closed one and consolidated two," said the spokesman. The consolidation was of two New York City stores one of which was on Wall Street. "We found out people on Wall Street don't buy computers." The closed store was in Detroit. "The site location was not as good as we had expected."

Coincidentally, a spokesman for Xerox Corp., which began opening retail

JUST 'ROUND THE CORNER

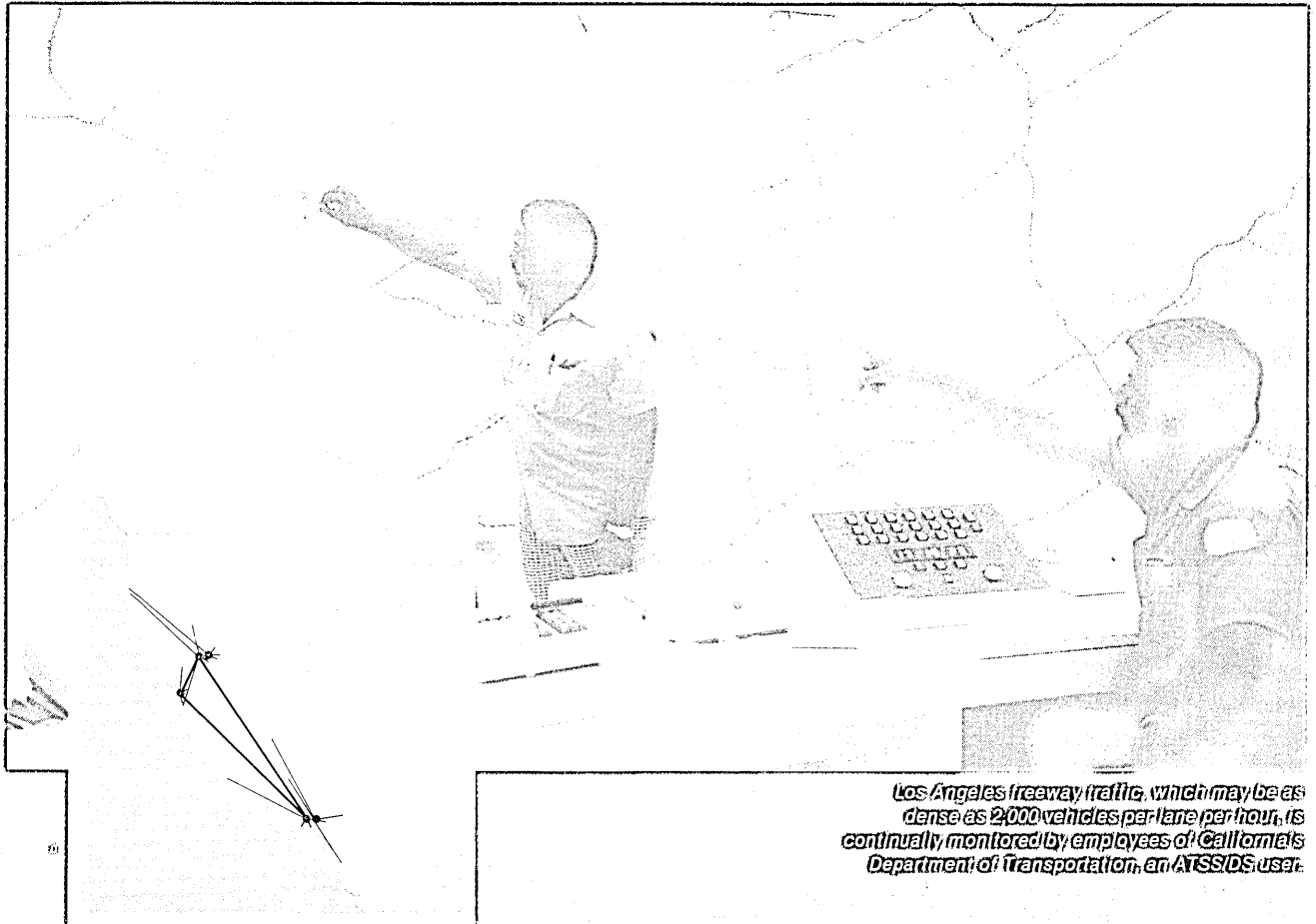
THE RULES ARE CHANGING,
AND SO ARE THE PLAYERS.



stores last April, when asked about criteria for site selection, listed a healthy economy and good growth conditions and added, "we wouldn't open a store in Detroit."

Xerox has three stores in Dallas, three in Denver and one in Hartford, Conn. The company expects to have 14 or 15 stores by the end of the year with Houston, Boston,

Pacific's ATSS/DS Network...



Los Angeles freeway traffic, which may be as dense as 2,000 vehicles per lane per hour, is continually monitored by employees of California's Department of Transportation, an ATSS/DS user.

...is also a Tran Network.

When a California state official near the Mexican border wants to check license plate files in Sacramento, his local terminal immediately connects him with computers in the state's capital. When an engineer in Los Angeles needs data from Sacramento, her inquiry is switched to computers in that city. When a researcher at an educational institution in San Francisco uses a program residing in a Los Angeles computer, on-line access is only a few keystrokes away.

Pacific Telephone's digital network makes it all possible. Called ATSS/DS, it is the first statewide switched digital network to be offered by a common carrier, the first packet switching network to be tariffed by a Bell System operating company, and the first to provide mixed packet and

nonpacket services simultaneously.

Stretching from the Oregon border to San Diego, from San Bernardino in the east to San Luis Obispo in the west, ATSS/DS ties the entire state together through switching centers in San Francisco, Los Angeles and Sacramento. It provides permanent and switched circuits between more than 400 terminals, 35 network access concentrators, and 250 ports on seven computers (including DEC, IBM, Control Data and others).


Users access the network for inquiry/response, data collection, remote job entry, time-sharing and even point-to-point message switching — all without concern for how the network will accommodate them.

In spite of its widespread topology, Pacific's network is an integrated facility with centralized management, billing, diagnostics and status reporting. And in spite of its already large size it continues to grow to meet customer demands. Nor will the state long remain the only one with such a network — California simply has a head start on the 1980s.

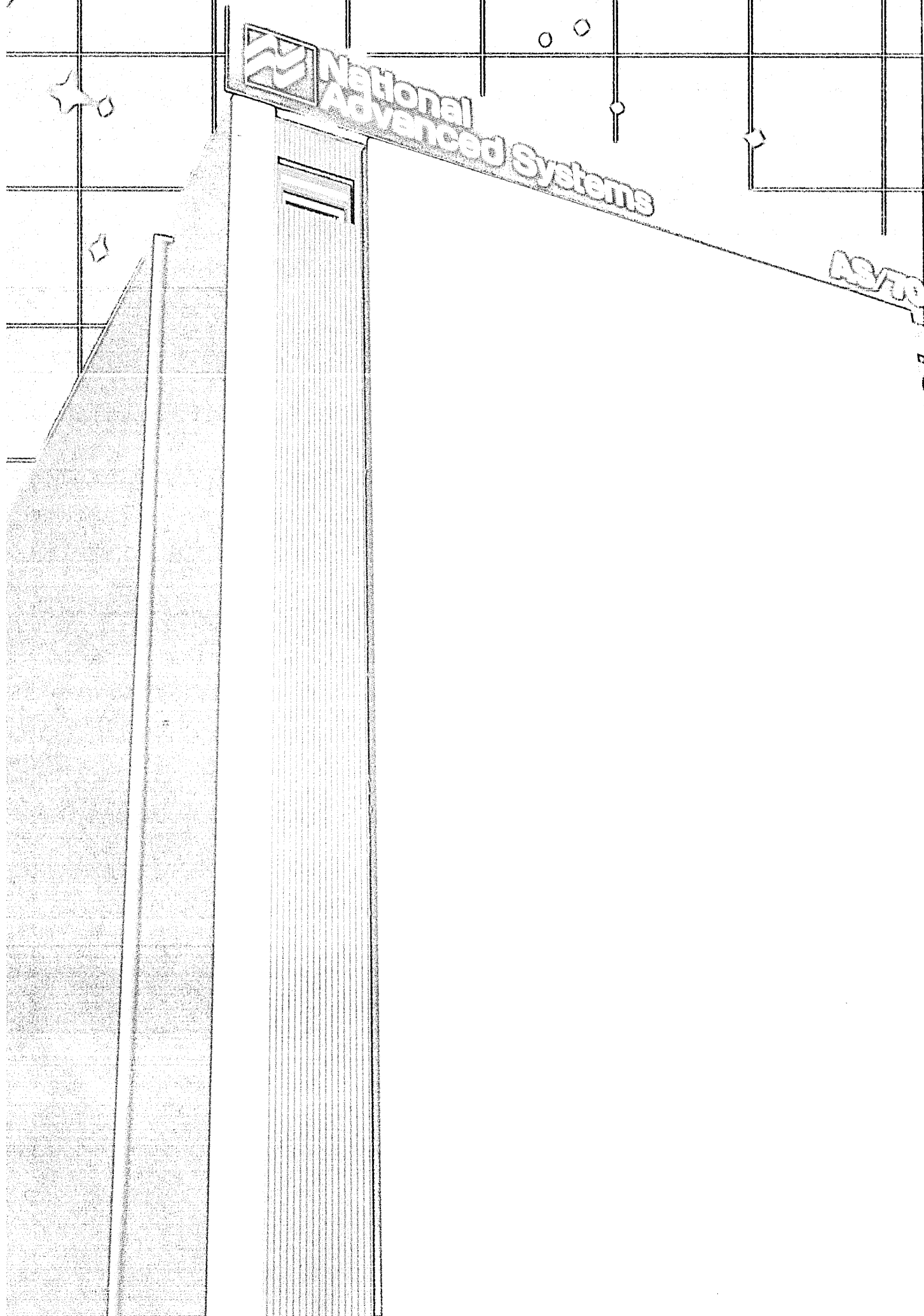
Tran has installed several such networks for telephone operating companies, and many more for educational and financial institutions, government agencies, and users in private industry in the United States and other nations. As a result, Tran now has more international experience in constructing digital data networks than any other communications company in the world.

CIRCLE ON READER CARD

tran TELECOMMUNICATIONS CORPORATION

 National
Advanced Systems

AS/TS



What it means to be the worldwide leader in IBM-compatible computers.

At National Advanced Systems, we offer the broadest range of IBM-compatible computers on the market. Our systems have met with unprecedented customer acceptance. In fact, we now have the largest installed base in the entire industry.

This leadership position isn't one we take lightly. We've dedicated ourselves to providing complete data processing solutions which help decrease your cost of doing business. And that's especially important in these times of recession, inflation, and high interest rates.

Why compatibility?

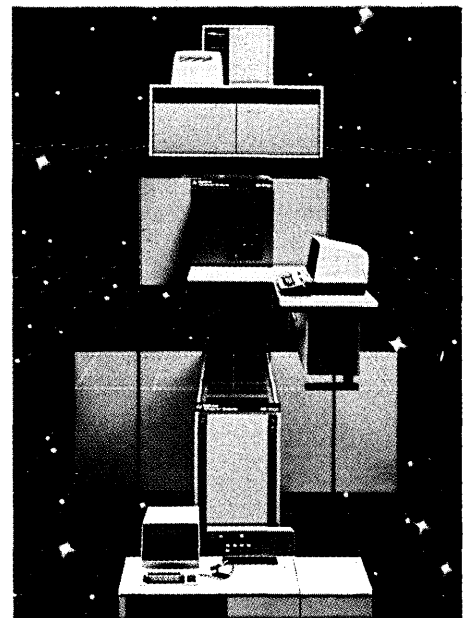
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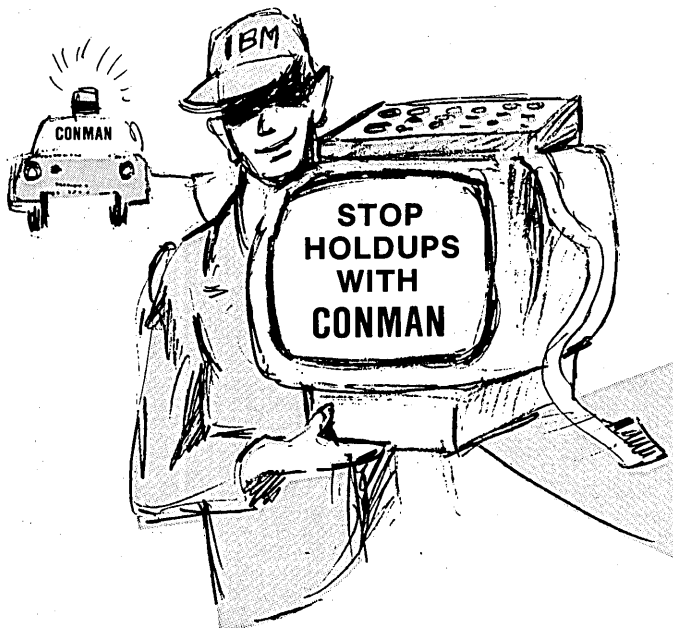
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MARKETS

Minneapolis/St. Paul, and London as previously selected locations for one or more outlets. The chain of stores is expected to be coast to coast by the end of 1981.

Xerox was the first manufacturer to open stores selling more than just its own equipment. In addition to its own brand of copiers, electric typewriters, word processors and telecopier units, its stores carry office products from Apple Computer, Hewlett-Packard and Panasonic. Xerox says its intended image is that of "a super-market for the office," offering small business computers, calculators, dictating equipment, telephone answering machines, security systems and on-line data base access services. Supplies for all products and a wide selection of other office needs from binders to staplers are kept in stock.

Control Data Corp. will carry lines of a number of vendors in its stores, first of which was to have opened in Minneapolis last month. By mid-September CDC had signed a contract to sell Ohio Scientific Inc.'s full line of personal and small business systems in the stores and was negotiating with Apple Computer and Atari. It also was expected that CDC, which recently signed a multimillion dollar contract with Data General to buy Nova and microNova processors, would put those in its stores as well. The Control Data retail chain is expected to number in the hundreds within 18 months.

Data General has no plans to get into retailing on its own but a company spokesman said the firm's products are carried in approximately 75 retail stores nationwide, some chains and some independent.

IBM doesn't have retail stores per se in the U.S. but it does have stores in Brussels, Paris, Lyons, London, Buenos Aires selling typewriters and office products.

In the U.S. the computer giant comes close to the retail level with its 50 Business Computer Centers and 20 mini Business Computer Centers. These are part of the firm's General Systems Div. and typically are located at the division's branch offices, usually on the ground floor. A few are in industrial shopping centers.

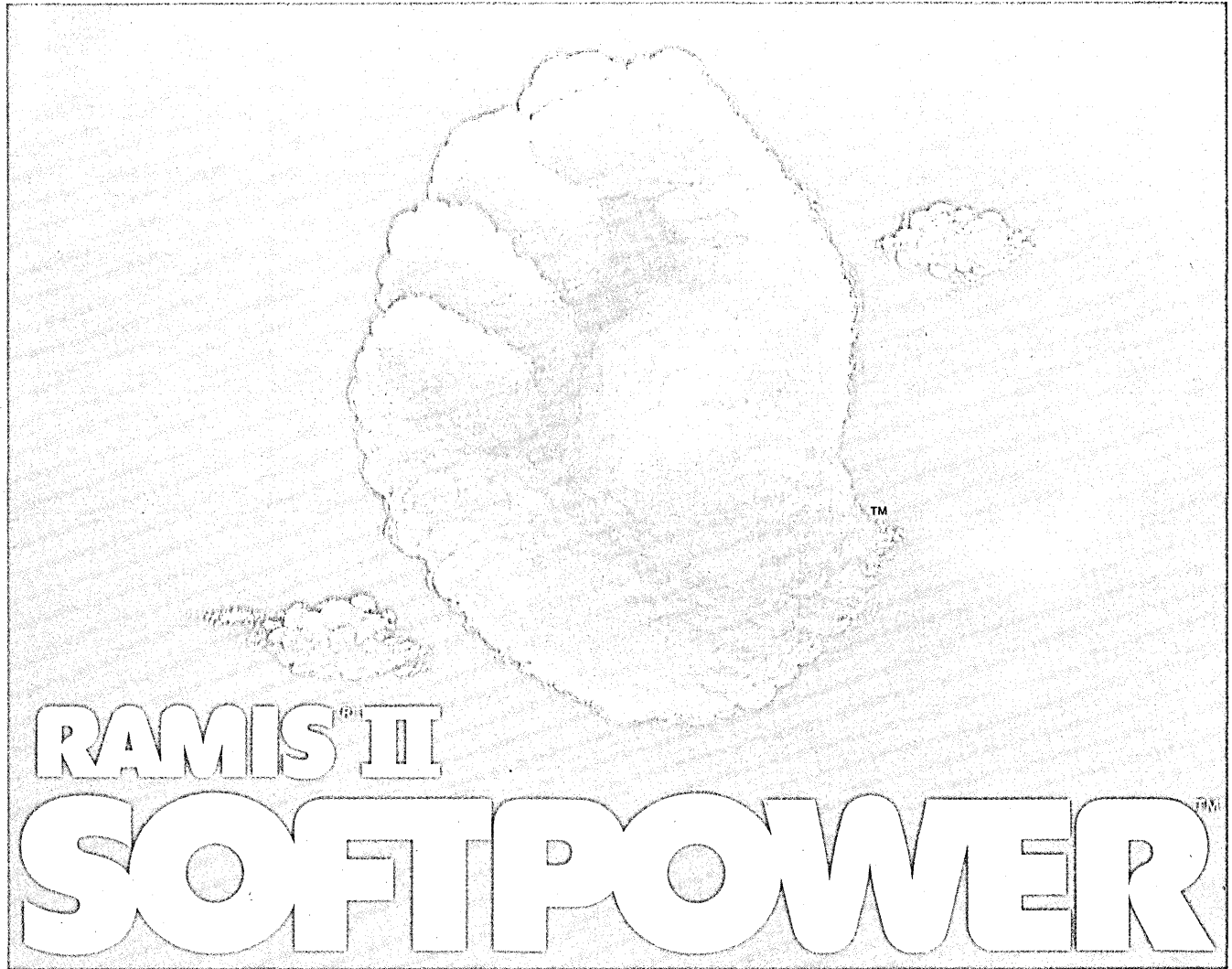
IBM conducts half day seminars at the centers and advertises these via local radio and print media. Customers typically will phone for a reservation but some do come in off the street and equipment can be, and is, purchased off the floor.

A similar approach is being taken by Hewlett-Packard which says it has no plans to get into retailing at the store front level. "We have the ability to demonstrate equipment on the spot at H-P sales offices," said a company spokesman. "In some cases customers do buy off the floor but typically not, because we offer a number of options."

He said equipment from H-P's calculator operation in Corvallis, Ore., including the HP 85 personal computer, is "available in many retail stores, including Macy's."

—E.M.

Most installations have a 2-3 year backlog of unimplemented applications



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Franelle: "Right now we have ten different data centers to serve our clients. We need not only the capacity to handle the volume, but also the flexibility to handle the complexity of our operations. That's why we chose Control Data's 3211th Fastrain printer—it gives us almost twice the throughput of a 1403 and yet it's completely compatible with our hardware and software. The Fastrain even accepts our existing carriage control tapes, so conversion is transparent and painless."

Gage: "We were also impressed by its print quality and reliability. Both were exceptional, given that it operates at 2000 lines per minute."

Franelle: "That's right. In one three-month period it cranked out more than 60 million lines with perhaps one hour of downtime. I think that's pretty good reliability."

Gage: "We're getting almost twice the speed and print quality that's as good if not better. We're getting service and support whenever we need it. We're getting greater ease of operation and greater ease of conversion. For us, the Fastrain was the better business decision."

Perhaps our Fastrain printer is the better business decision for you. Call 612/553-4029 or contact your Control Data representative.

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TECHNOLOGY

We've all heard much lamenting over the lag in R&D during the last decade. We also know U.S. productivity plummeted during that 10-year span. And we know that in some industries, at least, a lead in innovation was lost to creative companies in other countries.

What many of us don't know, however, is just what caused the R&D slump of the '70s. More importantly, we aren't too sure whether to view productivity in the '80s with alarm or optimism.

These very unknowns, and many others regarding technological innovation, were examined in a survey of U.S. business leaders conducted by Yankelovich, Skelly and White, Inc., under contract to Sperry Corp. What's particularly significant about this recently released survey is that it's one of the first in which U.S. corporate executives have been polled on their views of industrial innovation.

Not surprisingly, the survey report points out that business leaders find it difficult to assess the future of R&D in terms of either optimism or pessimism. Instead, what the Yankelovich group found is that there does exist "a real desire on the part of American business executives to take a hard look at the factors limiting technological innovation in this country." Furthermore, the report states, the attitude of survey respondents can best be described as "deep concern which calls out for new forms of cooperation between industry, government,

BUSINESS READY TO UP R&D

A SURVEY OF EXECUTIVES BY SPERRY CORP. SHOWS AN IMPROVED R&D OUTLOOK IF INNOVATION POLICIES ARE REDIRECTED.

finance, academia, labor, and other key groups in the country."

First, survey respondents were asked to assess the reasons for the "unfavorable" climate for innovation during the last decade. (Two out of five execs, by the way, do believe their respective industries suffered an innovation lag in those years.) Respondents came up with two major factors that served as innovation inhibitors:

- Government actions, particularly regulations (cited by 66% of the execs) and tax policies (53%), were given as the primary deterrents to innovation.
- Another major hindrance to innovation was the economic climate, characterized by inflation (52%) and shrinking markets (43%).

Indeed, the surveyed execs most frequently mentioned two factors that actually encouraged industrial innovation during the '70s—foreign competition (54%) and rising

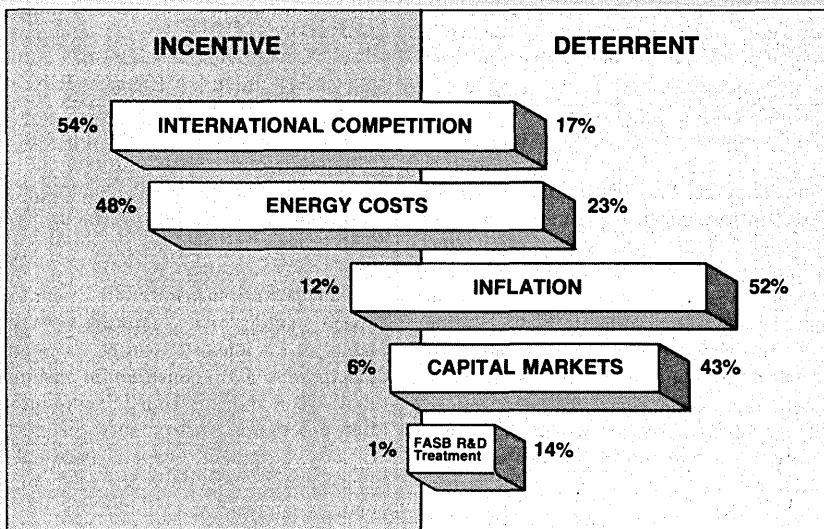
energy costs (48%).

In addition to those two innovation incentives, business execs mentioned one more—the spread of microelectronics technology—to complete their list of factors that pose challenges necessitating an increased business rate of technological innovation for the '80s.

Executives expressed the belief that microelectronic devices will be incorporated into more traditional product lines and there will be increased internal use of computers for production, administration, design and scientific research. In fact, this spread of the microelectronics revolution from the industries which pioneered this technology to other industries is considered the dominant force for innovation in the '80s.

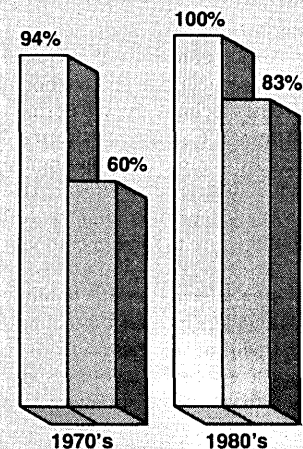
Outside the microelectronics industries, 68% of the execs said that their expectations were for a "much higher" or

IMPACT OF ECONOMIC CLIMATE ON INNOVATION



Source: Yankelovich, Skelly & White

BUSINESS EXECUTIVES RESPONSES



EXECUTIVES PLACING INNOVATION CENTRAL TO BUSINESS STRATEGIES

- MICROELECTRONICS INDUSTRIES
- OTHER INDUSTRIES

"WE WILL SEE GREATER UTILIZATION OF THE COMPUTER ON THE FARM, BOTH AT THE HOMESTEAD AND ON EQUIPMENT. FOR EXAMPLE, IT WILL BE USED TO COMPUTE THE GROUND SPEED AND PLANTING SPEED FOR OPTIMAL FUEL UTILIZATION, TELL THE FARMER WHEN EQUIPMENT ADJUSTMENTS SHOULD BE MADE, ENABLE HIM TO KEEP TRACK OF HIS COSTS, AND GIVE HIM GUIDANCE ON HOW HE COULD BEST TAKE ADVANTAGE OF THE MARKETPLACE."

—FARM/CONSTRUCTION
EQUIPMENT
INDUSTRY EXECUTIVE

"somewhat higher" innovation rate in the '80s than in the '70s, while 83% believe that innovation will be central to their business strategies.

Within the microelectronics industries, 48% of the execs think that the innovation rate in the '80s will be "much higher" or "somewhat higher" than in the '70s. One hundred percent of these executives believe that innovation will be central to their business strategies. Also, microelectronics execs see a refocusing of research efforts to give greater emphasis on software to fill user needs as well as forward integration into customers' industries.

Business execs concurred that, taken together, foreign competition and the boom in microelectronics technology will define a "new competitive environment," characterized by rapid technological change. If U.S. industries don't up the pace of innovation, they feel, this country will lose the technology race to foreign competitors.

As for microelectronics technology alone, business leaders foresee this technology dramatically influencing R&D efforts in most other industries. Specifically, respondents indicated they expect the interactive capability of microprocessor technology to cause innovation to occur from a "systems" perspective, with less emphasis on components. They also anticipate that the expected forward integration by microprocessor-based companies into customers' industries will cause a blurring of industry distinctions. Additionally they look for three industries—electrical, leisure

time, and industrial machinery—to be forced to reexamine their product development strategies.

While high energy costs provided an incentive for innovation in the '70s, execs believe that these costs will offer an even greater incentive in the '80s considering that fast paybacks from conservative measures are now possible, and there is a growing market demand for new energy efficient devices.

Despite these three incentives, executives are undecided as to whether the sad state of technological innovation in the '70s will actually improve in the '80s. On one point, however, they were quite decisive—that U.S. government policy changes are a requisite for successfully meeting the foreign challenge.

While direct government subsidies as a means of support were considered taboo by four out of five execs, some preferred alternatives were suggested: a revision of tax policies to provide incentives for reinvestment; a more reasonable and consistent approach to regulation; greater funding of university research as well as improvements in the current educational system; and relaxed antitrust laws so that cooperative research on specific industry problems would be allowed.

"Pessimism is nearly as prevalent as optimism," the Yankelovich report states, "that favorable government policy changes will occur in these critical areas."

What's more, there's not a lot of optimism for improved economic conditions. One out of five executives believes that inflation will serve as an even greater deterrent to innovation in this decade; only one in 10 believes inflation will be less of an inhibitor.

As for education, a grave concern of executives from microelectronics-based companies is the shortage of electrical engineers in the U.S. "This is seen as a serious problem," the report says, "since the spread of microelectronics will place greater demands on those capable of adapting this technology to meet diverse needs."

Executives also admit that they too are part of the constraining factors in innovation. They believe that corporate policies result in research and planning that's targeted to the short term. In fact, three out of four execs feel that incentive plans reward performance only in the short term and thus limit risk-taking projects for the long term.

Perhaps more significantly, the survey found that one out of three executives believes that most senior managers are not thoroughly conversant with technological concepts, and therefore a low priority is often assigned to innovation.

Although the majority of U.S. business claims it is willing to commit more resources to enhance R&D, many industries see themselves handicapped by such factors as government regulations (a serious concern for the chemical, drug, fuel, and per-

sonal/home care industries); limited access to capital (a particular problem for the semiconductor, information processing, telecommunications, and electronics industries); and new competitors using new technologies (a consideration for the electrical, industrial machinery, and leisure time industries).

Looking at the plight of these industries, the Yankelovich group asks an important question: "Should encouragement of business innovation become an objective of public policy?"

The answer that was given in the report is that the responsibility for increased innovation must be assumed by both the government and the corporations. It suggests that a public policy on technological innovation in the '80s would need to consider four major issues: more consistent and balanced regulatory policy; reduction in the competitive advantages now enjoyed by foreign competitors; an increase in the availability of venture capital; and additional incentives provided for innovation.

The responsibility of the corporation is to change corporate policies to remove organizational impediments to innovation, while at the same time emphasize a longer term outlook, better systems to evaluate technological innovation, incentives for management that are tied to longer term factors which encourage innovation, and a positive effort to assist government in developing policies to spur innovation.

"Total opposition to regulations is unlikely to succeed in repealing the laws or avoiding new laws," the report states. "But a business program which acknowledges the public interest and emphasizes safeguards and solutions to potential hazards can be successful."

—Becky Barna

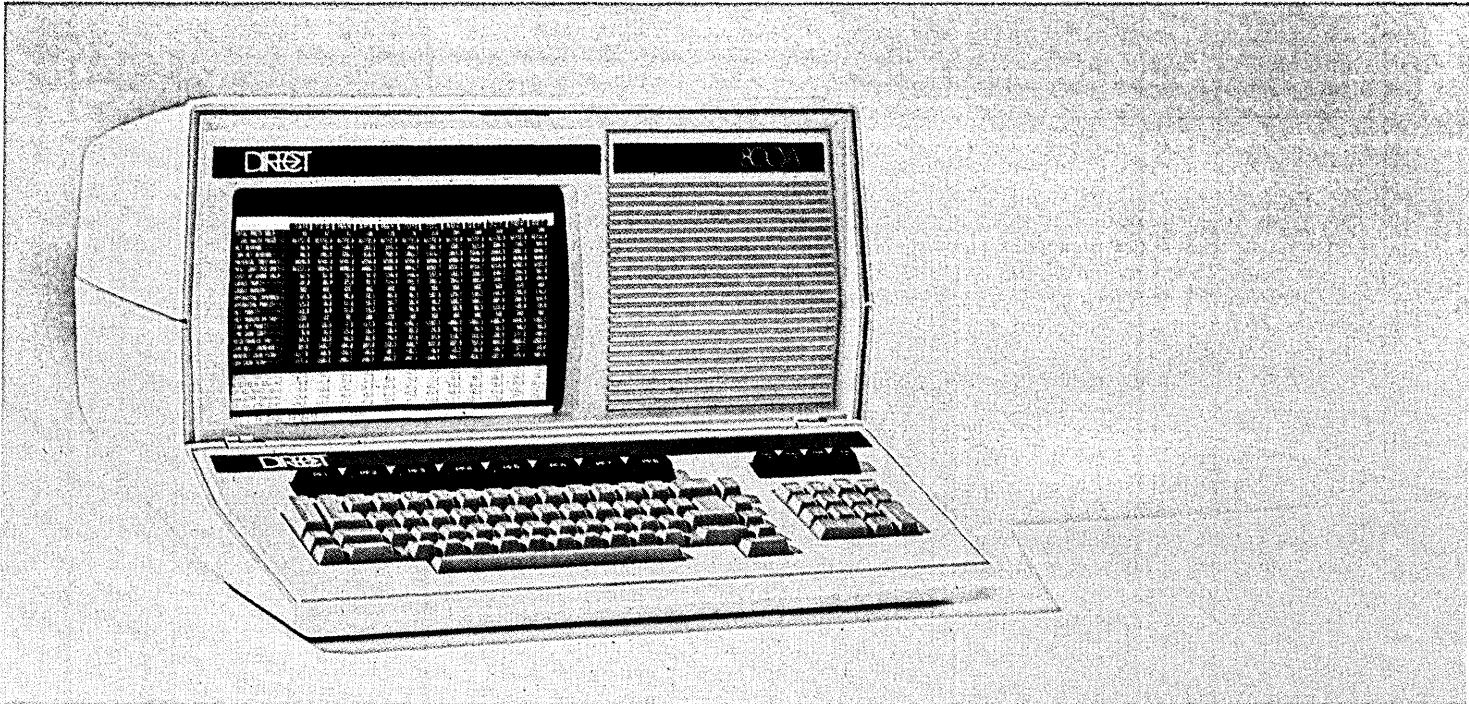
HOW THE SURVEY WAS CONDUCTED

The Yankelovich survey of corporate executives, titled "A Business Perspective on Technological Innovation," consisted of 101 personal interviews with top corporate executives representing 20 industries with the highest commitment to technological innovation. Of those businessmen, 59 were R&D execs and 42 were senior operating execs.

The 20 industries studied were aerospace, automotive, automotive components, chemicals, drugs, electrical, electronics, farm/construction machinery, food, fuel, industrial machinery, information processing, instruments, leisure time, office equipment, paper, personal and home care, semiconductors, telecommunications, and tire and rubber.

Three to seven companies were interviewed within each industry. The criteria for company selection was twofold—industry leaders, and smaller companies devoting a large percentage of sales to R&D.

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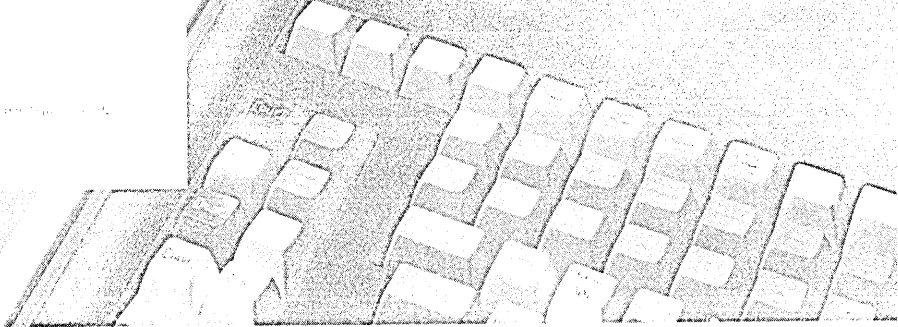


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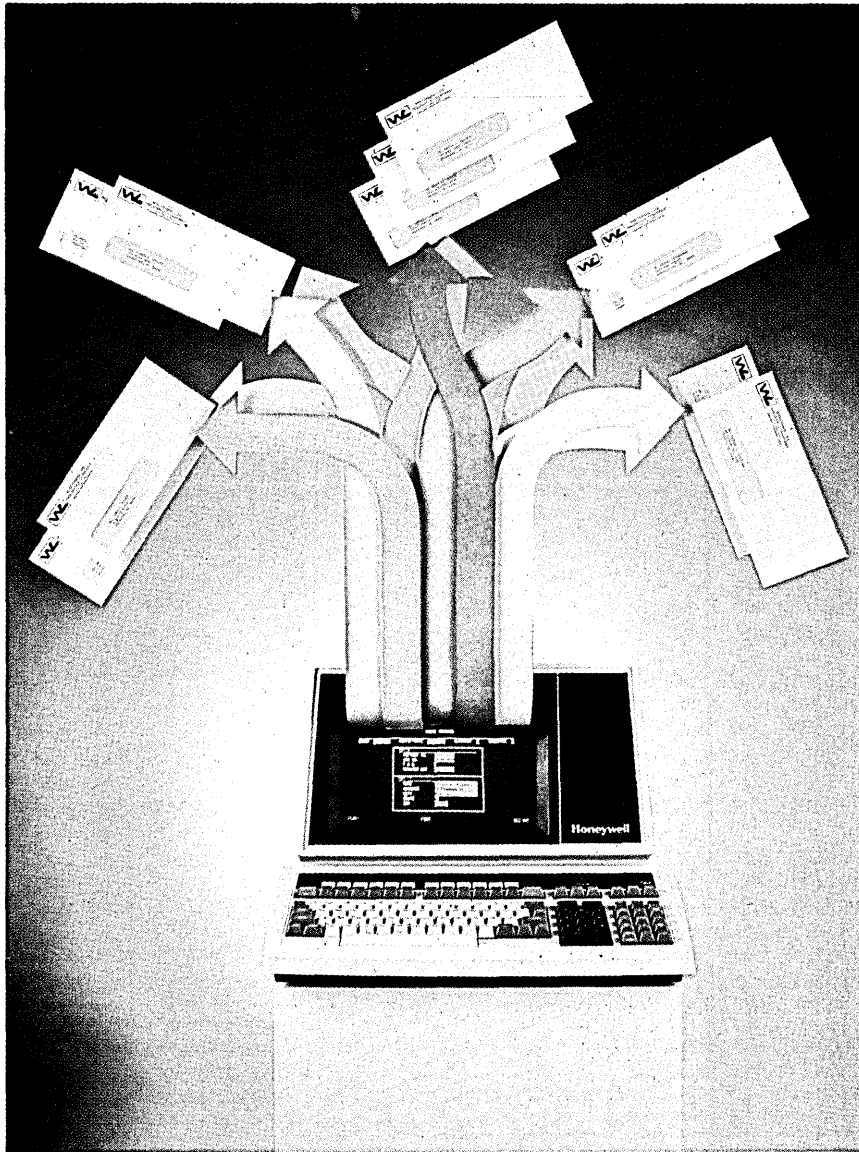
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The Level 6 has also been helping Wisconsin Life develop new applications for their transaction processing capability. For instance, there's a program in the works now that will enable them to process all new business on-line.

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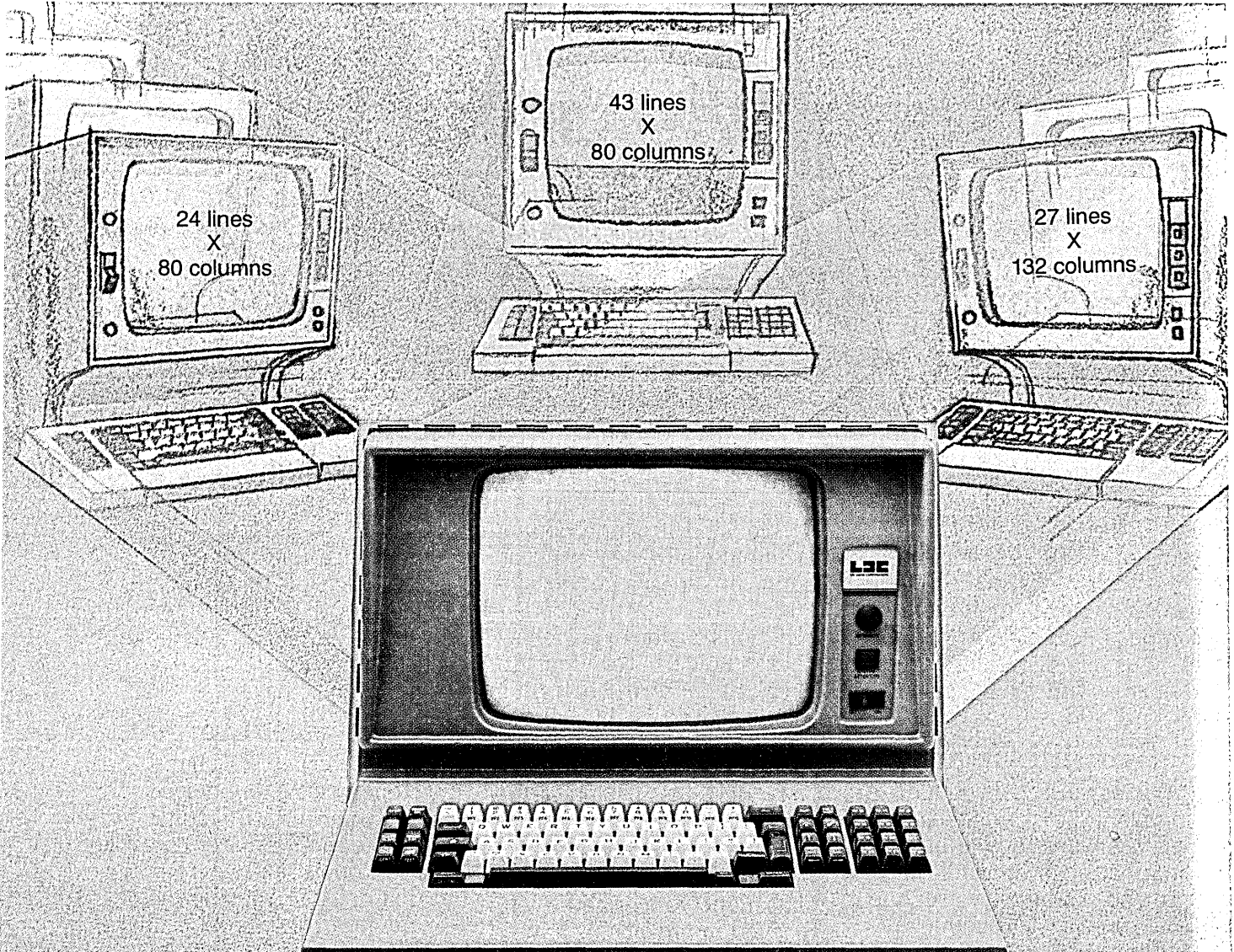
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TELECOM CHANGES COMING

THE IDEAL ALTERNATIVE WOULD BE AN END-TO-END LINK THAT WOULD PROVIDE A NEW TRANSMISSION PATH, AND PROBABLY A NEW TECHNOLOGY.

Telecommunications managers have learned to be a patient lot. Having been bombarded with sizzle so long by both carriers and vendors, they have come to appreciate even small morsels of steak.

Probably no other user group has been

told so often that things are going to be so great, if only . . . In the meantime, these telecommunications keepers of the corporate networks must be able to look through the rose colored marketing smoke and chart a path for their company's communications

from three to five years down the road.

The odds against guessing right under these conditions do not seem good. And yet, the majority of corporations have networks that meet their communications needs with relatively good efficiency and in most cases reasonable cost.

The answer to this seeming paradox lies in the fact that most telecommunications managers take conservative approaches to solving their network needs, which may seem strange in an industry that prides itself on fast-paced technology.

Most networks today are based on private line facilities to which users have added a variety of specialized hardware and software to meet specific application needs and operational patterns. These nets evolved as users acquired the detailed knowledge necessary to better define their needs.

So these custom tailored communications systems are now under siege from a



ILLUSTRATION BY RICHARD EGIELSKI

TECHNOLOGY

variety of suppliers who promise to improve operations at lower cost with greater efficiency. It goes without saying that the telecommunications manager who has nursed his network to its current level will not jump at the chance to make wholesale changes.

But change is coming. And the users probably understand that better than anyone. They are the ones who have learned to live with the limitations of currently available facilities. And that means they also are the ones who have a keen appreciation for where significant improvements can be made.

A look at the shortcomings of today's networks is an effective way of pointing to areas where improvements can be expected in the next few years.

Virtually all network links must rely on local loops. These telephone company access lines between the user site and the nearest terminal point of the common carri-

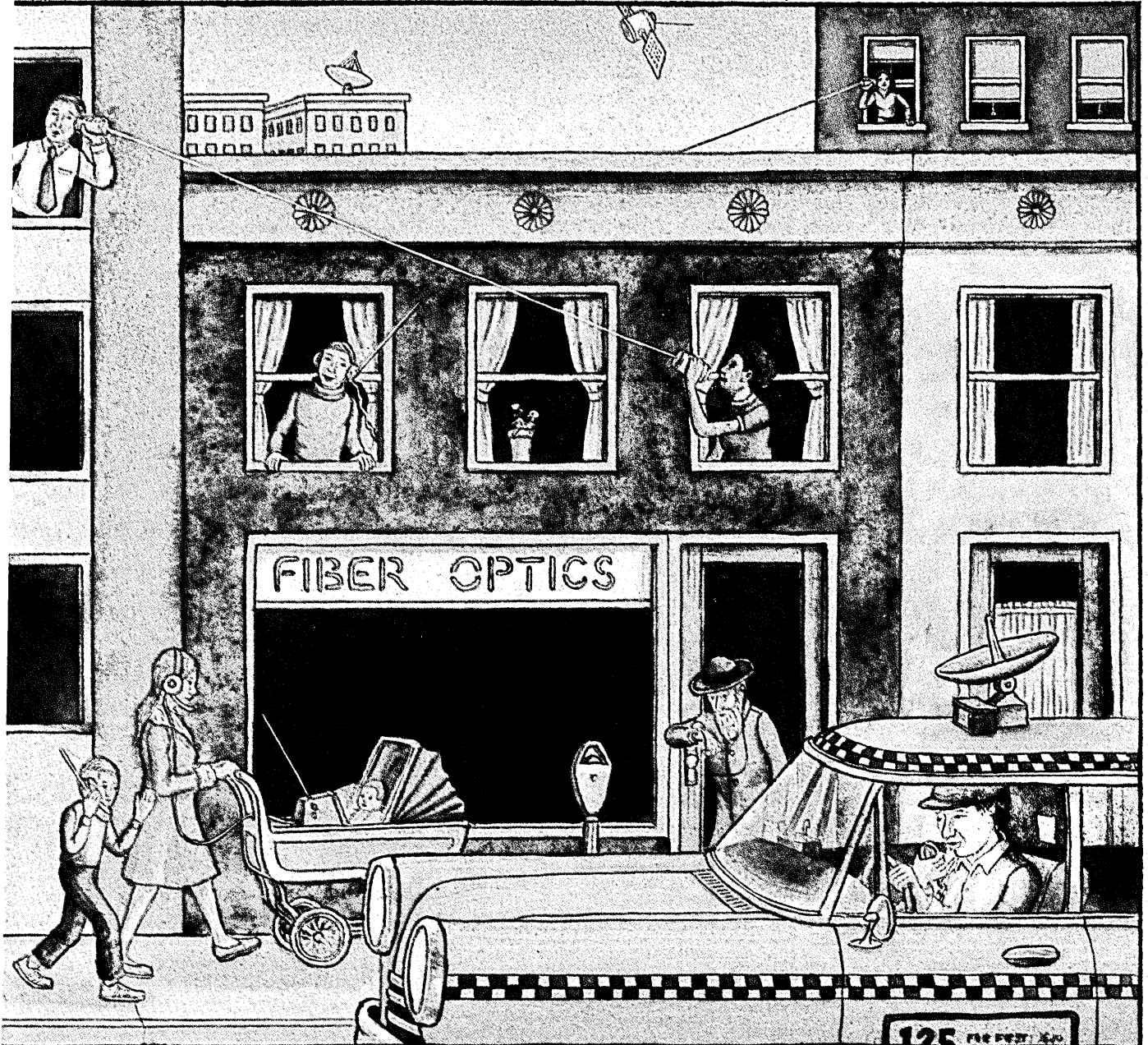
er are usually archaic by today's technology. Invariably, these are copper wire with limited data carrying capacity and often high vulnerability to service interruptions.

The ideal alternative to the local loop would be an end-to-end link that would provide a new transmission path, and quite probably a new technology. Satellite Business Systems has for several years been

Many private nets have specialized equipment for control and management functions."

trying to convince users that an earth station on every roof is the ideal alternative. But given the high cost of satellite antennas, only the largest users can justify this solution—although antenna costs are dropping. There are also tests with cable tv facilities in cities that have such cables in downtown business districts. And cellular radio, a broadcast radio technology, is being examined. Using light waves or wave guides may also be feasible. But widespread availability of low cost alternatives is still years away.

Inside the user's building, more and more devices are being interconnected. Word processors, intelligent copiers, electronic mail, the dp center are all being hooked together in an effort that someday will lead to multifunction corporate networks. Much work is being done on local data networks to provide common interfacing wherever needed for a variety of busi-





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TECHNOLOGY

ness machines. Companies such as Ungerman-Bass and Xerox with its Ethernet are working on local network solutions.

And the interfacing needs are not limited to data transmission. More and more users are finding ways to combine data and voice over common facilities. One way this can be done is through a new breed of supercontroller PBX that can handle voice, data, facsimile, teleconferencing, and the many other functions being projected for the integrated network. Intecom, the new Exxon subsidiary, has this system, and companies like Northern Telecom, Rolm, and even IBM (overseas) are edging in that direction.

In the network area, the public data nets are offering services that often look more attractive than dedicated private lines, in certain situations. Many telecommunications managers are adding selected public links to see how well they can be integrated into the private line environment. Telenet and Tymnet links with value-added features offer advantages that include usage only on demand, but they raise questions about compatibility with existing applications, existing transmission speeds, and public versus private network security.

Many private nets now have specialized equipment for control and management functions. These network control systems from such vendors as Racal-Milgo, Intertel Inc., and Codex are often designed to monitor, diagnose, and test private links and they may have limitations on public network facilities.

Users with large mainframe-oriented nets may have communications systems based on network architectures such as IBM's Systems Network Architecture (SNA). These environments frequently have restrictions or degraded performance when nonprivate lines or other vendor equipment is used. On the other hand, the minicomputer makers like Digital Equipment Corp. offer architectures like Decnet, or Data General's Zodiac. These are oriented toward peer-coupled networks of multiple distributed processors instead of the large mainframe approach traditional with vendors like IBM.

Then there are international standards like X.25 which may or may not work with the user's existing network structure. And propagation delays can be encountered on satellite links, which may cause the need for software modifications unless the user installs special devices such as the Satellite Compensation Delay Unit available from American Satellite Co.

And there are protocols that work with word processing but not with dp equipment, thus requiring special translation units such as those offered by Telesystems Network Inc.

Up to now, the network suppliers have provided only limited value-added features. Telenet and Tymnet, plus American Satellite, can accomplish many of the routine

conversion functions needed by users, but specialized needs are usually programmed by the customer for his or her on-site equipment.

There are new options such as Faxpac from ITT, which promises to allow communications between otherwise incompatible facsimile devices. And Satellite Business Systems will handle voice, data, documents, teleconferencing, and much more—if the user is willing to shift all his operations to SBS.

The satellite carriers typically have all-digital links, but they still connect with analog local loops if the user does not have his own antenna. AT&T offers its end-to-end Dataphone Digital Service in selected cities, but the user cannot use his network management systems designed for analog nets.

The situations and vendors mentioned are by no means meant to be all inclusive. Instead, they are only a snapshot of the never ending options and trade-offs that daily face the telecommunications manager. In many cases, innovative users work side by side to find solutions to network problems. The vendors are very much aware of networking complexities, and one of their major concerns is to avoid the introduction of new capabilities that will obsolete existing systems already in operation.

So what is the ideal network and when will it become available? In the late 1970s, network experts felt packet switching was the answer. Today there is talk of hybrid combinations of packet and fast circuit switched networks. It was not long ago that X.25 was hailed as the network standard to solve user problems. But X.25 is a moving target that is continually being upgraded and modified. Many overseas telecommunications authorities have implemented X.25 based networks that are different from implementations and networks in other countries, yet they all supposedly use the

same standard.

The ideal network may actually be a concept that standards makers are exploring called Open Systems Interconnection. In greatly simplified terms, this would provide a common public network that would allow the interfacing of *any* business machine. Some think that given the seemingly endless variety of user needs, the goal cannot be attained. Other experts feel such a network is within reach in a few years.

There is also the possibility of a user-programmable network that would provide mainframe capabilities such as applications programming and storage as part of network capabilities. AT&T just might offer such a network service as part of its evolving unregulated operations. There are also industry sources who think Exxon is working toward this ultimate goal with its many subsidiaries—each of which seems to handle one piece of the emerging corporate communications network.

Through these virtually infinite variables, the telecommunications manager continues to meet the needs of his company. With phased evolution, networks are upgraded to serve increasingly complex applications.

Network service expansions from carriers are announced frequently, advanced communications equipment is introduced almost weekly. New standards, network technologies, architectures, terminals, front-ends, electronic mail, office automation . . . and each is described as better than the system that preceded it.

Through it all, the telecommunications manager keeps his perspective and maintains a viable network, while at the same time developing ways to test emerging hardware, network features, and software options. And that's the most amazing fact of all.

— Ronald A. Frank

COAXING ON CO-AX

DIGITAL TRAFFIC CAN CO-EXIST WITH VOICE AND VIDEO ON THE SAME CABLE.

More and more organizations find the need to move intracompany electronic messages over relatively short distances—throughout a building or industrial park, across a university campus, or between a number of regional offices. The need to move data at high speeds and with high reliability has caused several outfits to investigate coaxial cable as a medium.

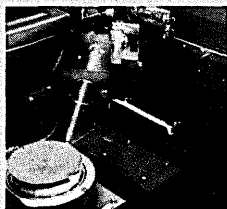
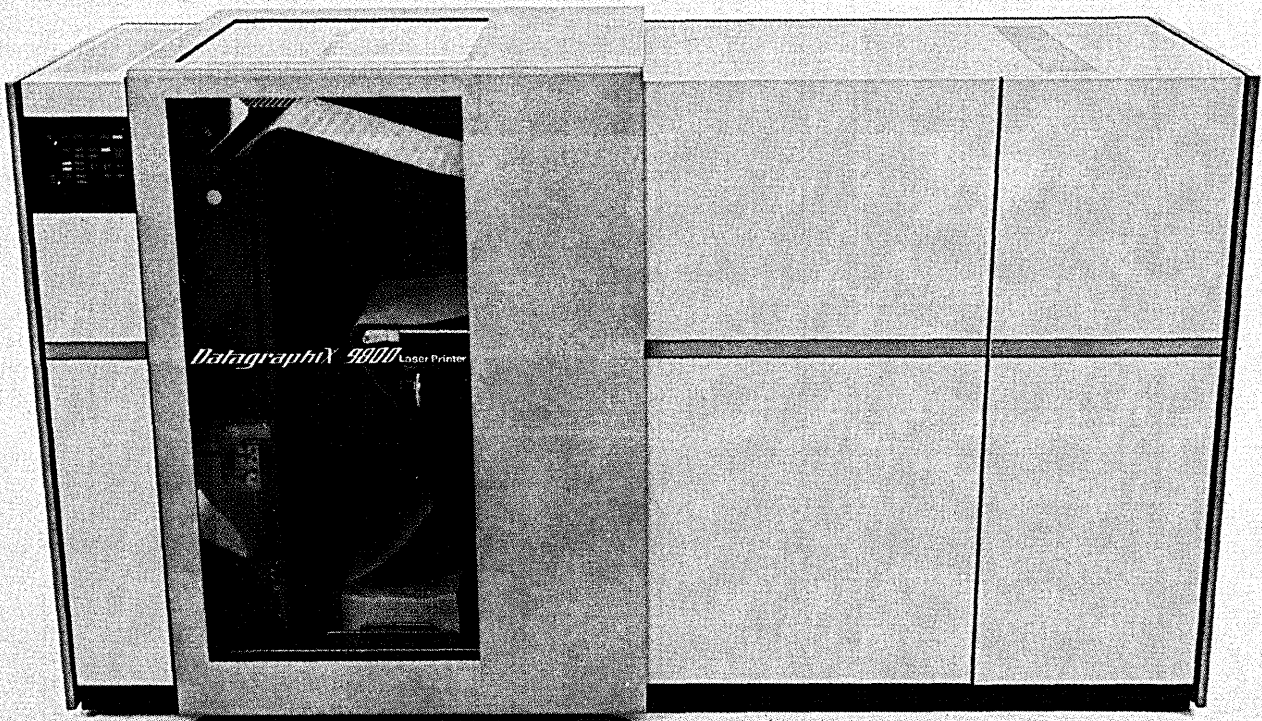
Datapoint chose co-ax to link the multiple processors in its Attached Re-

source Computer systems; Zilog, too, chose co-ax to interconnect processors in its recently announced Z-Net architecture of interconnected, autonomous microcomputers; and the Xerox Palo Alto Research Center began experiments with Ethernet, a short-haul base band co-ax link for connecting disparate computers.

Datapoint, Zilog, and Xerox PARC all have ranges limited to a few kilometers in their co-ax communications approaches,

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CIRCLE 28 ON READER CARD

TECHNOLOGY

and only PARC made a nonprocessor-specific approach to link a variety of equipment.

Sytek, Inc., a Sunnyvale, Calif. consulting firm, and its manufacturing subsidiary, Network Resources Corp. also took co-ax for its medium, and packet switching for its message switching phi-

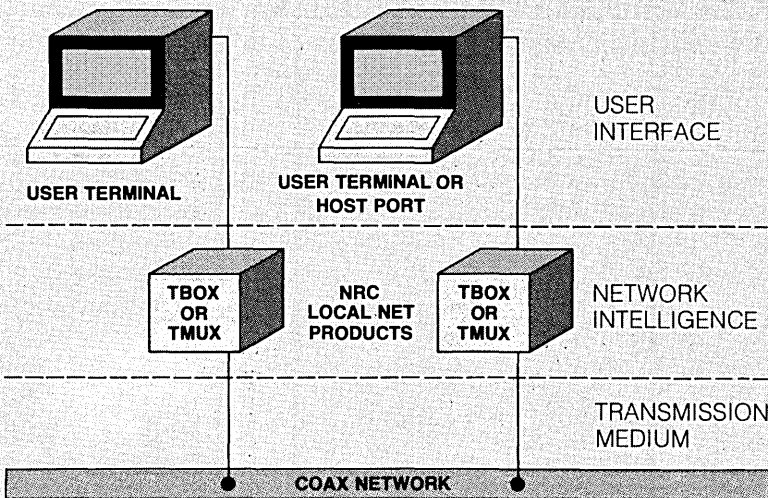
losophy. The outcome is LocalNet, a broadband communications system capable of maintaining up to 24,000 9600bps full duplex channels over existing cable television (CATV) co-ax networks (network range is quoted in the neighborhood of 50km). The LocalNet system can use an installation's

existing private CATV wiring as a medium; or a community's cable franchisee can use the technology to provide data communications—as a value-added offering—utilizing any excess bandwidth on the same cables that serve "Mr. Ed" reruns along with the children's dinner. A company can also install its own co-ax wiring, using standard CATV parts, and have an easily extended dedicated LocalNet. Dr. M.S. Pliner, president of Sytek, said that his company wired its building with about 40 terminal taps, for a total cost of \$1,500 including the co-ax, related hardware, and labor (but not including the cost of network interfacing and digital data communications equipment).

In LocalNet, information travels over the co-ax as a modulated radio frequency (RF) signal. A cable can carry 120 of these RF channels, and each channel can support 200 or more devices communicating at 9600bps. The initial LocalNet offering, dubbed System 20, comprises four different boxes that handle data communications traffic moving over the co-ax cable.

To put data onto the co-ax (and conversely, to take it off), a Model 100 Tbox formats messages into packets, adding addressing information and error control codes. The Tbox has an RS232 interface, with automatic speed detection, for connecting to digital devices (terminals, print-

LOCAL NET FUNCTIONS



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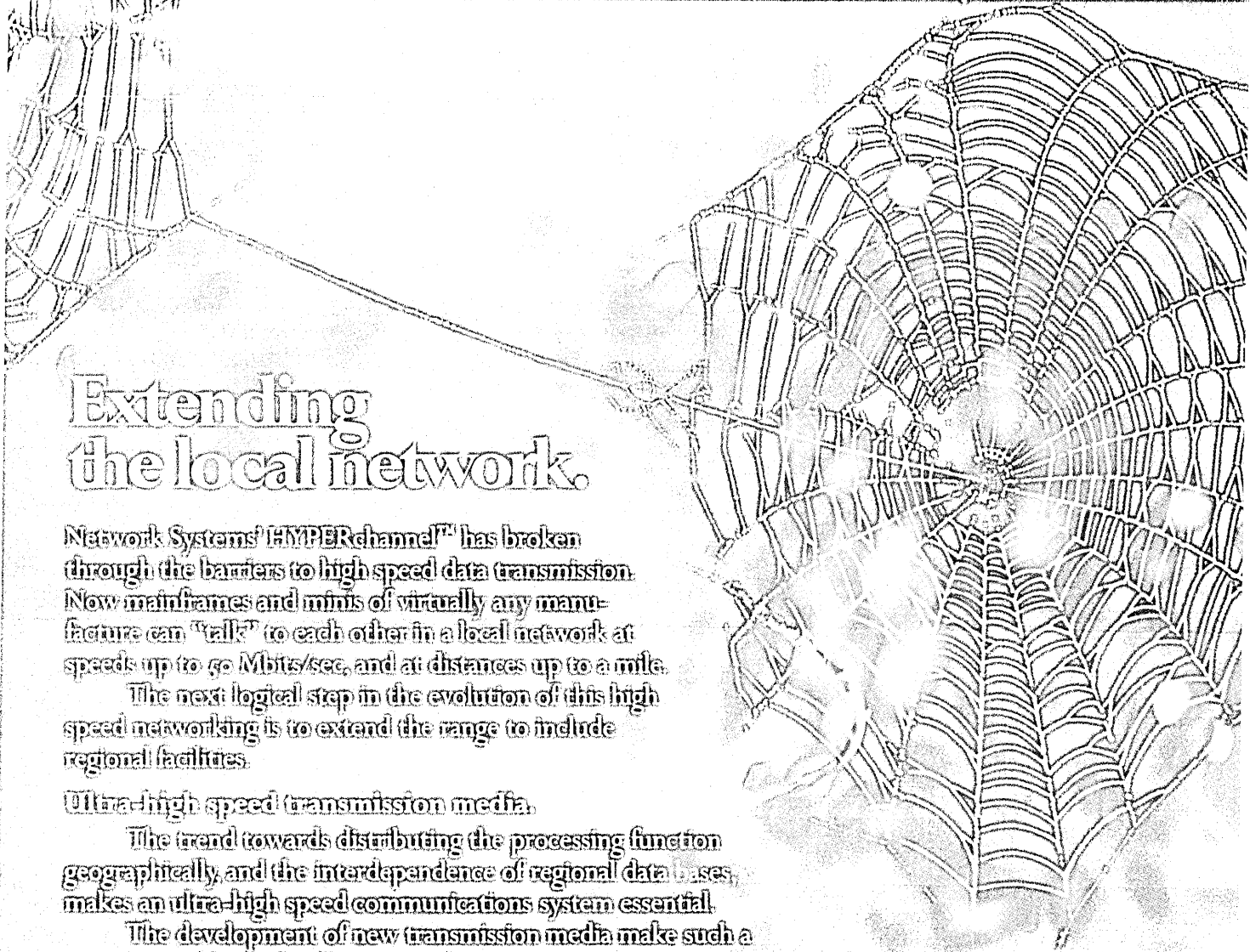
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The trend towards distributing the processing function geographically, and the interdependence of regional data bases, makes an ultra-high speed communications system essential.

The development of new transmission media make such a system possible. T-1 landlines (1.5 Mbits/sec), T-3 microwave capabilities (44.7 Mbits/sec) and fiber optics allow ultra-high speed data communications within a geographic radius of hundreds of miles.

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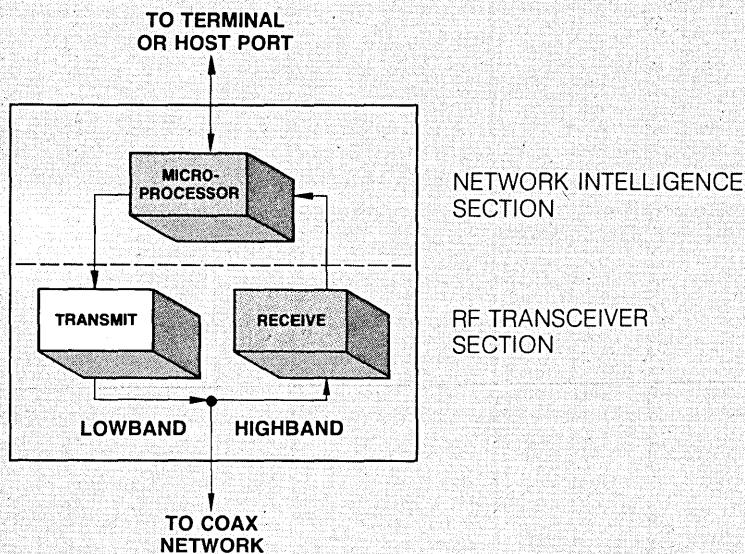


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CIRCLE 30 ON READER CARD

LOCAL NET SYSTEM 20 TBOX



ers, computer ports, etc.), the Tbox also contains a "frequency agile" modem for modulating the signal and putting it onto the co-ax. A frequency agile modem can, under microprocessor control, address any of the 120 channels on the co-ax, obviating the need for separate fixed frequency modems for each channel.

At the receiving end, the Tbox picks off packets addressed to it, demodulates the RF signal back into digital form, and sends the message out its RS232 port to the addressed device. The Tbox also includes speed matching capabilities, allowing a fast crt to communicate with a slower printer. The Tbox is a \$995 piece of equipment that interfaces digital devices to the communications medium.

For clustered terminal installations, there's a Model 200 Tmux, which serves the same function as a Tbox, but additionally includes multiplexing for eight RS232 ports. The Model 200 Tmux sells for \$4,238.

There's also the Model 300 Tbridge, which includes four independent frequency agile modems; its function is to recognize packets addressed to devices operating on different channels, and provide a bridge between the channels. It copies packets from one channel to another, as needed. The Tbridge is a \$4,500 piece of hardware.

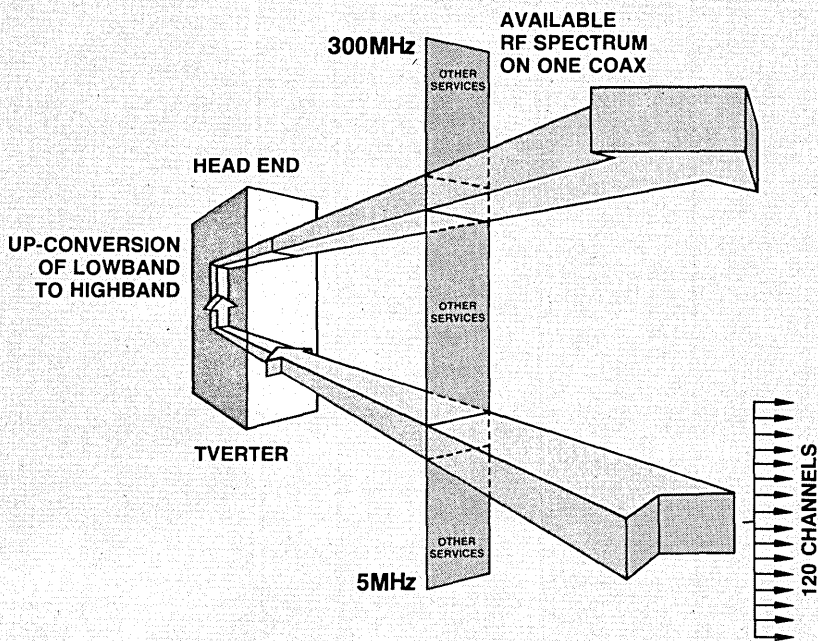
Finally, there's the Model 900 Tverter. As with traditional approaches to full duplex communications, there are forward and reverse channels operating at different frequencies. The \$3,500 Tverter sits at the head end of the CATV network, where all lines converge, and provides broadband conversion from the 120 lowband channels to 120 highband channels.

The high capacity of broadband CATV communications, coupled with the Local-Net System 20 packet switching approach and intelligent interfaces to the network, provide a number of benefits. Digital traffic can coexist with voice and video on the same co-ax cable. Physical network topology isn't a factor in configuring a LocalNet because messages carry destination addresses, and the LocalNet hardware takes care of actually getting the messages from source to destination. Again, because the hardware handles message routing, several logical networks can use the same co-ax link. The use of addressed messages also allows devices to be physically moved (if you finally get that window office and you need to take your terminal with you) with little more effort than stringing some additional co-ax. Special functions, such as data encryption, can be added to the network interfaces.

LocalNet—or a similar system—may serve as the glue that binds together the information processing of organizations in the future, whether it occupies a suite of offices on a single floor of a building, or an industrial park.

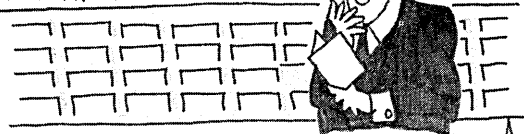
—Bill Musgrave

LOCAL NET USE OF THE BROADBAND MEDIUM

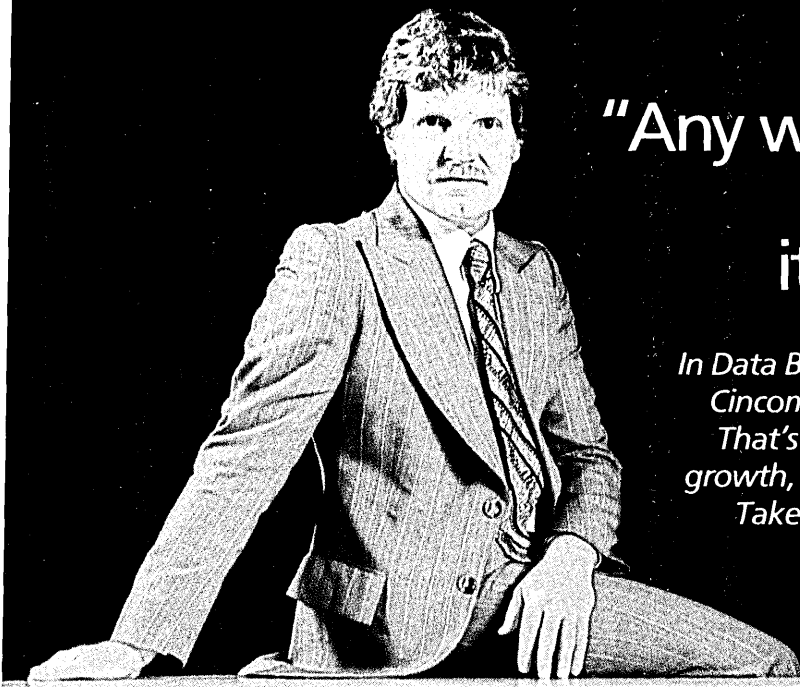


GREETING CARDS

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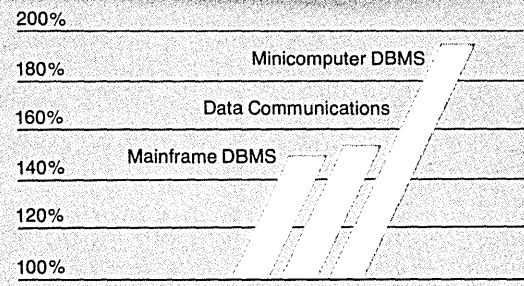
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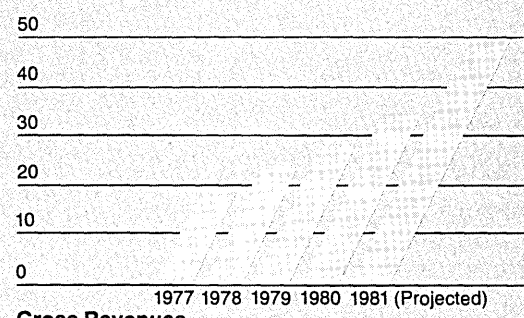
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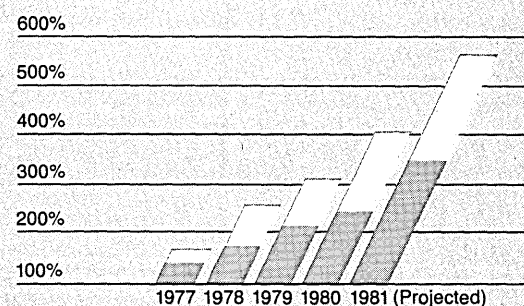
In Data Base and Data Communications software, Cincom Systems is clearly the industry leader. That's true in new product sales, in revenue growth, in R&D investment and in market share. Take a closer look. We believe the results speak for themselves.



Percentage increase in DB/DC unit sales over 1979.



Gross Revenues (in millions)



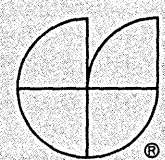
Comparison of R & D expenditures to gross revenue.*

□ R & D ■ Revenue

*1976 Base 100% for R & D and Revenue.

- Unit software sales increases over 1979: Mainframe DBMS—154%; Data Communications—157%; Minicomputer DBMS—195%.
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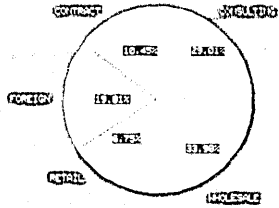


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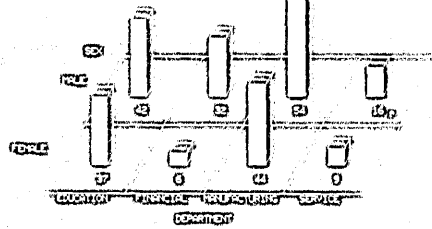
*Based on IDC Report—August, 1980

CIRCLE 32 ON READER CARD

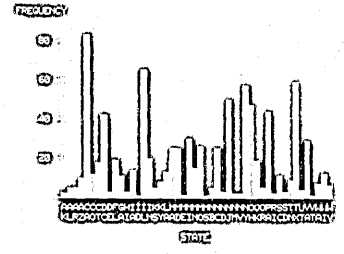
Total Income by Division
PERCENT OF TOTAL



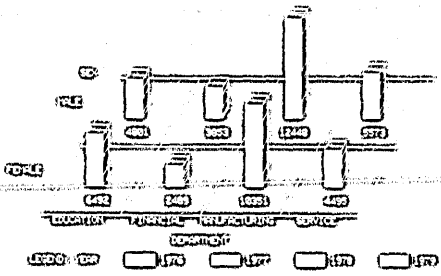
HEALTH PLAN ENROLLMENT
PERCENT OF EMPLOYEES



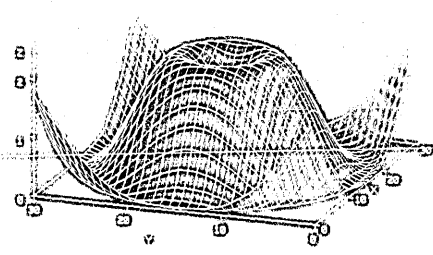
SAS Installations by State
PERCENT OF TOTAL



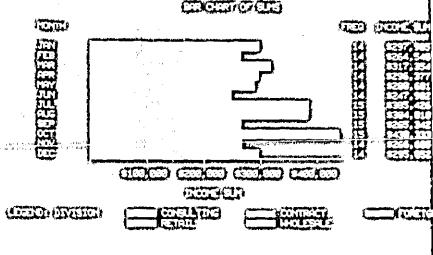
Insurance Benefits Paid



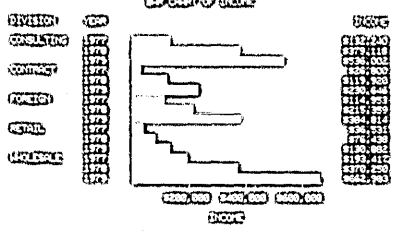
SAS 3-D COLOR GRAPHICS
PERCENT OF TOTAL



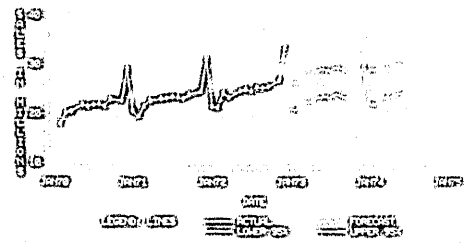
INCOME BY DIVISION
PERCENT OF TOTAL



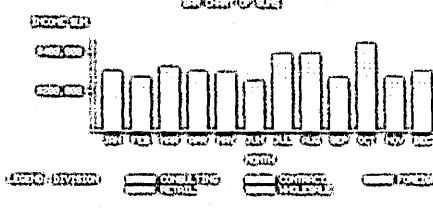
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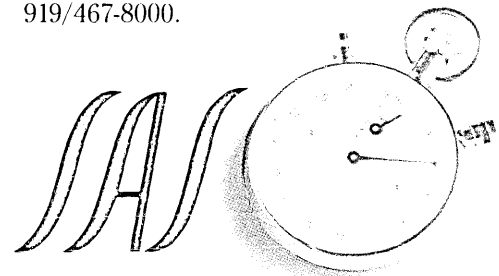
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BUSINESS

FINANCING FEVER

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When interest rates began to plummet last April—hitting a low of 10¼ in July—the resultant favorable economic climate in the capital markets spurred a rash of external financing by computer companies hurrying to facelift their balance sheets by rolling over their short-term obligations into long term debt.

"This is natural," commented Ulric Weil, a vp at the Wall Street firm of Morgan Stanley, "American industry always replenishes itself with long term equity financing."

Nevertheless, from the late '60s until early this year, the market for equity issues was poor (and often terrible). IBM common, for example, is still selling below its high for the '60s; it has not yet returned to the investor what he paid for the stock at its '60s' peak. For 12 years, it's been a difficult time for computer issues; in the '80s, suddenly, the window has opened for financiers.

It didn't open soon enough to accommodate IBM's unfortunately timed \$1 billion bond offering in October '79 that coincided with a leap in interest rates, but it was raised for the \$250 million bond issue from Burroughs; CDC's \$1.5 million worth of common stock (the first new issue from CDC since 1972); and \$200 million worth of bonds from Sperry.

For the smaller companies, however, balance sheet facelifts are not the objective of external financing. As Weil explained, "When you're growing at rates of 30% to 90%, such as Prime, Tandem, and Cray, you must have equity financing to maintain growth. These are fast-moving athletes, we call them, and internal cash flow cannot support their pace."

Mixed debt/equity vehicles, such as convertible bonds, debentures, and preferred shares have enjoyed a great vogue among the smaller high-tech companies. Debt issues that convert later into common stock (at specified prices) offer a company the chance to borrow money at lower inter-

As interest rates creep up, the financing windows close."

est rates than are available on straight bonds, and postpones the dilution of management's holding control that occurs in a pure stock offering. Meanwhile, the investor, assured of a certain return on the bond, also has the opportunity to make a speculative capital gain upon conversion.

Recent money raisers have included Paradyne, with a secondary offering of 800,000 shares estimated at a value of almost \$40 million; a \$60 million convertible from Prime; \$100 million in convertibles from Wang; and \$250 million from DEC.

According to Weil, the demand in the market has remained strong.

"However, as interest rates creep up," (at press time, prime had reached 17%) "the cost of financing is less attractive, and the window will narrow," he added.

"The recent success of external financing has been a function of the money supply, the interest rates, and the general mood of the country. Companies are productivity-oriented, and the catch-phrase 'the reindustrialization of America' has a definitely bullish tone."

—Wendy Reid Crisp

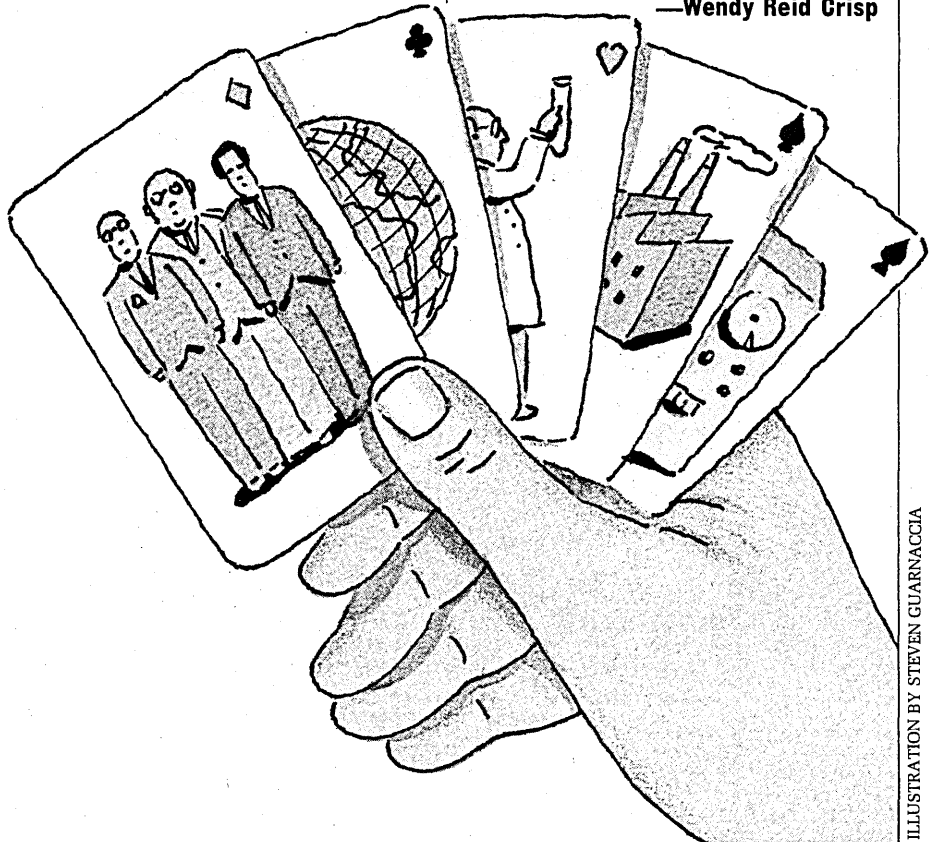
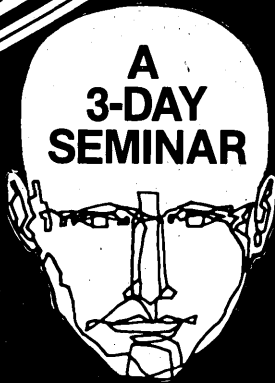


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Frederic Lamond worked at The Economist Intelligence Unit before joining Univac as a Senior Systems Analyst. You have read a number of his articles in Datamation and Computer Weekly. This seminar is the result of a just-completed investigation of the IBM 4300 Series. Mr. Lamond is a seasoned speaker who entertains as well as informs seminar attendees.

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It's a hot market for venture capitalists. Since 1978, when the capital gains tax rate was lowered (to 28% from a high of nearly 50%), plenty of private money has been available for high-tech startups with solid business plans.

A further decrease in the tax rate—to 20%—is on the federal burner now, and is strongly supported by such groups as the National Venture Capital Association (NVCA). The legislation began in '78 in the House Ways and Means Committee, and is known as the Steiger Amendment; if it passes—and most investment bankers expect it to—it will result in attracting many additional private investors to the vc market.

Times were not always so rosy. In the early '70s, the capital gains tax rate was so high investors chose certificates of deposit rather than new companies. In 1974, there were only two million-dollar deals (Telenet and Tandem); in 1975, only three. In those years, most of the money for new ventures came from foreign investors pumping into such companies as Amdahl (Fujitsu) and Sycor (Canada's Northern Telecom).

Tom Perkins, president of the NVCA, and a member of Kleiner Perkins Caulfield & Byers, a venture capital partnership in San Francisco, reports that it is still difficult—because of securities regulations and pending legislation at the Department of Labor—for the general public and for major investment trusts (such as pension funds) to make money available for new ventures.

Nevertheless, the strings have loosened, and venture capital firms are seeing hundreds of business plans. About 5% of the submitted plans are funded; in some vc firms, the percentage is much lower.

As venture capitalists are not traders—their investment is risked for a period of several years in anticipation of long term gains—vc companies require a five-year business plan from the startup at the time of funding. Milestones to measure success are a critical feature of the plan and are proportional to the individual nature of each company.

The right people, however, is the primary factor a vc firm looks for in a business plan. Norman Fogelson, an associate at Mayfield, a San Francisco area venture capital company specializing in high-tech companies, says, "This includes a chief executive officer with prior profit and loss responsibility, and a seasoned team in the fields of finance, marketing, and opera-

tions. Without the right people, you have nothing. Second, of course is exciting proprietary technology with extraordinary market potential." That market potential is generally defined as having a sales potential of \$20 million to \$30 million—starting from ground zero—at the end of the five years.

And how does a fledgling company reach that level? Jim Treybig, president of Tandem Computers, who, in addition to receiving vc money to found Tandem, also had several years' experience working for a venture capital firm, replies, "I've always had people better than I am working for me. You have to have people who are good at creative, strategic thought; you need people with the ability to sell, with backgrounds in finance, research, development, and marketing; people with tenacity, faith and drive. Glamor people rarely make it; they're

overconfident, afraid to get their hands dirty.

"A lot also depends on timing; for example, when to introduce the prototype—if development takes too long, you can't raise the money."

A cycle of five to seven years is necessary for most new companies to reach fruition; recent examples of matured startups include Qume, which was acquired by ITT; Tandem, which went public in 1977; Cado Systems, which made a public offering last spring; and Genentech, the DNA research firm that hit the open market last month (and of which Tom Perkins is chairman of the board).

What happens to the fortunate 5% of the business plans that are funded? According to Treybig, "One out of ten makes it big, two do okay, five are a burden and always need more money, and two go bankrupt."

"There are four reasons for a startup going bankrupt," Treybig explains. "First, it is undercapitalized from the beginning; secondly, the basic business concept has no potential for success, or it's not an original idea; third, it has a marketing guy and no R&D, or vice versa; and finally, it's just plain bad people."

*

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funding companies that succeed. Paul Stephens, a partner at Robertson, Colman, Stephens & Woodman, a San Francisco corporate finance firm with several high-flyers to its credit ("We took Tandem public; we took Rolm public"), is recommending Triad Systems from his vc portfolio. Triad is a small business (turnkey) system manufacturer that went public last December.

The Cupertino, Calif. company specializes in vertical markets, and, despite the fact that its first field of emphasis was the automotive aftermarket, it has experienced a 100% growth rate every year for three years. Triad had FY '79 revenues of \$30 million; even with a third quarter slump, it will finish FY '80 with revenues of \$58 million. The company will enter its second vertical market—hardware stores—early in '81.

Other picks from Stephens include Avantek, a San Francisco manufacturer of microwave and semiconductor devices for the military, cable tv, and satellite communications markets; Printronix, which went public in '79 and had a secondary offering in June '80; and Paradyne, the data

com manufacturer that had a secondary offering last spring, and is growing at an annual rate of 60%.

*

The availability of microprocessors may spark the revival of yet another dead horse: computer assisted instruction. The Cumberland Investment Group of Manhattan has just completed a favorable study of WICAT, Inc. (the acronym originally stood for World Institute for Computer Assisted Teaching). WICAT is a not-for-profit foundation that holds R&D contracts from mainframers, the National Science Foundation, defense firms, and publishing firms to develop hardware and software for the educational market. Plans call for the spin-off of a for-profit, privately held (50% by the foundation, 50% by management) corporation to be known as WICAT Systems, Inc., and to be located, as is the parent, in Orem, Utah.

*

Fledgling companies to watch from the portfolio of Kleiner Perkins Caulfield & Byers include three disk drive manufacturers in the San Francisco Bay Area: Priam, Quantum, and Ontrax. —W.R.C.

4300 line took 18 months from introduction to volume delivery, even though no delays occurred.

The multitude of production problems evident in the mainframe computer sector is not equal to these companies mentioned. Smaller manufacturers are running into similar delays. Wang's VS-100 super minicomputer was originally scheduled for ship-

There is a new economics emerging within the computer industry.

ment in the spring of this year, but now initial deliveries are hoped for this month. Dataproducts and Centronics are further examples of smaller companies that have incurred such product delays in the last 12 months. The short term causes of many of these setbacks seem to center around overly rapid reaction to IBM's 4300 announcement in January 1979. Almost immediately, all other mainframe companies and many smaller computer vendors introduced competitive products in response. These encompassed various semiconductor components. The semiconductors and circuit boards turned out to be unavailable in the quantities needed. Shortages were not the only problem. The new computer products were simply premature. In some cases they are still not ready for volume production. This situation will not be resolved until 1981.

Longer term, the causes of manufacturing problems are more deep rooted and appear to have a more enduring impact. There is a new economics emerging within the computer industry. Product prices are plummeting as technological change accelerates. To achieve needed revenues, companies must ship substantially more units. Thus standardization and high production volume particularly within the mainframe sector will be necessary. In the past, the industry has produced mainframe computers largely on a custom basis, with the name of each purchaser attached to the processor as it moves through the plant. Clearly, part of the current manufacturing delays evident throughout the industry stems from the need to produce in volumes never before experienced.

In contrast to the large mainframe vendors, the minicomputer and peripheral equipment companies have, since their inception, dealt with a much more standardized product, mass produced in sizeable quantities. Digital Equipment's VT-100 terminal is a notable example. These companies are adept at expanding manufacturing at 25% to 40% rates each year on a substantial basis. The mainframe compa-

DELAYS, DELAYS & DELAYS

ALL MAINFRAMERS ARE EXPERIENCING PRODUCTION PROBLEMS.

Manufacturing startup and volume production delays have become increasingly evident throughout the industry in 1980. The causes run deep and may last longer than just this year. Earnings have already been hurt. Moreover, in the future this factor may add a new element of uncertainty to financial planning and control.

Evidence of production problems proliferates. NCR initially experienced semiconductor component shortages in the third quarter of last year and continues to have difficulties in ramping up production of not only the 8200 but various terminals and other products. This apparently has been of such magnitude and duration that it may have had something to do with the recent resignation of senior vice president of engineering and manufacturing, D. E. Eckdahl, a career member of management. There was a similar occurrence at Honeywell where Fred R. Priest, manufacturing vice president of the Large Information Systems Div., was transferred to low level personnel and facilities responsibilities.

At an analysts meeting in May, C. E. Exley, Jr., president of NCR, stated that the company "has not learned to grow manu-

facturing at sustainable high rates. Little mistakes hurt. Learning curves relate to time as much as volume."

Burroughs experienced production delays with its new 7800 computer and BMT terminal lines in late 1979. According to the second quarter 1980 earnings release, the company remains "unable to meet targeted production buildup in a number of new product areas." Much of the new 900 computer series has been delayed by at least three to four months. Its original plan was to ship 40% older 800 models and 60% newer 900 series computer systems in 1980. As it turns out, it will be lucky if as much as 40% of the mix is the newer 900 series.

At a June analysts meeting, Honeywell similarly detailed delays with the new DPS-8 large scale computer. Approximately 10% of planned 1980 shipments have been pushed into 1981. A bulge of initial shipments is still hoped for in the fourth quarter but delays make this difficult to achieve. Problems entail multi-layer circuit boards and an automated test system.

IBM also is experiencing such difficulties. An IBM product that was delayed a full year was the System/38. Moreover, the

BUSINESS

nies are struggling to make the transition to this type of manufacturing. NCR, for example, has been striving to expand its revenues at a 15% rate for several years now and finally did it in 1979. However, manufacturing was strained and the hectic pace could not be maintained in 1980, with revenues slowing to about 10% in the first half of this year.

Another factor that may lead to future manufacturing difficulties is the increasing complexity and sophistication of semiconductor design. VLSI and custom designed circuits will be a key element in mainframe development. All mainframe companies

and some minicomputer firms are committing large amounts of capital to ensure such capability in the future. Recently, NCR announced a \$155 million semiconductor buildup scheduled over the next four years, and Burroughs plans an \$80 million plant expansion to begin immediately. Digital Equipment and Data General are also adding considerable semiconductor design and manufacturing facilities.

The new element of sophisticated, custom circuit design and production is likely to make manufacturing control and planning even more tricky in the future, especially with new product startups. These

companies are not experienced in the semiconductor component business and this unfamiliarity will be compounded by the blinding speed of technological advances and the increasing complexity of VLSI semiconductors.

On balance, existing and future complications influencing volume production and new product startup may make forecasting and planning more difficult. Financial performance could therefore become more volatile. Customer frustration and marketing morale problems may also result.

—Stephen T. McClellan
Salomon Brothers

INCHING INTO AMERICA

THE BEST ADVICE FOR FOREIGN COMPANIES ENTERING THE U.S. DP MARKET IS "GET AMERICANIZED."

No one has yet identified a homogenized European information processing market. Each country exists for its suppliers as a separate, distinct and increasingly cramped selling ground. In sharp contrast to this, the U.S., which at least offers the appearance of homogeneity, looks "roomy" and hungers for new technology. For ambitious Europeans who have been gingerly diversifying into each other's fields and into market conflict, America has emerged once again as the promised land.

But how do you get into this "paradise"? In addition to hosts of small company failures that no one will ever hear about, more than a few ambitious ventures have crashed to the dirt. One such plan from Great Britain, though richly supported and watertight in theory, fell victim to politics and personalities and was aborted after three years.

A few weeks ago in New York, the same venture re-emerged in a more modest but, experts say, more workable form. And hot on its heels is an ultra-ambitious export program from the French, bearing close resemblance to the ill-starred British concept but with determination not to make the same mistakes.

So what are the hard lessons that these and other ventures can expect to learn in the U.S. marketplace? And assuming these experiences bear fruit, which sectors of the U.S. information processing business will be hardest hit by foreign competition?

According to well placed U.S. observers, a European company's initiation into America can be made a lot less painful (it will never be easy) if it adheres rigidly to the following game plan:

- Establish a name for yourself. Get noticed. But on *no* account be too aggressive.
- Don't even start promoting yourself until you can ensure wide geographic coverage,

both market and support.

- Get "Americanized" quickly and with the right staff (that means U.S. staff) and image.
- Talk big, by all means. But above all, back it all up with money, organization and knowledge of the market.
- And remember one thing: you may still fail.

Apart from data processing, where so far less than a handful of European companies have achieved even a modest \$100 million a year in sales, the main focus for a major initiative has been America's burgeoning software bottleneck. Three years ago the government backed British National Enterprise Board (NEB) established a cash

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CIRCLE 37 ON READER CARD

"We switched to NCR," says Joseph A. Dee of Brooks Camera, Inc.

DEE:

Brooks Cameras is the largest photographic dealer in Northern California. And we're growing fast. We just outgrew the processing center that had been doing our computer work. We needed faster turn-around. And we wanted to establish our own priorities.

NCR's SWEENEY:

So you went to your own NCR system.

DEE:

Yes, but not directly. First, we selected a competing vendor's newly announced system. But as we started to plan, we began to see problems ahead. No tape drive. Perhaps no COBOL. Perhaps no match-up with our sales terminals. And all we could get from the supplier were vague assurances that the problems would somehow disappear. So we switched to NCR. Very fortunately, as it turned out, because our NCR system is up and running. While the other vendor is still not delivering the other system.

NCR's SWEENEY:

We are not only delivering, our operating software is fully tested.

DEE:

We had a shirtsleeve session with the NCR software people that was refreshing. They told us exactly where they stood. What we could expect and when. And that's the way it's turning out. They gave us the hard answers.



Joseph A. Dee (left) is president and chairman of Brooks Cameras, Inc. in San Francisco. Jim Sweeney is his NCR Account Manager.

NCR's SWEENEY:

You liked Migration Path Engineering, too.

DEE:

Our requirements are too unique for us to expect off-the-shelf application software from any supplier. We have every kind of sales transaction. We accept all the regular charge cards as well as our own. We have rentals, repairs and layaways. And our own special promotions. So once we made the investment in our own specialized programs, we wanted to protect it. Even when our growth forces

us to move to a larger system. With Migration Path Engineering, NCR can give us that protection.

NCR's SWEENEY:

And finally, you wanted one supplier who would assume responsibility for the entire system from A to Z — including the terminals.

DEE:

You're absolutely right, Jim.

In the NCR office nearest you, there is an account manager like Jim Sweeney who knows both NCR systems and your industry. To learn more about what an NCR system can do for you, phone him at your local office. Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.



NCR
Complete Computer Systems

flushed software export consortium, INSAC, to take a crack at this market. The idea was to harness Britain's low cost, but experienced software pool to U.S. demand, both remotely and on-site. In addition, hefty chunks of British taxpayers' money would be used to acquire U.S. software companies and to enter into joint ventures.

INSAC set out to talk big and get itself noticed. But its arguments (too aggressively stated, according to some U.S. observers), touched off a few exposed nerves when it pointed out, perhaps too well, the weaknesses of several U.S. software companies. So when threatened with its members being undercut and systematically picked off for purchase, the U.S. Association of Data Processing Services Organizations (ADAPSO) deliberately torpedoed INSAC's first U.S. acquisition plan. Any company agreeing to

INSAC Software will appear to be an American firm out of Atlanta.

a takeover by the British consortium, the association said, would forfeit its membership in ADAPSO. It would be wrong to blame INSAC's continuing problems in getting started in the U.S. on this one isolated case. But it does highlight the early importance of getting the right image, say the experts.

In stark contrast, the new "Phoenix" version that emerged from the ashes of INSAC in New York recently has an altogether different approach. Now under a changed and less benign British government, INSAC's ideas have a harsher, more workmanlike realism. For a start, its much sought first U.S. acquisition is of a British owned American subsidiary. Second, the Phoenix was quick to become a member of ADAPSO and to court its good graces. In addition, the new enterprise has sought out the services of ADAPSO's own pr company to boost its image building. A Dun & Bradstreet credit rating and a team of top U.S. lawyers complete the set of INSAC's early build-up program.

What other lessons has INSAC learned from its three-year stint in the U.S. market? "One important rule when building up your geographic coverage," says INSAC Group's managing director Neil Pearce, "is that you don't rush into the obvious locations." Pearce claims that most Europeans when setting up their U.S. operations would head for Washington, New York, Los Angeles, and Boston without giving the matter too much thought.

"But if you use time zones, taxes, liv-

ing conditions, and communications as a measure," he adds, "Philadelphia, Chicago, Dallas, and Atlanta are better choices for Europeans." Pearce notes that despite the unpopular Pacific time zone, "a West Coast presence is probably essential, particularly for access to Japan and the Far East; and New York, despite the expense, is a must for your group headquarters."

With its acquisition of Altergo Software Inc. (now renamed INSAC Software Inc.) earlier this year, the INSAC Group has inherited a portfolio of nine major system software products for the IBM market, including two which made the Datapro honor roll and each of them with about 200 U.S. users. Of equal importance in meeting the game plan, INSAC has acquired sales and service offices in six U.S. cities as well as one Canadian location.

"The important thing," says former ADAPSO president John Imlay, "is that INSAC Software will appear to be an American firm out of Atlanta (its new headquarters)." He said the new company was one way of providing the much needed access by phone and flight that U.S. users demand.

"Service is the most important part of this business," stressed Imlay, who heads the \$46 million software concern, Management Science America (MSA). "People buy on service."

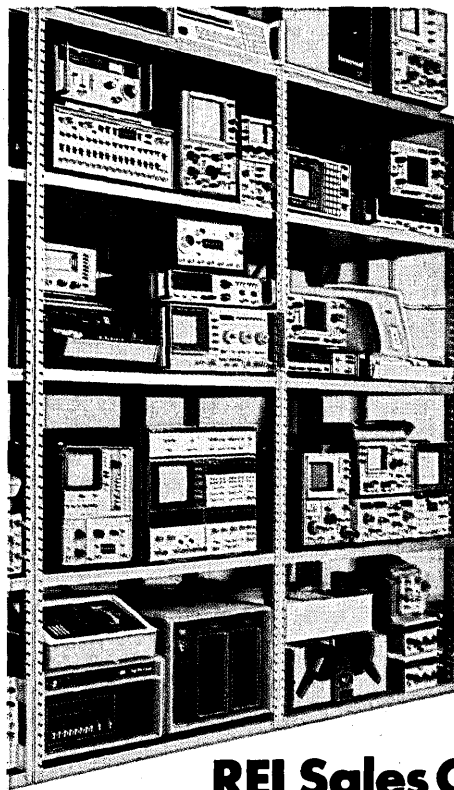
Pearce said that next year he will form

a new U.S. subsidiary—this time by acquiring a U.S. company. The concern will be known as INSAC Products Inc., and will expand its IBM product-orientation by going after the DEC and DEC-compatible markets. Once again, new sales and support outlets will be added. "But support must always grow in line with revenues," Pearce warned.

Also spreading its name in New York recently was an ambitious new French agency, Intelmatique, and its English director, Roy Bright. After talking to both Bright and Pearce, one could possibly think that, on the group services strategy at least, the two were reading lines from the same script.

The traditional problem for French empire builders in the U.S. information processing market is language. Hence the English-speaking Bright, who was lured away from the British Post Office and his pioneering work on viewdata systems one year ago, was won over to the French firm by an offer he "couldn't refuse."

Most French successes in the U.S. have been of the anonymous kind. Generally, Americans who buy BIC ballpoint pens and Cricket disposable lighters, for example, are unaware that these mass produced successes are French in origin. Likewise, the only big selling by the French in the U.S. information processing business has been of the "back door" kind—namely



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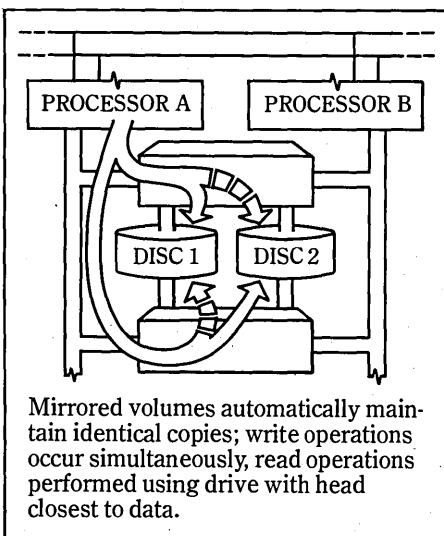
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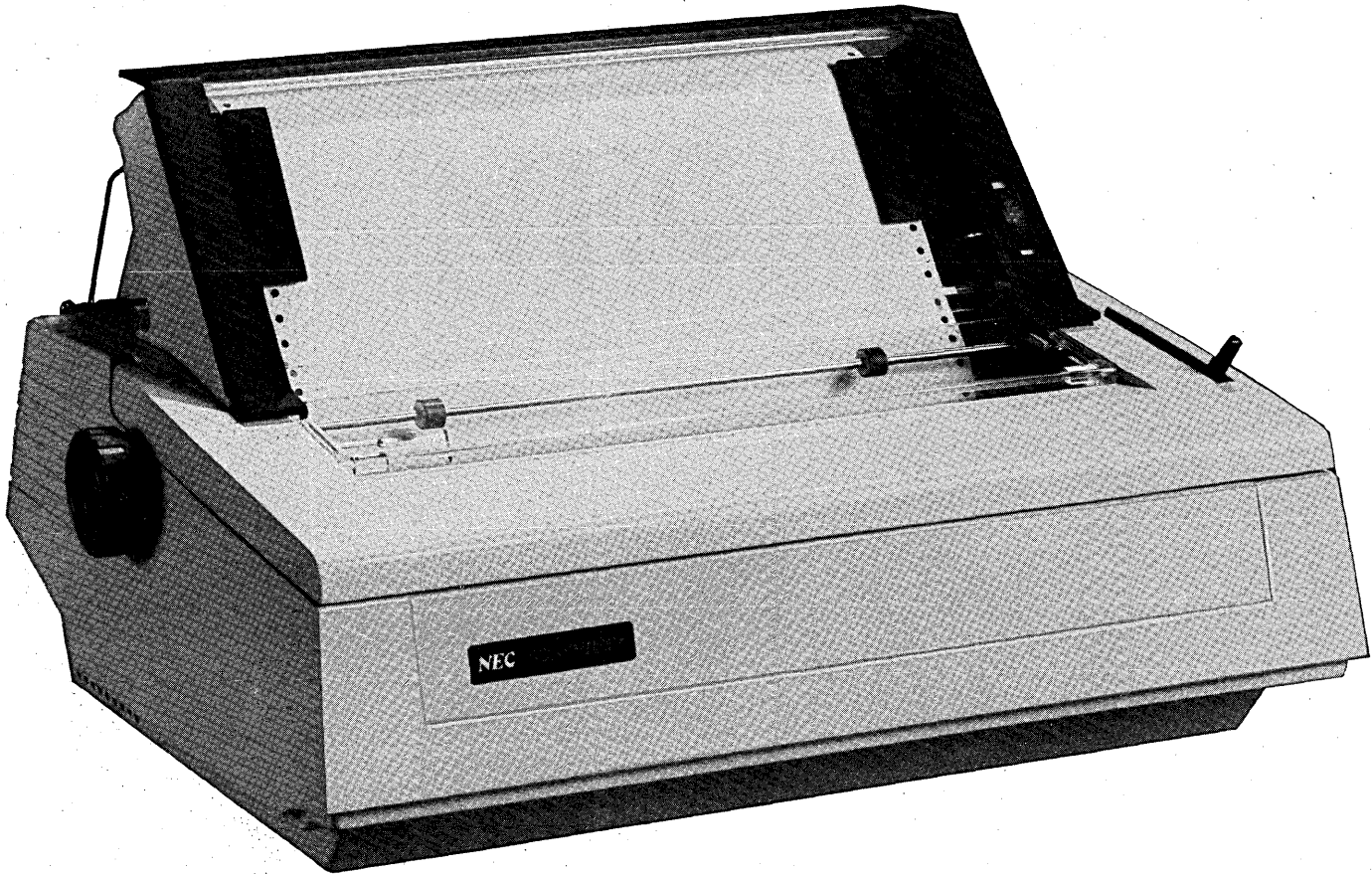
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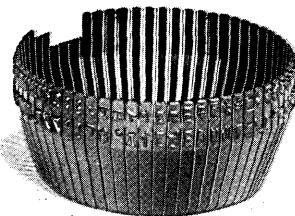
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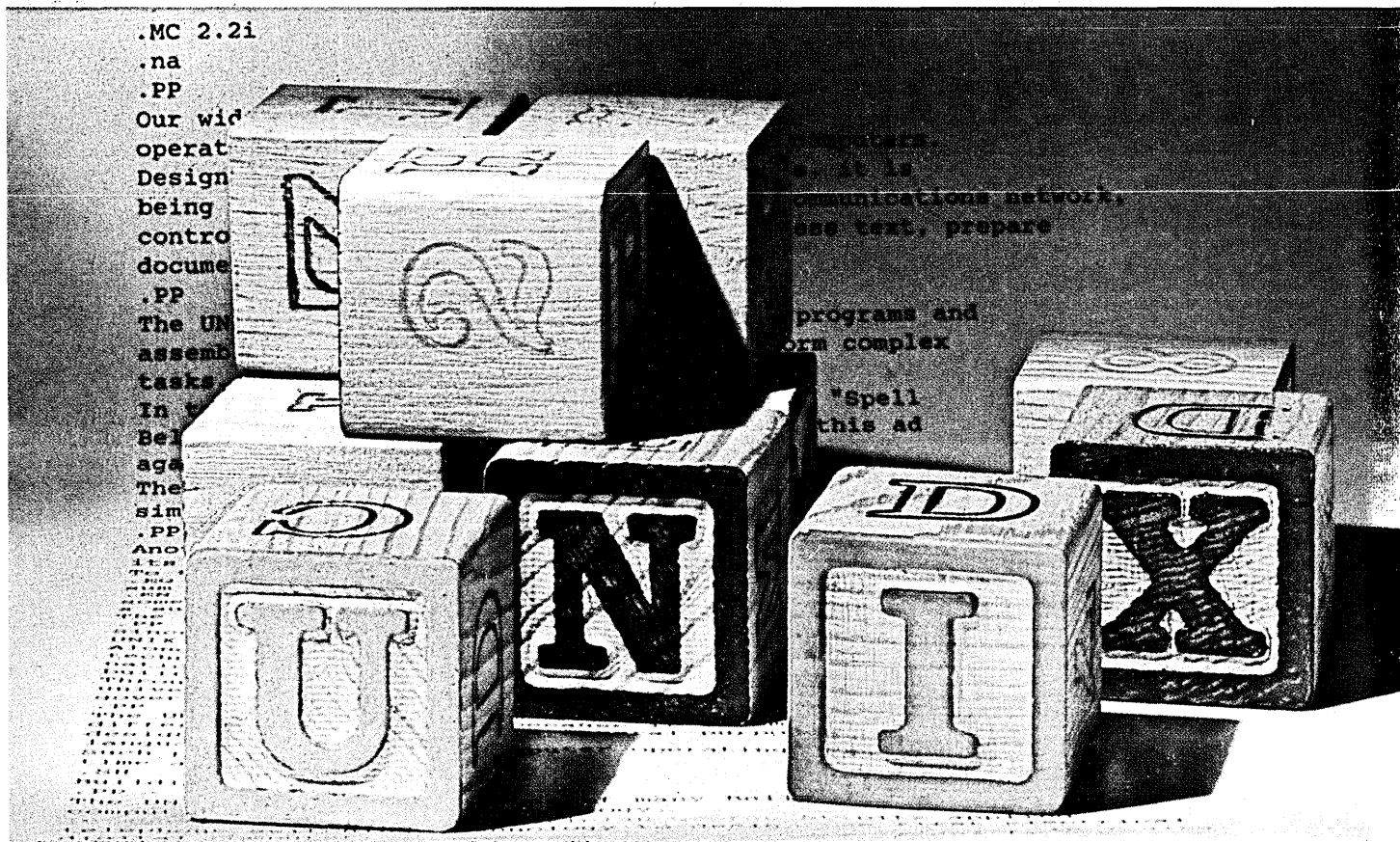
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Demonstration of first general-purpose transistorized
digital computer
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Development of computer operating systems
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Design of computer languages, including ALTRAN,
SNOBOL, LG, and C
.IP \ (bu
Invention of computer graphics techniques for storing,

The computer printout in the picture above contains the instructions and input needed for the UNIX system to format and produce the text on the opposite page.

Our widely accepted *UNIX*TM operating system is simplifying the use of computers. Designed to handle a variety of applications, it is being used to manage and maintain the telecommunications network, control experiments, develop software, process text, prepare documents, and teach computer science.

The *UNIX* system allows users to take small programs and assemble them like building blocks to perform complex tasks. In text processing, for example, the command "Spell Bell Labs Ad" tells a computer to proofread this ad against a dictionary filed in its memory. The program that performs the task was created by simply combining several smaller *UNIX* programs.

Another useful feature of our *UNIX* operating system is its ease in typesetting mathematical expressions. To typeset an equation like

$$\sum_{i=1}^{\infty} \frac{1}{x_i} = \pi$$

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Since 1969 the Bell System has installed more than 1100 *UNIX* systems. Along with other Bell Labs innovations in computing technology, these systems are enhancing the way the nation's telecommunications network is planned, designed, built, and operated. Through licensing agreements with Western Electric, universities have installed over 800 *UNIX* systems, and government and

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The *UNIX* operating system can be used with computers of different manufacturers because it is small, cleanly designed, and written in a general-purpose programming language. Such portability in a computer operating system saves time and money.

Building on the past

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- First demonstration of remote computer terminal and data link
- Conception of electronic analog computer
- First design of AND and OR gates for diode circuitry
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- Invention of error-detecting and error-correcting codes
- Demonstration of first general-purpose transistorized digital computer
- Development of computer operating systems
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Looking ahead

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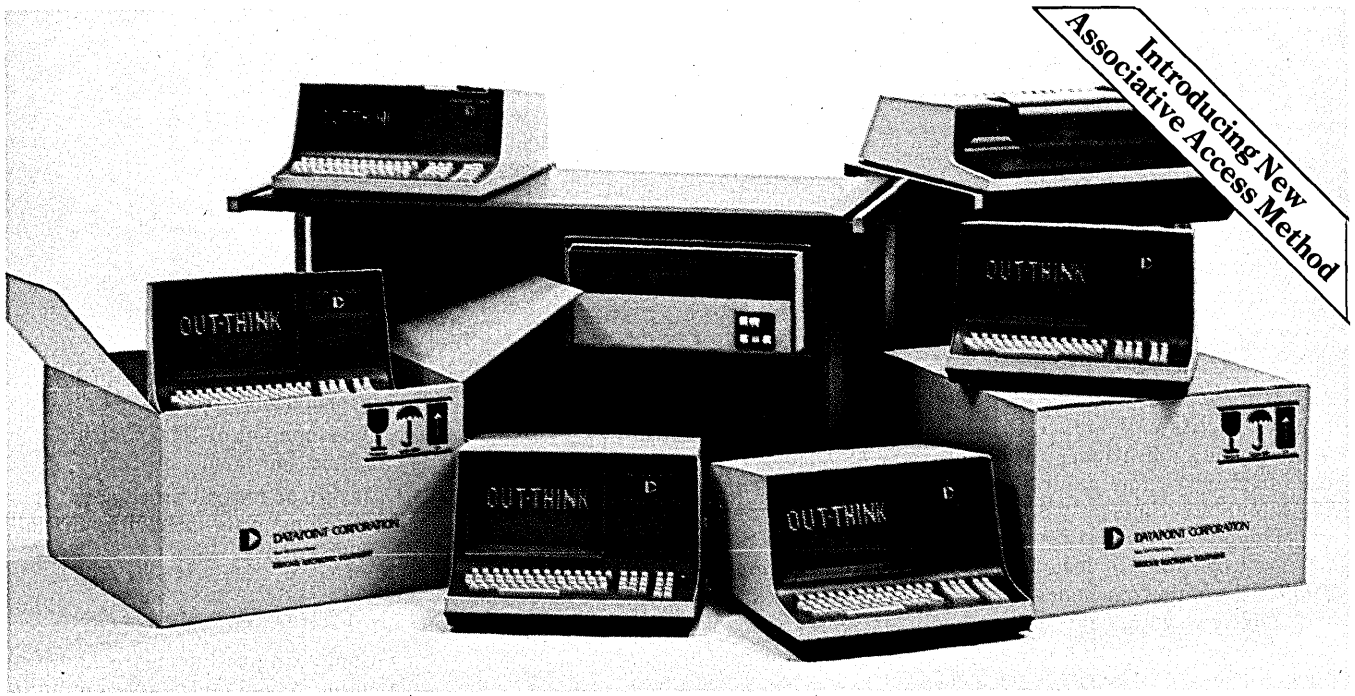
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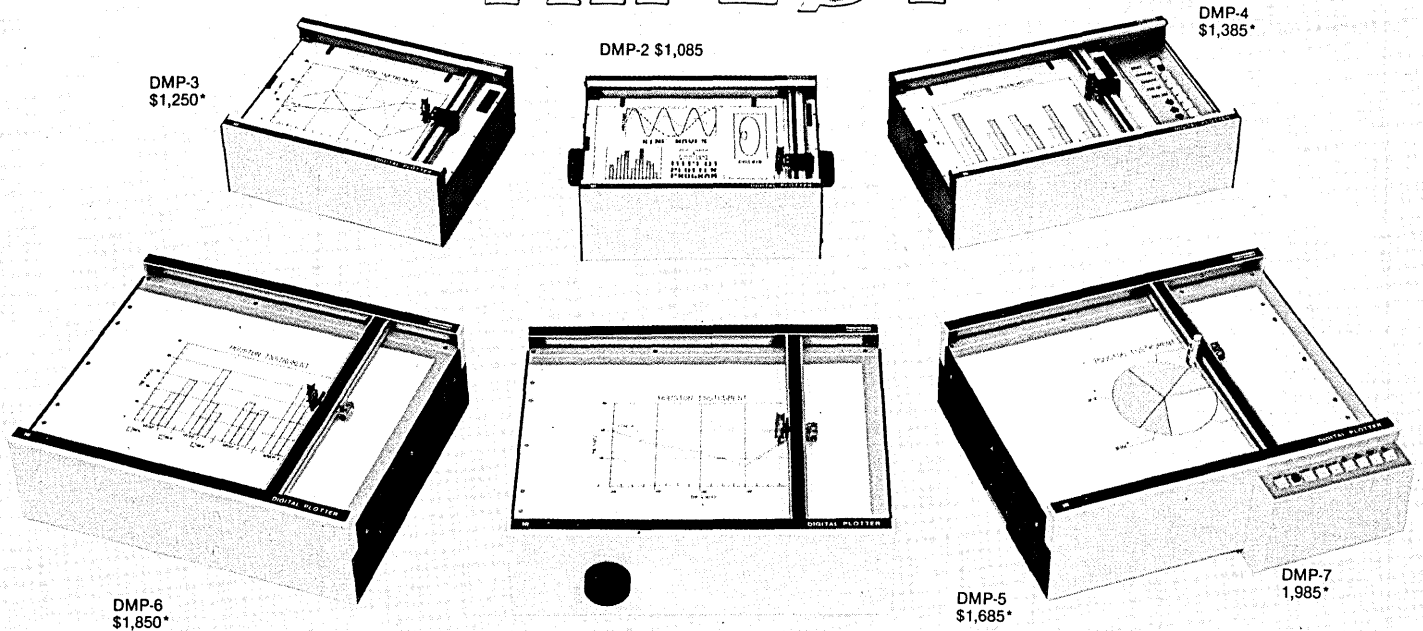
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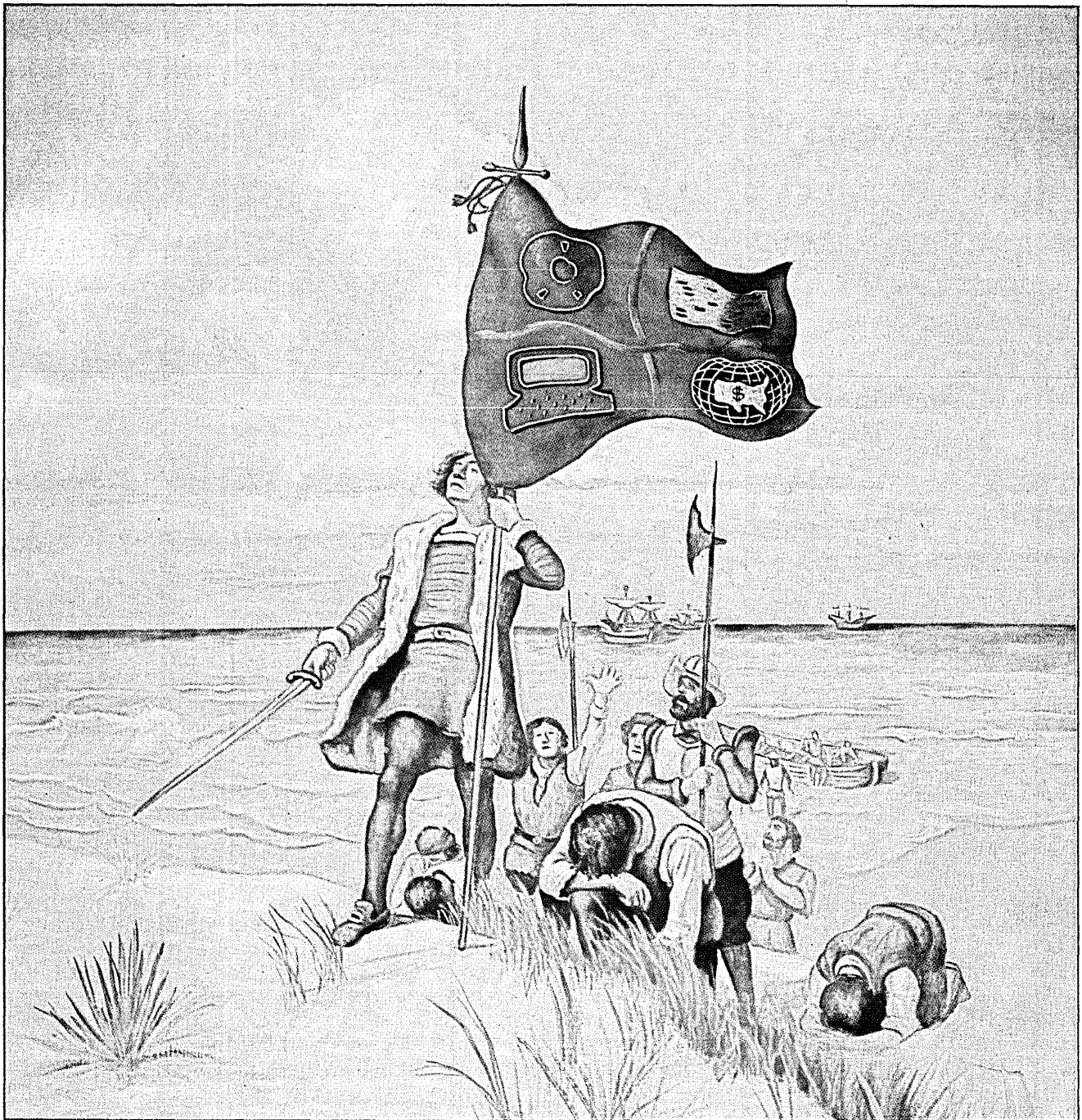


ILLUSTRATION BY MICHAEL TEDESCO

software (for defense) and telecommunications exchanges through Washington.

The French government and its telecommunications authority are now anxious to enter the growing U.S. markets for office automation (called "bureatique" in France), electronic mail, and viewdata systems. They also want to ensure that they grab a slice of the sizable software and services pie. According to Bright, the French approach to entering these markets will be consistent with its tried and tested methods: namely, mass produced anonymity and back door selling.

French ambitions in the office automation area are analogous to the man whose eyes are bigger than his stomach. Unlike the West Germans with their traditional small

machines base, the French have no products with which to mount an export drive. So, with a grand sweep, the country has embarked on a multi-billion dollar revamp of its telecommunications network. From this base, further billions will be given to French firms over the next few years to replace telephone books with cheap, mass produced electronic equivalents, viewdata and electronic mail terminals, telewriters, and fax devices.

Much under-the-covers technology for these devices will have to be imported from the U.S. and Japan. But the French government realizes that this is the price the country will have to pay to enter these key U.S. markets.

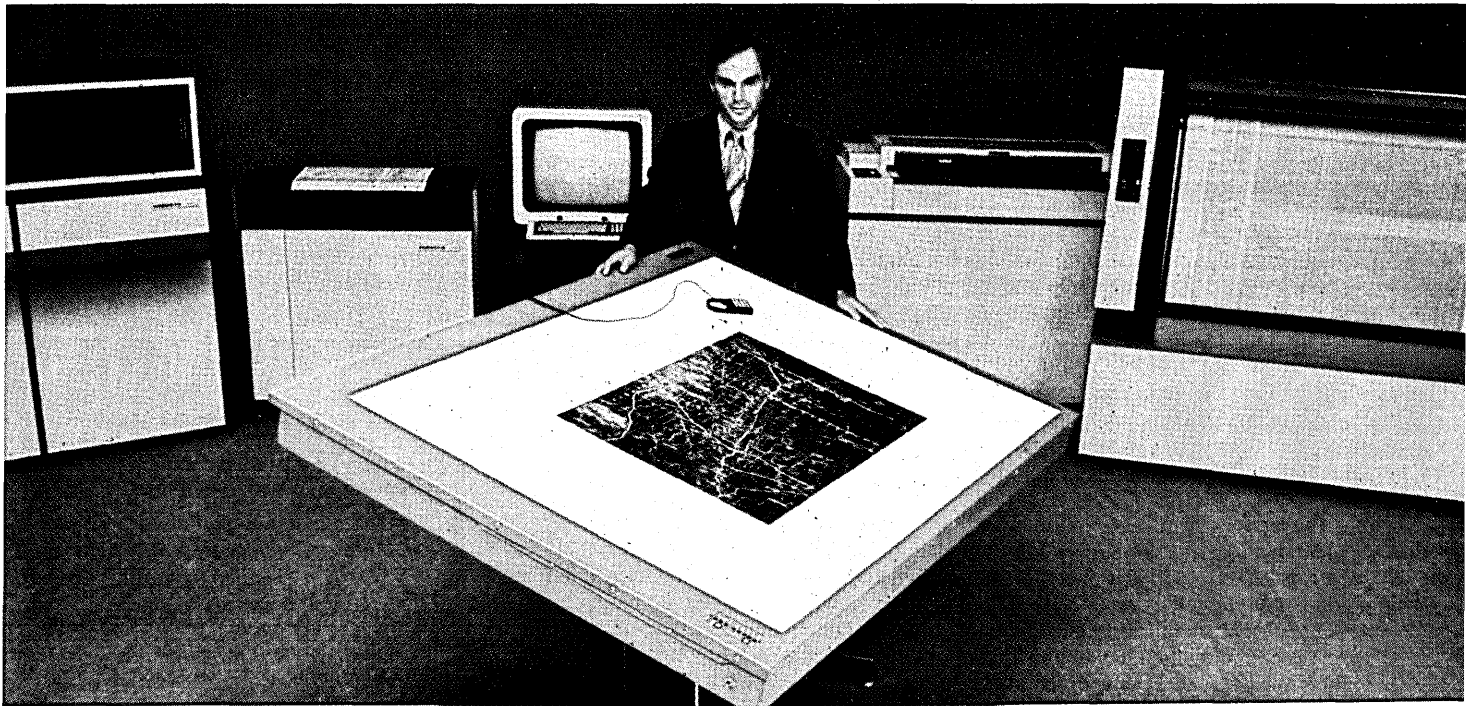
Bright added that the important thing is

that the new mass produced devices will be repackaged with French software and added value.

One important question remains: How much of this French domestic initiative can be translated into sales in the U.S.? The answer, according to Bright, depends on how well the whole program is coordinated in France and then projected in the U.S. Bright says that this is where Intelmatique comes in. "The important thing from our point of view is that France presents a united front to American buyers," said Bright.

Sources indicate that to ensure that French firms work together, the government of France will soon announce plans to lump the leading players together into a consortium. Intelmatique, as the agent or

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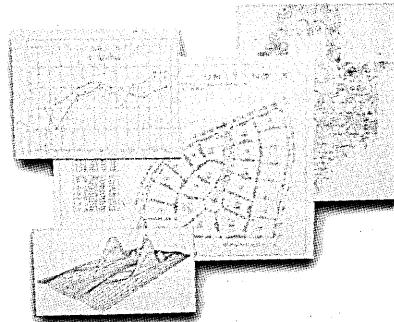
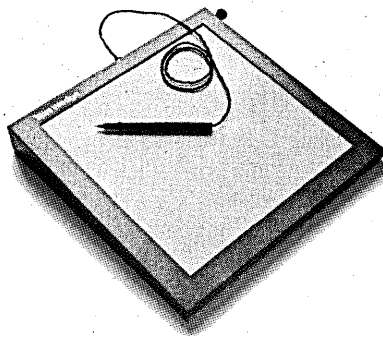
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CIRCLE 44 ON READER CARD

catalyst, then would seek out U.S. buyers and put them in touch with the consortium's pool of goods and services.

"In addition, we can use our acquired experience of the U.S. markets to help those individual French firms make headway here." Bright said this service would be offered for a small consultancy fee.

The French government's preferential buying programs will in theory provide the necessary arm-twisting to keep the big companies in line throughout the Telematique program, as the whole thing is generically named. But in an effort to avoid the whole program degenerating into an "in club" for big preferred suppliers, Bright says that Intelmatique will be responsible for putting the best goods and services from small French concerns in front of potential U.S. buyers.

Many observers, both in the U.S. and in Europe, have noted that the whole program has a largely "artificial air," or smacks of being an overnight creation. Bright is one of the first to admit that there will be some very real problems created by the clash of interests between the public and private sectors, as well as a duplicity of effort.

The \$4 billion French electronics conglomerate, Thomson-CSF, for example, is one French company that will provide some of the mass produced electronic directory terminals. Another concern, this time the \$150 million CAPSogeti/Gemini software group, would provide packages and follow-on services. Another would provide cheap fax devices. And yet another, telecopiers, and so on.

Yet, according to Thomson-CSF director Francois de Villepin, the only way his company can compete with the likes of IBM and Exxon in the office automation sector is by offering a complete system—all the things mentioned above, and then some. Because the French government is only handing out money piecemeal through its Telematique program, Thomson is having to joint venture with foreign competition to build up a complete portfolio. A deal struck earlier this year with Xerox will hopefully result in a new kind of laser optical disk in five years. Rather than divide up marketing territories, the two parties will simply add the innovation to their respective product portfolios. The French company said it is also interested in similar deals for Shugart floppy disk technology and a new kind of telecopier.

Villepin has been actively engaged in talks with likely U.S. partners for many months now. But he is concerned that this approach, if taken too far, could place too great a technological dependence on outsiders. An easier approach might be to acquire U.S. companies, he notes, adding that he is looking at the American word processing and software services sector.

Perhaps a less dangerous approach—particularly if French companies get their

backs to the wall with too many joint ventures—could be a general government merging of the key companies in the Telematique program. But Bright and other French observers consider this option very unlikely at present.

It's difficult to see the Telematique program making such headway in the U.S.—at least in the short term. The first mass produced French terminals, some 250,000, will become available in France next year and some will find their way to the U.S. for distributorship and packaging. But real volume—say, into the millions—of the electronic directories and fax terminals can't be expected much before late 1982, sources estimate.

As the initial thrust of the program is to build French manufacturing and mass production, U.S. manufacture of the terminals is unlikely for a number of years. But what is likely, in the short term, is that French and American companies will agree to co-fund manufacture in cheap labor countries (in the Third World, for example) for eventual sale of the units in U.S. markets.

If a market base is built up with these devices, the real payoff will have to be secured in a more face-to-face manner by French and other software companies. If this is to happen, then agencies like Intelmatique and the INSAC Group will have to be particularly effective at following and refining the "Americanization" game plan, say experts.

Old hands like John Imlay don't seem too intimidated by the sometimes limitless funds and political clout behind these European and other foreign initiatives. "We're used to what I call the 'deep pockets' approach from the likes of Exxon and Citibank," he explained, "and it hasn't worked too well so far."

He added that the Japanese (through Amdahl Corp.) have shown that they have some control in America, and that they will probably try to ease their software problems by buying U.S. database and applications software companies. "But they might well choke on them."

Imlay and other U.S. software experts say that all these foreign competitors are welcome to try their hand in America. "There's room for all," Imlay proclaims.

The general feeling among the indigenous U.S. software industry is that access and service are the keys to building up credibility in the marketplace. As one expert observes: "Access means, for example, where your development people are. American users do not want to hear that they are all in Europe or Japan."

In the end, the concern of the home-spun software companies in this alluring and apparently homogeneous U.S. marketplace remains the same as it always was—what will IBM do next?

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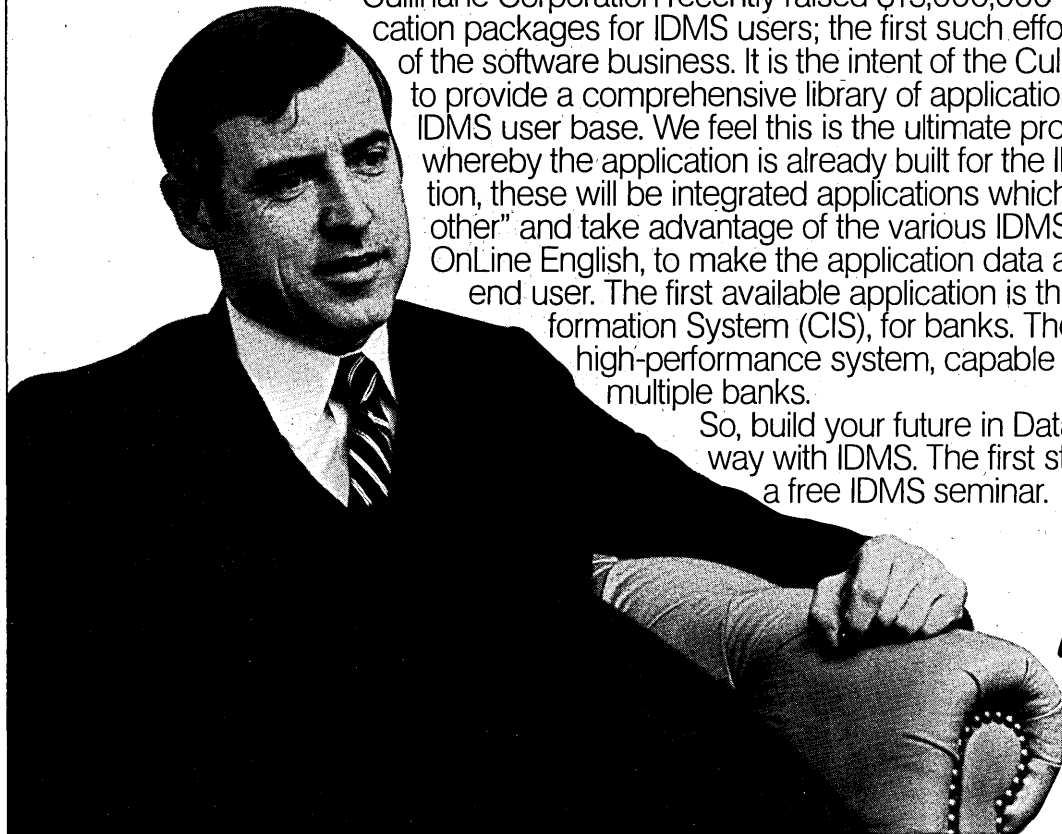
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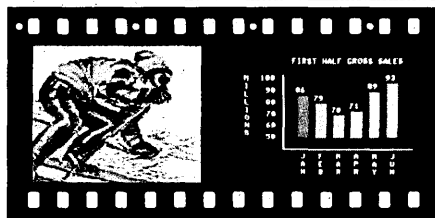
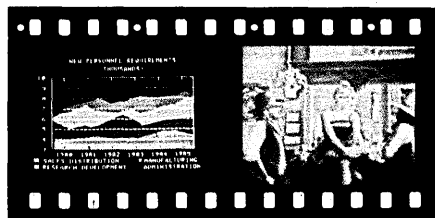
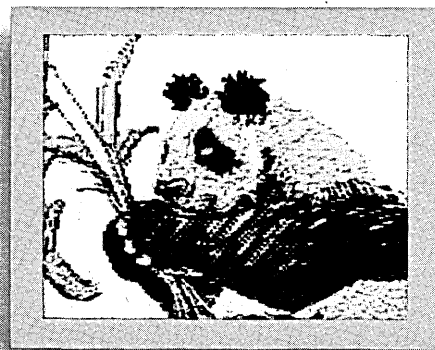
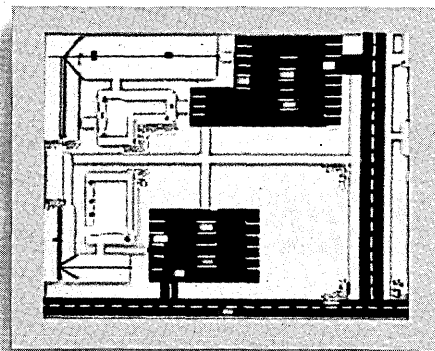


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PEOPLE

Vowing not to repeat the 1970 slump, the industry is looking to its leaders. A variety of top management changes have been taking place as computer firms jockey for position in a marketplace that is constantly expanding both in terms of the number of opportunities and the number of competitors seeking to capitalize on those opportunities. Below are some of the key people whose decisions will shape the computer industry in the years to come.

"Our company has gone through and is continuing to go through a path of rapid growth and expansion. Mr. Kaufman's broad-based experience at Xerox during the time when that company was undergoing a similar growth pattern will be of particular benefit to Centronics."

With those words, Robert Howard, chairman and ceo of Centronics Data Computer Corp., announced the appointment in April of Michael D. Kaufman as president and chief operating officer of the printer company. Four months later, Kaufman announced a rearrangement of the company's management and a new business structure.

Faced with the blessings and the challenge of 62% growth in revenues during fiscal 1979, Kaufman's business strategies should soon show their worth in the rough and tumble printer marketplace.

*

"It's going to be hard to repeat what he did because the original PCM computer game is not so good anymore."

"If it's going to be a pure plug-compatible, there is no reason, just based on Gene Amdahl's deserved fame, to think it would be very successful."

These are two of the more pessimistic industry opinions concerning Acscys Corp., Gene Amdahl's newest venture into the PCM arena. Founding directors Gene Amdahl and his son Carl will likely target very large organizations for their product line and will stress scientific applications on business machines beyond present IBM capabilities.

Proposed innovations will include advanced microcode control and a type of multi-processor architecture that is radically different from present machines.

"We not only intend to develop the computers but we will manufacture, market, and service them worldwide," Gene Amdahl comments. These new systems, which are still at least three and a half years away, will give Acscys a "sterling lead over what I expect competition to have at their disposal."

Gene Amdahl left the Amdahl Corp. in August, four months before his scheduled retirement. With him went Clifford Madden, former vp and chief financial officer of Amdahl Corp. and now president of Acscys.

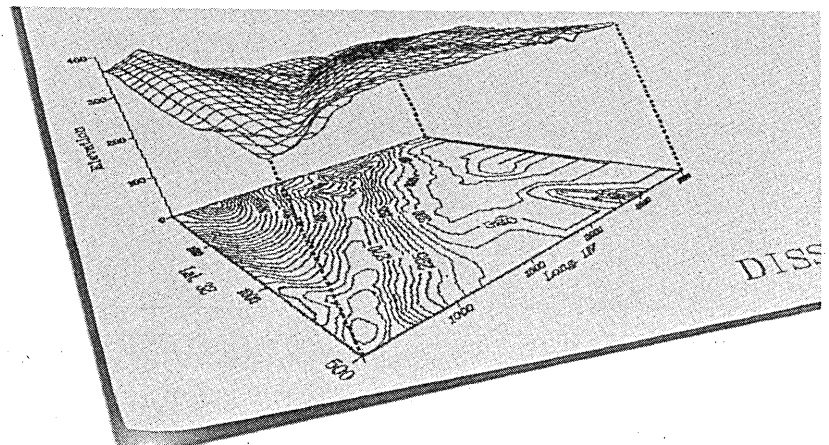
Given his past track record, observers feel that Amdahl has an excellent chance to

make the new company work.

*

"Clearly, Olivetti has not been very successful in the U.S.," says one industry observer. Marisa Bellisario "was supposed to come in and revolutionize everything, but she didn't."

Olivetti's role in the U.S. has remained stable during this past year, and Marisa Bellisario has come and gone. Her aim, to revolutionize the American subsidiary, hadn't quite materialized by the time she had returned to Ivrea, Italy on a new assignment for the Olivetti Group. "She was only here for a year," commented another Olivetti watcher, "and in that time she managed to trim a lot of deadwood. But in a year, you barely have time to find your way around the plant."

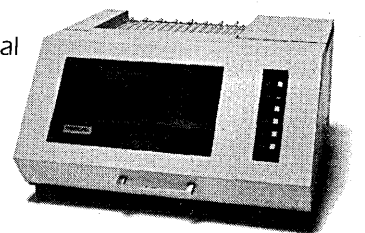


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Burnham



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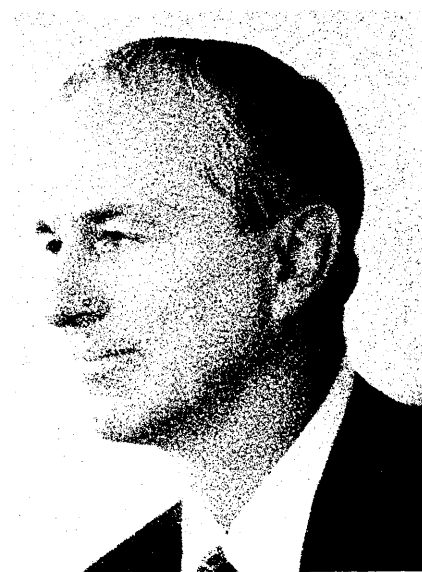
Gaffney



Spangle



Winegar



Brown

PEOPLE

Albert Winegar has been running the U.S. operation since May. He came to Olivetti last year after serving IBM for 23 years in a wide range of sales, marketing, and product management positions. His most recent post at IBM was division director for management service in the Office Products Division. Winegar received his appointment as president and chief operating officer after only eight months with Olivetti.

Upon the October retirement of George S. Trimble, Duane L. Burnham took over as president and ceo at Bunker Ramo Corp. Burnham joined the company in 1975 as assistant controller, and was elected executive vp in 1979.

Historically Bunker Ramo's financial state has risen and fallen dramatically at different times, due to different circumstances. Now in one of their lows, the company has been considering acquisition offers. Given Burnham's financial background (he is a highly regarded CPA), it appears he was brought into the ceo/president slot to either save the company or to handle the negotiations involved in a sell out.

Named president of Lexitron Corp. in February, Dick Gaffney had been an employee of Raytheon—Lexitron's parent—for 23 years. When the acquisition took place, Lexitron was floundering because of a series of management disasters and Gaffney was called in to pick up the pieces. He's been busy restaffing Lexitron, and getting the company back on its feet. Industry observers foresee the renaissance of his once nearly moribund division in the word processing field; the company is active, making commitments and following through.

In May Clarence W. Spangle was elected chairman and ceo of Memorex Corp. Spangle has been president, ceo, and on Memorex's board of directors since March of 1980, when he joined the company after more than thirty years with Honeywell. At Honeywell, Spangle was president of Honeywell Information Systems (HIS), which comprises the company's computer operations; executive vp of Honeywell Inc.; and had also served on the board of directors.

He spearheaded the 1970 merger of Honeywell and General Electric's computer operations—from which HIS was established. Considering his involvement with the Honeywell-GE merger and Memorex's recent merger discussions with Amdahl and Storage Tech, industry speculators predict Spangle has been chosen to "find the right fit" once more. Present Memorex financial conditions are similar to those existing at GE before the Honeywell merger. Now it appears Memorex has the right man to handle the situation should the need arise.

In addition, Charles S. Strauch was elected president, a member of the board of directors, and chief operating officer of Memorex in May. Strauch has an extensive

background in international management and marketing of high technology products due to his work history with Gould Inc., a Chicago manufacturer of electrical systems, instruments, controls, and automotive parts. His reputation is that of a "team builder," after turning several of Gould's troubled operations into company contributors.

Phillipe Villers was co-founder and senior vp at Computervision when he decided that "the baby's grown up and I need a new challenge." And so he founded Automatix, Inc., to enter the fledgling robotics industry.

Automatix is marketing programmable automation and sensor-based industrial robotic systems. Villers' will differ from the thousands of robots already installed in factories—television cameras will enable the robots to "see." Also, for the first time, robotics systems will be offered on a turn-key basis.

Villers has put together an impressive team. Joining him in the startup are Michael Cronin, ex-vp from Computervision, now marketing vp at Automatix; Arnold Reinhold, former Computervision director of advanced applications, is the new company's product line manager; John Dias and Daniel Nigro, both former Data General

employees, are vp of finance and vp of manufacturing, respectively; Dr. Donald Pieper, formerly with Continental Can, is the new vp of research and development; Dr. Gordon VanderBrug comes from NBS where he headed the robotics program—he is now a product line manager with Automatix; Dr. Norman Wittles, also a product line manager, was with the Sperry Corporate Research Center; and Victor Scheinman has become the company's vp of advanced systems, after leaving Unimation as a general manager. Scheinman, known as the "father of the new robots," developed the Vicarm, the arm movement engineering technique used by Unimation, the oldest and largest robot manufacturer.

For the Automatix startup in February 1980, Villers received investments amounting to just under \$6 million from Harvard University, MIT, and the Memorial Drive Trust, an investment trust for the benefit of Arthur D. Little employees.

William S. Wheatley Jr. was elected in August as president of American Satellite Company, one month after the official merger of the Fairchild subsidiary with Continental Telephone. It is believed that American Satellite's future plans have been well established by its parent companies and that Wheatley's appointment came not

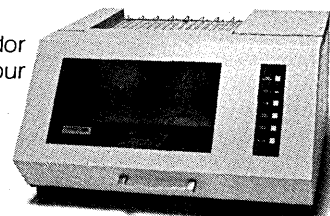


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SCIENCE/SCOPE

Information supplied by weather satellites has become significant in search and rescue missions conducted by the U.S. Coast Guard. Field offices of the National Oceanic and Atmospheric Administration have oceanographers and meteorologists who are specially trained in interpreting and analyzing satellite imagery. When a vessel or plane is lost at sea, they evaluate wind velocities and directions, activities of major ocean currents, low-level cloud cover and fog data, and sea surface temperatures. They then can suggest where search efforts should be concentrated. The GOES (Geostationary Operational Environmental Satellite) spacecraft used in these efforts were built by Hughes.

Radar-guided missiles of the future will undergo simulated flight tests in a computerized facility under construction at Hughes. A unique signal generator will create up to four fully independent targets simultaneously. It also will simulate clutter and jamming. The three-story complex will evaluate missile hardware and software in real time under approximate real conditions, thereby saving the expense of certain flight tests. Ultimately the facility will serve a variety of missile seekers that operate within the range of 2 to 100 GHz.

The process that enables tree branches to obtain water may eventually be used for cooling avionics or other systems where fluid pumping against high-pressure heads or high g forces is required. Under U.S. Air Force sponsorship, Hughes engineers are developing a closed metal tube which moves heat from one place to another using direct osmosis, the passing of a fluid through a semipermeable membrane into a solution where its concentration is higher. Unlike conventional devices using capillary wicks to pump liquid, the osmotic heat pipe would operate regardless of gravitational or centrifugal forces.

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Important advances in many disciplines of electronics -- including lasers, fiber optics, liquid crystals, semiconductor materials, and fabrication techniques -- are being reported by Hughes scientists and engineers. Recent papers include "Image-Understanding Architectures," "Scaling Limitations in MOS Technologies," and "Fabrication Techniques for Nanometer Dimension." For copies of these and others, write to Technical Publications, Hughes Research Laboratories, Bldg. 250, M/S 1073, 3011 Malibu Canyon Road, Malibu, CA 90265.

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PEOPLE

out of a need for strategic planning, but from a need for strong financial expertise. He is known as a traditionalist, numbers-oriented, with a vast knowledge coming from a 12-year association with ITT.

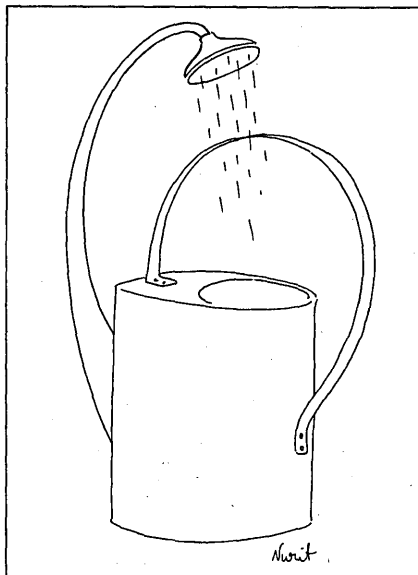
Fairchild Industries predicts a growth in domestic satellite service from its current \$75 million to \$100 million level to more than \$1 billion annually by the late 1980s. In announcing the partnership, John Dealy, president of Fairchild Industries, stated: "... by combining the aerospace and communications hardware capabilities of Fairchild Industries with the consumer telephone experience of Continental systems, this will help ensure a major position for American Satellite in that high-growth marketplace."

To meet the need for high speed digital communications, American Satellite initiated its Satellite Data Exchange Service in 1978 which enabled major corporations to provide intra-corporate communications rooftop-to-rooftop while avoiding AT&T's territory.

The addition of American Satellite's data-to-data capability to the nation's third largest non-Bell telephone company forms a natural partnership in the changing marketplace.

To no one's surprise IBM this year moved John R. Opel into the ceo slot, while Frank T. Cary continued as the board chairman. The final shuffle is effective January 1, 1981, when, in accordance with company policy, Cary steps aside upon turning 60.

IBM had directed much of its competitive attention to the PCMs and was a late entry into such markets as office automation and ddp. It now remains to be seen how Opel will deal with these markets and whether he will continue the directions laid down during Cary's tenure, or begin moving IBM along less traditional lines. Some industry observers feel that "IBM's policy



has been shaped and it wouldn't put anybody at the helm who's going to rock the boat." Others feel that a change is imminent to cope with the new markets and the challenge of a partially unregulated AT&T.

In any case it is expected that Opel will be more of a public figure than Cary and under his leadership IBM will act more aggressively toward traditional competitors, particularly DEC, Honeywell, Burroughs, and Prime.

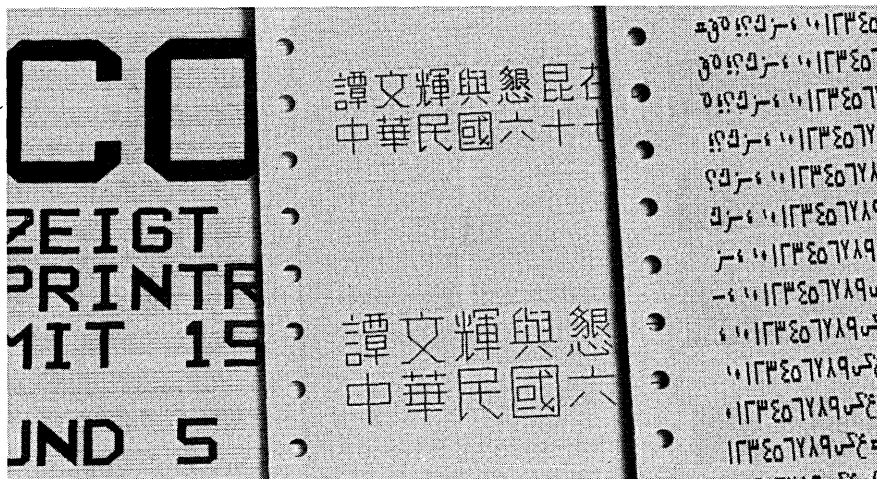
Industry insiders speculate that IBM has been positioning itself over the past few years for some new and dramatic moves in the near future that will impact on the entire structure of the computer industry.

As president and ceo of Honeywell Information Systems, Stephen Jerrits has streamlined the organization, leaving himself with a very lean but strong central management team. After being appointed to the new spot in January, Jerrits immediately became more publicly visible than his predecessor, Clancy Spangle, who moved on to become chairman of Memorex Corporation.

In May, Jerrits announced a major restructuring of Honeywell's worldwide computer operations to change the company from a matrix management approach to a line organization. "Responsibility for oper-

ating results are now clearly assigned to the operating organization with strategic planning, controlling, and integrating functions being performed at the headquarters level, while the worldwide management responsibility for each product line, including business and product planning, will reside within the appropriate systems organizations," he said. Another Honeywell spokesman added, "this change makes those divisions more worldwide in scope and a little more autonomous at the same time."

Among new areas of expected growth are office automation, local networks, and an increased involvement in Europe through Honeywell Bull. One industry observer sees Honeywell as being "blocked at the pass by IBM. They've seen that their opportunity doesn't lie in just maintaining their unique Honeywell base, but in expanding outward, that's part of the whole minicomputer strategy. A consequence of this would be Honeywell's support of open systems architecture." The announcement in September of Honeywell's proposed acceptance of the ISO standards would make it the first major computer manufacturer to adopt the standards. Another observer feels "the best way to break the IBM stranglehold is through standards and they will go after that. The acceptance of the standards would

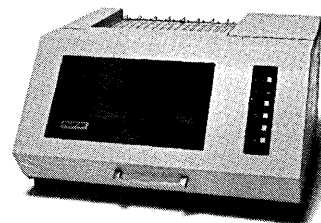


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DATAMATION SPECIAL ISSUE 71

PEOPLE



Blumenthal



Irwin



Coffon



Opel



Olsen



Jerritts



Kaufman



Berg

**"THE 1980S WILL BE
UNIQUE: IN THE
PAST WE THOUGHT
IN TERMS OF
COMPETITION
WITHIN OUR
INDUSTRY; NOW
WE HAVE TO
EXAMINE WHAT
INDUSTRY WE
ARE IN."**

PEOPLE

also be in line with Honeywell's expected expansion in the world market."

Although the company remains silent on proposed plans, it is obvious that Jerritts has and will institute changes to create new opportunities for Honeywell in the future. Ira Cotton has been with the National Bureau of Standards for seven years, most recently as a manager of the local networking and office systems group at the institute for Computer Sciences and Technology, when he decided to leave the government and join Booz Allen & Hamilton, Inc. this April. His new position is Senior Associate with the MIS (Management and Information Systems) Division. Based in Bethesda, Maryland, 90% of the division's work is for the government.

While with NBS, Cotton helped establish guidelines for office automation. But he felt he was becoming too much of a technocrat, and needed to get back into business, or, "the real world." Cotton said, "It is difficult in government to know or measure how well you are doing—the bottomline becomes vague."

His immediate goal is to establish a consulting business in office automation; to "spread the gospel of office automation until the needs, desires, and necessary interest increases to meet the capabilities of this new technology." Management and executive productivity is the primary target of office automation, he feels, not the clerical aspects of corporate business.

Amy D. Wohl, president of Advanced Office Concepts, agrees with Cotton's assessment. She also notes that there are few executive suites where office automation has taken hold other than as an experiment. Wohl expects some companies will be using automation routinely at the executive level by 1982 or 1983, and more will be experimenting by that time. But it will be an area with vast productivity potential that will need further exploration, and acceptance.

All major offices of AT&T's proposed unregulated activity will be reporting to James E. Olsen, vice chairman of the board, as AT&T attempts to build a solid structure for its entry into the unregulated market.

Although the Computer Inquiry II decision came in April of this year, industry observers agree that AT&T has been gearing up for three to four years for the reorganization that took place in August. Charles L. Brown, AT&T chairman, has been instrumental in planning the reorganization and in creating a structure that will carry the company through the next fifty years. "So complex and extensive are the changes that will be required of us that we had best get on with them. The Bell System will be an organization vastly different from the one we know today."

There is speculation as to the scope of AT&T's entry into the unregulated market. An increase in AT&T's network services, with offerings like Advanced Communica-

tion Service and the entry of IBM into the PBX business could make for new competition in the industry. Preparation for the future will give AT&T a sound foundation in the unregulated market.

Smaller Winchester-type disk drives with larger capacity was a market Samuel Irwin saw a need in developing to "keep up with the immediate technological growth pattern." In September he announced his new company. "Irwin International has been a plan of mine since August 1979 when I began startup procedures and product technical development. The company's overall approach and general product philosophy is aimed at building a common base of complete memory system—eventually with the integration of software into these hardware components. The first embodiment of this philosophy is what we feel is a dramatic breakthrough in Winchester 5¼-inch disk drive technology."

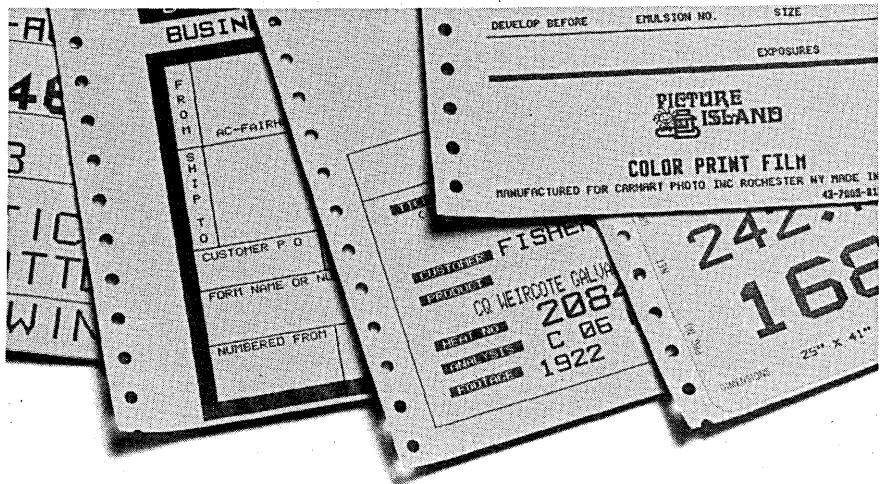
Samuel Irwin pioneered the intelligent terminal concept in 1967 when he founded Sycor Corp. Prior to that he initiated the application of automotive assembly line techniques in the electronics industry when he joined Holly Carburetor Co. in 1956.

Formerly president and chairman of the board at Sycor Corp., Irwin was first introduced to the 5¼-inch mini floppy at

SICOB in Paris where his initial reaction was, "That'll never fly, it's going to cost the same as an 8-inch floppy." But before formalizing the idea last summer "we learned that it didn't cost the same thing and the 5¼-inch mini floppies were a lot less expensive to build than 8-inch drives. Once we saw we could hit the 10MB to 20MB range it was obviously time to go ahead." Irwin hopes his new product will meet the need of designers of small business computer systems, distributed data processing, and word processing systems for large amounts of random access storage in a physically small package.

Two major management changes have taken place at Control Data Corp. this year: directors of the company elected Robert M. Price president and chief operating officer, and Norbert R. Berg deputy chairman of the board. They are joining William C. Norris, chairman and ceo, in the newly created "corporate executive office" with management responsibility for the \$3.3 billion (sales) firm and its subsidiaries.

Price joined Control Data in 1961 and has most recently been president of the firm's computer company. In 1961, he started as a mathematical staff specialist and was quickly promoted to manager of application services. He continued to advance,



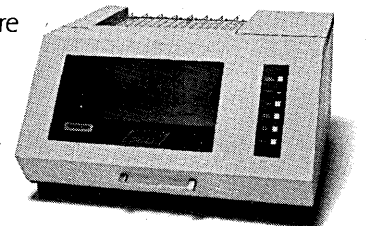
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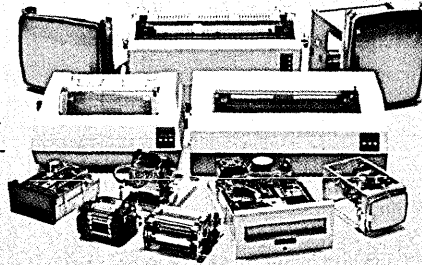
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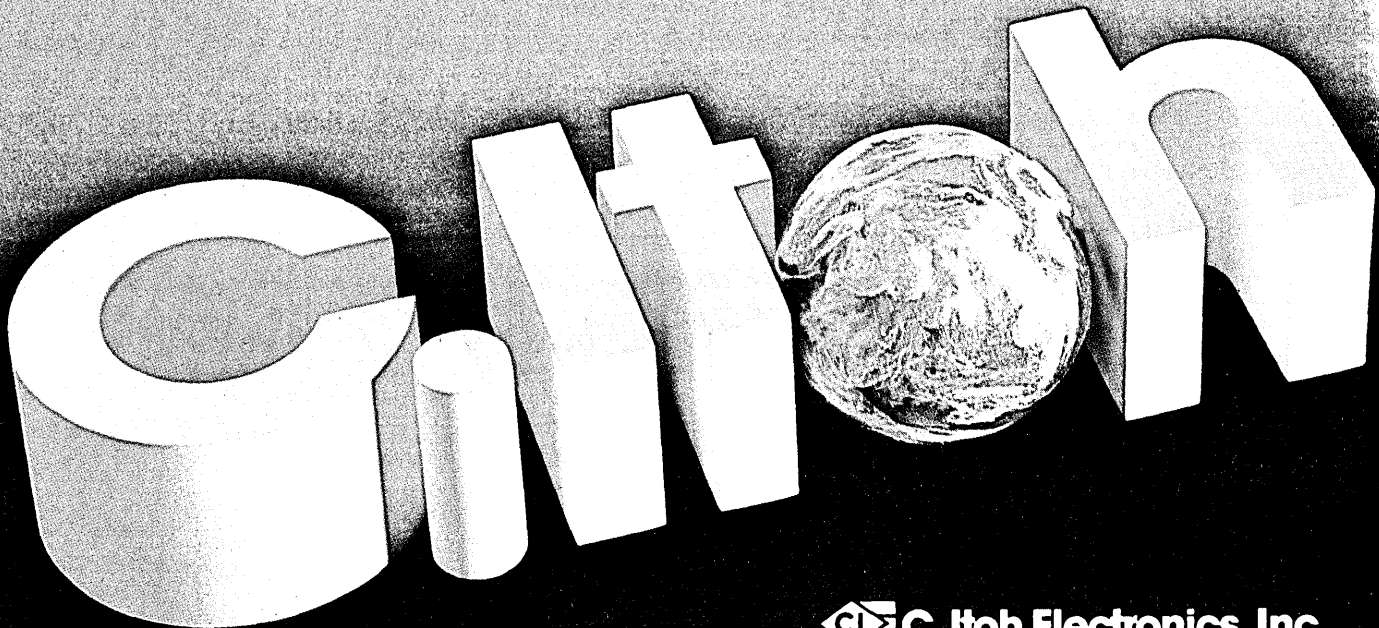
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PEOPLE

and when a major reorganization of the company occurred in 1970, Price returned to his primary interest of applying computers to problem solving—now as the vice president and group executive of services. From 1971 to 1972, Price chaired a key task force to determine the company's future computer line strategy. That task force's recommendations are directly responsible for today's profitable Series 700 line. The reason for success? Price says about Control Data (and notably an inadvertent comment about himself as well), "We have been, from top management on down, a very tenacious and determined organization.

"We have not only survived but are in a position of leadership in many of our markets; it is, I think, the result of facing uncertainty squarely, caring about people and their great potential, and making the hard decisions necessary to move forward."

Norbert Berg began his career with Control Data in 1959. Most recently, he had been senior vp for administration and personnel, and assistant to Norris. He will be responsible for a broad range of administrative functions, including senior executive development, human resource management and personnel, legal affairs, employee, community, and government relations, corporate growth, small business development, urban programs, and others. About his work at Control Data, Berg says, "My job has been to help marshal resources, to get something going, to make it happen. Many of us came to Control Data dissatisfied with the slowness and reactive stance of larger organizations. Our style has been to be out front and up front. Our yardstick for some decisions has been no more complicated than 'it is the right thing to do.' We acknowledge our obligation to serve society's needs but we are also clear that we will do so profitably." Berg has been involved in the company's development and implementation of strategic businesses to address social needs. As deputy chairman, he will have expanded responsibility for identification and early development of new businesses involved in such strategic programs.

"Burroughs' board of directors decided that the inside resources were much too limited in scope and in alternatives to pick successors from inside," explains one industry expert analyzing the addition of W. Michael Blumenthal to Burroughs Corp. "Under Ray McDonald, Burroughs did not develop much in the way of depth as far as general management talent and there were not many candidates for senior management. Blumenthal's heavy government background adds an understanding of government, economic and world proportions that a Burroughs inside man might know very little about."

Blumenthal moved into the chief executive spot three months ahead of schedule when Paul Mirabito unexpectedly stepped aside. Speculation was that the

company's first quarter profit decline in 17 years, a potential earnings decline for the year, and the desire of board members to have Blumenthal get on with the job, may have precipitated the decision.

In an interview with DATAMATION Blumenthal hinted at some of the directions the company will emphasize, including office automation and enhanced customer support.

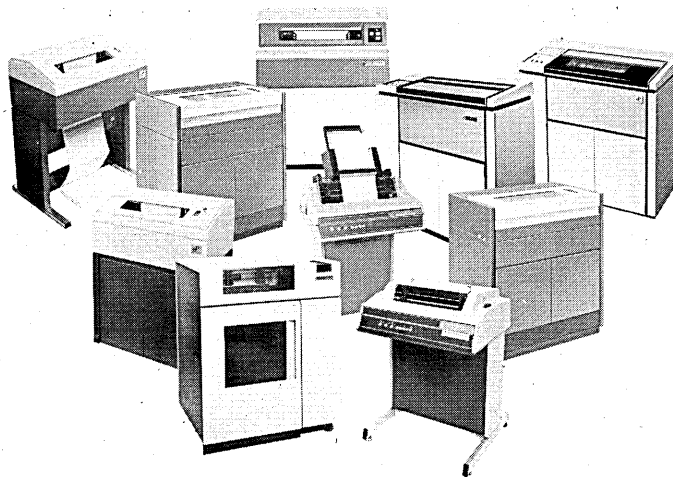
It is believed that Burroughs will also make a new thrust into the government market and Wall Street analysts expect an overall broadening of business and growth rate.

The proposed acquisition of System Development Corp., and reports of Burroughs' approaches to General Automation earlier this year may be an indication of this increased interest. Burroughs has made recent acquisitions including Contex, Redactron, and Graphic Sciences, all of which have taken place in the past five years.

Next year will show the full impact of Blumenthal's presence, when it becomes clearer what organizational, marketing, and personnel changes are under way.

—Deborah Sojka
and Don Rosenthal

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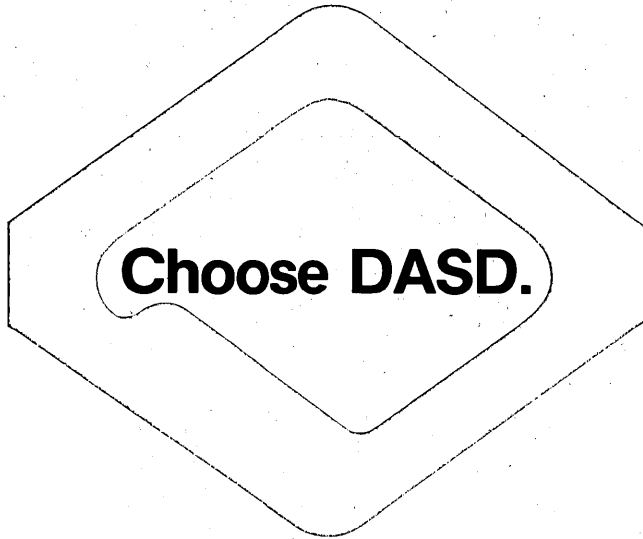
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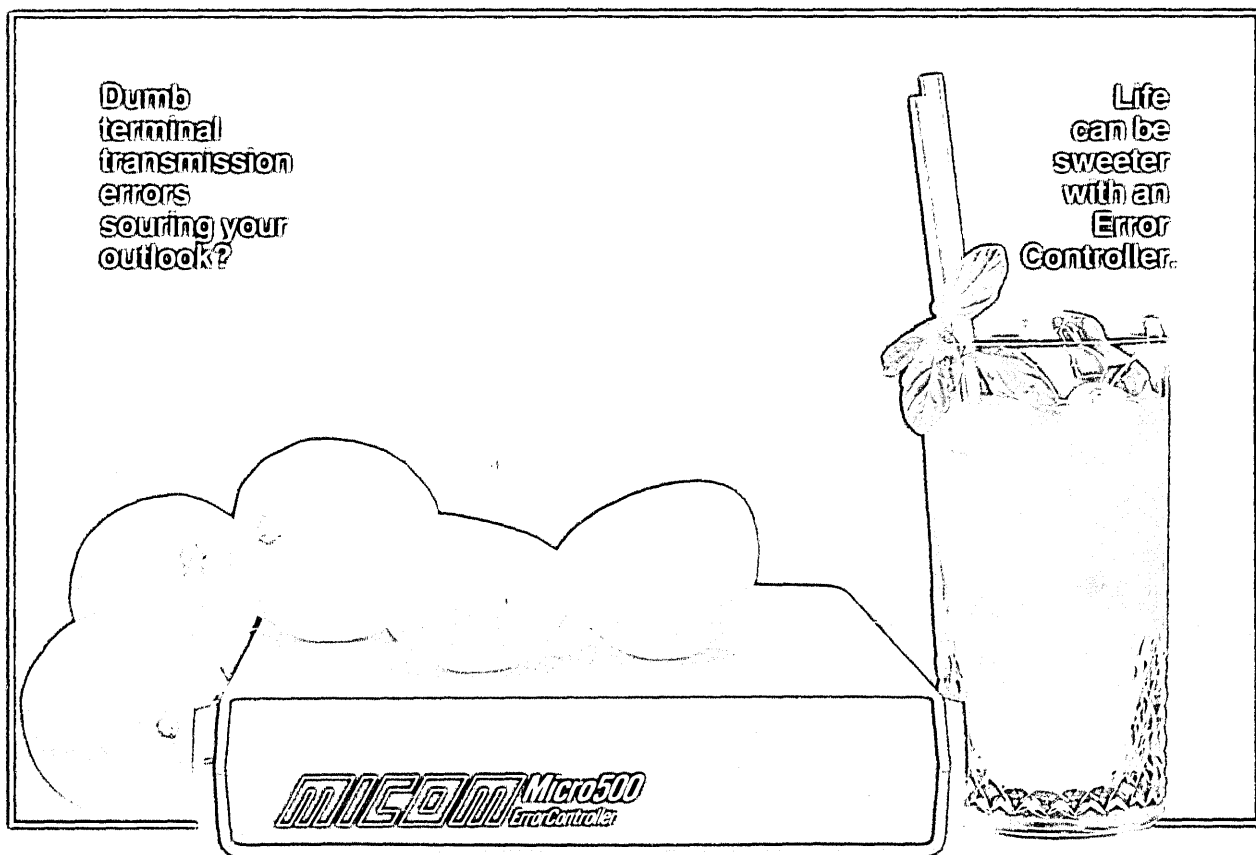
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