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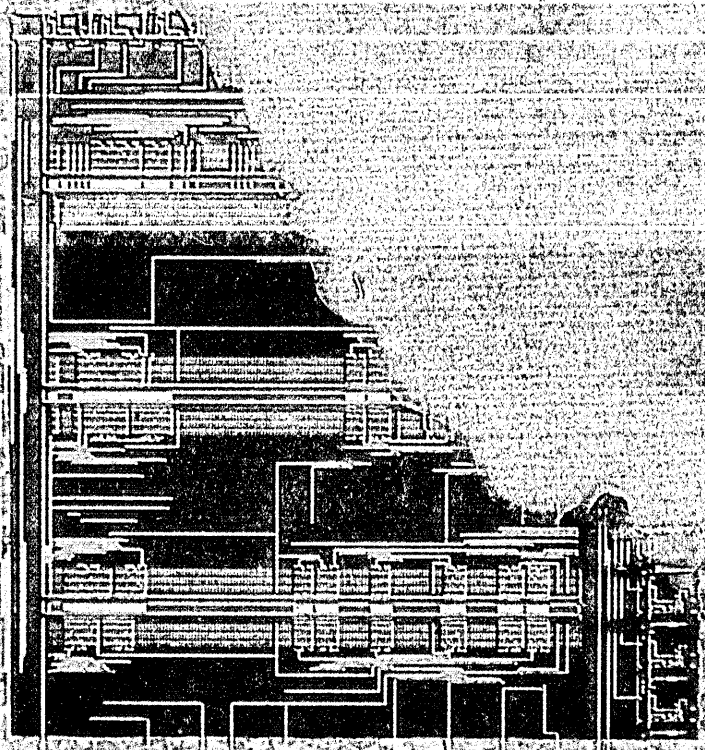
NCC '85: HIGH TECH IN THE HEARTLAND

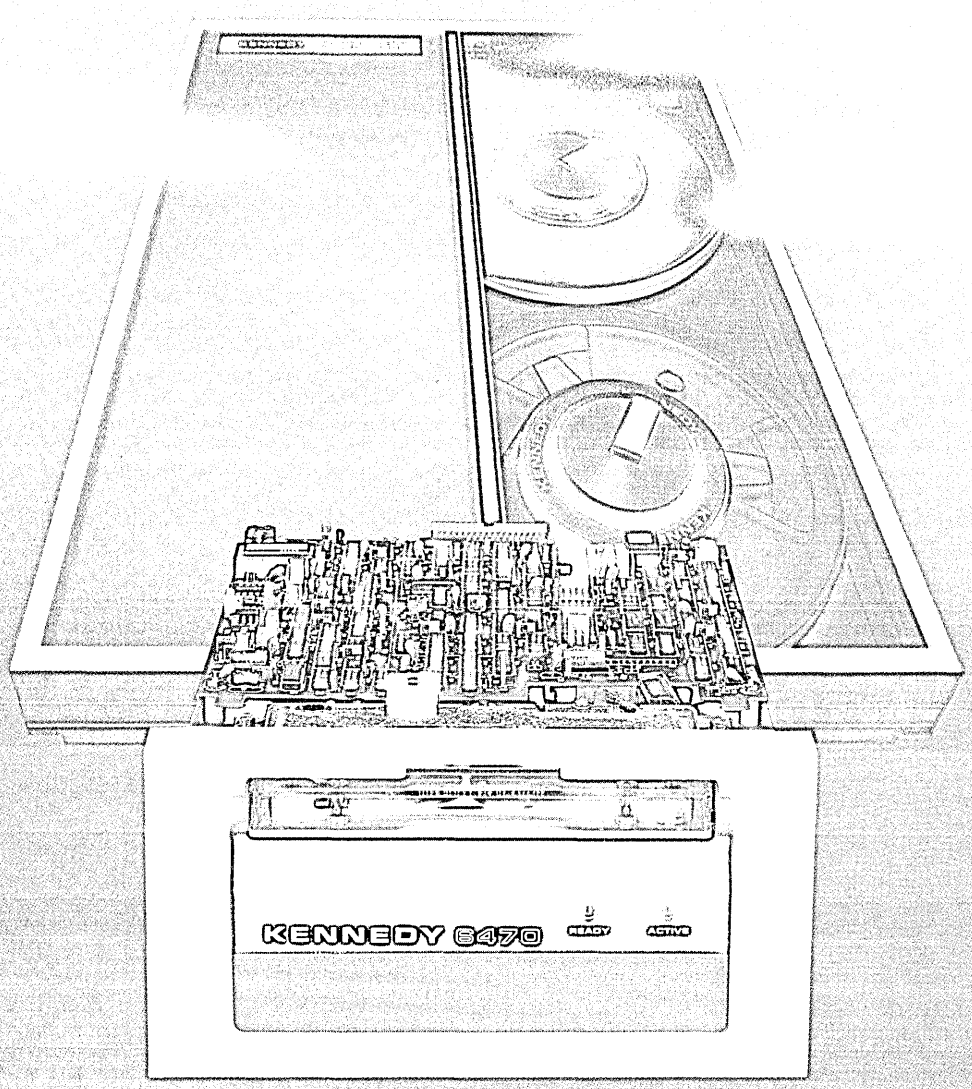
ALSO

DIGITAL NETWORK STRATEGIES

IBM BEEFS UP DB2

FRENCH MICRO LESSONS





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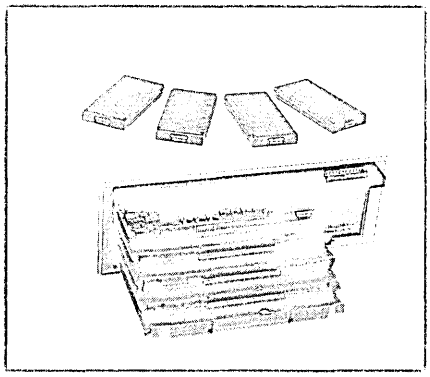

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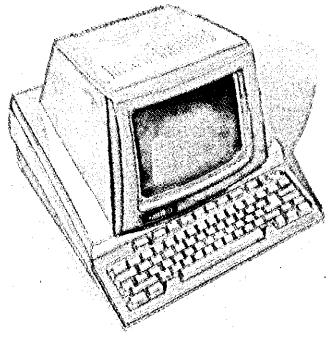

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DATAMATION

JULY 1, 1985/$3.00 U.S.A.
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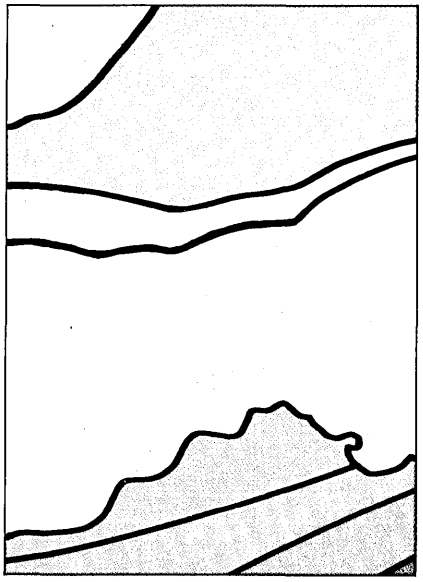

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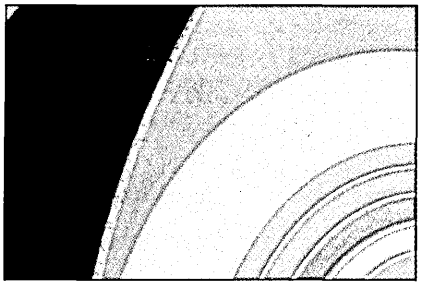

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COVER PHOTOGRAPH BY PETER ANGELO SIMON; COMPUTER CHIP BY PHILIP HARRINGTON

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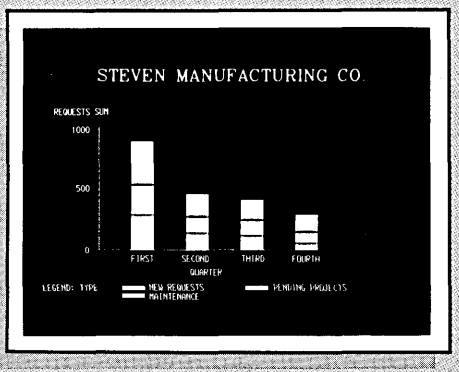

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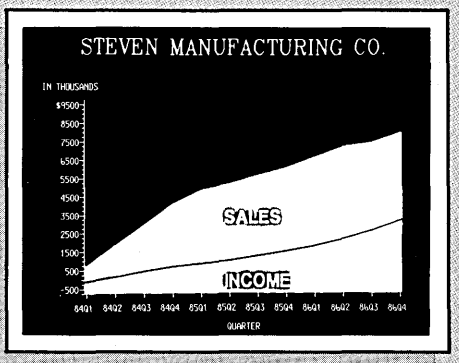

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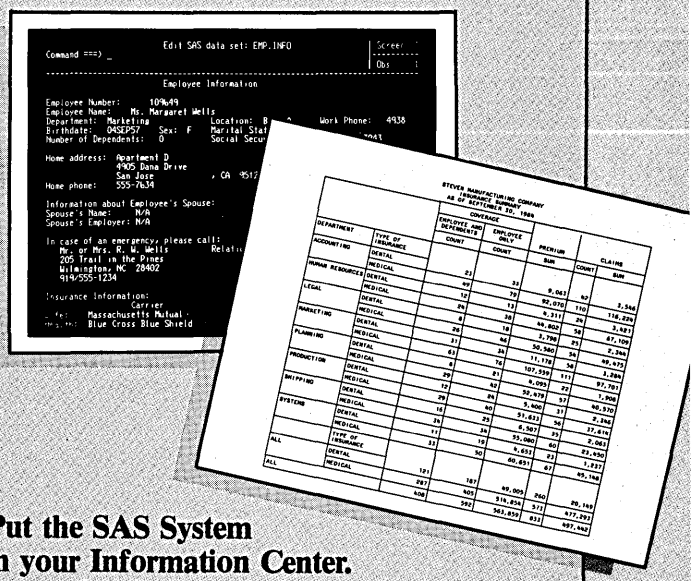

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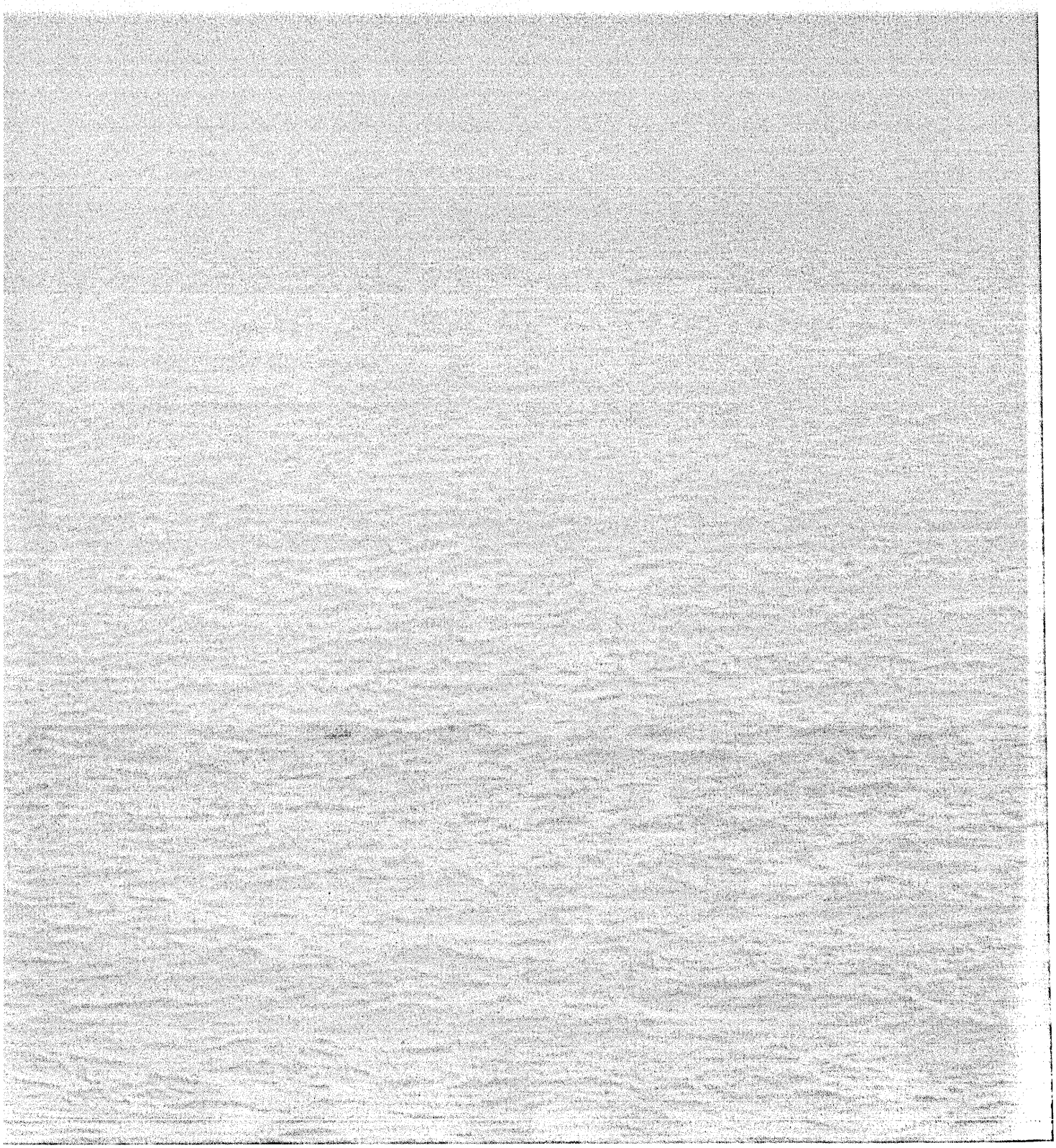

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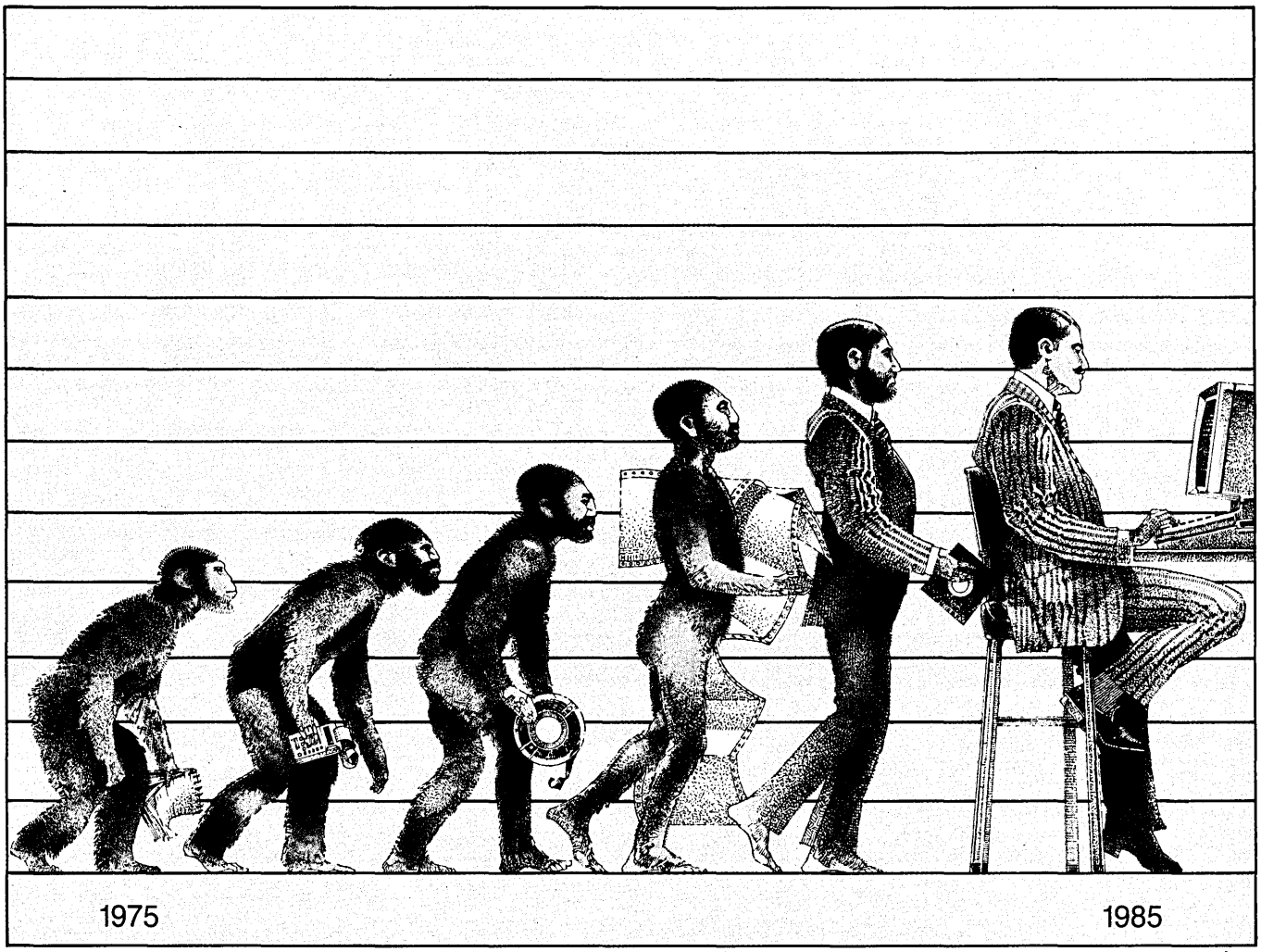

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LOOK AHEAD

IBM'S NEW PC STRATEGY	The industry's current market malaise has IBM on the horns of a dilemma. How can the company clear its inventory of aging PCs and at the same time introduce new technology for new customers when there appears to be a glut of MIPS and megabytes in the marketplace? IBM's answer, according to customer sources in the industrial sector, will be to both augment the PC and slash its price to the bone, but not to replace it with the so-called PC II until next year, or until bulging inventories are cleared. After four years of production of the PC, IBM's manufacturing costs -- put by one source at $750 or a 55% gross margin -- are low enough for the company to stimulate demand by selective price-cutting. At the same time, IBM will enter new markets with a PC AT upgrade geared for the scientific/engineering and CAD/CAM sectors. Another solution will be for IBM to augment the PC: introduction of a new 3270 AT and a larger 3270 controller, the 3274/81C, are imminent, sources say.
MORE CHIP-DUMPING CLAIMS	Look for more documented charges of Japanese semiconductor makers dumping chips in the U.S. market for less than their costs, in the wake of recent allegations that Hitachi Ltd. has been deliberately underselling EPROMs at 10% below the quoted price of domestic producers. Santa Clara, Calif.-based Intel leaked to the Reagan administration a few weeks ago an internal Hitachi memo urging salesmen to undercut all competitors, which started off the latest furor. "Expect a flurry of these documents to start making the rounds," says a source close to the company. The documents, says the source, "will show a sure and steady Japanese practice of dumping all kinds of gear right across the board." The source adds that some private detectives are being sounded out for "black bag jobs" -- breaking into the offices of Japanese vendors in the search for incriminating evidence -- reminiscent of E. Howard Hunt and G. Gordon Liddy of Watergate fame. Not surprisingly, no one is saying publicly which companies are hiring and if anyone's signed on.
100 AI PROJECTS AT LITTON?	Litton Industries is about to enter the artificial intelligence business in a big way. Company sources say that more than 100 AI projects are now under way throughout the Beverly Hills, Calif.-based conglomerate. Some have reached the prototype machine stage and a few are expected to result in product offerings before the year is out. A likely candidate is an expert system for training developed on a $100,000 Symbolics processor and rolled down to an IBM PC. "The PC is less capable in development but certainly capable of delivery," says a Litton source.

LOOK AHEAD

SIX SW PIRACY CASES IN REVIEW

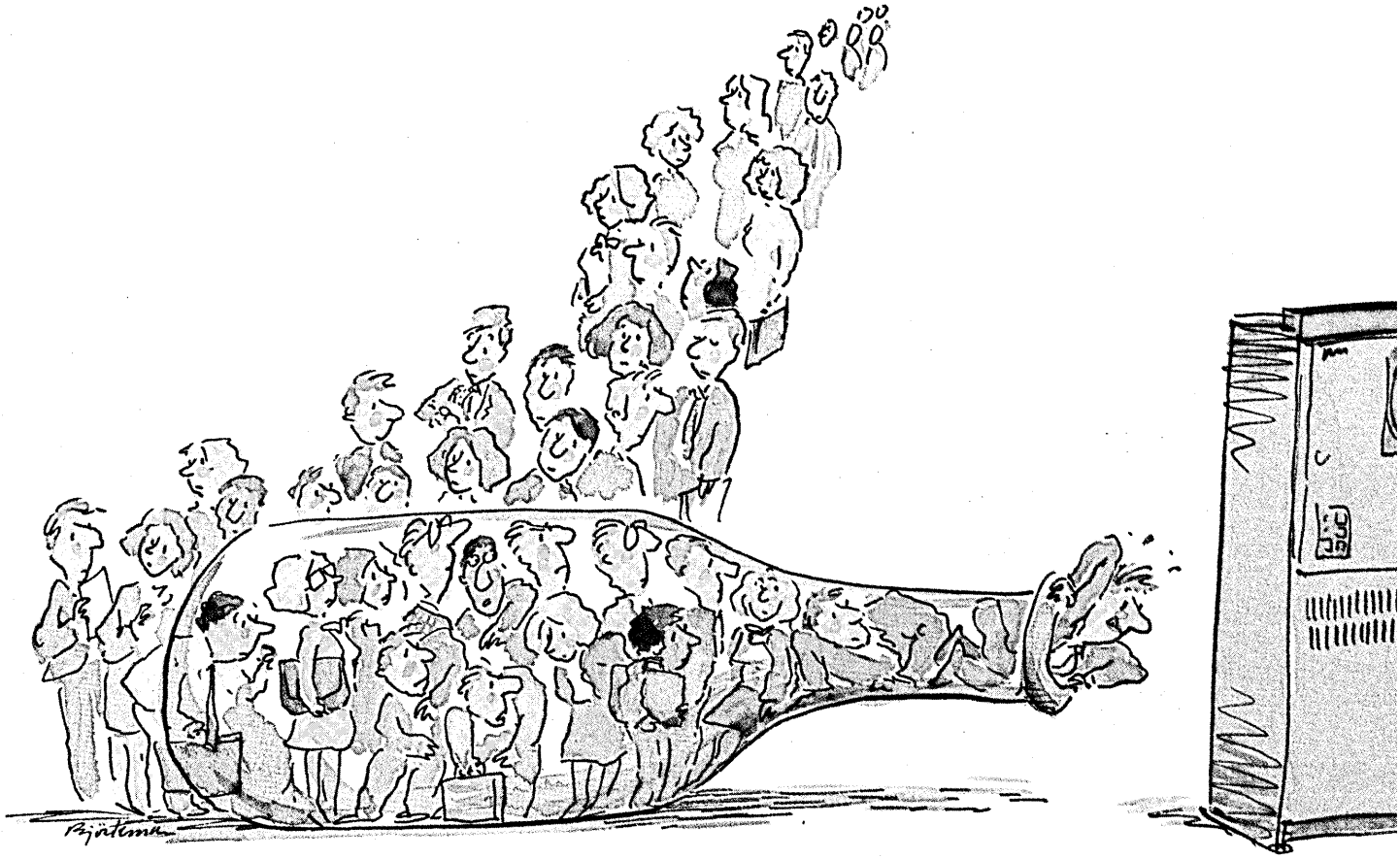
ADAPSO is presently investigating six more cases of illegal microcomputer software copying in which the early evidence of copyright violations is "substantial," according to a source close to the association. Three of the cases under surveillance are copy mills, including one operated by a judge in a small town in Ohio; ADAPSO will either pursue that case independently or will go through a local bar association. The evidence in the six cases is apparently substantial enough to have sparked heightened interest from the federal Department of Justice. "We're not going to take any step where we look like idiots or lose a case," an ADAPSO source comments. "We're going to make very sure of ourselves. We are only going to take winners."

KODAK TO TEST 9GB OPTICAL DRIVE

Hard on the heels of its acquisition of floppy disk maker Verbatim Corp. this spring, Eastman Kodak is readying a big bang in its efforts to break into the electronics industry. Sources say the company is putting the finishing touches on a 14-inch optical disk and drive at its Rochester, N.Y., research center and that it will boast the largest storage capacity yet seen in production devices: a whopping 9 gigabytes, or 4½ times the size of other devices. Kodak is said to be targeting banking and insurance customers for its new system. The Kodak drive and disks are scheduled for beta testing later this year. Outside sources estimate that the drive is expected to sell for $20,000 in oem quantities, the disk for $200. Verbatim, meanwhile, has its own 5¼-inch optical drive research project under way.

BEHIND CLOSED DOORS

Don't count on seeing too many suits against IBM by small companies, after the example Big Blue just made of tiny BMC Software Inc., Sugar Land, Texas. The companies are not talking, but an informed source says that IBM intimidated its foe with the threat of a burdensome discovery process and a potentially costly countersuit. BMC had charged the industry leader with numerous anticompetitive acts in the IMS add-on software market, including the use of "phantom products" (namely, IMS 1.3, whose delivery has been many months late), illegal bundling of products, and "leasing" of software in violation of IBM's 1956 consent decree with the government. But the case was never entirely heard (see "BMC Goes After IBM," Jan. 1, p. 72). A summary judgment in IBM's favor last December reduced the scope of BMC's suit, but both companies began discovery anyway, BMC scouring IBM's Northern California software facility and IBM arriving in Sugar Land with a couple of copiers in tow. BMC Software's once talkative president, John Moores, will not discuss the settlement.



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So why try to squeeze more users onto an already overcrowded system? With a BTI8000, you can comfortably handle a lot of users—without a lot of unnecessary expense. For details, contact: BTI Computer Systems, 870 West Maude Avenue, Sunnyvale, CA 94088-3428; (408) 733-1122. In Europe: BTI Computer Systems (UK), Ltd., Birmingham B13 8NG, England; (021) 449-8000.

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In a world full of imitators, it's an easy mistake to assume that any terminal that looks like a VT200™ will perform like a VT200. After all it's no major task to imitate the most superficial features of a video display terminal.

But there's one test of a video terminal that simply can't be judged in a 15 minute demonstration.

The toughest test of all. The test of time.

While other display terminals were designed to impress you in the showroom, Digital's VT200 series was designed to make a more lasting impression. To keep you comfortably productive years down the road.

That's what inevitably separates an industry standard from the rest.

And why so many professionals return time and time again to products with the Digital logo.

THE DIGITAL LOGO MEANS LONG TERM PRODUCTIVITY.

It's no coincidence that the VT200 family was designed by engineers who, like end users, sit in front of display terminals day in and day out. They've discovered the shortcomings, the idiosyncrasies and all the subtle little problems that can end up robbing you of productivity.

As a result, some of the VT200's best features are ergonomic. The angle of the screen. The sculpture of each key. The design of the keypad.

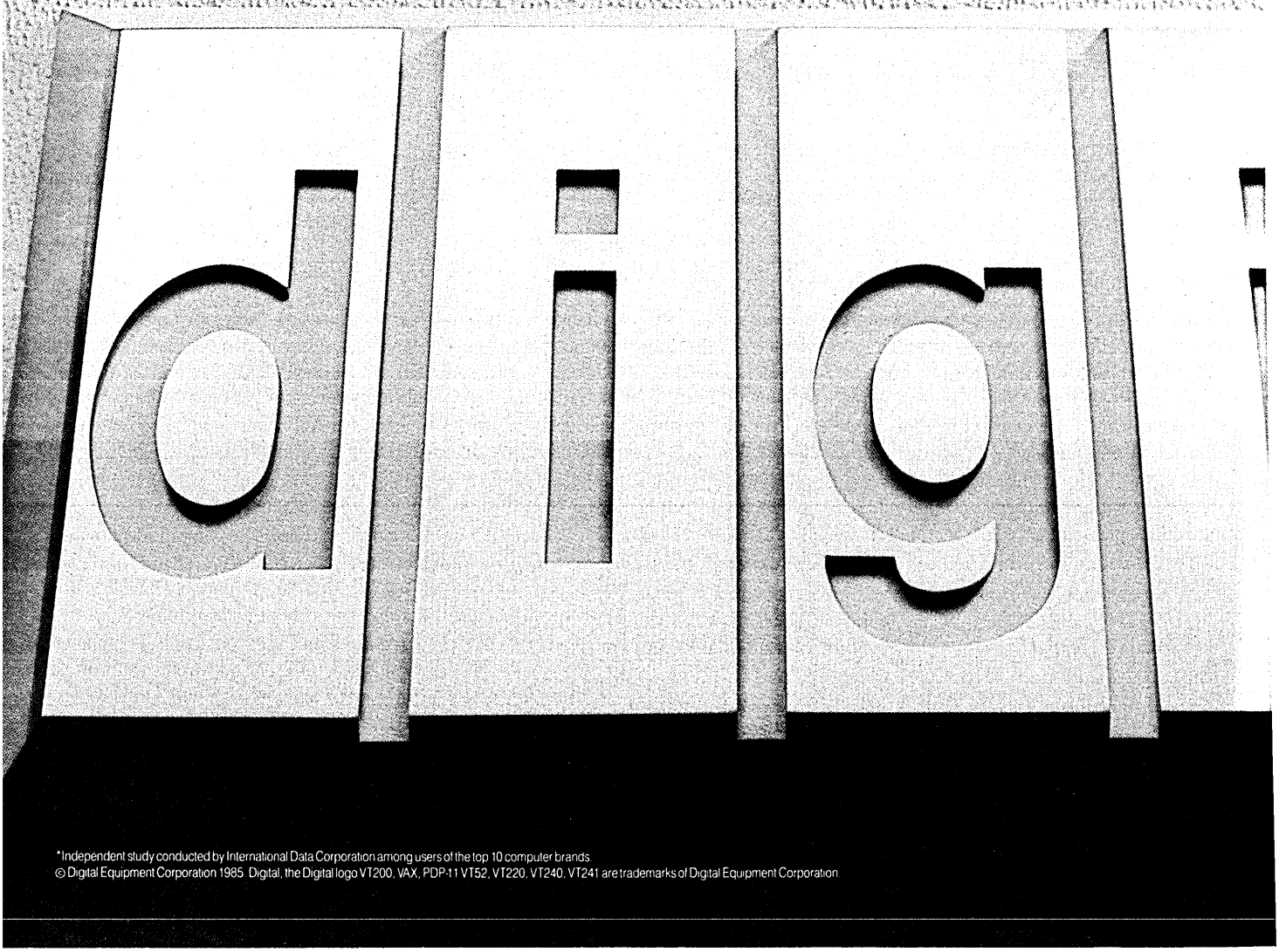
These are the things that become most apparent after hours of prolonged use. And often spell the difference between a terminal that's a genuine productivity tool and one that's – quite literally – a pain in the neck.

The fact is, the VT200's ergonomic design and the resulting ease of use were two of the reasons it won the International Design Award, in both 1983 and 1984.

THE DIGITAL LOGO MEANS LONG TERM COMPATIBILITY.

Whether you're looking for a terminal for your VAX,™ DECsystem or PDP-11™ based system, the VT200 has a rather obvious advantage over any other terminal you might consider.

We built the host. As well as the other peripherals you'll be using.



*Independent study conducted by International Data Corporation among users of the top 10 computer brands.

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So it only makes sense that our video terminals are substantially more compatible up and down the Digital family line. Each new generation, for example, brings with it all the important elements from previous generations. Which is why you'll find some of our customers using 10 year-old VT52™ terminals with brand new VAX systems. The simple fact is, Digital has always been committed to protecting your investment with every move you make.

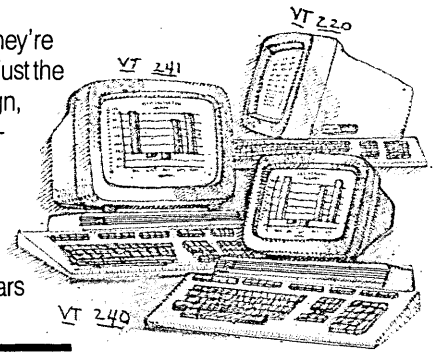
In addition, our breadth of product line means Digital can provide you with a total solution. Hardware, software and peripherals. And while single sourcing is not an end in itself, it certainly provides an extraordinary measure of convenience, compatibility and reliability. Particularly when the single source is Digital.

THE DIGITAL LOGO MEANS LONG TERM RELIABILITY AND SUPPORT.

When asked to single out the strongest feature of Digital's video terminals, many users point to the most visible asset of all. Durability.

Over the years, we've heard some pretty gruesome stories about the ordeal our terminals have endured. Like coffee that was spilled on keyboards. Or cables that were inadvertently ripped from their ports. They've even survived trial by fire. While it's unreasonable to expect even the toughest video display to come through every major trauma unscathed, it's comforting to know your terminal has a reputation for survival.

It's equally comforting to know you've got a support team behind you every step of the way. A support team rated the best in the business by users.* They're there for everything. Not just the repairs, but system design, training, updates, education and seminars. All to make sure you get the absolute maximum from your video terminals. Today, tomorrow, and years down the road.



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LETTERS

FAST LANE

It would seem that your May 1 Look Ahead column (p. 9) didn't look at all.

The University of Illinois has a 50Mbps HYPERchannel network from Network Systems Corp., a plethora of Ethernets, and a 19.2Kbps LocalNet from Sytek Corp. Our National Center for Supercomputer Applications will be served by Arpanet, LocalNet, Ethernet, HYPERchannel, and the campus backbone network. Speeds up to 80Mbps will be provided and, of course, 1,200 baud is always available.

SUE GREENBERG
Assistant Director, Networking
University of Illinois
at Urbana-Champaign
Urbana, Illinois

GOOD LUNCH

The three articles on stress in the April 15 issue were long overdue and welcome.

In "Users Are People Too" by Lorraine King (p. 104), consider the phrase, "dubious cures, such as lunchtime gymnastics . . . . " There is documented evidence of a relationship between HDL ("good" cholesterol), LDL ("bad" cholesterol), and physical exercise, to the effect that exercise raises HDL relative to LDL (as does nutrition). If the cardiovascular system suffers as a result of "bad" stress, then good things happen to this system as a result of exercise and good nutrition—which involve both gymnastics and lunchtime.

JIM KARAS
System Manager/Analyst
University of Tennessee Medical Center
Memphis, Tennessee

NET NEWS

The article "Departmental Computing: A Choice of Strategies" (May 1, p. 86) by Omri Serlin provided a well-needed study of the issues surrounding the multi-user system/PC network alternatives. But in his attempt to present the differing requirements of network intensive versus low utilization activities (viz. p. 94) the author fell into the trap of confusing raw data rates with demonstrable throughput.

It was a real shock to see our products completely misclassified in the category of networks for "relatively small . . . numbers of users . . . in close proximity." Nestar Systems prides itself on providing effective, field-proven products designed for and satisfactorily installed in demanding, large-scale environments, often comprising several hundred PCs per LAN. These networks link entire multistory office buildings and can span multiple buildings thousands of feet apart.

I thank you for the opportunity to correct the gross misimpression of our "industrial strength" products conveyed by the otherwise excellent article.

CHARLES J. HART
President and Ceo
Nestar Systems Inc.
Palo Alto, California

In his article, Omri Serlin states that "If the number of users (now and in the future) is relatively small and they are in close proximity, a 'lightweight' LAN such as the IBM PC Network . . . may be appropriate." Serlin errs on several counts in making this statement.

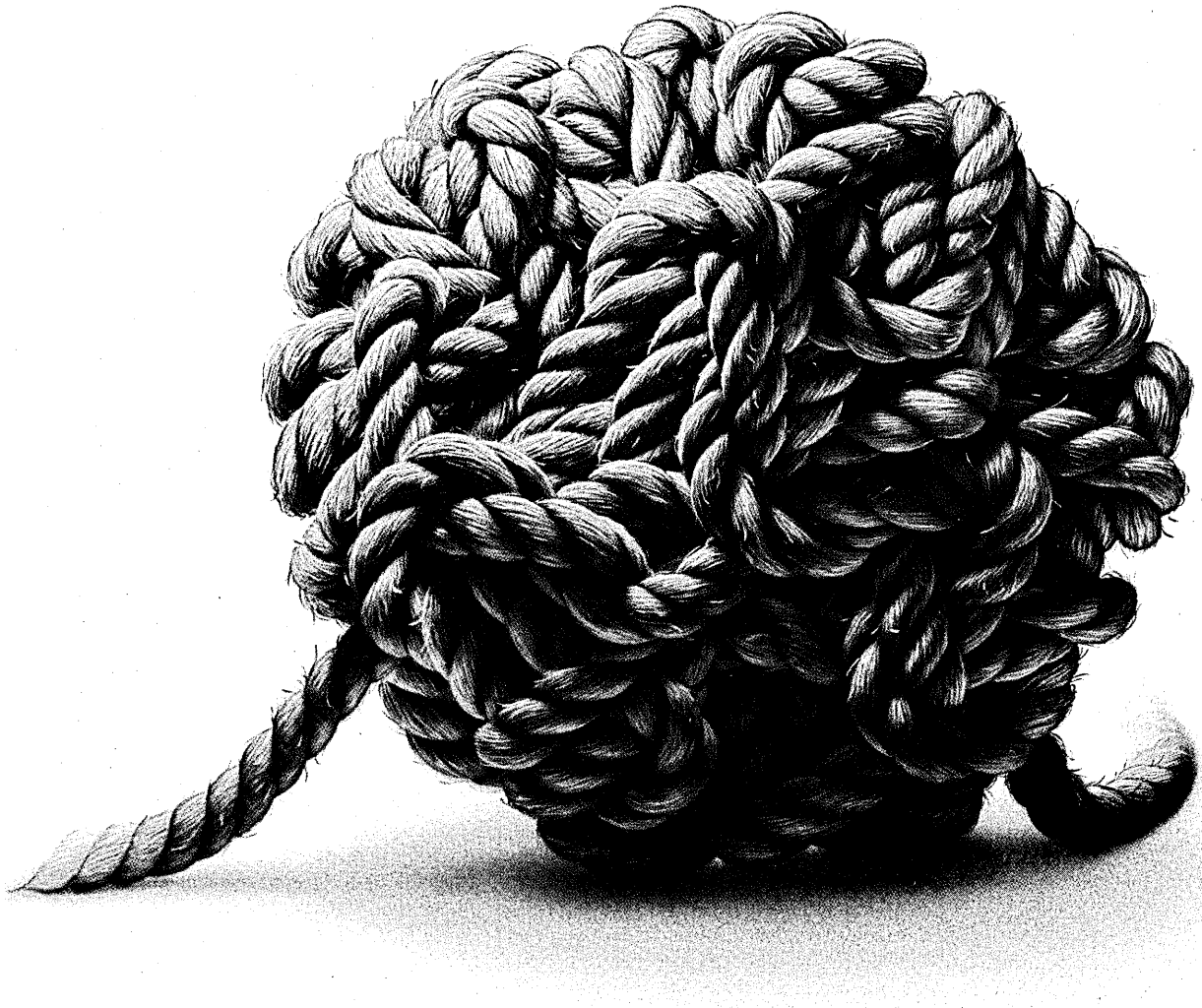
First, the IBM PC Network is not limited to small user communities or small geographic areas. The practical limit on PC connections is a function of the applications being supported, taken with the interaction characteristics of the particular users. Our experience has shown this limit to be approximately 1,000 connections. The geographic coverage capability of the IBM PC Network is in excess of five kilometers' radius (the IEEE 802.7 recommendation) from the translator, a large network by any standard. It is a requirement to have a properly designed broadband cable system to achieve these capabilities; the IBM Cable Kits are intended to support only modest-sized networks.

Second, in reference to the exchange of large files frequently, Serlin states, "A high-transfer-rate LAN, such as Ethernet, should be considered." By making this statement he is furthering the fallacy that meaningful throughput on a LAN is directly related to the signaling speed on the physical transmission medium. Application-to-application throughput (file transfer, for example) is most significantly influenced by protocol processing requirements: how this processing is accomplished, not the signaling speed, is the biggest factor in LAN performance. The IBM PC Network uses a signaling speed one fifth (2MBPS) of Ethernet's, but can outperform Ethernet microcomputer LANs by two to three times in throughput due to the architecture of the IBM PC Network Adaptor Card (all protocol processing through the session layer done on card without interrupting the PC's cpu) and the Sytek LocalNet PC protocols.

Serlin's choice of the adjective "lightweight" couldn't be more off base. In fact the IBM PC Network is the most powerful, sophisticated LAN product to be marketed to date. With the cooperation of the third-party software industry writing to the NETBIOS interface and the open architecture of the LocalNet PC protocols (now available for licensing through Sytek), the IBM PC Network should instead represent the benchmark for other microcomputer LANs.

WILLIAM R. PIESER
Senior Systems Engineer
Sytek
Englewood, Colorado

Omri Serlin replies:
I chose to characterize the IBM PC network as "lightweight" because the product, as officially defined by IBM, is limited to 72 users within 800 feet of the head end. I am aware that it is possible to remove both limitations by installing a much more costly head end and custom engineer the cable plant, but these products and services are not offered by IBM. As to the transfer rates, IBM's own published data suggests that the maximum usable rate available in PC Network is about 600 kilobits per second, and even that rate requires an unusually large 16-kilobyte message size.



TELECOMMUNICATIONS AND

ONCE UPON A TIME THERE WAS A KNOT NO ONE COULD UNTIE. It was a huge, hopeless tangle of rope and vine that had defied the best efforts of people from all over the world.

Ancient soothsayers claimed the knot was formed by Gordius, legendary King of Gordium. "Whosoever shall untie the Gordian Knot," said the soothsayers, "shall have all of Asia as their reward."

All of Asia, the fabled land of mystery and magnificence—what a prize!

Yet for centuries, no one had succeeded in unraveling the Gordian knot. Kings and wisemen, warriors and wizards: they all tried, and they all failed.

Then, in the year 333 B.C., a mighty Macedonian King arrived on the scene. Flanked by thousands of his troops, and armed with one of history's finest and most creative minds, Alexander the Great stood transfixed before the great Gordian Knot.

A hush swept through the ranks as all eyes turned to Alexander. Suddenly a flash of inspiration lit up his face. And with one bold and innovative stroke, Alexander untied the untie-able. Grasping his sword, he slashed through the knot with a swift decisive blow. And went on to rule all of Asia.

Today, the world has changed. Dramatically. But the need for innovative thinking remains the same.

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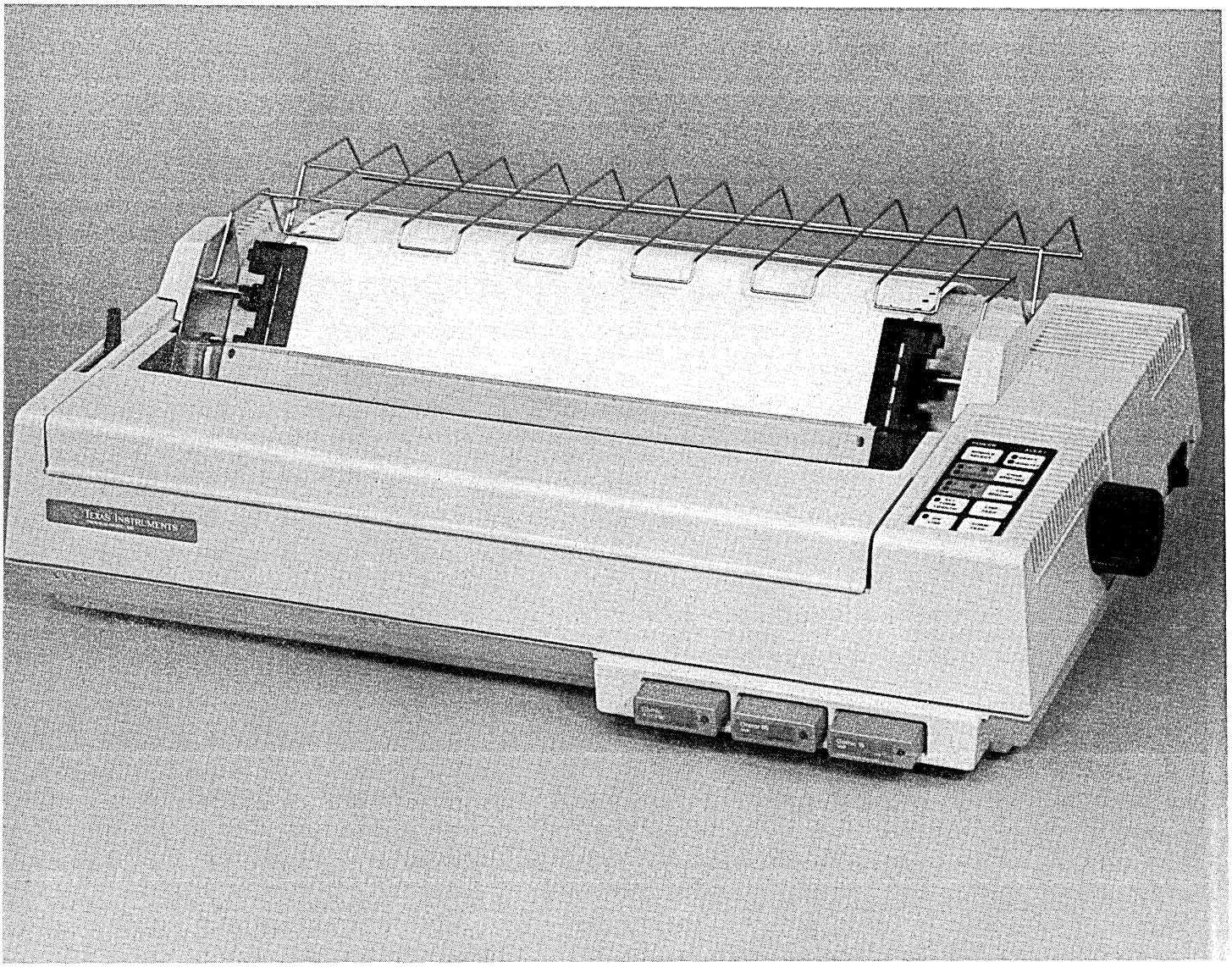

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CIRCLE 12 ON READER CARD

Rebecca S. Barna, Editor

EDITORIAL

THE NCC IS OUR BAG

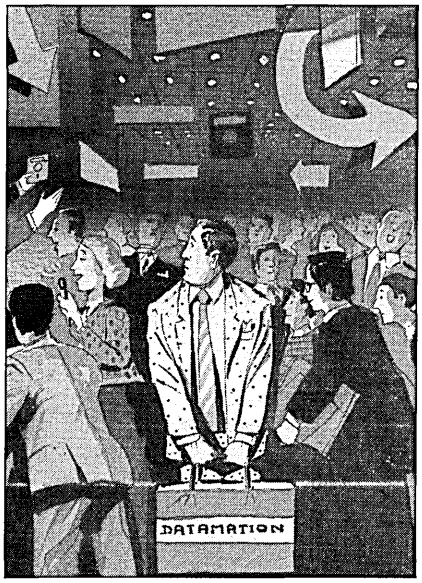


ILLUSTRATION BY ANDREA BARUFFI

The talk is all negative. The subject, of course, is the National Computer Conference. The descriptors are all ones of excess—too expensive, too unfocused, too crowded, too sprawling, too diverse to be useful.

The criticism is not aimed at the show alone. Its sponsor, the American Federation of Information Processing Societies, takes plenty of licks too—for poor sites, sloppy arrangements, and inopportune timing. Few have forgotten the debacle in Houston, where lunch was an impossible dream. Who could fail to recall the hot spot in Anaheim—those notorious tents (excuse me, "sprung structures")?

And it hasn't gone unnoticed that the conference is often a midwestern steambath in July, which muddles not only the mind but many vacation plans as well. Of course, we'd choose Chicago over Las Vegas any day, but couldn't we return to the more reasonable mid-May time frame?

NCC? Yes, there's talk. There's plenty of talk. And methinks, to muddle Shakespeare's line, we doth protest too much.

NCC is a topic that becomes the tag line in telephone conversations months in advance of the event: "Will I see you at NCC?" The usual response: "Yes, I'm unfortunately saddled with that duty again this year." Then the inevitable rejoinder: "Well, if we both *have* to be there, let's at least set aside some time to talk."

A date is made, the appointment calendar gets more crowded, and the headaches loom larger. But so does the anticipation factor. Faces will be put together with names and voices. An interview will move from the "on hold" list to the "hot" file. A headquarters marketing manager will get the date with the account that hadn't so much as returned a phone call to the local rep. Résumés will be dusted off and beefed up. There'll be thoughts of schmoozing with competitors and compadres alike.

NCC has become the general broad-based show for this diverse industry—vendors, users, technicians, publicists, consultants, and academicians alike. Dealers, distributors, and product builders in search of an outlet congregate at the multiple Comdex shows. Communications specialists inhabit the Interface and TCA confabs. For excellent technical programs on narrowed topics, there are the smaller affairs run by the constituent societies that make up AFIPS. User group meetings are flourishing. The many vertical shows run by such groups as the Society of Automotive Engineers and the American Bankers Association each has a unique role to play.

But the NCC is special. It is the only show at which the entire clan—all members of what the esteemed Dr. Herbert R.J. Grosch calls "the racket"—meet on common ground.

We'll be there. You'll recognize us by our biodegradable, recyclable paper shopping bags. (None of that newfangled plastic stuff for us!) We'll have bags on our arms, bags in our hands, and bags under our eyes. It is, unquestionably, the most hectic week of the year for our staff. From champagne breakfasts at dawn to midnight meetings in the bar, and with brunches and lunches and afternoon tea in between, we keep moving. We examine more "unique" and "innovative" new products in one NCC week than we do in the following second half of the year.

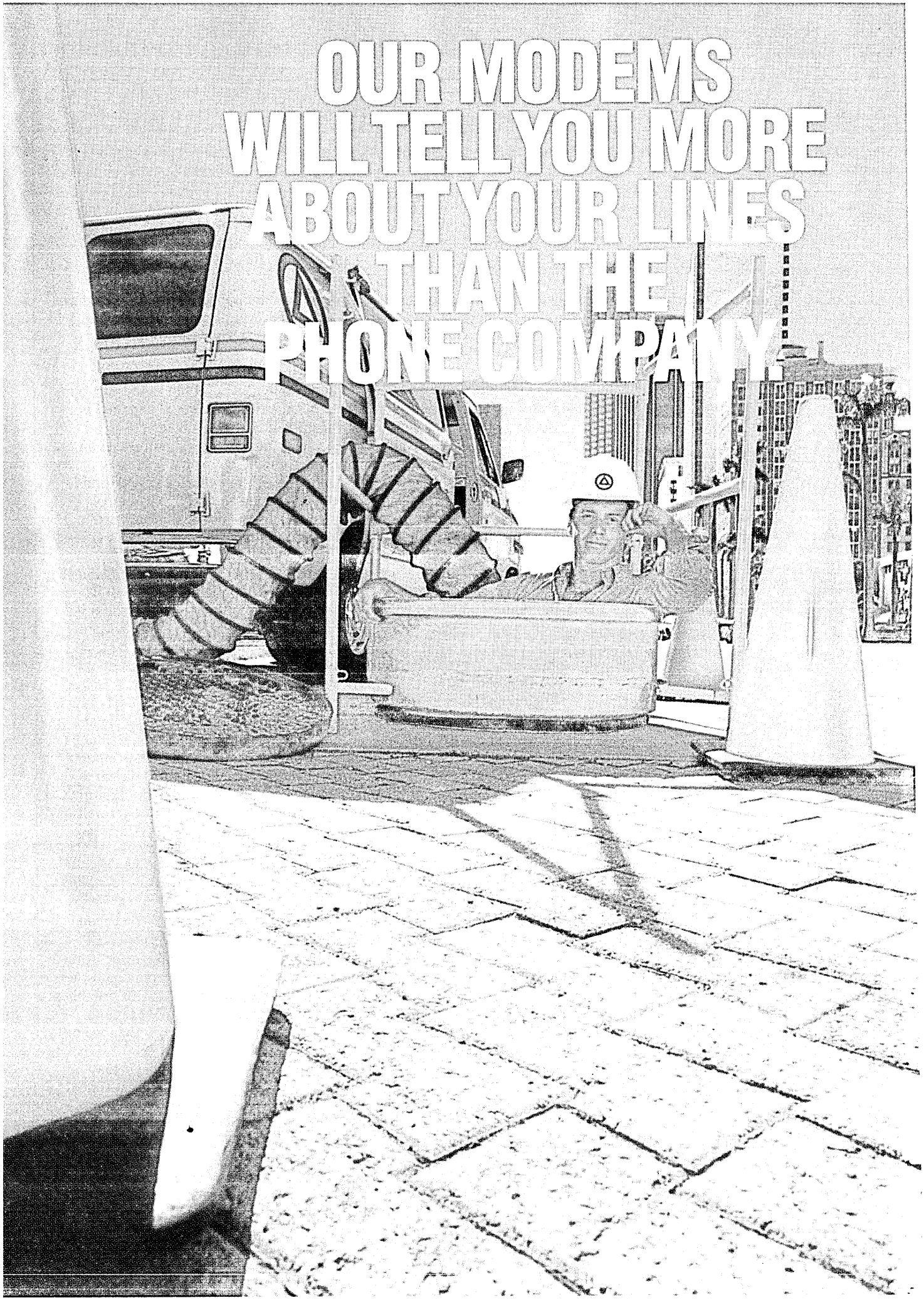
NCC may not be the best time to introduce a new product. It may not even be the time to clinch a deal with a big customer. But it's a great time to renew acquaintances, to establish rapport with new contacts, to develop leads, and to engage in some serious industry gossip—like why Wang or Apple dropped out of this year's show.

It's the worst of times.

It's the best of times.

There's no other time like it.

We'll see you in Chicago. NCC is our bag. ◉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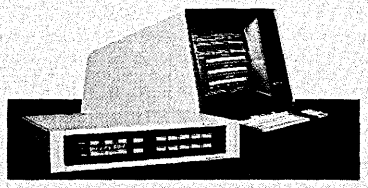

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IN FOCUS

THE IMPATIENT ITALIAN

Olivetti's confident chairman wants to conquer the world—in record time.

by Linda Runyan and Paul Tate

Carlo De Benedetti, the charismatic chairman of Olivetti, is a man on the move, a man in perpetual motion. With a speed and style all his own, De Benedetti transformed a troubled typewriter company into one of Europe's brightest high-tech hopes.

That feat took almost seven years—years that obviously didn't go quickly enough for the restless Italian. "I am a very impatient man by nature and by management style. I would always like to have 10 miles per hour more," declares De Benedetti, who can wheel and deal with the best of them.

A brash and bold bargainer, De Benedetti has prodded AT&T, which recently became Olivetti's U.S. partner, into keeping step with his own breakneck pace. Fast moves are necessary if the 50-year-old chief is to realize his dream of building his company into a successful worldwide supplier of information processing products. With total revenues of roughly $3 billion—about $2 billion in dp wares—the company already ranks as a strong contender in the business. De Benedetti's current challenge is to mobilize Olivetti's far-flung dp forces to create a worldwide power in the computer marketplace.

De Benedetti began his fast-track business life in 1959, when he went to work in his father's steel tubing operation in Turin, Italy, after receiving a degree in electrical engineering. During those 15 years in Turin, he methodically molded the family business of 50 people into a profitable automobile parts company with 1,500 employees that captured Fiat as its major customer. Fiat, in turn, captured De Benedetti, making him the chairman in 1974. The relationship was short and not so sweet—De Benedetti fled Fiat only three months after he came on board.

The fiasco at Fiat, whatever the cause, probably still irks De Benedetti, whose ego is as strong as his entrepreneurial sense. It was his entrepreneurial smarts, in fact, that attracted the attention of Olivetti chairman Bruno Visentini who, in 1978, was anxiously looking for someone to salvage the sinking Ivrea, Italy, company, which at that time was losing a reported $10 million a month.

Signed up as Olivetti vice chairman and chief executive that year, De Benedetti became the company's salvager. Chipping in $50 million of his own money to guarantee a crucial stock issue, he immediately began chipping away at the firm's massive debt, reported to be around $1 billion.

Workers were axed by the droves, an unpopular move in a country like Italy, where labor unions are strong and strident. "I think I was the first one in this country to lay off people in a big operation," De Benedetti recalls. The purge paid off. By 1984, a streamlined Olivetti, with 20,000 fewer people, was pulling in $168 million in net income on revenues of $2.89 billion. The actual turnaround, which came in 1980, took two years to accomplish.

Sitting in a meeting room in Olivetti's wood-paneled offices in Milan, De Benedetti recently reflected on his troubles and triumphs over the last seven years. De Benedetti divides his reign into three phases. Putting Olivetti into the black was the first step in building and broadening the company. "The second stage," he explains, "was to stabilize the company, because I think it is easier to turn a company around than it is to stabilize it and put it into a position for new development." Olivetti has been in that development mode for almost two years, according to De Benedetti, who sees the company entering a new era of "accelerated growth."

"We are shooting,' he says, "for a growth rate that is bigger than the market. So, if the market is growing by 20%, we would like to grow higher, which means acquiring market share." To get that market share and make it grow means raising capital, something De Benedetti does with apparent ease.

Some of that cash goes into investments in outside dp companies, something De Benedetti also does with great relish. Olivetti's investment portfolio reflects De Benedetti's driving ambition to become a world-class dp contender. It also reflects reality. "We needed to acquire products and technology to be able to have a complete range of office information products in a shorter period of time," he admits. To tie it all together and avoid connectivity problems, Olivetti has made a commitment to Unix and the International Standards Organization's seven-layer Open Systems Interconnection communications protocol.

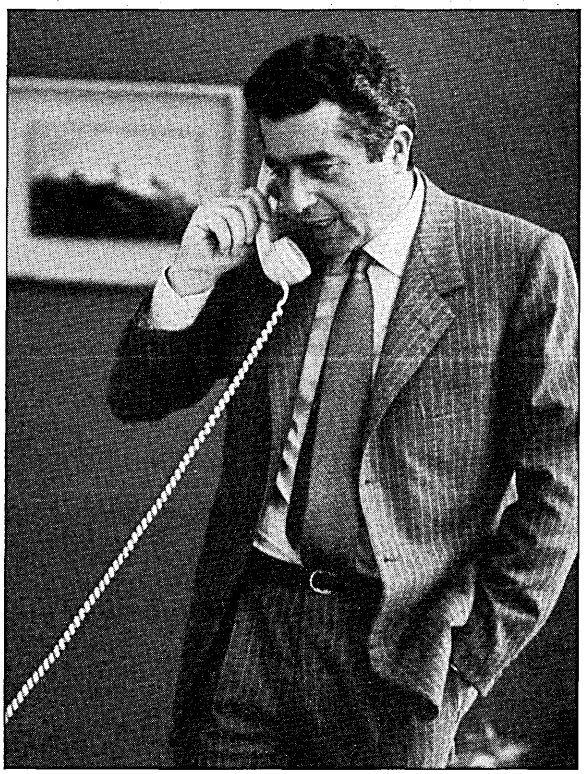
De Benedetti says his company has made four major investments, three in Europe and one in the States. Included on the European list are French microcom-

puter company Logabax, Swiss typewriter firm Hermes, and British micro maker Acorn. In the U.S., Olivetti has shelled out $60 million for minority stakes in some two dozen dp companies, investments that are currently worth roughly $440 million.

No such rewards have been seen from Docutel, Olivetti's major U.S. investment. The automated teller machine maker was merged in 1982 with Olivetti Corp. of America to form Docutel/Olivetti Corp., which racked up a $42 million after-tax loss in 1984 on revenues of $164 million. In an effort to stem those losses, Olivetti is bidding for control of the hapless operation, which critics say has been nothing but bad news for the Italian firm.

De Benedetti, who has been criticized for uniting the ATM maker with Olivetti's U.S. operations, disagrees. It wasn't "a bad decision. I think it was a badly managed situation." The Olivetti boss blames himself on that score. "If you take responsibility for things that are going well, you have to take responsibility for things that are going badly. So the first responsibility is mine," he concedes. "We were disappointed by the performance of the company as were the shareholders. The only problem is that Olivetti is paying the bill."

That bill will go up if Olivetti settles the lawsuits brought against it by disgruntled Docutel shareholders. De Benedetti believes these suits will be resolved "very soon." AT&T, his other big-time partner, hopes so too, since it's also named in one of the cases.



PHOTOGRAPHS BY F. DiAMARIO

In March 1984 AT&T doled out $260 million for its 25% stake in Olivetti. For that sum, AT&T also secured the services of Carlo De Benedetti for 10 years. "It's very cheap," quips the Olivetti chief, who went on to explain that this contractual requirement, which assures that he will remain chairman for the decade, "was very strange for me psychologically, because I consider myself a very free man. It was the first time in my life that I was asked to accept a commitment from a point of view of working, and not to choose it myself."

The soft-spoken executive also drives a very hard bargain. One AT&Ter involved in the negotiations with Olivetti described De Benedetti as "an excellent orchestrator. When he walks into a room to bargain, he leaves very little to chance."

He certainly wasn't leaving much to chance in the deal he cut with the mighty U.S. company. Recognizing the need for an alliance with a powerful American partner, De Benedetti also recognized the need to limit AT&T's interest in Olivetti. In the resulting pact, inked in December 1983, AT&T agreed not to up its stake in Olivetti beyond 40% during the next 10 years.

The venture, which had been in the works a good year before the actual contract was signed, has had its ups and downs on both sides of the stormy Atlantic. "It is very difficult," comments De Benedetti, "when you put two companies together that have different sizes, different cultures, and people of a different background." Nevertheless, the relationship, according to De Benedetti, "has been a fantastic success from a human point of view, which I consider the basis for business."

De Benedetti also feels AT&T has already profited from the deal. In the year since AT&T bought the 25% equity position, the company's stock price soared more than 60%. "From an investment point of view," says De Benedetti, "it has been a fantastic deal [for AT&T]. Of course AT&T," he quickly adds, "is not out to make any financial investment."

Olivetti's investment portfolio reflects De Benedetti's driving ambition to become a world-class dp contender.

What it's really after is a comrade that can bolster its dp and office product lines and broaden its European appeal. De Benedetti believes Olivetti has done just that. "They [AT&T] have been associated with the most successful European company in our business. . . .We were able," he says with no trace of modesty, "to put them in business in personal computers."

AT&T is selling Olivetti's M-24 microcomputer system in the States as the PC 6300. The pc, which got off to a slow start, caused both companies some initial problems—AT&T on the distribution side and Olivetti on the quality side. The Italian company, hoping to further expand its pc distribution network in the U.S., recently signed an oem agreement with Xerox. The Xerox move, which was carefully considered and which AT&T apparently okayed, looks as if it could be part of a broader, unstated strategy on the part of both companies.

A shrewd strategist himself, De Benedetti has been characterized as "a man who doesn't take a breath of air that doesn't benefit him or Olivetti." Anxious to stay on top of the AT&T situation, he has the ear of AT&T president and chief operating officer James Olson. And as one AT&Ter puts it, "When Carlo talks, Jimmy listens."

"I think that AT&T has learned a lot from us," declares De Benedetti. "We have been a company exposed by history to international markets and exposed by nature to competition and marketing. AT&T by history has been a company isolated in the U.S. and not exposed to marketing, because of its monopoly position."

Breaking out of that monopoly mold hasn't been easy for the bureaucratic AT&T. De Benedetti has said that he would like his U.S. cohort to act more aggressively on the marketing front, and he's obviously taken some heat for those outspoken comments. "By my nature," he cautiously explains, "nothing is quick enough."

In an interview with DATAMATION, De Benedetti gives kudos to AT&T for its turnaround. "The changes inside AT&T have really been dramatic—in style and in the way of approaching business and markets. . . . What [AT&T] did in 1984 is a major achievement. I think they did very, very well."

But, what has AT&T done for Olivetti? "In the short term . . . nothing," carps De Benedetti. "They bought products from us, which is good of course, but this," he dourly notes, "is not the basis of our alliance." In actual fact, the telecommunications giant bought around 100,000 M-24 micros from Olivetti, more than half of its 1984 production. That pur-

chase put $250 million on Olivetti's order books. AT&T's 25% buy-in also brought another $260 million into the company's coffers.

The $510 million must have come in handy, but that isn't exactly the way De Benedetti sees things. "Frankly speaking, we don't need capital," he claims. What Olivetti needs is more dp and telecom products and a stronger footing in strategic Stateside and worldwide markets. AT&T has undoubtedly helped on both counts.

On the product side, Olivetti is peddling AT&T's 3B minicomputers outside the U.S. Sales of the system have been sluggish everywhere, especially in Europe. De Benedetti, however, insists that "we are satisfied and AT&T is very satisfied."

The Olivetti chairman does not seem so satisfied about an advanced PBX AT&T has promised. "We are waiting for AT&T to deliver the PBX," says De Benedetti with a hint of exasperation in his well-modulated voice. He seems anxious to speed things up. "We have no delays in getting approvals [from the national telecom authorities]," he says. "We have delays in presenting them with a product that is suitable for those countries."

Although he doesn't say so directly, you get the feeling that De Benedetti faults AT&T for the PBX delays. That's the view from Italy, but here in the States, things look different. One AT&Ter who's worked with Olivetti claims the Italian company didn't actually express interest in a PBX until relatively recently.

Maybe the communication channel between the two companies somehow got crossed. Or AT&T isn't used to responding as fast as De Benedetti expects. Whatever happended, one thing is certain: De Benedetti will push AT&T to come up with PBXs modified to the various European country specs.

While jointly working on workstation wares, Olivetti still considers the PBX to be pivotal. The switch, according to De Benedetti, "is one of the basic reasons for our alliance with AT&T." Of course, there are other reasons that the Olivetti boss candidly admits. "I think AT&T gave us a better understanding of and entry into the American market." There have been global gains as well. "Olivetti's credibility throughout the world is much higher than it was before as a consequence of the alliance with AT&T," he concedes.

The world is a big place, so big that the dp duo has opted to split it into separate marketing spheres, in two of which they will be partners. In explaining this divide-and-conquer strategy, De Benedetti seems somewhat vague. "We have decided with AT&T to divide the world substantially into three parts. In one part, AT&T would act exclusively, like in the U.S. Olivetti would be responsible for the rest of the world." Then there are also major markets in Canada, Japan, and other Far East nations where the companies have solo acts.

If all that sounds confusing, it is, even to the two parties involved. Indeed, sometimes the companies seem to be going their own separate ways for no real rhyme or reason. This confusion could be sorted out at least in Japan, where Olivetti has been in business for almost a quarter of a century and last year recorded $80 million in revenues. De Benedetti says Olivetti's Japanese subsidiary "has always been profitable and always paid dividends, which I consider a miracle, because it is almost like selling refrigerators to the Eskimos."

Those "Eskimos" happen to be in one of the most lucrative markets in the world—a market that both AT&T and Olivetti would dearly love to crack. AT&T, which currently has a distributorship deal with Ricoh on the 3B minis, will also handle the Japanese vendor's facsimile machines. Meanwhile, Olivetti has its own tie with Toshiba, which will take a 20% stake in Olivetti's Japanese subsidiary. Putting the AT&T and Toshiba pacts into perspective, Olivetti vp Vittorio Levi recently said that "the two agreements are mutually compatible and they may even make it feasible for Toshiba, Olivetti, and AT&T to collaborate with one another in the Japanese market in the future."

"If you take responsibility for things that are going well, you also have to take responsibility for things that are going badly."

Does that mean the transatlantic twosome are finally getting their act together and teaming up in Tokyo? "I think one day we will come to a common agreement," hints De Benedetti, "but this is not our understanding for the time being."

Actually, De Benedetti would probably like nothing better than to mastermind an intricate international deal. It fits his character and the characterization of him offered by one source who's seen him in action. "De Benedetti is like Caesar trying to conquer the world. But unlike Caesar, he is his own army."

De Benedetti's search for new markets knows no geographical or political boundaries. The Olivetti overlord is currently working hard to exploit trade openings to politically sensitive countries like China and Russia. His attitude is typically pragmatic: "Free trade is the most peaceful approach in business."

With that free trade slogan emblazoned on the Olivetti banner, De Benedetti recently visited China, where he put his seal on an agreement for a local province to produce Olivetti micros. IBM as well as several Japanese companies has already broken into this nascent market, and De Benedetti doesn't plan on being left behind.

Quick to take advantage of any new marketing opportunity, De Benedetti hopes to build up Olivetti's Chinese operation, which currently generates about $4.5 million a year. He sees advantages for both sides. "The Chinese are serious and they want to speed up their process of industrialization." De Benedetti would naturally like to give them a helping hand in speeding up their high-tech drive. "When I talked to government officials in Beijing, my impression was that they run a very balanced kind of culture. They would like to have help from everybody and, to some degree, they'd like to have a European influence balancing Japan's [influence] on one side and America's on the other."

Having opened the Bamboo Curtain a little, De Benedetti also tried to open the Iron Curtain wider on a recent trip to Moscow. Olivetti has had an office in Moscow since 1972 that pulls in around $30 million from sales of machine tools, peripherals, terminals, and typewriters. Now the Russians want Olivetti to set up a typewriter factory. De Benedetti is eager to close the deal. "We are trying to do business everywhere we can," he says matter-of-factly. "If the Russians want to buy a typewriter factory, they will do it. Somebody will deliver it and we

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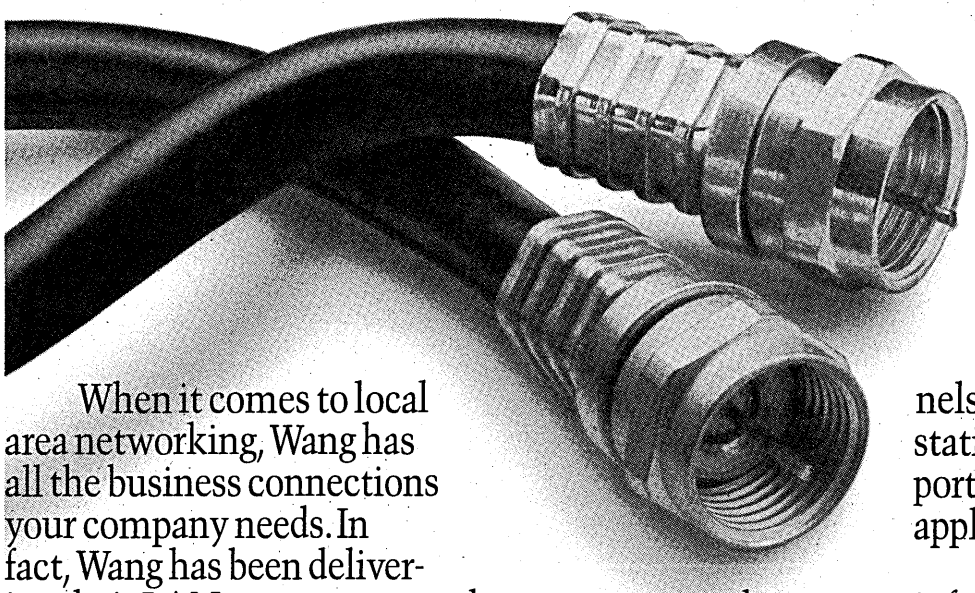

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would like to win the business."

De Benedetti also confides that "there's a more general discussion going on that we are looking at favorably." That discussion may be about a personal computer factory and increased dp trade with the Soviet Bloc, a move that could be frustrated by international technology embargoes. That kind of external interference doesn't sit well with the Olivetti boss. "For political reasons, you can think that you have to limit yourself in Russia. I personally am not convinced about that," he remarks.

While he stops short of getting publicly embroiled in the East-West trade debate, De Benedetti strongly believes there are sound business reasons for opening up trade channels. "I would just like the people who decide whether or not to do business with Russia to be aware that in Moscow there's a line of Japanese executives from very important companies who are prepared to deliver technology that is absolutely up-to-date."

The Olivetti chairman's confessed impatience is a great image builder, both in his own company and among the international business community. He uses this facet of his personality adeptly and frequently, whether he's talking about the politics of cooperation or the politics of his home continent.

Europe's interests in international affairs are very dear to his heart. But De Benedetti is far from sentimental in describing his fellow Europeans. "We are philosophically and culturally a nonmobile society. We are provincial and parochial," he complains with characteristic bluntness.

"When I say mobile," he explains, "I don't just mean labor. I mean management and capital as well. The U.S. is a mobile society that is prepared to take advantage of the changes. If you aren't mobile, the changes pass you by. That mobility is the basic rule during a transition period like the one we're living in today."

De Benedetti believes Europe should capitalize on its economic strengths. "We are the world's biggest market. Europe has more people than Japan or the U.S. It has the highest percentage of personal savings. So, why do we have 13.6 million unemployed—the highest figure in the industrialized world? Something is wrong."

Part of the problem is that Europe is fragmented into over a dozen different markets, markets that remain largely nationalistic. In Europe, he points out, "we talk about the Germans or the French. But in the U.S., when you talk about the Texans or the Arizonians, you are talking about Americans. You know, there is a lot of difference between California and Boston, but Americans don't care. From a market point of view, it is all the same. Americans keep the individuality of their origins at the personal level. But in the way the society is organized from the point of view of marketing and finance, America is a unique country. Why shouldn't Europe be able to do that?"

De Benedetti also likes to parade his admiration for the American entrepreneurial spirit. "In the U.S., the challenge of change is very much a part of individuals and families. Who created Denver? Not the government, but the people. They accepted the risk of change and took the opportunities it brought."

European culture is very different. "When I have to move a manager from Milan to Rome or from Florence to Bologna, I have my problems," he complains. "That is not because of the unions, but because the manager simply refuses." And is isn't just the lack of mobility and entrepreneurialism in Europe that bothers De Benedetti.

"When De Benedetti walks into a room to bargain, he leaves very little to chance."

"The unions were a part of our disaster in the '70s, but governments and industrialists were also responsible," he charges. "Sometimes the attitude of the unions becomes an alibi for management not doing anything. It also becomes an alibi for the government that mediates between mangement and the unions. But the function of politicians is to point out the new frontiers for countries in Europe, not to mediate. Mediate what—disaster?"

De Benedetti is nevertheless optimistic about Europe's future. "We have a fantastic opportunity to change. We don't have to reinvent an umbrella. Somebody has already done that. We only have to copy it. America has led the way and, as a result, it has a declining rate of unemployment—not because of government policy, but despite government policy."

While the Olivetti chairman is outspoken on politics and labor relations, his personal life is another story. An intensely private man, De Benedetti seems to have shrouded himself in secrecy. Very little is known about his lifestyle or his habits, even in his native Italy, where he's regarded as a man of almost mythic proportions.

The secrecy helps enhance that image. It's also a serious necessity in Italy, where terrorists have kidnapped and killed prominent businessmen and their families. A cautious man by nature, De Benedetti travels with bodyguards. He takes the same cautious approach with his wife and three sons, who have been living in Switzerland for the past 10 years. De Benedetti also lived in Switzerland during the '30s and '40s, after his family was forced to leave Italy to escape the Jewish persecution under Mussolini.

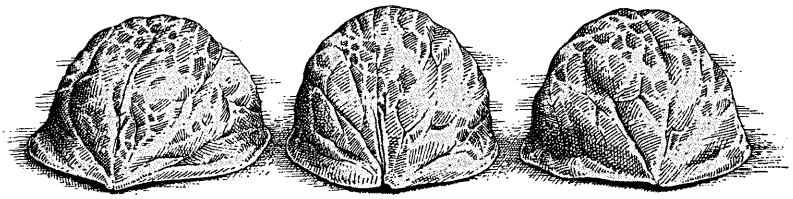
Characterized by one of his associates as a workaholic, De Benedetti spends little time with his family in Switzerland. His business day is long, his patience short.

Bustling around on the marble-floored offices in Milan, De Benedetti gives new meaning to the word dynamic. His personal magnetism and swarthy good looks qualify him to be a leading man on the silver screen. Instead, the role he chooses to play is that of the consummate entrepreneur and insightful investor. He plays both parts very well. "I wear two hats," says De Benedetti with a grin. "One is for my job as chief executive of Olivetti and one for my role as investor." Those are challenging chores even for a man considered to be Europe's leading entrepreneur. "My holding company has 10,000 shareholders," he explains, "so I should try to satisfy them as well as the Olivetti shareholders."

Satisfying those Olivetti shareholders satisfies De Benedetti, whose 14.8% personal interest in the firm actually translates into a 30% stake when added to the shares held by his holding company, CIR. So when Olivetti does well, so does De Benedetti.

He is doing very well indeed, whether you count his money in liras or dollars. But you get the impression he's not in business for the money but for the thrill of the game. His love affair with Olivetti is genuine. Looking back on his challenging years with Olivetti he says with real emotion, "Maybe once the company needed me badly. Now I think we need each other badly. We love each other, so we need each other. I think I will be with Olivetti for the rest of my life." ◉

OF THE BIG THREE IN BUSINESS SOFTWARE, WHO'S THE REAL NUMBER ONE?



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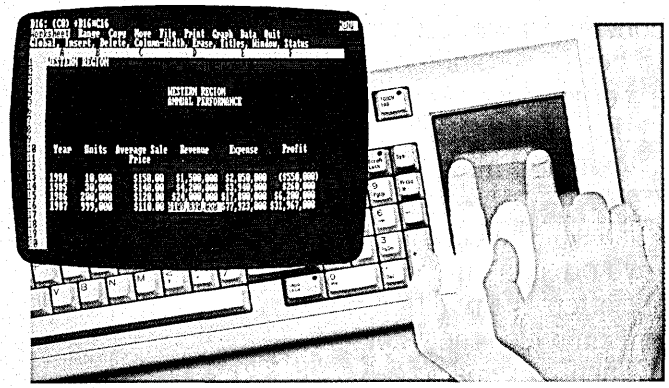
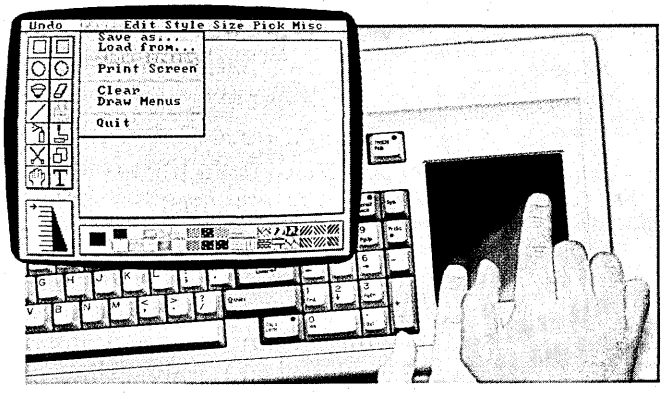
The Touch Pad currently offers four modes of operation with unlimited flexibility for future enhancements through utility software.



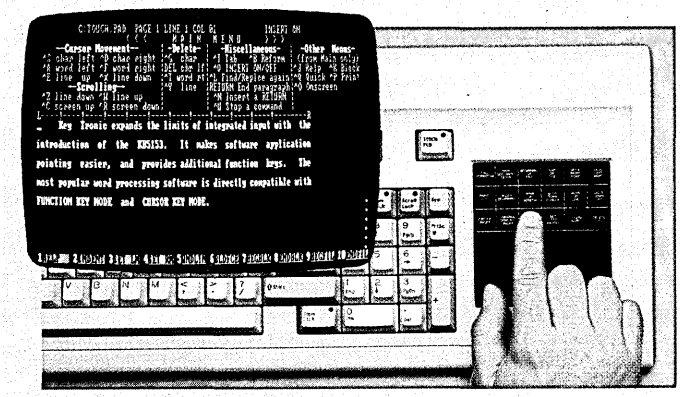
Cursor Key Mode

The KB 5153 Touch Pad makes Cursor Key operation faster and easier, and it is compatible with all existing software that accepts cursor key input. Movement of your finger or stylus across the Touch Pad is converted to equivalent cursor key strokes. The result is faster cursor movement — by a factor of 4 to 5. Imagine what that can mean in word processing and spreadsheet applications!



Mouse Mode

Consider the Touch Pad as an alternative to a Mouse. With the appropriate driver, it's compatible with all existing Mouse software. Combining text entry and pointing in a single compact unit frees up desk-top space. And better yet, it makes lap-top operation a breeze.



Concurrent Modes

Both a pointing mode and the function key mode can be used at the same time by dividing the Touch Pad into defined areas. Or by assigning one of the function keys as a Mouse Mode key, for instance, you can toggle from a full function pad to the Mouse Mode with the touch of a finger. The powerful, new KB 5153 Touch Pad Keyboard by Key Tronic provides versatility for the most sophisticated input requirements.

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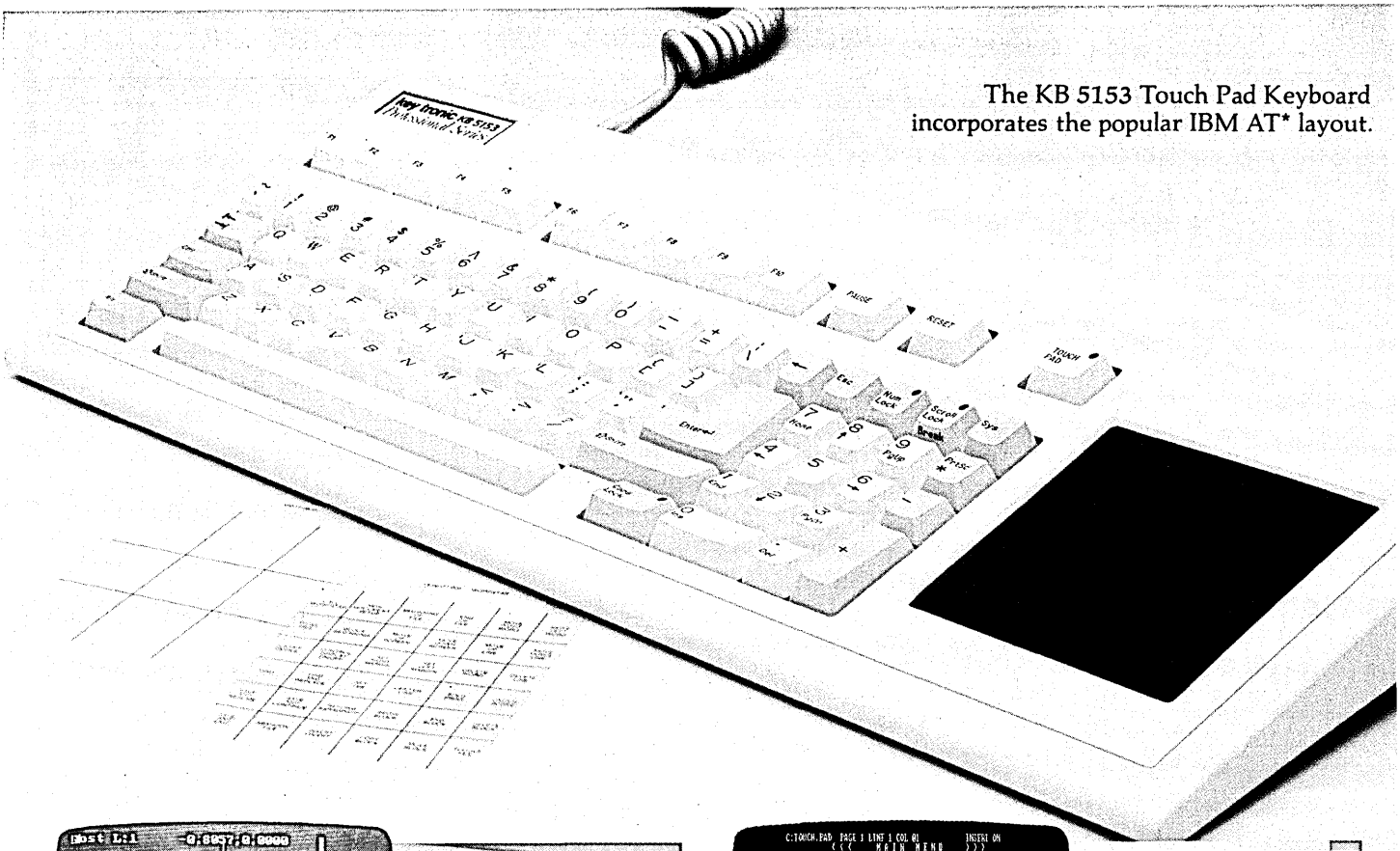
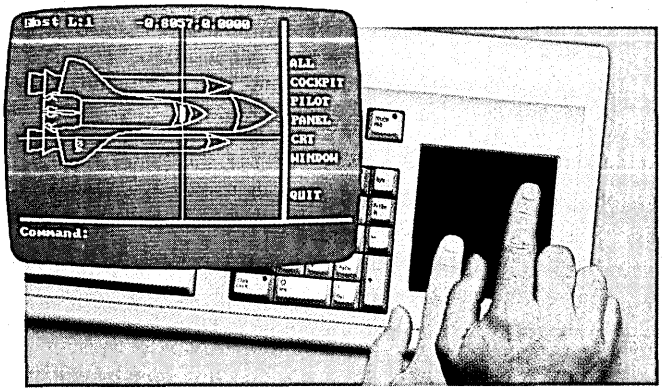
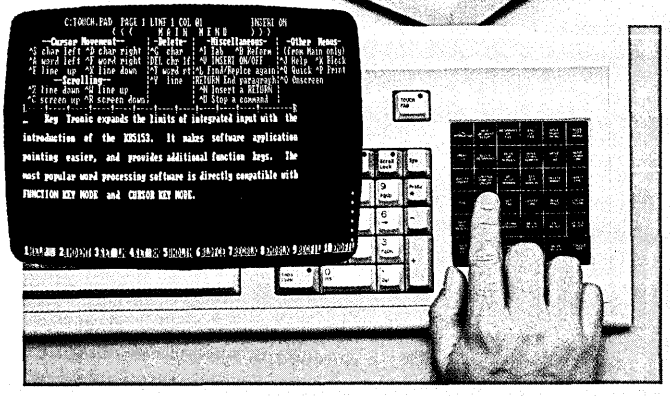
The KB 5153 Touch Pad Keyboard incorporates the popular IBM AT* layout.







Absolute Coordinate Mode

When direct pointing is required, the absolute coordinate mode is the answer. It's perfect for graphics applications such as CAD by providing fast, accurate pointing to direct screen coordinates. It can be a digitizing tablet or bit pad and is likely to become your preferred pointing method.

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NEWS IN PERSPECTIVE

WORKSTATIONS

SUPERMINI ON A CHIP

Mini makers are readying strategic new products just as demand for them—and the economy—is faltering.

by R. Emmett Carlyle

The leading American minicomputer makers have been engaging in a massive product buildup that is increasingly out of step with the faltering domestic economy. Digital Equipment, Data General, and Prime are all bringing out "superminis on a chip"—machines with much of the power of board-based products but selling with much slimmer margins—even as capital spending for computers is slowing significantly.

The most rapid rate of expense growth has so far come from DEC as it shifts into volume on its mainframe class supermini, the 8600, and hunts new market share with its aggressively priced MicroVAX II, the chip-based VAX introduced in May. DEC is clearly ahead of its competition in bringing microsuperminis to market, so it has the most to gain if the U.S. economy picks up and the most to lose should the economy remain sour for the balance of the year, as some experts are now predicting.

The current slowdown is not limited to the well-publicized troubles that the mini makers have had: the entire economy grew at only .7% in the first quarter, compared to 4.3% in the fourth quarter of 1984. Moreover, the sectors most responsible for the slowdown are precisely those that buy the most minis: U.S. industrial and technical oems.

"The dollar's strength is helping overseas competitors take a greater slice of this business," Data General chairman Edson de Castro says. In the first three months of 1985, DEC and DG managed only 3% and 5% domestic order growth over the same period a year earlier, despite racking up 49% and 44% order growth overseas. (Both firms do about a third of their business outside the U.S.)

DEC isn't the only minimaker going out on a limb at precisely the time that the U.S. demand environment has softened. Despite the economic slowdown and the uncertainties surrounding possible tax reform, there are many factors working in favor of the minicomputer companies: IBM notably lacks aggression in its midrange, competition from supermicro startups has diminished, and semiconductor prices are falling. Nearly all the leading minimakers have now begun to ship 3MIPS to 4MIPS superminis and this explosion of processing power is creating new market opportunities.

"You've got to bite the bullet on R&D and hope for the best," says Data General spokesman Dick Brown, adding that the company's R&D spending had climbed rapidly to 10% of total revenues in the March quarter—two percentage points greater than the year-end quarter.

Brown won't say what the added development dollars are buying, but sources in the company's customer base claim that DG is capping a low profile four-year ECL development effort this summer that will catapult the company back to the top of the supermini class.

DG has built a 5MIPS ECL uniprocessor on three boards and a 2.5MIPS booster on two ECL boards, these sources say. The resulting 7.5MIPS combination, featuring Motorola 2,800-gate macro array ECL circuitry and TTL interfaces to the rest of the system, has been dubbed the "MV 12000" by customers and will be announced by the end of the year.

As part of a barnstorming finale late in the year, Data General is also readying its MicroVAX II response—since, like DEC, it has made the necessary investments in semiconductor technology. DG's senior vice president in charge of its Business Group, Robert Miller, is openly critical of what he terms DEC's timidity with the MicroVAX II. "You don't do your customers any favors by half announcing a product," he says of MicroVAX II's limited communications bandwidth and current lack of VAXclustering, peripherals, and the All-in-1 office automation software.

Miller does, however, concede that because DG will enter the market later than DEC it has to add more value than its larger competitor—"and we will." Miller confirms that a challenger is being readied this year: "Expect a few surprises," he says.

Data General's Micro Eagle will be a five-chip pc with a full MV architecture, CEO office software, and IBM PC support, for $7,000.

The clue to what added value to expect from DG may have come from another competitor critical of the MicroVAX II. Andrew Knowles, the former head of DEC's terminals division, is now head of the Workstations, Terminals, and CAD/CAM group at Prime—another minimaker undergoing a big buildup during the current U.S. order slump.

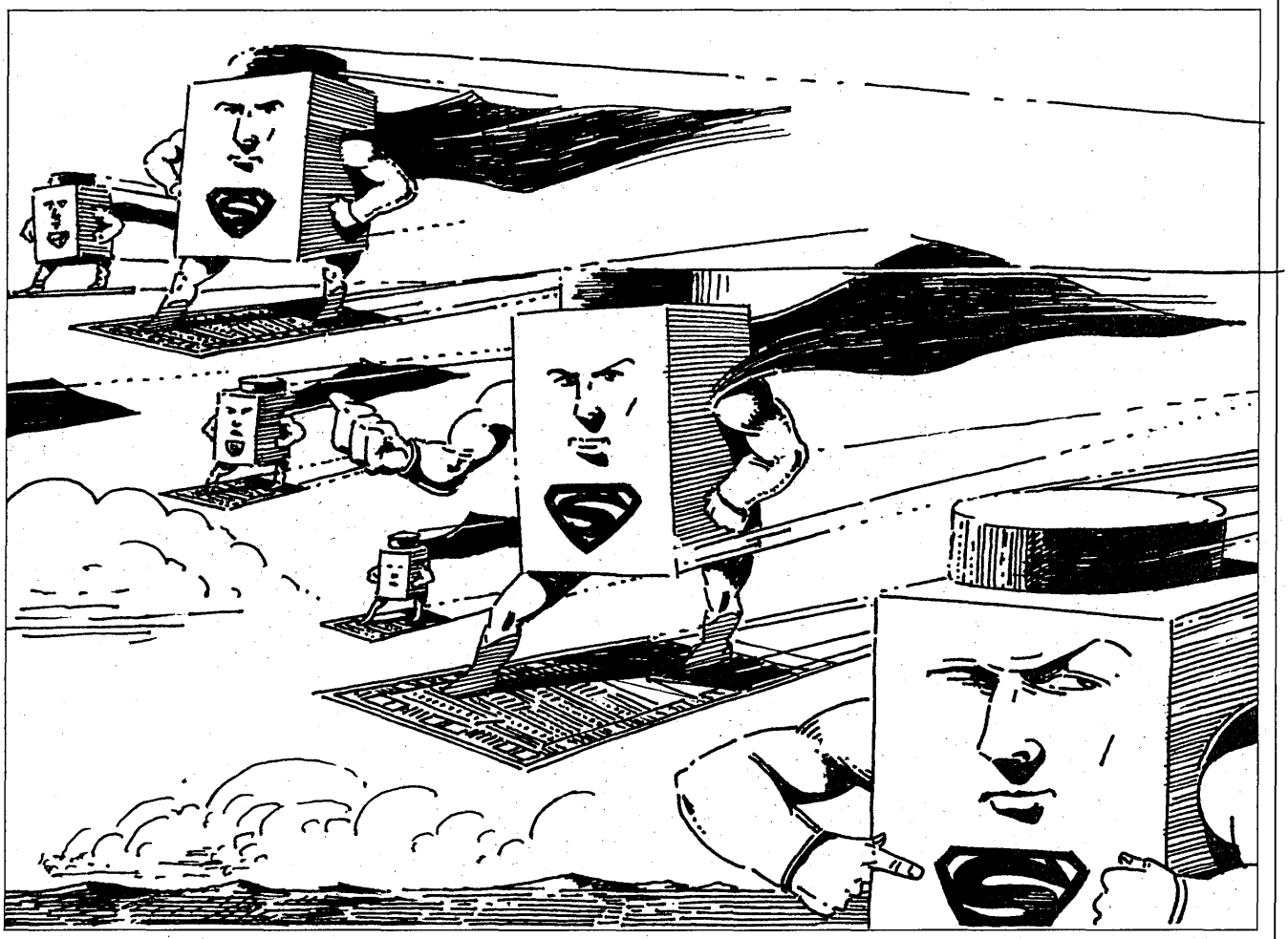

ILLUSTRATION BY JAMES R. JONES

"Though DEC seems to think it can announce the MicroVAX II and software will simply fall from heaven, it should be stressed that vars and oems will have to recode VAX programs to run on the new workstation," Knowles says. "With only a subset of the operating system and instruction set, DEC is not yet offering a full VAX on a chip." (The full VAX architecture on eight chips, the MicroVAX III, will be announced next year—see "DEC Puts VAX on Eight ICs," Feb. 1, p. 34.)

Data General's strategy is to skip the intermediate stage and offer a full MV architecture with a personal computer implementation costing around $7,000. Known internally as the Micro Eagle, the unit will be offered with its CEO office software and support for the ubiquitous IBM PC. The Micro Eagle has been built on five chips, four for full MV and one for the floating point processor.

Prime, for its part, lacks the semiconductor capabilities of its larger competitors, and is thus late into the workstation business. Still, a new workstation will be announced by year's end, the company has revealed. Jim Twiname, dp manager at Stonhard Inc., Maple Shade, N.J., a big Prime customer in the manufacturing sector, says that PC and workstation support isn't essential yet. "We [Prime customers] tend to access our superminis from semi-intelligent terminals. Since software issues drive the business, our programs would have to be recoded before they could run on a workstation," he explains.

Prime's buildup may be the riskiest of all, but it has been supported by its large overseas business—45% of total sales.

Knowles says that the software is currently under development and will be ready this year. At that point, the company is expected to announce a new CAD/CAM workstation built by Raster Technologies, North Billerica, Mass. Finally, a smaller, repackaged version of the .75MIPS 2550 low-end mini is slated to take up a workstation mission.

In some ways Prime's buildup is the riskiest of all. Stonhard's Twiname says that Prime's product, manufacturing, and field support organizations are capable of supporting a much larger revenue base. Consequently, the company is now aggressively expanding both direct and var selling and distribution channels at a time when the U.S. demand picture is fuzzy at best. But so far Prime has been supported in these efforts by its large overseas business—45% of total sales.

"Of course, new channels need new products," says Prime spokesman Joe Gavaghan, "and we've been spending heavily in the R&D area, too." Later this month the company is expected to announce a wide-ranging office automation offering that includes support for the IBM PC. It will also debut a new IBM 3270-like terminal that runs MS/DOS programs and ties into IBM's SNA.

Both DG and Prime will announce powerful new word processing workstations for their respective OA environments, insiders say. DG's—code-named Shark—offers a variety of secretarial interfaces and allows users to run IBM PC programs in DG's CEO office software environment and format. Prime's offering—code named T1—is being oemed from Convergent Technologies.

With so much going for the supermini makers, at any other time shark might have been an appropriate description of their market potential. "The irony of the current situation," says Hambrecht & Quist analyst Marc Schulman, "is that macroeconomic forces have conspired to

produce an industrywide domestic order slowdown at precisely the time when all other environmental forces are favorable for the minicomputer companies.

"It's a most curious juncture in the history of the industry," he adds, "and frankly I see no light at the end of the tunnel until late in the year." Schulman notes that DG's aging 16-bit mini business virtually evaporated in the first quarter, a demise confirmed by DG. "Historically, this product line is the most sensitive barometer of all the major mini makers' revenue streams. Consequently, I believe that the industry has not yet hit bottom."

Faced with such a prognosis, the question facing DEC is whether its MicroVAX II—which, unlike DG's and Prime's offerings, is a market reality now—will attract a host of new users or simply cut into sales of DEC's more profitable minis. Yet the latest DATAMATION/Cowen & Co. survey of 5,000 installations shows that most potential new users are still almost totally preoccupied with digesting and integrating the IBM PC into their mainframe core (see "Up, Up, and Away," May 15, p. 32), meaning that the market for departmental superminis is still relatively small.

More to the point, DEC still doesn't support the IBM PC, and probably won't until late in the year or early next year, according to industry observers. "This is an absolute prerequisite for selling to the Fortune companies," says Dale Kutnick, an independent consultant in Wayland, Mass. "Though DEC's MicroVAX II is two years ahead of IBM, and is the right box for its engineering users and vars, it's the wrong box for corporate America at this time. DEC is moving too fast for the Fortune companies," Kutnick says.

A DEC spokesman counters, "The best hedge against a recession is the right product. There is always a market for the right product, and we believe the MicroVAX II is that product." Sources say DEC hopes to sell 20,000 units by the product's first birthday next July, but, as Schulman points out, a lot of 1985 orders will be at the expense of the low-end VAX 725 and 730 and the medium-sized 750—"all of which carry much higher margins." What's more, Schulman says, the company might not be able to ramp up production of its 8600 and MicroVAX II fast enough over the next few months to replace lost demand for other VAXs. "Evidence of self-impact at the high and low end is already widespread."

Though the MicroVAX may not be the right box for the large corporations—which DEC disputes—it already has many ardent admirers within the var community because of its unparalleled price/performance. Applicon, a var in Burlington, Mass., that buys DEC's computers and then packages them into CAD systems, waxes lyrical about the tiny VAX and says it expects to order 200 of them in the first six months after they become available.

"Should either the U.S. economy or the corporations manage to get back in step with the minicomputer companies through the balance of the year, they should all take off like rockets," Schulman says. If not, the MicroVAX II may soon wind up right back where it was introduced—as an exhibit in a computer museum. ◉

DBMS

IBM BOUNCES BACK

A host of major enhancements to relational database management system packages are coming in September.

by Tom McCusker

Two years ago when it announced a relational database management product called Database 2, IBM not only blessed the relational database concept but also, as it soon became clear, the products of such savvy independent organizations as Applied Data Research, Cullinet Software Inc., and Cincom Systems.

Last year, as DB2 began to seep out among a small, controlled user base, which today numbers about 200, IBM gave the competition more to crow about than just its approbation: it was becoming evident that DB2's shortcomings would give the independents a commanding lead for many reasons. Not the least of these was IBM's commitment to prolonging the life of its aging hierarchical Information Management System approach to database management, while limiting DB2 essentially to end-user applications in the IBM-coined "information center."

So, rather than bring to a screeching halt a rash of competitive DBMS software evaluations, IBM's announcement accelerated these evaluations. A host of user surveys indicate that the independents have placed the majority of DBMS packages in IBM system sites.

A DATAMATION/Cowen & Co. study of 2,947 IBM and IBM-compatible sites (see "Up, Up, and Away," May 15, p. 32) found Applied Data Research and Cullinet to be capturing a hefty 41% of those planning to install a mainframe-type DBMS product over the next two years. Those showing a preference for IBM's products during the same period dropped to 33% from the 40% that had installed IBM products this year.

A study by Computer Intelligence Corp., La Jolla, Calif., and Dataquest, San Jose, two market research firms, found that installations of DBMSs and fourth generation languages by nine independents rose 9% between last October and this April. IBM's increase languished at 2%.

Other market studies conclude that IBM is in trouble—to the extent that a giant bothered by gnats can be considered to be in trouble. International Data Corp. recently predicted that nearly half of the DBMS sales made in 1988 will be made by independents. Studies by the Gartner Group Inc., Stamford, Conn., suggest that IBM's data management products are weak in most functional areas.

Don't count out IBM, however. Consultants and users familiar with the

FIG. 1

DBMS MARKET SHARE CHANGES, 1985 TO 1986

PRODUCT (VENDORS)	(IN PERCENT OF 3033/308X SITES) 1985	1986	(43XX,370) 1985	1986
IMS (IBM)	30	0	9	4
DL/1 (IBM)	5	2	25	10
SQL (IBM)	5	9	6	12
DB/2 (IBM)	0	22	—	—
IDMS &/R	17	26	20	27
ADABAS (Software AG)	11	4	7	10
Datacom (ADR)	4	17	8	15
Total (Cincom)	5	2	9	6
Other	23	18	16	14

Source: Datamation/Cowen & Co. survey, Jan. 1985

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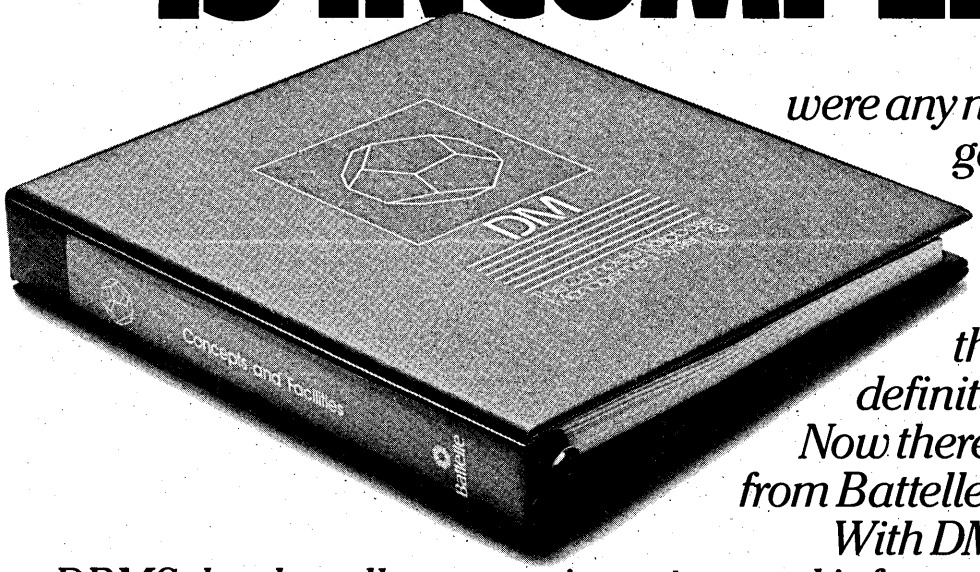

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turf say that Big Blue is about to unleash some potent new functionality that will threaten the DMBS upstarts.

Specifically, they think DB2 is a lot stronger than IBM is making public. "Users with whom I talk tell me DB2 performs better and has more features than IBM has presented to them," says consultant Steven Pfrenzinger, president of IMS Consulting Inc., Encino, Calif. He acknowledges, though, that for the most part, IBM customers are remaining with IMS in production environments and are using fourth generation languages instead of DB2 in the information center. "But wait until this fall, when IBM announces new releases to the product," Pfrenzinger warns. He suggests that its features will be strong enough for the company to quickly regain the momentum he says it lost to the independents.

The independents, noting that they have a commanding lead both in the development and availability of relational systems, contend they can remain ahead of anything IBM offers. "As they improve their DBMS, so will we," says Martin Goetz, president of Applied Data Research, who adds that ADR will have a product announcement in September, about the same time as IBM's expected new release of DB2. He said ADR will enhance security features and offer a 20% to 40% improvement in the speed of Datacom DB, ADR's relational DBMS.

Cullinet and Cincom Systems continue to add applications software packages that run with their respective DBMSs. At a time when packages are proving to be considerably more cost-effective than software developed in-house, customers are snapping up both the software package and the DBMS. Cincom's relational system is called the Totally Integrated System and Cullinet's is a version of IDMS called IDMS/R. Cincom, which has installed some 240 TIS systems, including some at sites that are converts from IBM's IMS DC, claims it will generate revenues of $70 million this year from TIS, or about 65% of its total revenues, projected at

ADR will offer a 20% to 40% improvement in the speed of Datacom DB.

$110 million to $115 million. Cullinet says it has installed 1,000 copies of IDMS/R and expects to double that number by year-end. ADR has about 900 installations of Datacom DB.

It seems to be just a matter of prospecting. "IBM will get lots of sales without us ever knowing," says Dennis Yablonski, president of Cincom Systems. "But we have a very good track record in beating IBM when we know there's an evaluation under way."

Ronald G. Ross, editor and publisher of the *Database Newsletter,* Boston, cites Cullinet Software's "uncanny market sense for people with bucks to spend." Others may have better products, Ross adds, but none have the intimacy with the buyer that Cullinet has. Informal conversations with dp managers who have opted for Cullinet's products repeat that theme—while another vendor may have a slightly better product than Cullinet's, no one else comes close to offering a more highly integrated package of products.

As long as IBM with its DB2 product follows what is being called a dual strategy, it will remain vulnerable to independents' offerings, market researchers say and competing vendors hope. This dual strategy stems from IBM's need to protect its many thousands of IMS users. It recommends that its relational products coexist with, not replace, IMS. When it announced DB2 in June 1983, IBM said the product "may coexist with and complement IMS," and added that it "will provide an excellent foundation for decision

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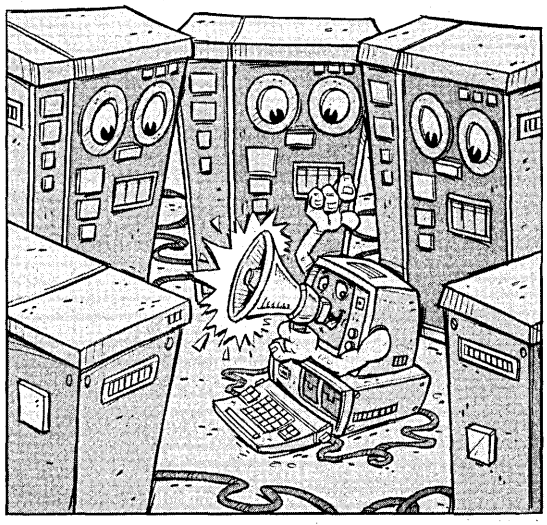

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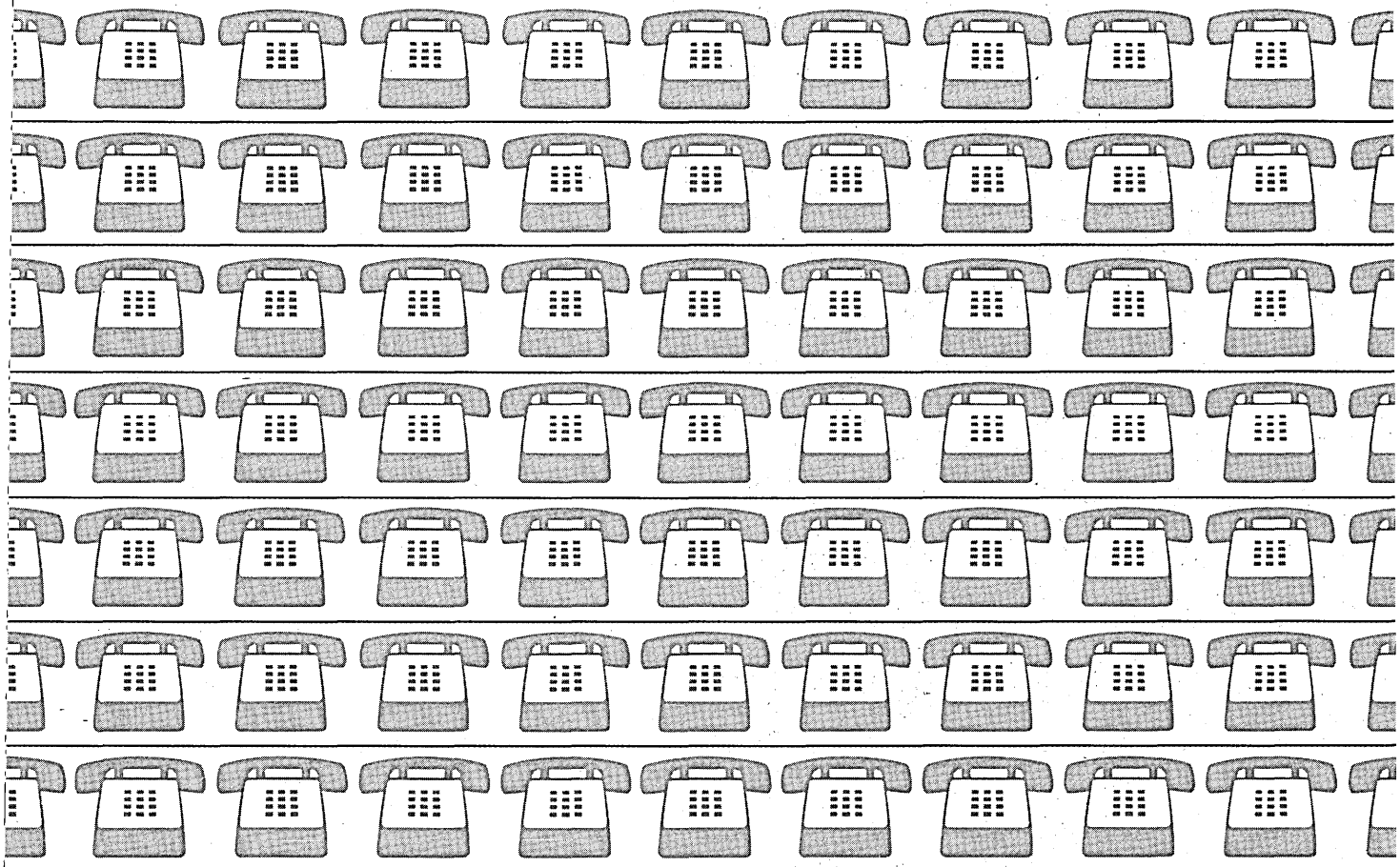

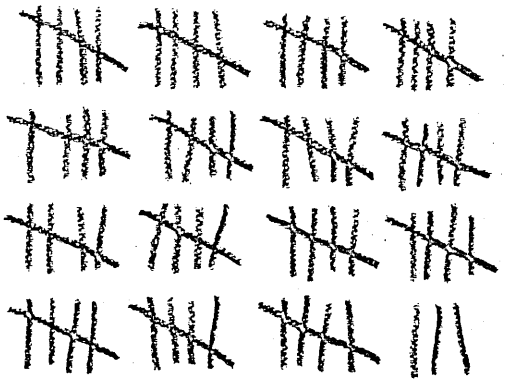

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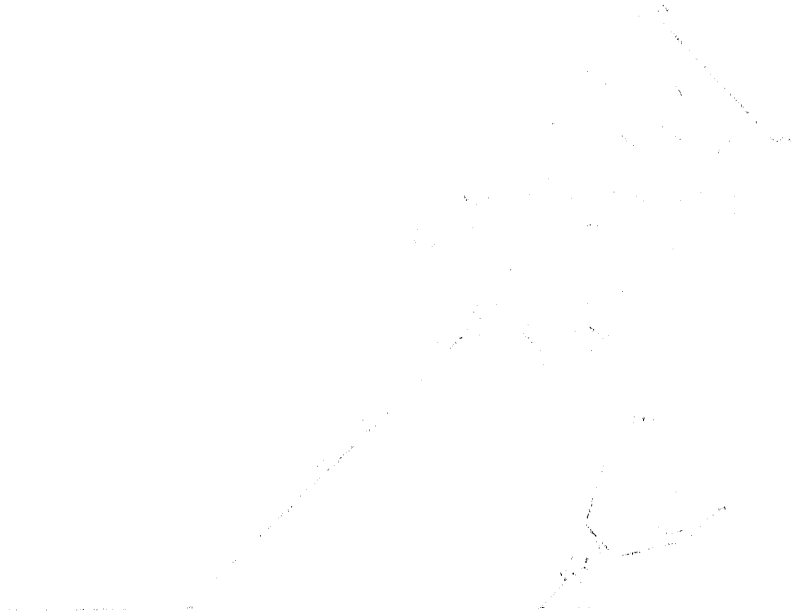

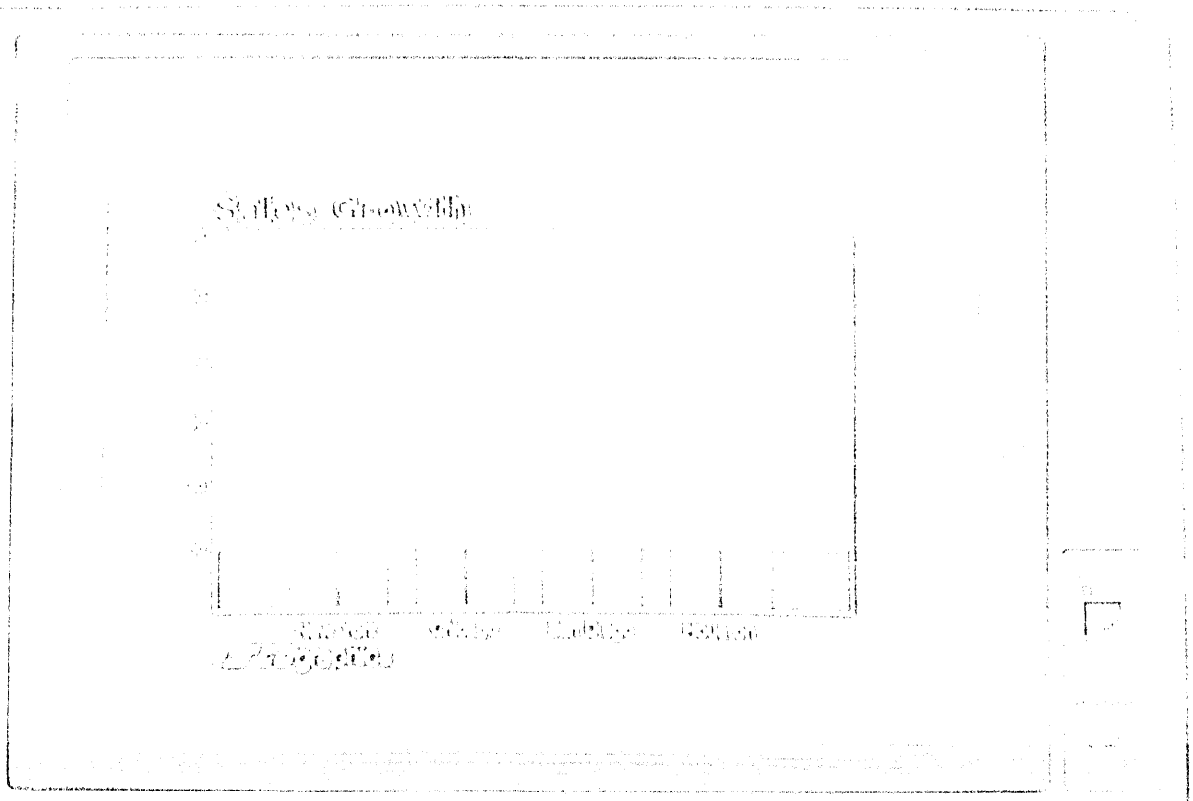

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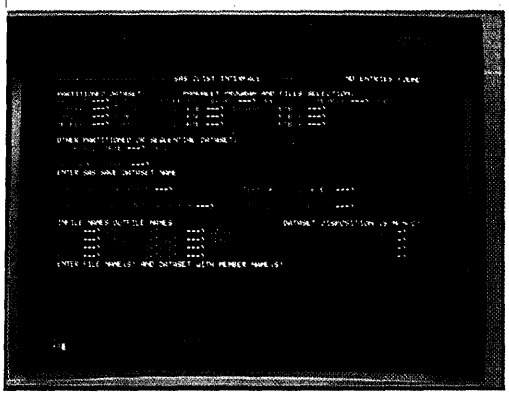

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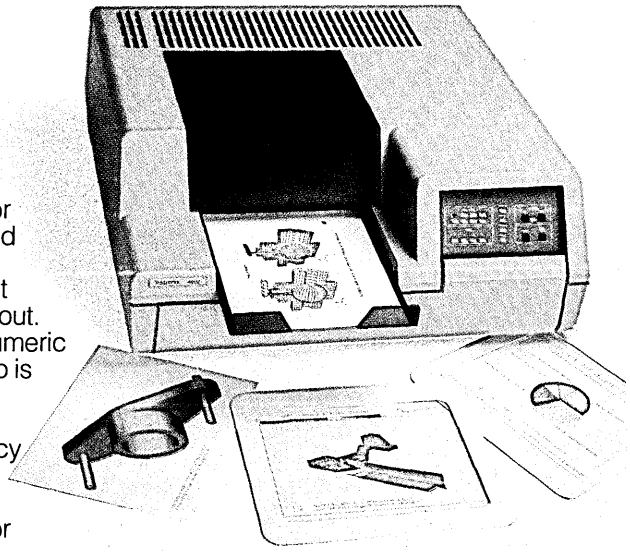

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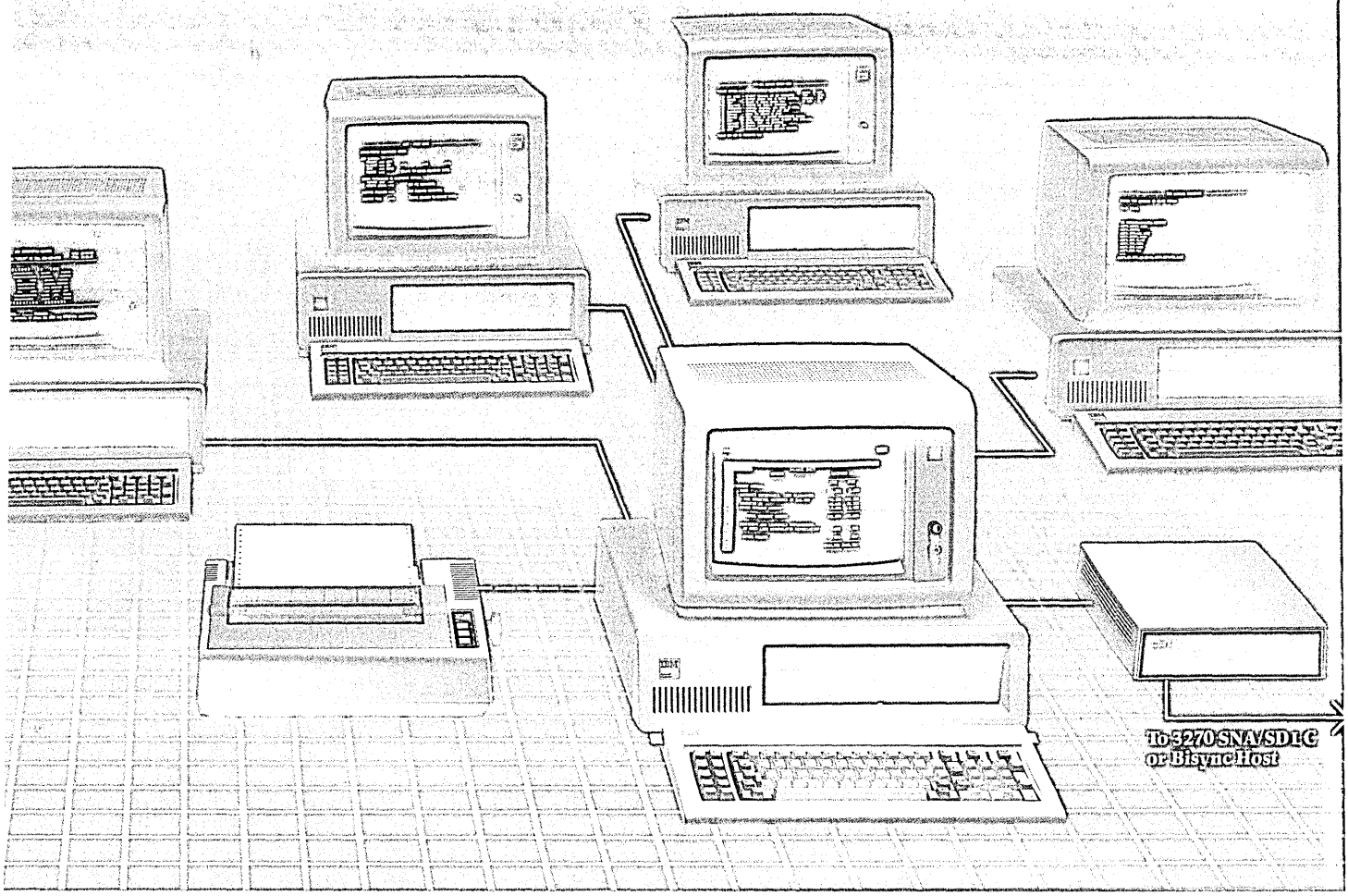

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support systems in information centers."

What IBM was saying, explains Goetz of ADR, is that it was "recommending a relational database system for information centers and PC users and a hierarchical/network database product for production users . . . and, in addition, that the data be stored in two databases and transferred between databases as often as necessary to keep the data 'up-to-date.' "

He charges that this is based on a fallacy that end users don't need current operational data and instead can access and update "almost-current data." The fallacy will be wiped away, he adds, as simple PC applications grow in complexity and function, as they are wont to do, and thus evolve into major applications. "If these applications use old data they

ADR and Cullinet have strong migration packages for IMS users who want a relational DBMS.

can thoroughly poison the best conclusions of an organization's decision makers." Goetz, however, thinks IBM's dual strategy will go on for another five years. Paul Hessinger, director of advanced technology research for Computer Task Group, a Buffalo consulting organization, says IBM simply can't overlook the technical complexities in many IMS applications. He believes it is a "borderline impossibility" that IBM will soon change its dual database approach.

It's not that IBM couldn't provide a way for users to migrate easily from IMS or DL/1 (products, incidentally, that are believed by market researchers to have generated more than half a billion dollars of IBM's $3.2 billion in software revenues last year) to a relational product. At present it doesn't think that's the way to go, according to several observers.

Ross of *Database Newsletter* recalls how IBM in the late 1970s announced that it wouldn't introduce a relational product until it had a good migration path. That hasn't happened, he noted, adding that IBM introduced a relational DBMS simply because the IBM-generated concept of the information center created a need for one.

Into the migration path void marched the independents. ADR recently announced DL/1 Transparency, an upgrade package that offers an automated migration path from DL/1 and IMS to Datacom DB. The $40,000 ($30,000 for DOS environments) upgrade consists of utility programs that automatically redesign the database for Datacom DB, load and convert the actual data, populate the database dictionary, and provide an ongoing basis—a layer of software that allows older DL/1 and IMS applications to make calls to the new relationally structured data.

The product, which is being tested at a dozen user sites, will be available in August. Cullinet's product, Escape DL/2, has been in use two years, but the company says it isn't a fully automated tool.

Some sources expect IBM's new release to include microcode assists. Others say DB2 isn't ready to be microcoded yet.

Some 70 IDMS/R sites are using the product. Cincom doesn't provide automatic tools to convert IMS users to TIS, even though 40% of its 240 TIS customers are either new users or users migrating from the IMS family, albeit with fewer applications and thus less complicated conversion problems. "These users simply rewrite their systems," explains Cincom's Yablonski.

TOTAL users converting from Cincom's hierarchical DBMS to TIS don't change programs or files. Instead, they use utilities that enable programs to run in a compatibility mode without the need

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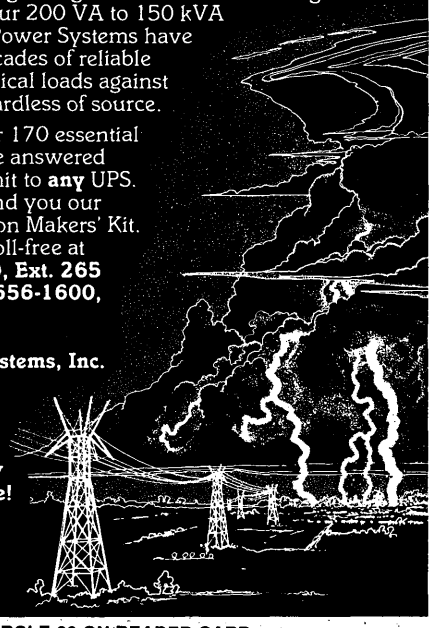

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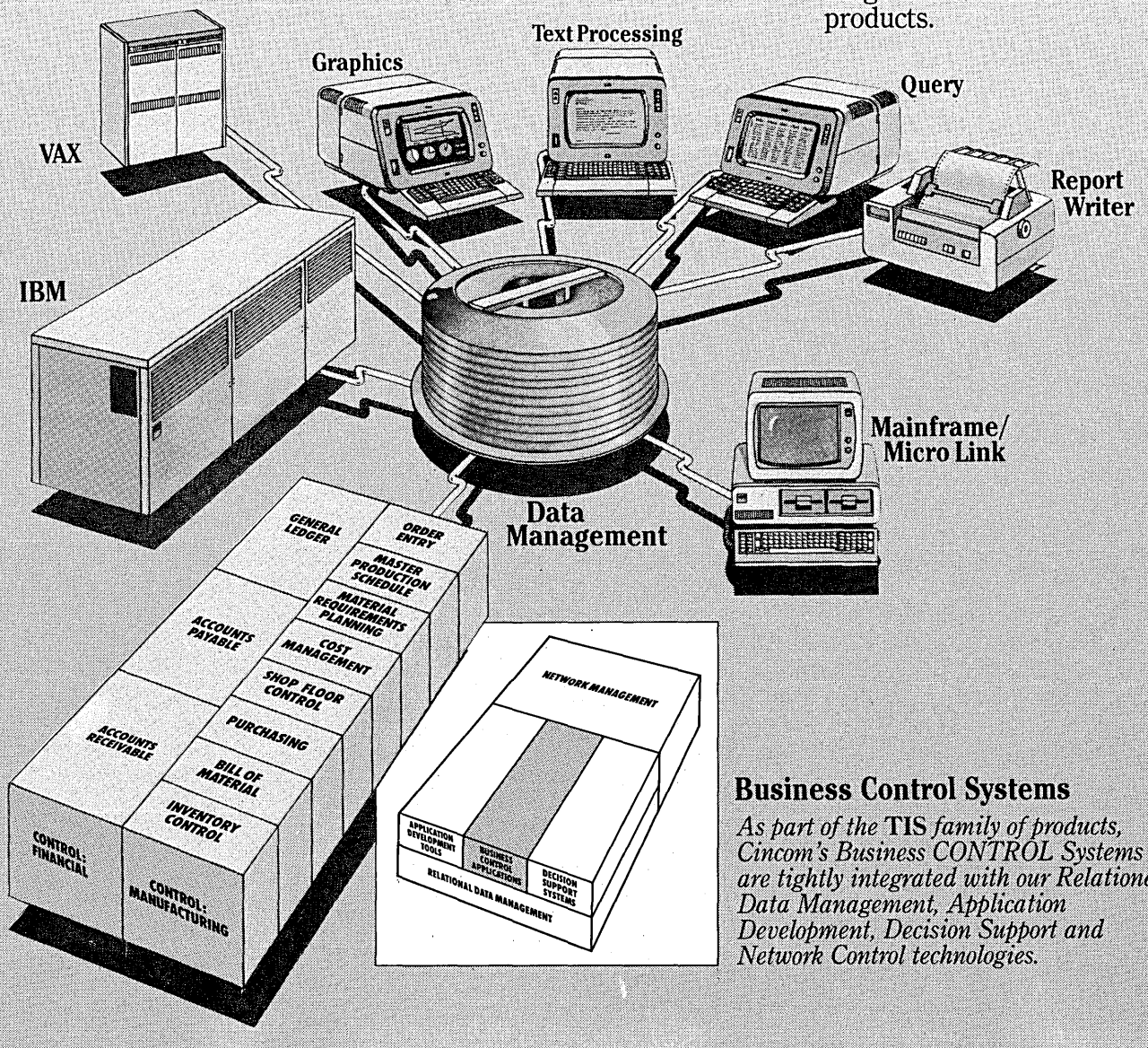

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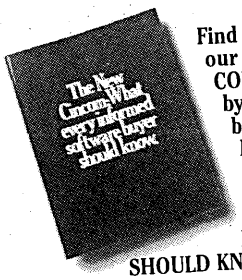

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for an intermediary kind of software, according to Yablonski.

IBM has told investors of its long-term goal of 35% annual growth rate in software revenue. So it must protect its DBMS market, which represents nearly a fifth of its total software revenues. How will that be done?

Pfrenzinger believes that the company will win over customers by offering better performance with its next release of DB2, perhaps even presenting a product that questions the true "relational" nature of competitors' products. For example, he says IBM will announce improvements in the referential integrity of the relational product as well as an improvement over DL/1. He says DB2's performance is only about 50% to 60% that of DL/1. Referential integrity, an essential function in relational database products, applies to logical relationships. It dictates, for example, that a purchase order may not be written for a nonexistent vendor and, conversely, that a vendor cannot be removed from the database if purchase orders are assigned to the vendor. If these relationships aren't defined the system cannot enforce them.

Relational integrity is a feature not fully supported on existing relational systems, contends Pfrenzinger.

Other sources expect IBM's new release to include microcode assists—the placing of a large number of instructions into a much smaller number of instructions that are in microcode. This enhances execution speeds. Others have doubts. "IBM's DB2 isn't ready to be microcoded yet," says Ross, noting that microcoding also means freezing part of a design.

"If these applications use old data they can thoroughly poison the best conclusions of an organization's decision makers."

In all of this speculation, one fact remains clear: IBM has lost and continues to lose ground to independents. Its new release could help it regain that lost territory, even if it doesn't give IBM a product superior to that of its competitors. All IBM has to do, say the observers who follow software trends, is give an indication that it intends to remain in the relational market for keeps and that its customers can feel comfortable that it has their interests in mind. Another fact is clear: large users are looking at competitive offerings. What these users see may not be the appeal of remaining in the IBM fold. Rather, they may be drawn to the products of the independent vendors, who are under great pressure to offer the kind of productivity that end users are demanding today. ◉

NETWORKS

SNA TO LAN LINKS SOUGHT

Software to tie local area networks to an SNA mainframe environment is now available. But are users ready for it?

by Irene Fuerst

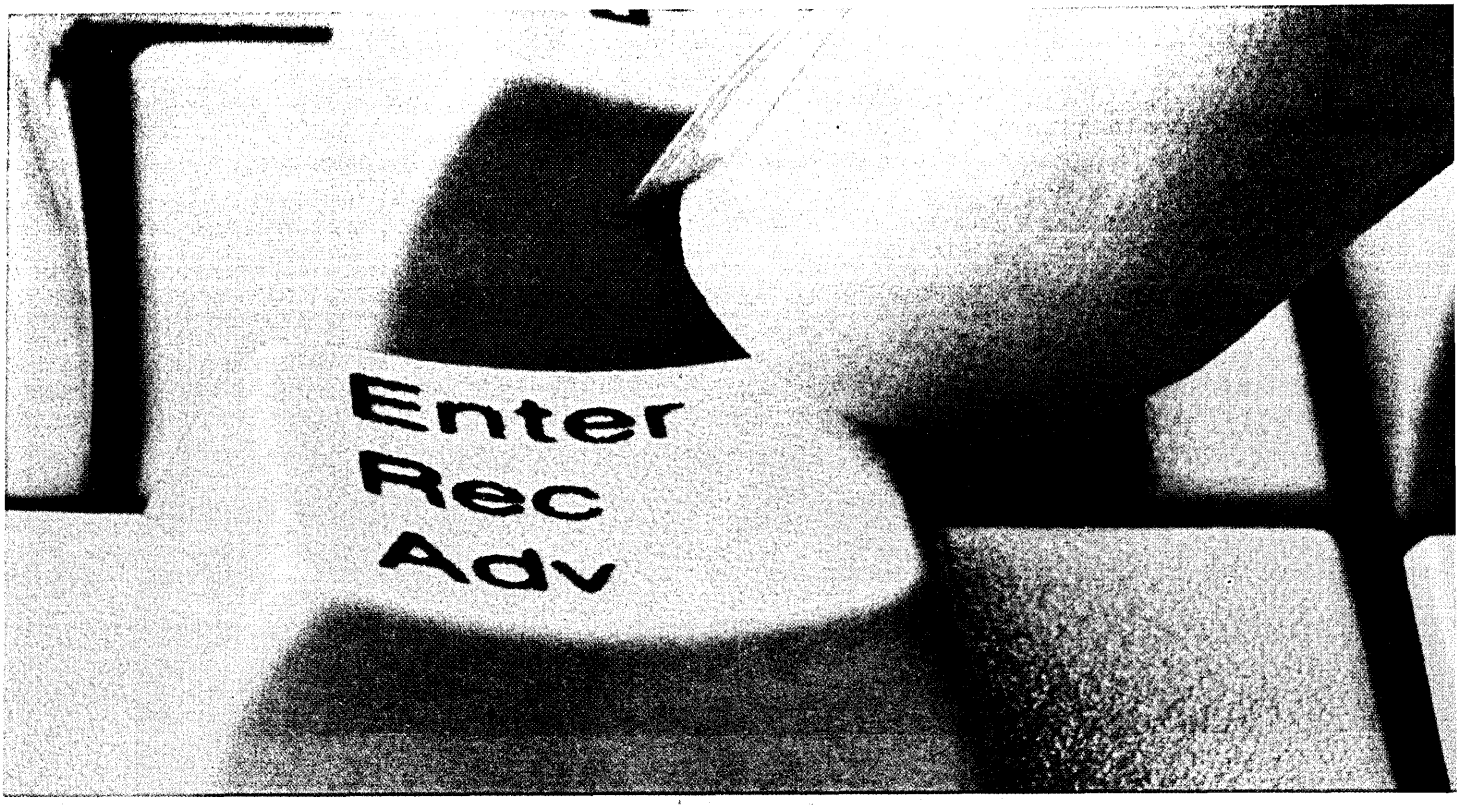
Entrepreneurs can be like children. The first kid on the block with a new toy has a certain cachet, a *je ne sais quoi*. Big kids feel the same when they start making toys—they want to sell the first one. But when your toy is made with microprocessors, watch out for the Big Blue schoolyard bully. Not to mention the fact that the other kids may not be ready to play.

All of this comes to mind when one hears California Network Systems, a Milpitas, Calif., startup, claim to be shipping the first gateway to SNA environments from the IBM PC Network. Its gateway simply links a network as a whole to an SNA mainframe, replacing expensive point-to-point links over modems or using IRMA boards, coax, and special software for a mere screen transfer. The CNS package also acts as an ASCII-to-SNA protocol converter.

Called the PC Network/SNA 3270 GateWay, CalNet's product emulates a 3274 cluster controller, allowing pcs on the network to emulate 3270 terminals. CalNet's product line extends from a software package to be used with the PC Network boards to a network server.

CalNet vp Tom Longman acknowledges that IBM has also announced a gateway, but says that his company's product was actually first to ship. An IBM representative says the company's PC Network/SNA 3270 Emulation Program has been available since April for a per user license fee of $375. IBM doesn't seem to be shipping many networks, though, according to outsiders, a fact that could spell trouble for CalNet. IBM declined to provide any PC Network shipment information. IBM has also announced a Series 1 PC Connect that lets the minicomputer act as a gateway between a PC Network and a mainframe running SNA.

"IBM announced a software emulation package, but it's not yet available," says Longman. The IBM product, which requires an IBM PC dedicated as the gateway, costs between $2,000 and $4,000 for 12 users, he claims. CalNet's entry-level



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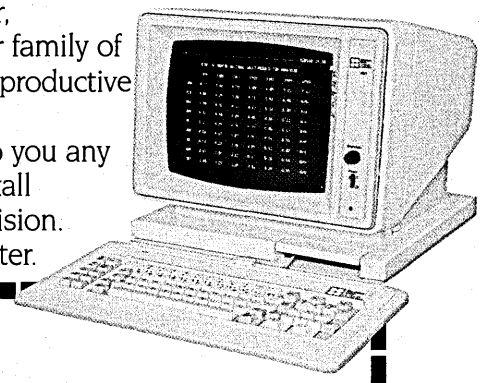

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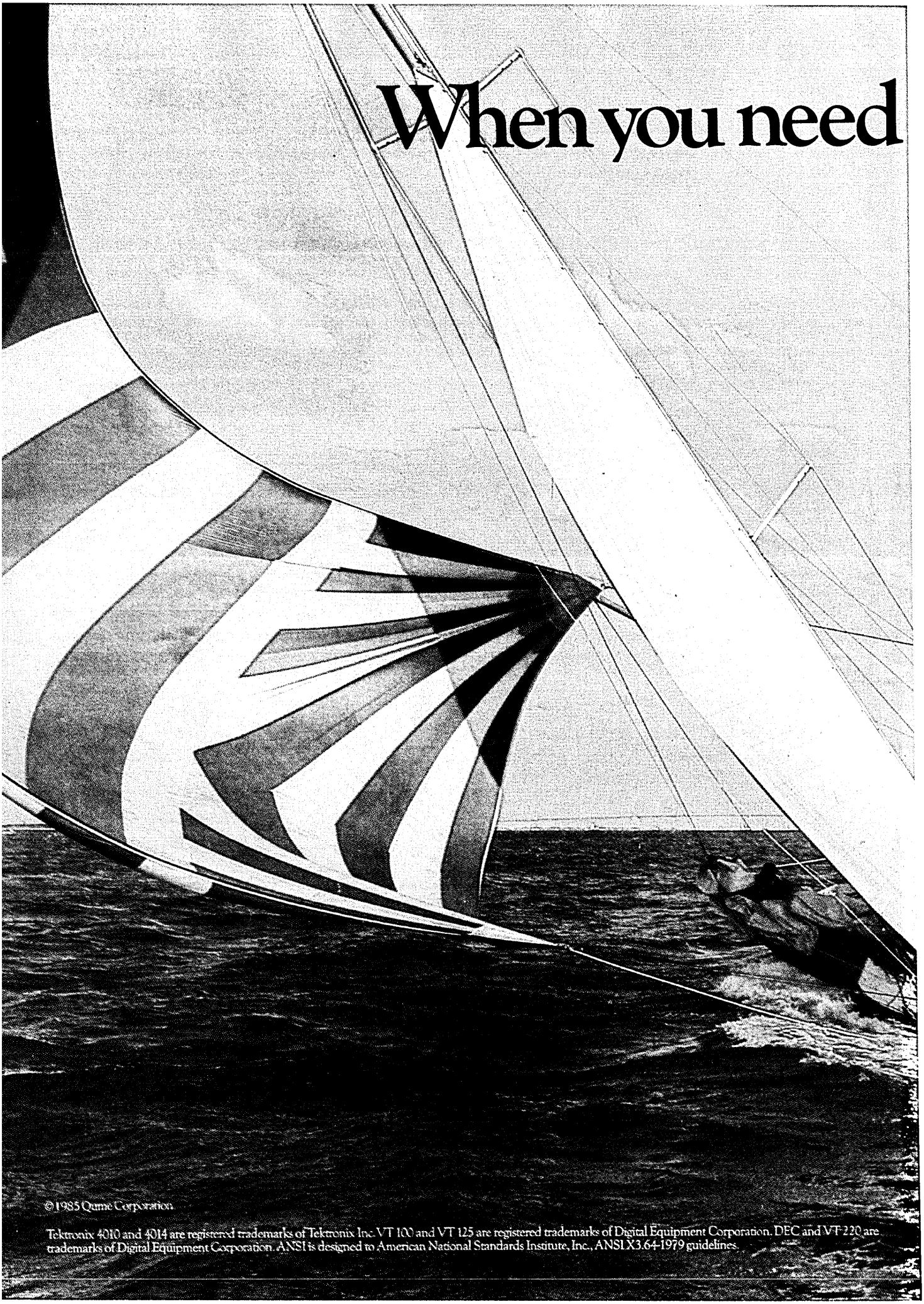

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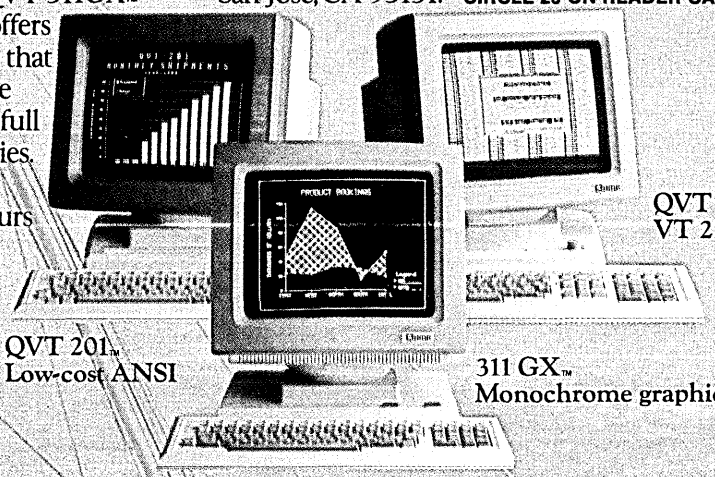

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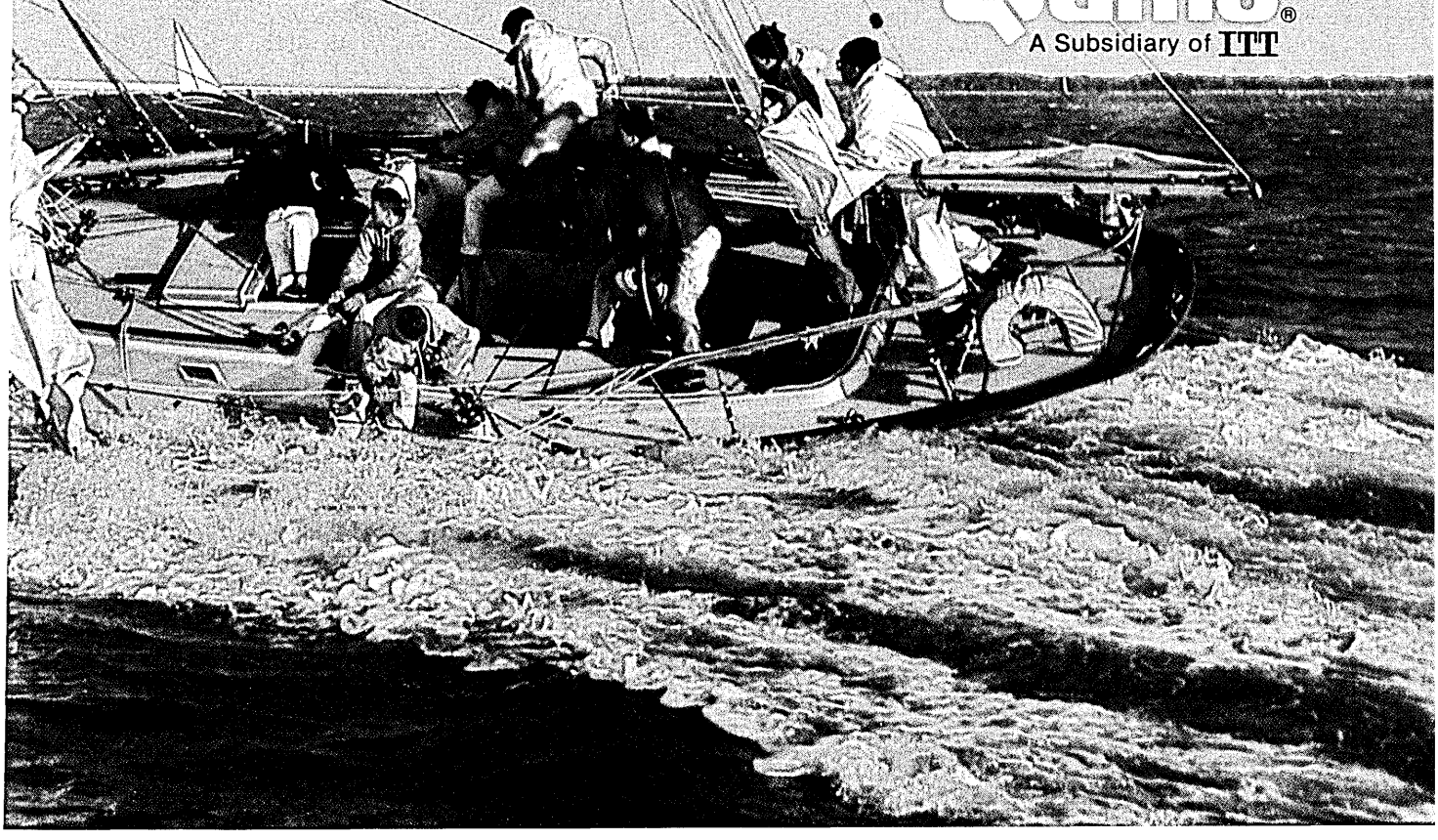

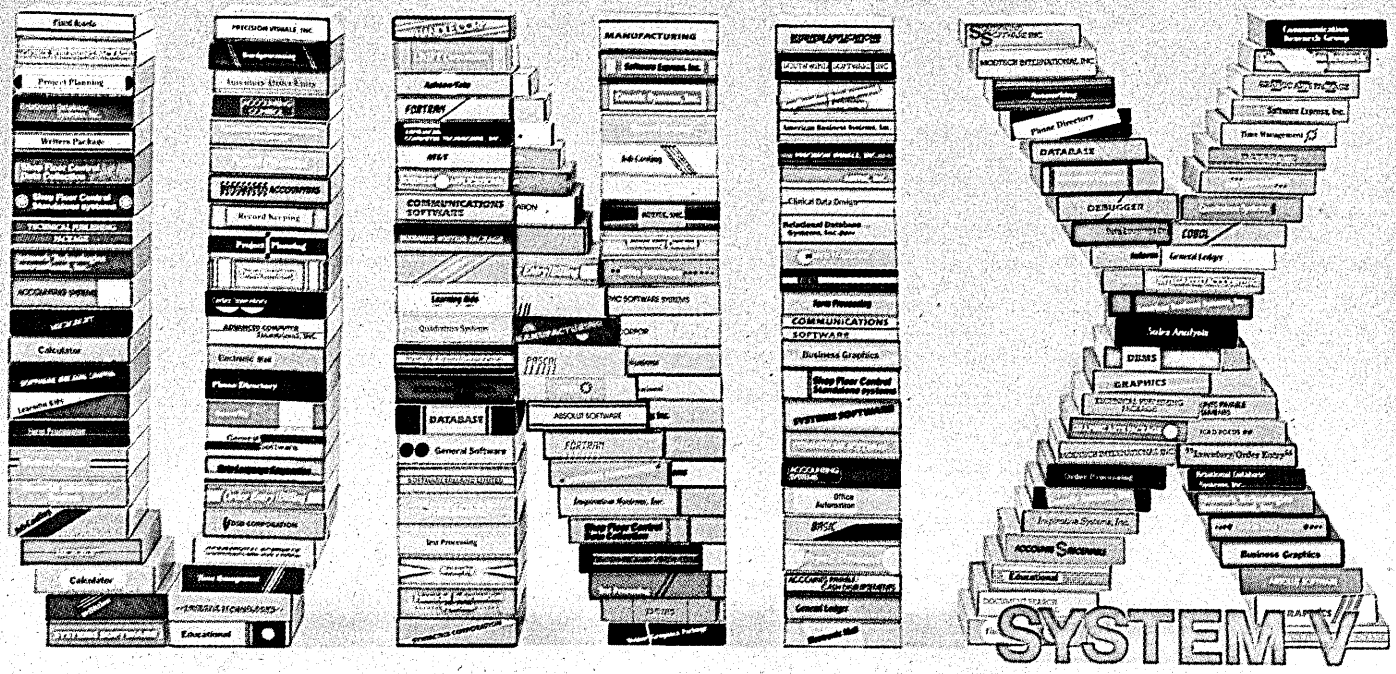

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gateway software package is also priced at $375 per user, but the Gateway PC retains its local processing power. CalNet's product "offers a clear migration path," according to Longman, from an eight-user software product to a software and hardware solution that will support 48 concurrent sessions, for $500 per user.

Of the thousands of mainframe sites running SNA, CalNet expects 40% will want connectivity to LANs. Although the potential is there, the market is likely to get crowded as IBM and others release gateways. Hints a representative of Sytek, Mountain View, Calif., which did much of the PC Network development, "We haven't announced anything yet."

Dozens of companies like 3COM, Sytek, Corvus, Novell, and Digital Communications Associates are dependent on microcomputer communications with mainframes and other micros, so IBM's moves can literally make or break them. Every shred of marketplace advantage is crucial, and CalNet is in a race against time. "Being first is always extremely important," explains Los Altos, Calif.-based consultant Omri Serlin. "It doesn't guarantee success, but being number four makes it harder." Adds Brian Jeffery of the International Technology Group consulting firm in Palo Alto, Calif., "It's not going to make them rich. In three months they'll have lots of competition."

CalNet, and other vendors in the micro-to-mainframe business, may be too far ahead of the market, however, given the dearth of PC Networks. The largest is rumored to be a 20-station network installed in a computer store on the East Coast. "If you look at it today, there are too few PC Networks to make this an issue," says Serlin. Adds Jeffery, "the feedback I've been getting is that the PC Network isn't exactly going great guns. One of the great mysteries is, 'Where is PC Network?' "

"The feedback I've been getting is that the PC Network isn't exactly going great guns."

Tying your fortunes to those of IBM isn't such a bad idea, unless you choose the wrong end of the elephant. The PC Network in its current incarnation hasn't garnered accolades, and many of the participants in the Elephant Waltz hope that they can duplicate the success of others who have triumphed when Big Blue slipped. Anyone seen an IBM Portable PC lately?

The subject of local area networks as a whole is like the old saw about the weather—everybody talks about it but no one does anything about it. This year, it's LANs; last year, it was integrated software. Future Computing of Dallas, which specializes in sunny forecasts, puts the market for pc networks at $1.6 billion for 1988. International Data Corp., Framingham, Mass., puts the market at less than $450 million for the same period. Repeated annual surveys of DATAMATION readers indicate that 10% have some sort of LAN and another 20% plan to buy one in the next year. But in the surveys taken a year later, only 10% have LANs.

The confusing state of affairs may reflect that there's not a whole lot of fire to account for all the smoke as yet. The actual installed base is 40,200 personal computer networks installed by year-end 1984, according to IDC, with about eight pcs per network; many seem to be used by small businesses that don't have a mainframe or SNA to worry about.

Groups who have installed SNA gateway equipment to personal computer networks often do so on a modest scale. James L. Albin, director of financial systems planning for Detroit's Henry Ford Hospital, first connected about eight pcs using Nestar's LAN about 14 months ago. A network that has since expanded to 30 users, Albin's group added a Nestar gate-

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way about six months ago. "Our initial motivation was to share information and have local computing capability," he says, noting that gateway access eliminates multiple connections. "If you are in a network environment it is certainly more cost-effective."

Many microcomputer networks have only an either/or setup—users can communicate either with the mainframe or work with the pc, but cannot transfer data back and forth or even toggle between sessions. Albin says he has no direct file transfer capability as yet. "To me, that's one of the major things," he says, adding that file transfer is currently done with a 1,200-baud modem.

One concern among MIS people is what Jeffery terms the "holdback factor." He says managers are holding off making a decision vis-à-vis networks until IBM's token ring is released, which may not be for two or three years. "The holdoff factor on the token ring is affecting PC Net as well," he says.

For MIS managers who decide to jump in now, the holdback factor, the expense, and the plethora of network types—broadband, baseband, twisted pair, fiber optics, etc.—can lead to a quick and dirty "throwaway" solution that's easy to swallow and easy to expand. "That's where low-cost nets come in. They're easy to cost-justify," says Bennett Wiseman of the Cupertino, Calif.-based market research firm, Infocorp. Low-cost networks such as Apple's AppleTalk connect only small groups of workers, but they can themselves be linked by other, more powerful networks. Gateways, he says, are "going to be a very slow strategy." Wiseman says he wouldn't be surprised, however, if by 1987 or 1988 networking "becomes as common as the pc is today."

Andy Foulds, an assistant vp in the International Banking Group at San Francisco's Wells Fargo Bank, uses a Corvus OmniNet and typifies the prevalent price/performance trade-off attitude. "It runs like a champ," he says, "but as a systems manager I find it a bit slow, a bit bearish," noting that he performs management functions no one else uses. With the Corvus SNA gateway there is a four- or five-second delay each time the enter key is pressed. "What's a four- or five-second delay when you save $50,000?" he asks. Foulds says he is not in a high-volume, high-speed environment and terms his a "slowdown approach." He says that if his input needs were different, he would have to reconsider his setup. "I waited and waited [for IBM's network]. IBM was saying, 'It's coming, it's coming.' I couldn't wait any longer. From what I've seen, I still don't feel the IBM system is as secure as my present system." Foulds says that the Corvus network will endure—even if he outgrows the software, he can keep the hardware. "The cost was so low—under $10,000—that at the price it was good experience. I could have thrown it out after six months if it hadn't worked."

And then there is a question of priorities. Most companies that have installed LANs, according to San Francisco consultant David Ferris, "generally want to get the local net going. They're still working on assimilating the local net." ◉

FAST, FASTER, FASTEST

Fiber-optic technology has won big endorsements as users seek new ways of connecting computers with ever faster networks.

by Robert J. Crutchfield

For years it was little more than a laboratory curiosity, and more recently the technology seemed to be used almost exclusively by the telephone companies in densely populated areas, but fiber optics may finally be ready for the big time. IBM and several big dp installations have jumped on the bandwagon, and the effects have been significant.

IBM's recently announced 3044 fiber-optic link for host mainframes and peripherals is selling like gangbusters—four times the level anticipated by IBM when it announced the product in February, according to Carl Conti, IBM group executive in charge of the Information Systems and Storage Group. Other vendors—companies like Network Systems Corp., Minneapolis, and ChannelNet, Southport, Conn., whose fiber-optic mainframe communications packages predate IBM's—are reporting stronger sales since the IBM introduction.

While IBM's blessing of the use of fiber optics has been a boon to third-party vendors, an equally important impetus has come from the users. Ford Motor Co. is building its own high-speed data network to link its Michigan facilities. Michigan Bell, concerned that Ford would bypass its system, undertook the job of building a fiber-optic link that meets Ford's specifications. The Bell operating company did what other telephone companies may be forced to do—offer users high-quality transmission lines at rates that will make bypass an uneconomical alternative.

New York Telephone is about to learn that lesson the hard way, courtesy of Merrill Lynch Telecommunications and Western Union Communications Systems. The two firms, through their Teleport Communications joint venture (95% owned by Merrill Lynch), are constructing, marketing, and operating a teleport in Staten Island, N.Y. One of the most ambitious communications projects currently under way in the United States, the Teleport (whose property is owned and managed by the City of New York and the Port Authority of New York and New Jersey) will act as a central node in a 137-mile fiber-optic network extending through most of Manhattan (from the downtown financial district to 72nd Street), as well as through parts of Brooklyn, Queens, and New Jersey. The network is tied to a satellite earth station on Staten Island for global communications.

Recently, Teleport Communications signed a contract with AT&T to provide a fiber-optic communications link for Merrill Lynch's new headquarters in lower Manhattan. The link circumvents New York Telephone even though AT&T had rejected all previous BOC bypass proposals. The fiber will carry both voice communications and high-speed data.

"By using Teleport as a supplier, Merrill Lynch will gain the diversity, high capacity, and flexibility it needs for its sophisticated communications," says Ray Annunziata, Teleport Communications' senior vice president.

A third major installation is being weighed by the CIA. The agency is exploring the use of fiber optics to link computers situated in different locations on its campus at Langley, Va. For the CIA, the rationale is security. "It is almost impossible to tap a fiber-optic line without destroying the link," a Los Angeles-based security consultant says.

The technology offers a very secure and fast way to link computer equipment. The Ford and Teleport Communications networks are probably the largest fiber-optic schemes currently being implemented, but users report that numerous smaller links are under way—most of them strictly for data transmission between dp centers. "Most large dp networks will probably require a fiber backbone," says analyst William J. Ritger at Dean Witter.

The rapid acceptance of this technology is due in part to cost savings and the added flexibility that fiber optics offers in configuring big data networks, users say. ChannelNet's SysLink system can free the mainframe from the burden of the "bus and tag" connection—IBM's standard cabling system for linking cpus with storage peripherals, printers, and front-end processors, with a distance limit of 400 feet—allowing computers in-

stead to communicate from several floors to several miles away.

In some cases, breaking the bonds of the bus and tag connection also means freedom from costly front-end processors such as IBM's 3705 and 3725. Those units can cost more than $250,000, while a comparable fiber-optic product, like SysLink, can cost as little as $90,000 and link two cpus more than five miles apart.

"Replacing the front-end processor with fiber-optic equipment is a radical departure, and if successful will change the way data processing is done," says a vice president of MIS in the South.

"Replacing the front-end processor with fiber optics is a radical departure that could change the way dp is done."

The idea of IBM offering a fiber-optic cabling alternative may seem counterstrategic to the computer giant's game plan, but IBM has configured the 3044 in such a way as to limit potential cannibalization of the 3705 or 3725. Indeed, even top executive Conti has been doing some missionary work on behalf of fiber optics. At the introduction of the 3044 channel extender link, he said, "An investment in fiber-optic channel extension networks today will continue to pay dividends in the future as strategic enhancements continue."

IBM's endorsement has clearly helped its competitors. "IBM has blessed fiber optics much the same way it blessed the pc," says John DeSantis of ChannelNet, a subsidiary of DataSwitch Inc., Norwalk, Conn. Vendors such as ChannelNet want someone like Conti with the power of IBM behind him doing the missionary work for fiber optics. Early converts include brokerage houses, insurance companies, and other large companies with displaced dp shops in a campus or building environment.

The 3044 is catching on because it gives customers more flexibility in locating sufficient floor space for their equipment. In national accounts presentations, IBM positions the product as a way to provide local response time to terminals up to 1.25 miles away; near-local response time is possible up to 2.5 miles away, the company says, but customers need to house at the remote site both the 3044 and a 3088 multiple path channel-to-channel communication unit. The 3088 is required for any channel-to-channel links of greater than 400 feet.

Although the product has taken off so quickly, some users say that IBM will have to come a lot farther to satisfy them. Says the southern MIS vice president, "I don't understand IBM's communication policy. I don't understand why anyone would want to connect through IBM. It still hasn't stepped up to the [fiber-optic] challenge."

He adds, "The 3044 is only the first step for IBM. Why did IBM start with a Volkswagen when they could have had an Olds? I'm sure this is only the first step in a long product cycle."

These users explain that the 3044 is only a partial solution. IBM's product is a nonintelligent, single-fiber channel extender, meaning that it allows devices to be attached to the host from greater distances than would otherwise be possible;

IBM offers 43Kbps transmission, but users say they need 1.5MBps now and the full 3MBps channel speed later.

it is not designed to connect cpus to each other. Front-end processors are still needed to connect these devices to the mainframe, however. The 3044, moreover, can transmit data at only 43Kbps—not even 1% of the 3MBps channel speed. Primary among user requirements is a link that permits communications at 1.5MBps now

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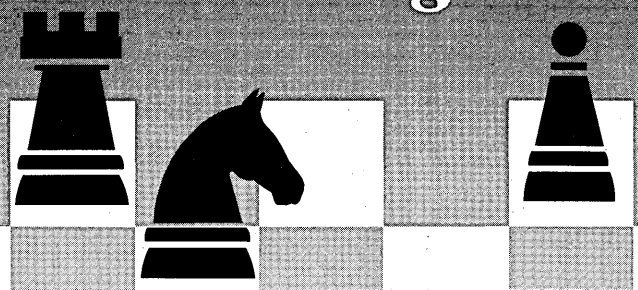

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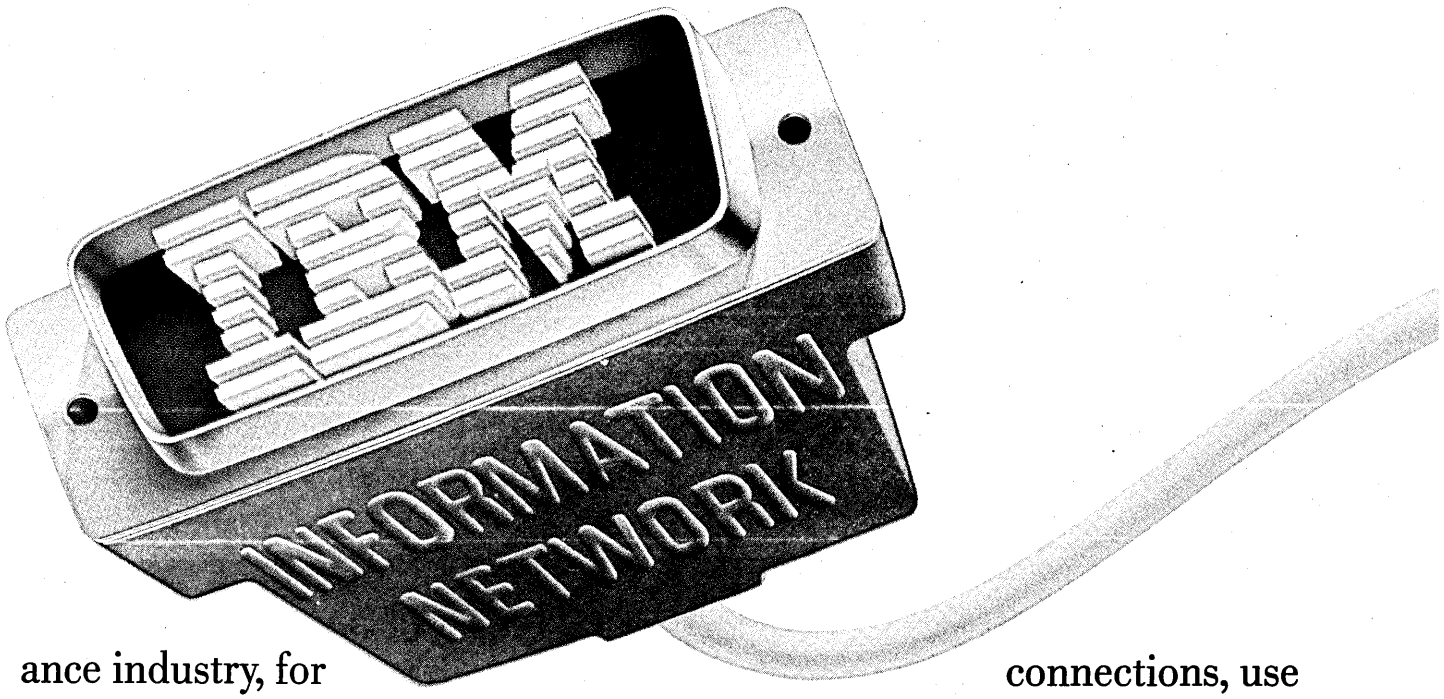

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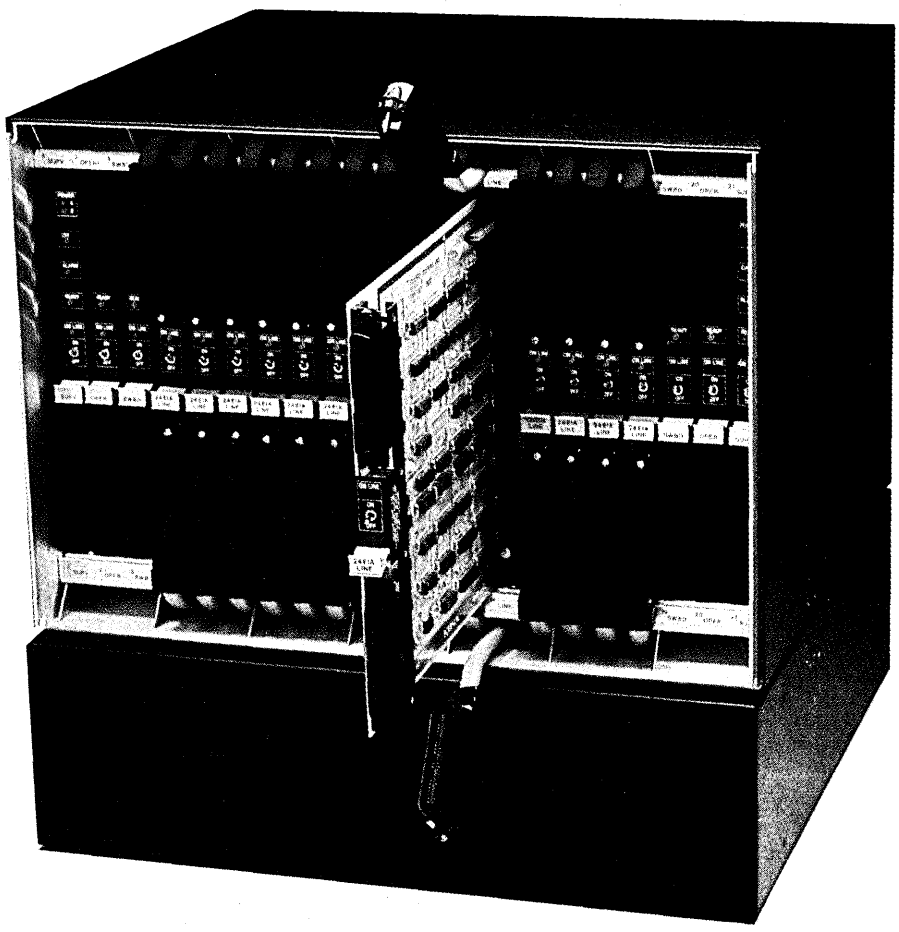

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and, in the long run, at the full channel speed. To establish a link, customers need to pay $17,000 apiece for a 3044 at either end, and $95,000 for a 3088.

Where IBM falls short in the eyes of users, other vendors are rushing in. Technology available today allows users to operate channel-attached control units at extended distances from the host without sacrificing performance. A combination of high-speed logic and fiber-optic technology can provide near-local performance to remote locations over three miles from large host processors in the 308X and 3090 range.

Fiber-optic vendors are bringing a lot to the table. Network Systems Corp. is developing Datapipe, a fiber-optic link that can connect data centers at 275Mbps; at 11 times channel speed, that is far faster than any other product available. The product is currently in beta testing, and will not be a significant contributor to NSC's business this year or next, Ritger says. In the meantime, NSC is selling a fiber-optic extender that can connect two Hyperchannel networks from distances up to two miles apart. A third product is its RDS-500 remote channel extender, which can link remote printers at speeds from 1.5Mbps to 50Mbps.

While NSC is alone at the very high end of the performance spectrum, ChannelNet is competing head-to-head with

NSC's Datapipe, when it is shipped, will link cpus at 275Mbps.

IBM's 3044 in the performance spectrum from channel speed down. Its 8044 can operate over distances surpassing three miles at 650Kbps; that's still well below channel speed but significantly faster than the 43Kbps IBM quotes for its product over a shorter distance. Moreover, while the 3044 suffers performance degradation over distance, the 8044 does not, ChannelNet says. To obtain the performance improvements over IBM, the 8044 doesn't handshake every bit as the 3044 does; it does one handshake at each end of a 3270 screen (1,000 bits). ChannelNet is also selling a high-end fiber-optic product, Syslink, which connects cpus to peripherals or to other cpus at the 3MBps channel speed.

The telecommunications companies are also joining the fray. Several Bell operating companies are investing in fiber-optics technology, to a large degree following Michigan Bell's example and using the technology as a defensive mechanism to prevent customers from bypassing their systems. Other Bell companies see fiber optics as a way of developing new business; Bell South, for example, is building a fiber-optic network between Atlanta and Washington, D.C.

The fiber-optic activities by the telecommunications companies will open up the next opportunities for vendors, linking data centers to the outside world at T-3 rates of 44.7Mbps. AT&T says it will have 21,000 miles of optical fiber cable routes in place by 1990. United Telecommunications Inc. has plans to lay 23,000 miles of fiber-optic cable. MCI also plans to offer this service.

The success of fiber optics depends on how hard IBM pushes it as a standard and how well the dp community accepts it. IBM's endorsement and the recent announcements of big user installations may be the catalysts that fiber-optic technology has so long lacked in the marketplace. Even so, the acceptance and general use by data centers worldwide could still take years. ◉

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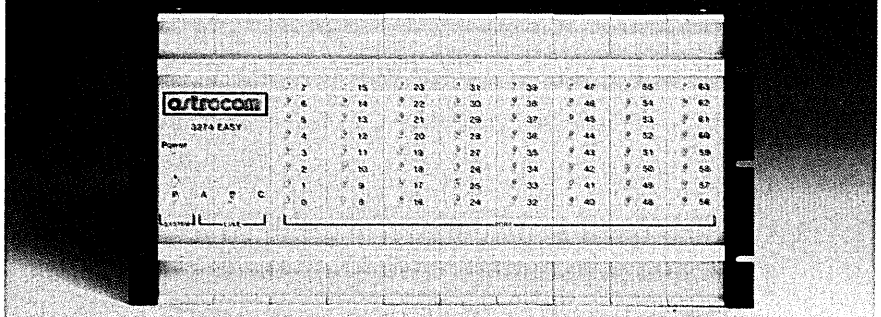

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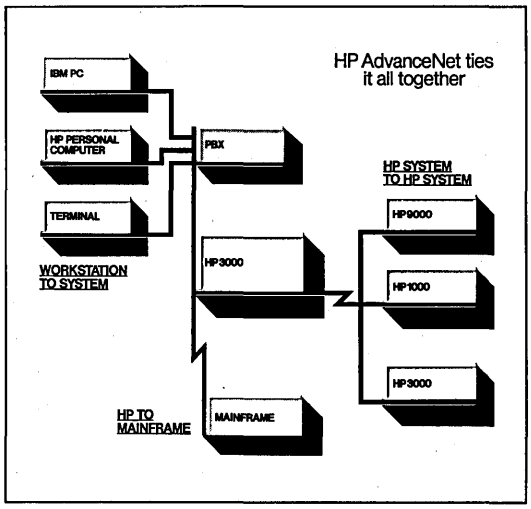

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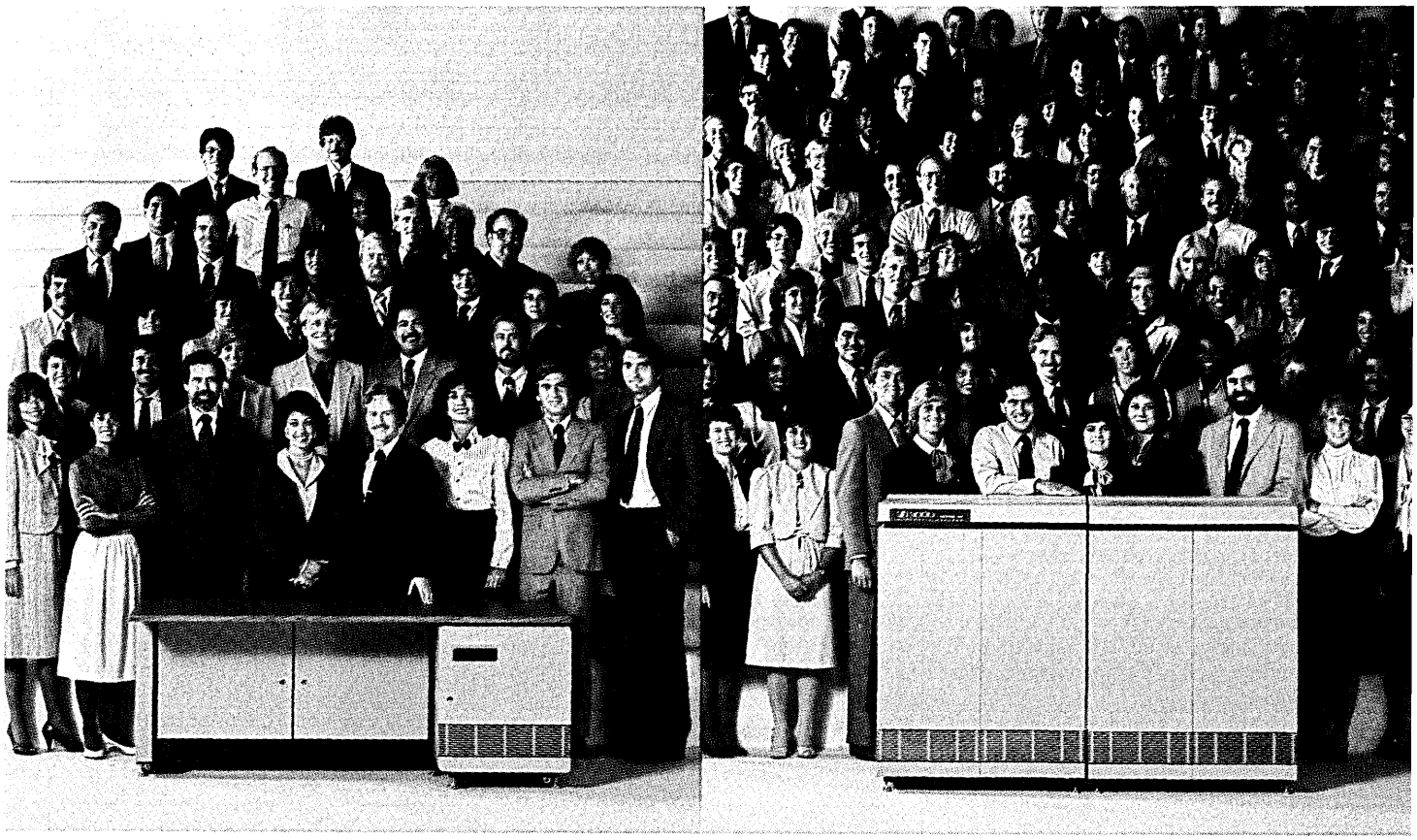

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SUPERCOMPUTERS

MFLOPS FOR THE MASSES

Those new supercomputer centers will be offering more access than is realized. Will time-sharing be threatened?

by Karen Gullo

The beginning of a new era for supercomputing is upon us. Forget micro-to-mainframe links—supercomputer gurus are touting micro-to-Cray links as the most exciting thing to come along in computing since Seymour invented the sofa cpu. Remote access from workstations to supercomputer systems via satellite transmission, and parallel systems with throughput 50 to 100 times faster than the fastest Cray are now more than a dream of advanced system users. Courtesy of Uncle Sugar, remote workstation access to hundreds of megaflops owned by somebody else may one day be commonplace for researchers.

The realization of these technologies is a few years down the road, but scientists at four U.S. universities—who earlier this year were the recipients of National Science Foundation grants totaling $200 million—plan a much wider distribution of access than heretofore realized. Companies at remote locations will be able to access university supercomputer centers through a hierarchical structure of personal computers to minicomputers to parallel processors via satellite and dial-up links.

The first steps in the development of such a network will be completed this year, according to Larry Smarr, the 36-year-old director of the University of Illinois' center for supercomputing applications. The university is gathering equipment for its NSF-funded "intellectual center," a scientific research center where workstations will be linked to a Cray X-MP. "We'll have 30 to 40 scientists at the center at any given time; all will have workstations at their desks," says Smarr. "At the low end there will be a PC AT or a Macintosh. In the middle will be a Sun or Apollo system. Everything will be networked—the Macs will be on Appletalk, the pcs on Ethernet—and it will all be connected by high-speed links, such as HYPERchannel, to the Cray."

The University of Illinois, Cornell University, a consortium representing Princeton University, and the University of California at San Diego, are courting hardware and software support from computer corporations like Cray Research, IBM, Floating Point Systems, and a number of startups that, in turn, are aligning themselves with the supercomputing centers where extensive research and development projects are under way.

All this activity is another indication that the supercomputer market is poised for a dramatic upswing, say scientists and analysts. Supercomputer use in corporate America will increase 60% over the next five years in terms of the number of users, according to some estimates, with the market growing from $300 million today to $1.5 billion by 1990. The time is ripe to enter the fray, vendors realize, because such university centers can create the demand that private companies will be pushed to meet.

For years, Cray has been the number one name in supercomputers, controlling 60% of the market. This isn't likely to change in the near future. But in its partnership with Cornell University, to whom it has contributed, along with Floating Point Systems, about $30 million worth of equipment, IBM is taking a strong position in what boils down to a race with the Japanese to develop faster and more powerful supercomputers.

For its part, Cray has aligned itself with the University of Illinois, which will take delivery of its X-MP at the end of the summer. In addition, Cray will be working closely with a team of U of I scientists who are building a large-scale multiprocessor system, code-named Cedar, which consists of clusters of processors, each with a shared memory system. The system will have two clusters of eight processors in operation this year; by the end of 1986, the system will be expanded to a 32-processor system. The goal of the project is to double the system's performance every year. What is rumored to be a vector processing compiler for the cluster is coming from Alliant Computer Systems, a three-year-old Acton, Mass.-based company. The systemwide shared memory and interconnection hardware will be designed at the center.

Vendors see the new centers as the way to increase their sales.

Princeton's center will initially consist of a Cyber 205 from Control Data. The university plans to install an eight-multiprocessor unit from ETA Systems of Minneapolis, a Control Data spinoff, in 1986, assuming ETA-CDC has

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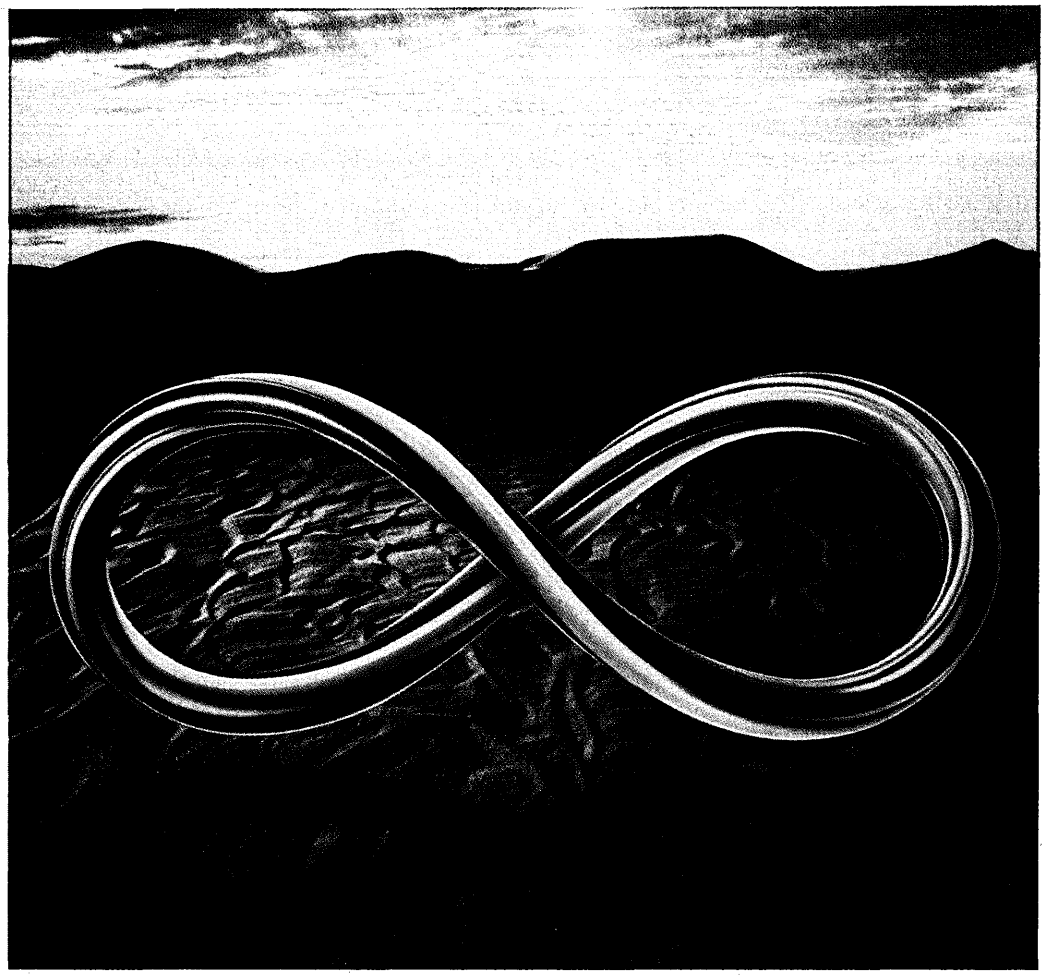

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produced a product by then. Based on a check with the company, however, observers think it is highly unlikely that Princeton will see its ETA equipment before 1987.

The primary use of the supercomputer is for academic research, but there's no doubt in anyone's mind that private industry has the most to gain from the research frenzy of the next few years. Corporate researchers in oil exploration, biology, and other computation-intense fields are being courted by the universities. Given the federal funding and the nature of the negotiations, all sides are keeping a tight lip about who is teaming up with whom.

"There is considerable competition between universities in attracting users and support," says Kenneth Wilson, a Cornell physicist who is leading the university's negotiations with corporations. Cornell is not saying which companies have been approached as potential partners, but several companies already doing research in New York State, including Xerox, Eastman Kodak Co., Bausch and Lomb Inc., and the Link division of the Singer Co. are likely candidates. General Electric in Schenectady, N.Y., has announced plans to use the Cornell center.

In Illinois, General Motors or Ford is rumored to be planning a major involvement with the supercomputer center. U of I plans to purchase, with corporate contributions, a second Cray X-MP for an industrial computing center, set up specifically for use by private companies. "There are many companies that will be using supercomputer power in the coming years—pharmaceutical firms and companies doing biological engineering," says U of I's Smarr. "These companies can't afford to invest in a supercomputer, and no one at the companies knows the first thing about supercomputers." The center will serve as a training ground for corporate researchers, Smarr says.

"Most of these university supercomputer centers will have commerical customers, and will be selling cycle time sometime down the road."

Companies that need supercomputing power currently have two options—either to purchase a system at an average price of $10 million, or to purchase cycle time from a commercial timesharing operation such as Boeing Computer Services or university-based supercomputer centers. Accessing a VAX system can start at $200 an hour, while using a Cray or a Cyber 205 can run between $1,500 and $3,000 an hour. Users tap into the system either through public telephone lines via a dial-up modem or over dedicated high-speed lines.

The four new university supercomputer centers provide a third option, but companies must meet certain government gobbledygook standards before they can get into the centers. They will plow through review boards, NSF policy guidelines, scientific councils, and a variety of other channels with a proposal for a research project that seems worthy of support by the government, according to sources in the academic community.

They add, however, that the new centers will not be in the business of selling cycle time like a commercial operation. They are strictly for developmental research. So if your project is deemed worthy and of high scientific standards, you're in. If not, you can always make a hefty contribution in the way of computer equipment. That, according to other sources, might get you in the supercomputer center door. In any case, the centers are apt to eventually sell some cycle time in the future. The confusing guidelines and university interest in offering cycle time for sale promise lots of future controversy.

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The interest is high because the schools are building dream centers. The Illinois facility will have high-speed links between on-campus computer departments and the supercomputer center, and to remote locations. A VAX 11-785, which front ends the Cray, will be networked to an IBM mainframe with Network System Corp.'s HYPERchannel at 50 megabits. Workstations located in the applications center linked by Ethernet are connected by fiber at 80 megabits to the VAX.

In addition, the university has a $500,000 NSF grant to develop a high-speed satellite link between the campus and Chicago, more than 100 miles away. The link will initially connect the Cray to nets at the University of Chicago, Indiana University at Bloomington, and Princeton University. Long-range plans are to render the Cray compatible with IBM PCs, so that businesses in Chicago can link their existing terminals to the campus system. Access to the Cray will also be available via Telenet and Arpanet. "You can either buy very expensive workstations to do computer aided design, or you can hook very dumb terminals to a supercomputer and get the same results," says Smarr.

Researchers and scientists in the corporate community are enthusiastic about the prospect of having access to Cray-like power. Argonne National Laboratory is working jointly with U of I scientists on an astrophysics project, and plans are in the works to establish a data link via a fiber-optic network between the lab and the university. "This is an excellent development for us," says Walter Massey, director of Argonne. "Scientists here need supercomputing power for research in atmospheric physics, high-energy physics, and computer science. It's hard to think of anyone who doesn't need the power. We're very excited about the chance to tie in directly to the computer." Massey says the costs of using the center will be shared by Argonne and the university.

Argonne National Lab is working jointly with U of I scientists on an astrophysics project; plans are in the works to establish a data link via a fiber-optic network between the lab and the university.

Some researchers are skeptical about how long it will take to develop the technology that allows communication between remote workstations and the supercomputer. "Their [the university scientists] enthusiasm may be overblown, not in the sense of the potential for a micro-to-Cray link, but [that] it may not happen as fast as they think," comments the director of research at a Chicago-based billion dollar high-tech corporation with aerospace, automotive, petrochemical, and communications operations. "Some of our divisions are currently buying Cray time from a commercial facility. That's fine for now, but we may be interested in using the Illinois center in the next two years for modeling problems."

With supercomputer power on the rise, industrial labs will not only be buying cycle time, they will also be buying their own Crays. "People will not be shy about buying a Cray," the director points out. "The industrial community will pay for the power. Most of these university supercomputer centers will have commerical customers and will be selling cycle time sometime down the road. You'll also see a lot of spinoff companies coming from these centers." Given U of I's intention to develop another center for straight commercial purposes, this research director's forecast spells continuing controversy, with the already hard-pressed timesharing vendors having another headache.

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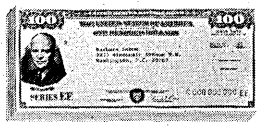

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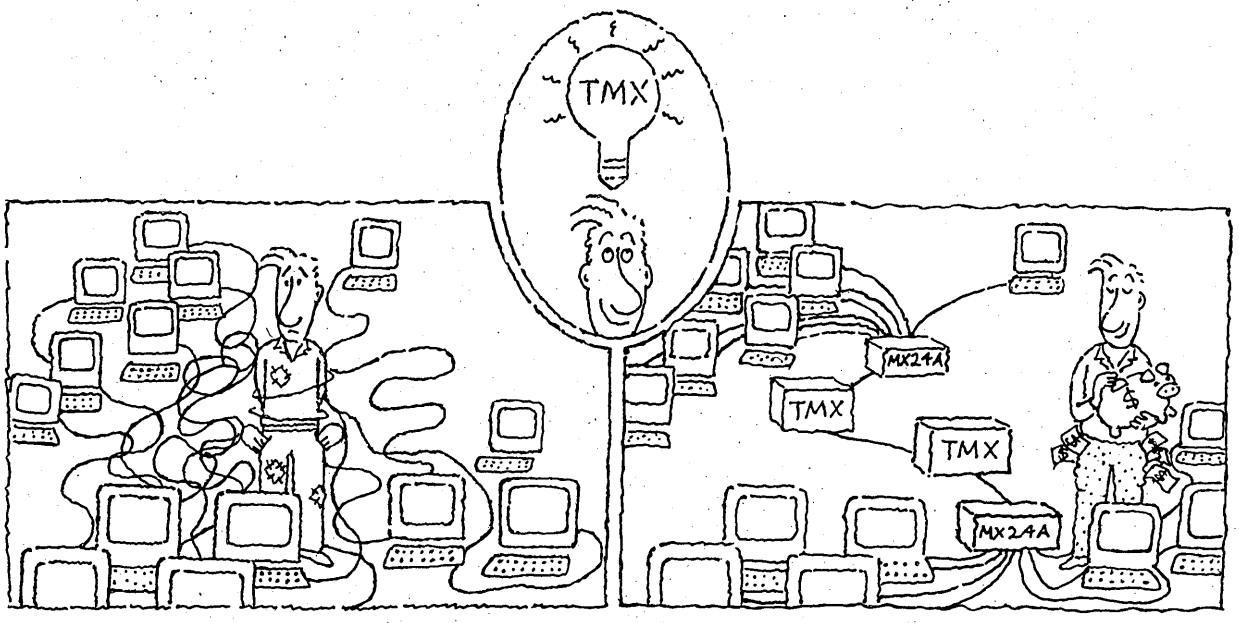

The TrunkMaster TMX 144 Multiplexer solves your data communication problems by concentrating more data links on a single T1 line.

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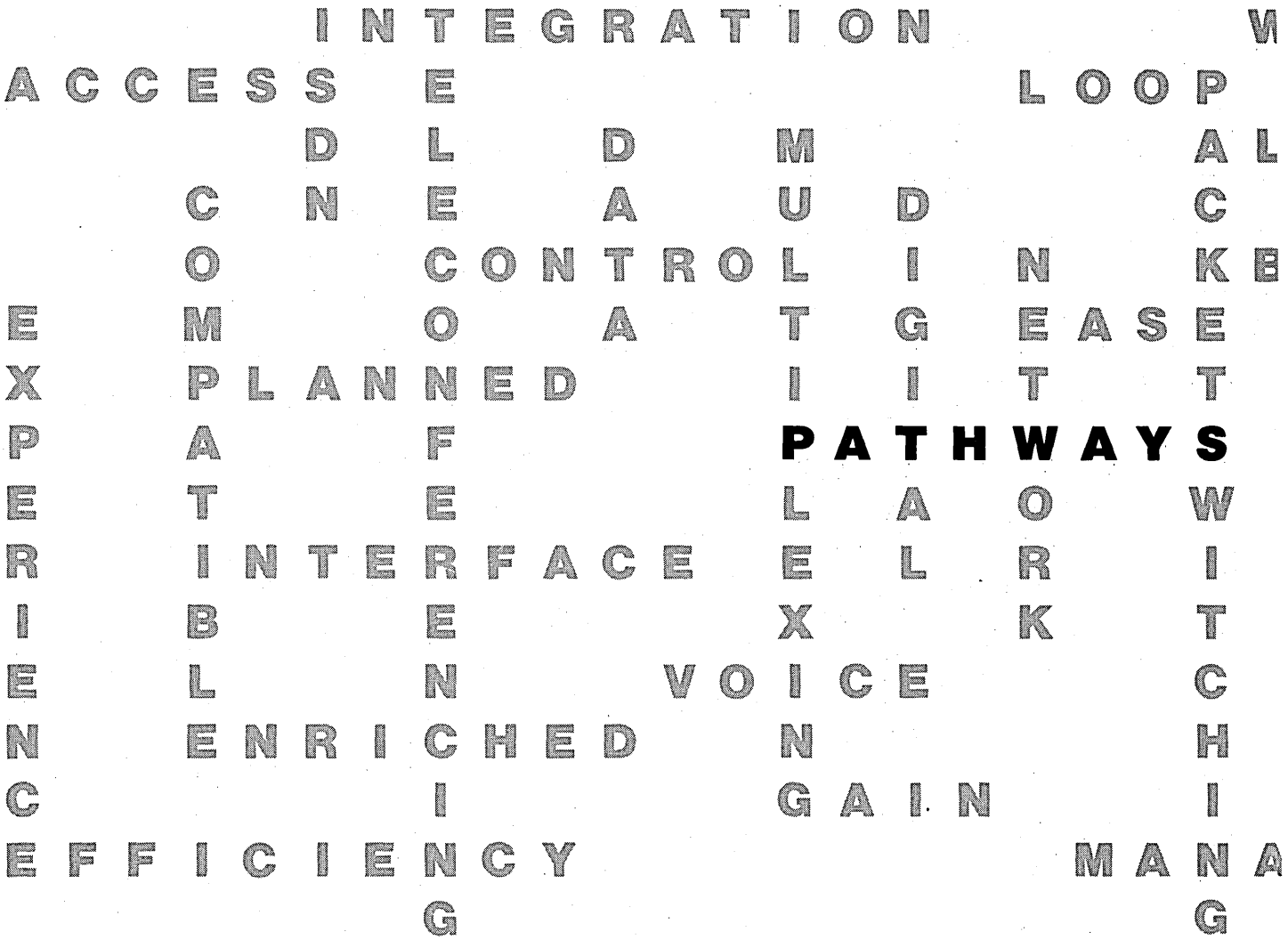
CIRCLE 33 ON READER CARD



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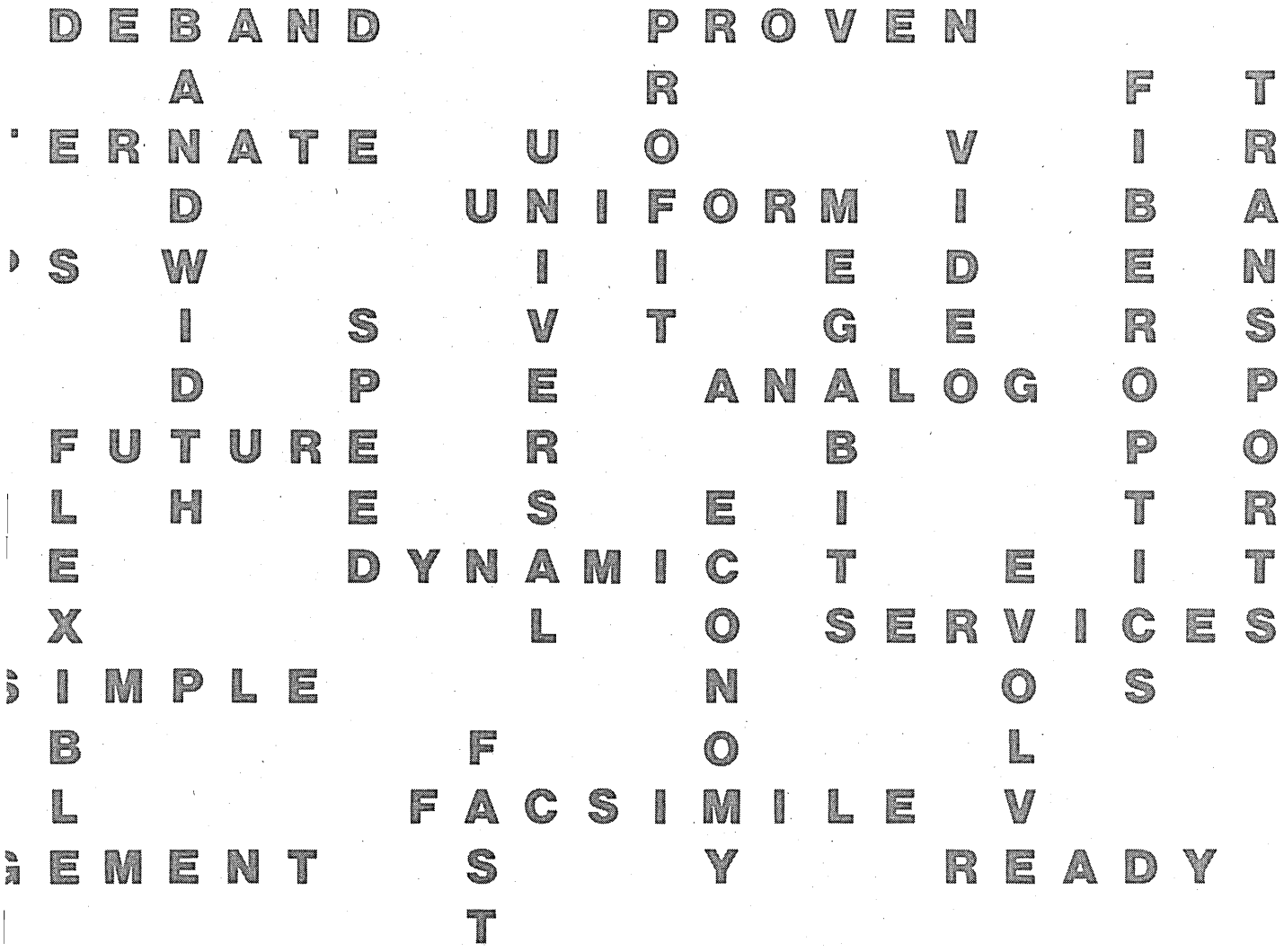

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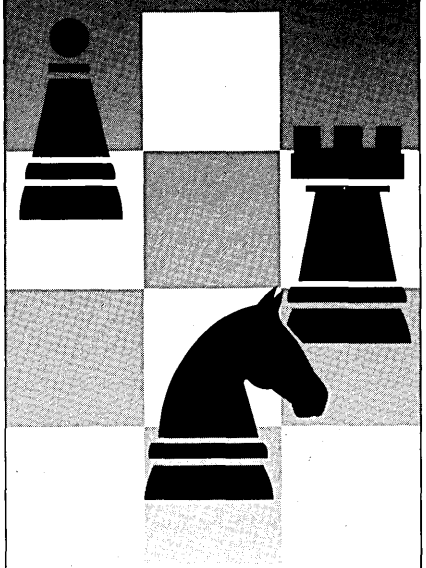

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the shopping list of most dp managers, there's no doubt that supercomputing is beginning to play a larger role outside of its traditional aerospace, government, and oil prospecting niches. Ford Motor Co. and Nissan obtained Crays earlier this year, GM bought one last year, and Chrysler Corp. recently purchased a Cyber 205. Soon everybody will have a chance to brag that they've touched a Cray. Even if it is a thousand miles away. ◉

MANUFACTURING

SMART CARDS GAIN

Banks may not want them, but a number of other industries are finding use for plastic cards or keys with embedded information.

by Charles Howe

Once upon a time, little boys went to the movies to watch cowboy and Indian serials. In Episode One a scout would invariably dismount and put his head to the ground, listening intently. "Hostiles coming, 372 of them, riding long-maned pintos, four and a half miles off, and they'll be here in 20 minutes," he would announce with such uncanny prescience that the children squirmed with glee in their seats.

This movie matinee scenario rather typifies some of the hyperbole found in the smart card industry, which is promising to do for banking and similar applications what the scout did for the cavalry. Unfortunately, users in the computer industry seem to be waiting for at least Episode 11 before buying the equivalent of a bag of electronic popcorn. This jaundiced attitude may be a mistake, for smart money has it that some smart applications may take off in the United States—in five or so years, at any rate—and just about everywhere except in banking. A variety of nonbanking uses of smart devices, like supplementary dog tags for the U.S. Army, are coming into their own.

Smart card technology got its start in Europe, and thousands of Frenchmen carry credit cards with embedded silicon chips. Point of sales and other electronic terminals use the encoded information to update the customer's account without needing a connection to the customer's bank account, using the chips in the card to carry account info.

Over the past few years many companies have tried and failed to establish smart card systems in the United States. Ambitious new attempts are now under way, though, with the proponents claiming that this time they have the combination of skills to prevail.

The American subsidiaries of France's Bull and Japan's Casio were scheduled to start trials in Virginia and Florida a few weeks ago. Each is expected to provide 50,000 cards to be used as Gold MasterCards. No one is saying precisely what the trials will cost, how much—if any—of the costs Casio Microcard Corp. and Micro Card Technologies may eat, or whether intelligence on the operations will ever see the light of day. The tests are said to be the largest of their kind ever tried here.

Fast-breaking news aside, to understand smart cards is to attempt to understand the French, who filed patents on the technology 11 years ago. A year later the French government dropped $27 billion for subsidized communications research and development that included the little carte memoire, a card reader in most every bank and bistro, and a videotex telephone directory in virtually every peasant's cottage. Current plans call for the issuance there of 3 million cards by 1986, and as many as 12 million by 1988. According to Hervé Nora, president of Bull CP-8, a principal card maker, this represents an investment of around $100 million in cards and readers. The cards are said to sell for around $3 apiece in large quantities, a price some Americans scoff at as being too low by a factor of five (see "A Chip in Your Wallet" by James Etheridge, June 1, 1984, p.38).

French representatives become near apoplectic when it is suggested that their government is still heavily subsidizing the effort. "The technology is now paying its own way in France," insists Bernard Perier, who publishes a Parisian newsletter called *Smarter Financial Technologies*, which exudes boundless optimism of the sort found before the fall of Dienbienphu or the outflanking of the Maginot line.

The problem with transferring French smart cards to the United States, say critics, is at least twofold. At a time when their telecommunications network appeared to some to be on a par with a third world offering, French smart cards that bypassed the dial-up networks used in automated teller machine applications in the United States seemed to make sense. Given French banking and consumer secrecy, a little card carrying one's past transactions also seemed reasonable, especially if one considers the Gallic passion for dossiers.

The problem in the United States

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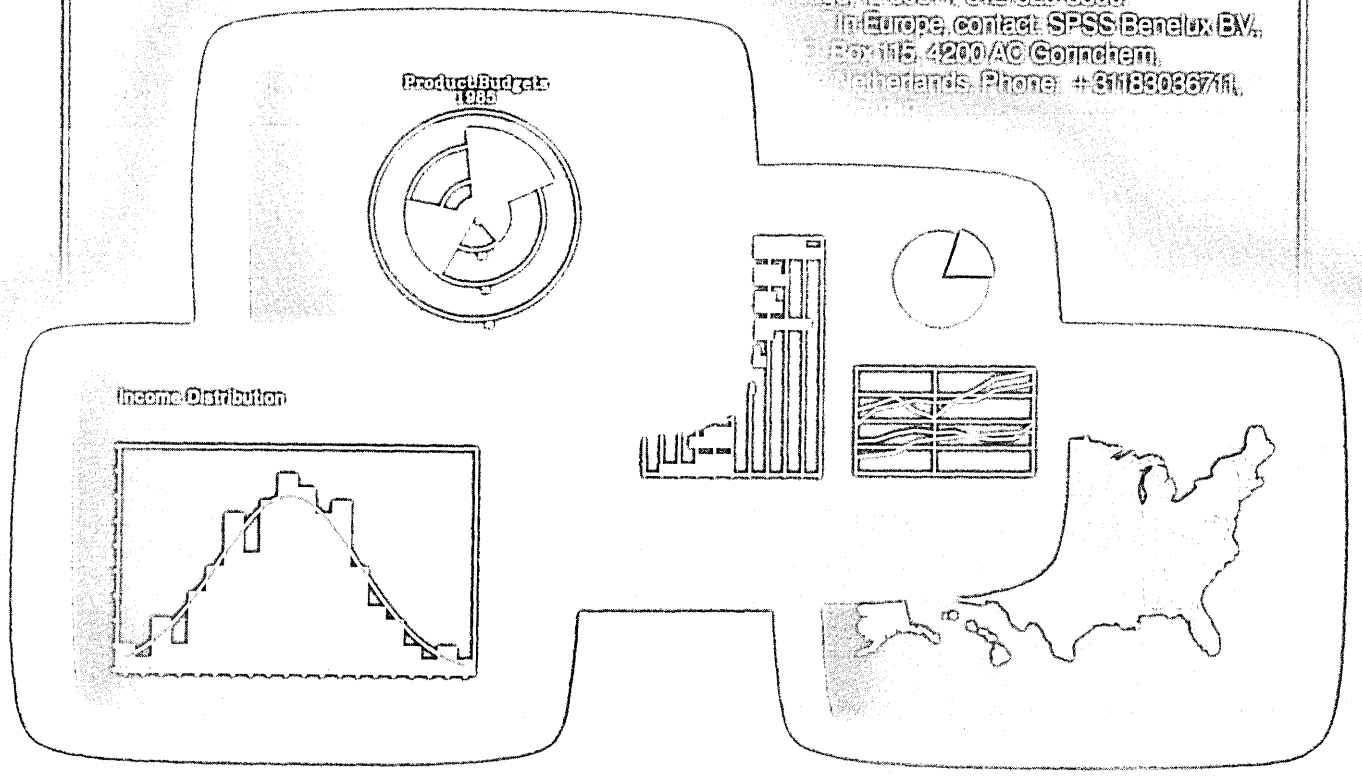

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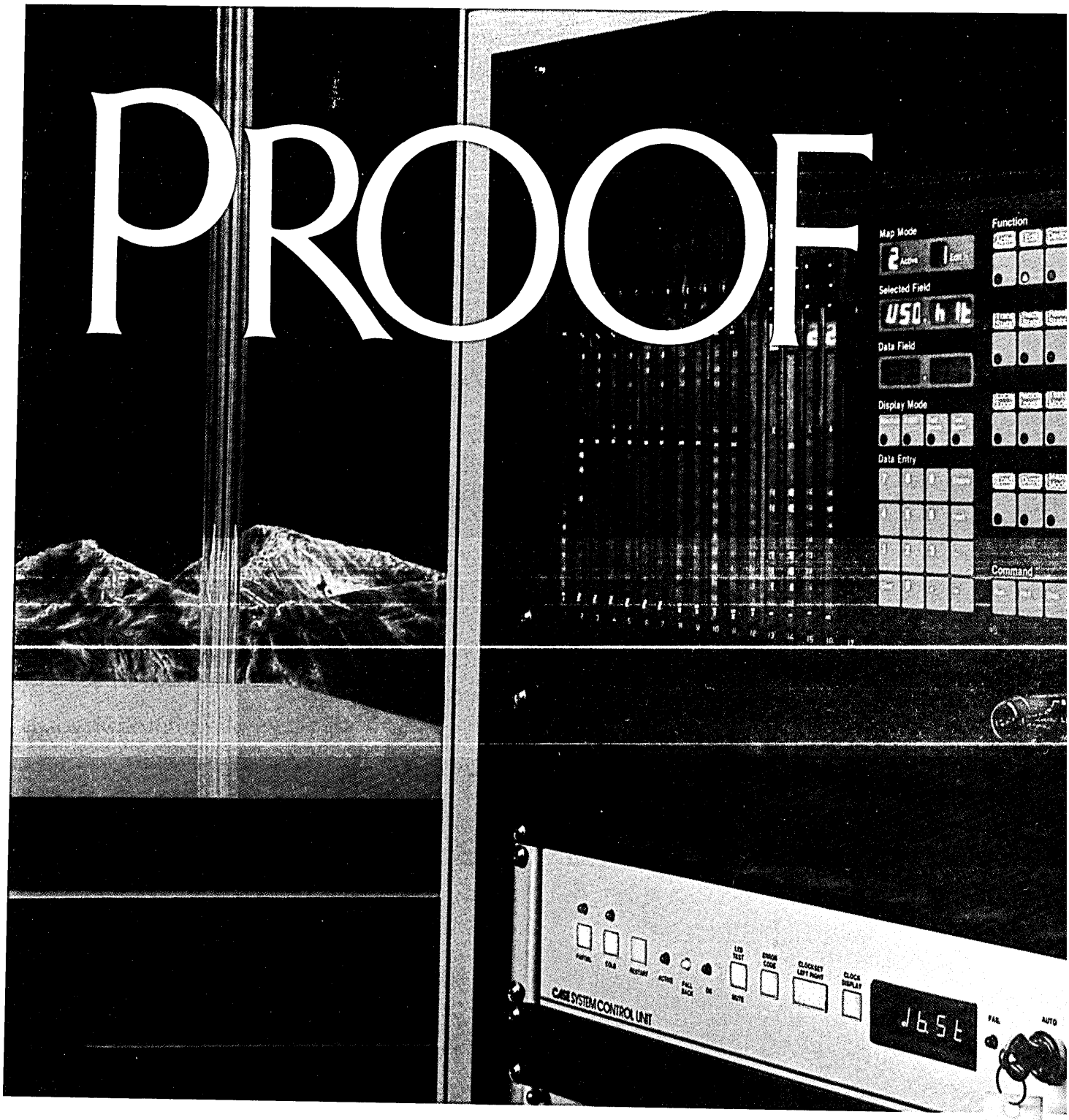

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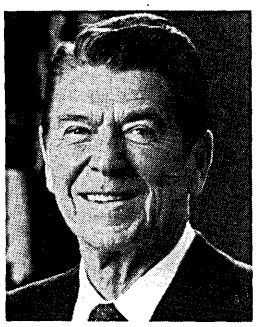

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President Ronald Reagan

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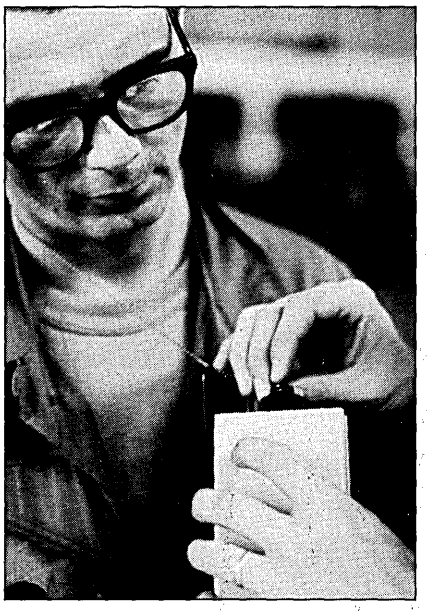
NEWS IN PERSPECTIVE



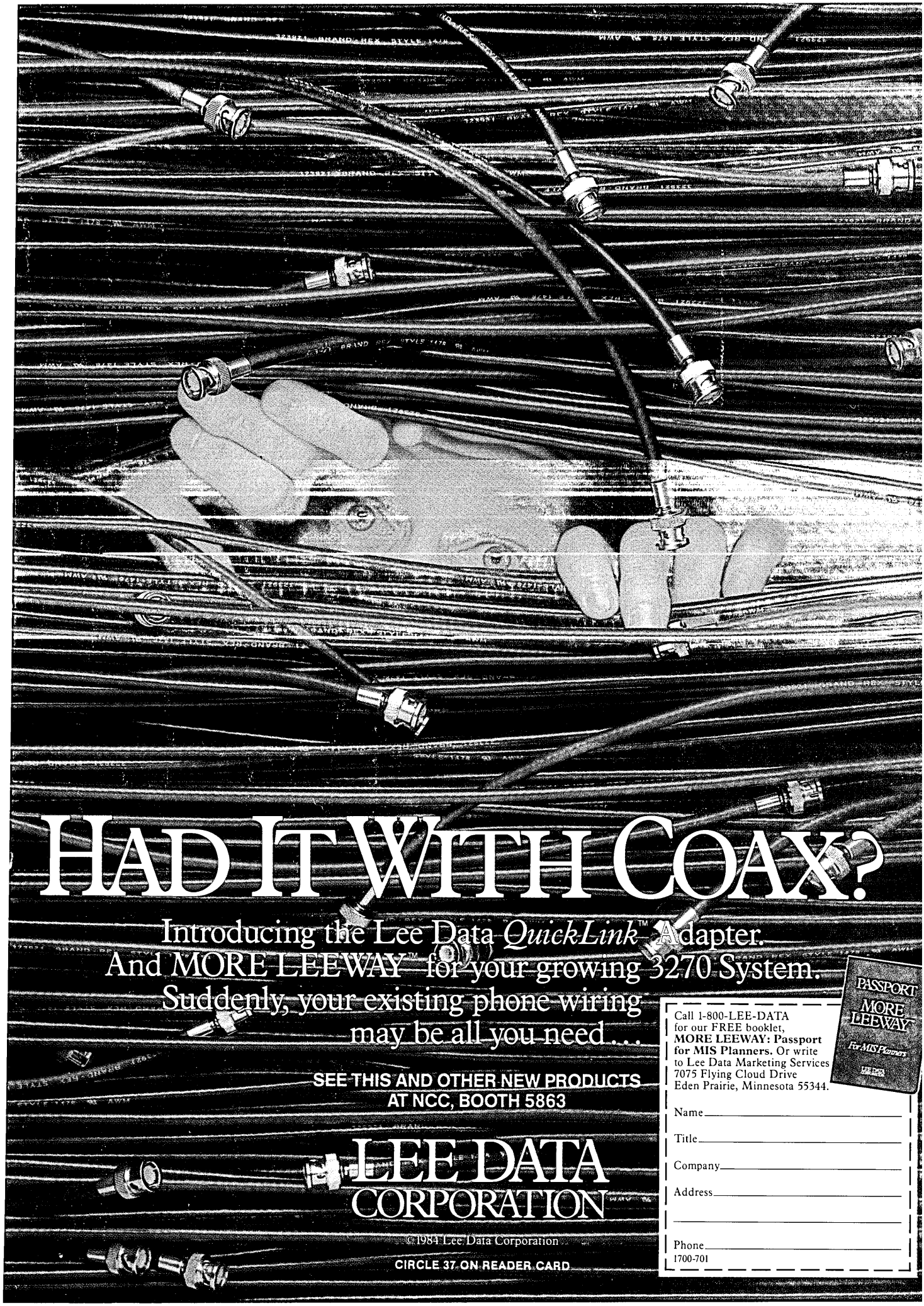
The U.S. Army is requesting bids for plastic tags to supplement the old familiar metal dog tags.

is that the French appear to be attempting to export a Concorde technology when the Yankees are quite happy with simple magnetic stripe cards and sophisticated networks. The old saw "If it isn't broke, don't fix it" seems to apply here.

There are people who are actually making a dollar on memory devices. They are not pushing smart cards, nor are they cozying up to bankers. Consider Drexler Technology Corp. of Mountain View, Calif., maker of Drexon Laser Cards and systems. This wallet-sized optical data storage card can hold the equivalent of 800 pages of information, or four times as much as one can put on early generation 5¼-inch floppy disks. A laser etches pits 0.5 microns deep in a coated standard plastic credit card. The cards sell in volume for $1.50 apiece, and will probably be used for, among other things, software storage.

Inventor Jerome Drexler is quietly getting rich. "I started out selling nonexclusive licenses for $200,000 apiece," he says. "Now the price is $700,000 and 20 firms hold licenses. Among them are L. M. Ericsson of Sweden, Fujitsu of Japan, Honeywell Information Systems, and Wang Laboratories. The price of these licenses, by the way, is going to go up again. And again."

One recent licensee of Drexler's technology is Blue Cross and Blue Shield of Maryland, which will distribute 1.6 million cards to members. The cards hold two megabytes of data that could include the patient's photograph and X rays. Drexler also sells the technology for a magnetic stripe-type laser card that holds 160,000 words of text. A card reader



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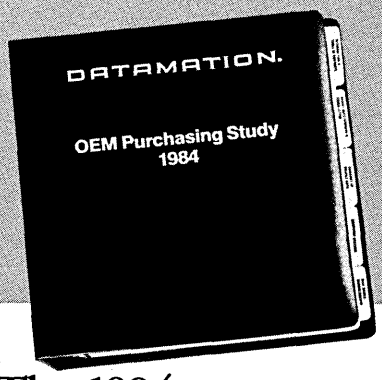

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costs about $100 for either technology, at oem prices. "We are going to destroy the micro chip card," says Drexler with the aplomb of a man holding a royal flush.

A knowledgeable fan of the Drexler technology is Jerome Svigals, manager of growth planning and electronic banking consultant for IBM in Palo Alto and author of *Smart Cards—the Ultimate Personal Computer* just published by Macmillan. Considered the father of the mag stripe card and, perhaps, the putative cofather of the smart card in the United States, Svigals cautions that the gear to read the Drexler card and burn in minute laser holes is still expensive, at around $500 at oem prices. Moreover, he wonders whether people carrying such cards in their pockets will get dirt and grease on the surfaces of the cards, making them difficult to read. Drexler says that read/write costs will come down on volume purchases, adding that he has three different methods to avoid getting the cards too dirty to read.

Another nonsmart card firm did a modest $1.5 million in sales last year, but still looks like a comer. At a cost of slightly less than $1 million, the U.S. Army has for two years been testing a gadget called

The French are attempting to export a Concorde technology when the Yankees have no need for it.

the Data Tag, which is worn around the neck and holds 64 kilobits of information on each soldier-wearer. Where soldiers once carried medical and personnel files from post to post, the same data can now be unloaded in seconds onto a terminal and printer, even as the soldier prepares to board a plane. This, of course, considerably speeds up things like troop processing.

The Army likes the widget so much, says Chris Occhialini, a civilian who has been monitoring the project, that it will be putting out a request for proposals in anticipation of putting them around the necks of more than 1 million soldiers, at a cost to the government of around $40 to $50 apiece.

The Data Tag is made by Datakey Inc., of Burnsville, Md. The firm also makes the Datakey, keylike gadgets—2 inches long, .45 inches wide, .24 inches thick, and weighing .18 ounces—with a memory capacity of 1,400 bits. A larger version has a 16Kb electronically erasable, programmable, read only memory that supports the access, storage, and revision of both program code and data.

The Datakey is being used in volume by Analytics Communications Systems Inc. of Reston, Va., a manufacturer of commercial encryption and authentication equipment. "We use the datakey to put on personal identification numbers and also to put in encrypted messages as an input device into our authentication and encryption equipment," explains Jerry Randall, director of engineering.

One of Analytics' customers is CHIPS, the national bank wire network that daily electronically transfers funds of up to $325 billion from financial institution to financial institution. The system is used for on-line access to the network. "We sell directly to clearinghouses," says Randall. "We sell the key as part of a system. We had some slight problems with the key in the beginning, but we resolved them. We looked at the smart card but I don't see using it in our applications." Other Analytics clients using the key, says Randall, include Chemical Bank, Chase Manhattan Bank, and Citicorp.

The Datakey is also being used by ART Systems of Fort Worth, a firm that makes fuel management and maintenance systems. Here, the key is inserted into a special receptacle on a gas pump by a trucker each time he or she fuels up. The data are downloaded into a 32-bit minicomputer. The trucker punches in current mileage and the mini compares this figure with the last recorded mileage. Inasmuch as each key provides other identification for the vehicle, the terminal on the pump will also tell the driver whether the truck needs maintenance. If maintenance is overdue, the pump may remain inoperative until the driver has such proof transferred into the Datakey's storage area.

"The Datakey holds an abundance of information," says ART spokesman Bill Jones. "It is more durable and secure than a smart card. A typical ART installation sells for from $40,000 to $50,000," adds Jones, whose firm has been selling the turnkey system for several years.

ART's largest installation is the Oklahoma City yard, with 14 remote key/pump sites servicing 3,500 vehicles. "We're very pleased with the Datakey," Jones says. "It is an excellent product, much better than a magnetic stripe-type card."

Datkey president Bill Flies says that his firm is eyeing a number of industrial applications. Here, a worker could carry information within the key that would allow a machine to perform automatic setups, eliminating the need for a more skilled specialist to perform these functions.

The key is also being used in medical applications, accompanying a dialysis patient or attached to an artificial kidney. Here, the key contains critical medical information instantly transferrable into machine applications. ◉

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CIRCLE 38 ON READER CARD

NEWS IN PERSPECTIVE

BENCHMARKS

DEFENSE RESTS: Senator Jeff Bingaman (D-N.M.), an unlikely DOD hero, restored $107 million for DOD's advanced computer research, including DARPA's strategic computing initiative.

SELLS PEACHTREE: Six weeks after its self-imposed March 31 deadline, MSA finally sold its troubled Peachtree Software unit to Intelligent Systems Corp. The two Atlanta-based companies would not divulge the sale price, saying only that it was under $10 million in cash and notes. MSA still retains the right to market micro-to-mainframe links between the Peachtree micro applications packages and its own mainframe applications. Peachtree was the last of MSA's micro operations to be sold following ceo John Imlay's October announcement that MSA was getting out of the micro business. In January and February it sold its Micro Distribution division to Corporate Software Inc., its EduWare and DesignWare educational software units to Encyclopaedia Brittanica, and most of Peachtree's international division to Plusmark Business Systems Ltd. At ISC, Peachtree will join Quadram Systems and Princeton Graphics as "micro enhancement divisions," ceo Leland Strange said.

FREE SOFTWARE: In a move that many analysts saw as a return to its bundling practices of yore, IBM recently began giving away two software packages with each of its PC XTs at no extra cost. The promotion, which lasts through the end of this month, was probably designed to reduce swelling inventories of XTs, sources said, as well as to position the machine as the current mainstay of the PC line. IBM's widely anticipated PC2, the device that analysts expect to restructure the PC line, has apparently been delayed until the end of 1985 to prevent cannibalization of current PC products. The free packages vary depending on the hardware configurations purchased. For the PC XT with 256KB RAM and a 10MB hard disk, buyers get the Displaywrite word processor and a choice of either the TopView window manager or the Data Edition filing package. For the floppy-based XT introduced in April, IBM is offering the Writing Assistant word processor and the Planning Assistant spreadsheet. The programs' list prices: from $150 to $250.

The move met strong criticism from IBM's software competitors. William Sellers, general manager for sales and marketing of Leading Edge Products Inc. of Wellesley, Mass., wrote to IBM ceo John F. Akers that "adoption of this [program] will likely be devastating to our business and to that of other independent software vendors. We . . . are of the view that IBM's new policy may well be directly contrary to state and federal antitrust laws." Sellers added that IBM's move could "eliminate competition in the software market and thereby monopolize the market through a combination of unlawful tying and predatory pricing."

HITS BOTTOM: Even as Beehive was pulling out of bankruptcy, Ztel Corp. filed for protection from its creditors and shook up its management. The Wilmington, Mass., firm has foundered this year because of technical problems in integrating an IEEE 802.5 local area network and a digital PBX into a single product, the PNX. The Chapter 11 filing came on the heels of venture partner Fred Adler's refusal to participate in a new round of financing for the troubled company. Ztel has already put together a reorganization plan keyed on $17 million in funding on top of the $50 million already invested in the company by Adler, NCR, General Electric Venture Fund, Hillman Co., and company employees. Adler, in addition to withdrawing his venture firm's support, also resigned from Ztel's board of directors. Ztel acting chief operating officer and board member James Long also resigned. As a result of the shakeup, NCR, Hillman, and the GE unit now have about 28% of the firm each.

The technical problems have caused product shipment delays that have in turn been responsible for millions of dollars of canceled orders. Consolidated Data Systems, a systems integrator in Paramus, N.J., scuttled a letter of intent to buy $35 million worth of the PNX product because Ztel could not demonstrate the switch carrying both voice and data simultaneously over single-pair or multiple-pair wiring, company president Stanley Platt said.

RIP-OFF? IBM is also coming under pressure from a very big customer. The U.S. Navy charged IBM with causing $800 million in cost overruns in building a submarine computer system designed to track Soviet subs. IBM had been the sole contractor on the initial $1.7 billion phase of the R&D project, and had been slated as the sole contractor on the two subsequent construction phases of the Submarine Advance Combat System, but the Navy will now accept bids from other firms to complete the remaining work. The cost overruns were caused by microchips that IBM had developed for the system but that hold too little information apiece, the Navy said. IBM's Federal Systems Division, based in Bethesda, Md., admitted that the chips cost more than the firm had estimated, but put the figure closer to $100 million. The Navy declined to say how much of the $1.7 billion estimate IBM has already been paid, nor how the $800 million overrun would be resolved. The current initial phase of the contract is designed to enable about 20 U.S. nuclear attack submarines to track several of the Soviet Union's newest and quietest subs. Subsequent phases are intended to equip the next generation of subs. Firms now expected to bid on parts of the project include Raytheon, General Electric, and Rockwell International.

STEPPING OUT: After a relatively short period of protection by the Bankruptcy Court, Beehive International announced that it is emerging from Chapter 11 status, and celebrated the event by slashing prices on three of its IBM-compatible terminals. The major provisions of its reorganization plan include a $3 million loan repayment to Continental Illinois National Bank (which will also receive 300,000 shares of Beehive stock and a $2.2 million note at 13% payable over two years); disbursement of 800,000 shares to other unsecured creditors; and full repayment of unsecured creditors' claims over 5½ years, with interest accruing at 11% for the first two years and then at 2% over the prime rate. The Salt Lake City company filed for protection from its creditors last October. In May, it reduced its $1,400 ATL-178 terminal to $1,100 or $1,200, depending on configuration. The CC74 cluster controller emulator now costs $3,000, a cut of 30%; the ATL-0078 dual personality ASCII terminal's price was cut 20% to $1,000.

INTEGRATION: If you can't beat 'em, join 'em. That seems to be the philosophy of Computer Associates International, which announced that it is planning to integrate its Financial Management and Distribution Management IBM mainframe software programs with the Model 204 DBMS sold by Computer Corp. of America. The integration is designed to allow applications from CA's Advanced Business Software line to access Model 204 files directly, rather than going through VSAM files, said James Rothnie, president of CCA, Cambridge, Mass. Ultimately, the integration may apply to all of the Advanced Business Software programs; other functions in the series include order processing, inventory control, sales analysis, purchasing, general ledger, asset management, accounts payable, and accounts receivable. Computer Associates, based in Jericho, N.Y., offers its own DBMS, CA-Universe, but senior vp David Tory said, "We are pleased to offer the combined capabilities [of the CA and CCA software] to users." CA has about 18,000 customers worldwide using 43,000 products, while CCA has 400 DBMS customers. ◉

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For more information, contact David Mills, ICL Europe, ICL House, Putney, London SW15 1SW, UK. (Tel. 01-788 7272.) UNIX is a trade mark of AT & T Bell Labs Inc. UNIPLUS+ is a trade mark of UNISOFT Corp. ICL is a member of the STC PLC group of companies.

CIRCLE 107 ON READER CARD

AT&T's portable operating system has sailed around the dp world.

UNIX GOES ABROAD

"Have Unix Will Travel," proclaims the glossy AT&T holiday brochure. And travel it has. Earlier this year AT&T's famous operating system sailed around the dp world, landing in Japan, where it won support from the mighty MITI. On an earlier shakedown cruise across the stormy Atlantic, it gained ground with six of European dp's finest.

All this impressive international backing is aimed at making Unix truly portable across hardware and across oceans. But the software, which was developed by Bell Labs 16 years ago, still has many miles to go before it becomes a firmly fixed international standard. For one thing, the operating system is still too limited from a technical point of view to make it popular with many international users. Commercially, Unix remains a suppliers' standard that has attracted only a small following in the business world. In the competitive marketing arena, the software has evoked the loyalty of independent mainframers irked by IBM's dominance.

Support for Unix actually means support of an open operating system concept that allows software portability across different makes and models of hardware. While AT&T works on improving its portable product, vendors in Europe and Japan are continuing to look at other open operating system approaches. In the long run a software methodology other than Unix may set the real international standard.

Nevertheless, Unix has certainly fueled the drive for open operating systems. To further that drive, many of the world's dp companies have rallied around AT&T's Unix System V. Most of the hardware suppliers realize that Unix has a number of technical drawbacks. "It's an excellent operating system, but it needs a lot of investment to make it usable," points out Heinz Nixdorf, chairman of West Germany's Nixdorf Computer AG.

In Europe that investment is being shared by six of the Continent's top dp companies. Nixdorf, ICL, Bull, Philips, Siemens, and AT&T's European partner Olivetti all joined forces earlier this year to set up a European Unix support group. The idea is to produce a pan-European standard that merges AT&T's Unix System V with Microsoft's Xenix version. What the group hopes to come up with is some kind of Euronix system that local software houses will be able to depend on when developing applications.

The support group is working on some specific tasks. Siemens' manager of operating systems development, Klaus Gewald, explains that "first we want to establish a standard interface between the main operating system and application packages. That is almost completed. Secondly, we will be continuing throughout this year to establish a broader common systems environment focused on databases, compilers, and the human interface."

There's much more to the group than that, however. Bull's managing director, Francis Lorentz, sees the effort as a strategic survival tactic for European vendors battling Big Blue. "Faced with one dominant manufacturer, vendors have to adopt other operating systems that are international standards. They must not become prisoners of IBM," Lorentz stresses.

Such anti-IBM sentiment bothered French software house Cap Gemini Sogeti, which had earlier been considered for membership in the European Unix club. "We couldn't afford to be associated with such an anti-IBM club," explains Christer Ugander, president of CSG's Europe Group. "Too much of our business is linked to IBM systems for us to be involved in an organization in which some of the members were so outspoken about IBM." CSG, which is still talking to the group, may eventually become a member.

MIFFED AT NOT BEING ASKED

Another European software house, Britain's Logica, was also considered for membership. This seems particularly appropriate, since Logica is a long-time user of Unix and is Microsoft's sole European distributor of Xenix. Logica chairman Philip Hughes is miffed that his company was not asked to join the Unix Europe group. "They can't do all the development work alone," he argues. "They are going to need the involvement of software companies and it is better to have that sooner than later."

All this noise about Unix in Europe is music to the ears of Unix Europe Ltd. (UEL), the London-based AT&T and Olivetti joint venture charged with selling Unix System V source licenses in Europe. "With the big boys committing themselves to System V interfaces, things are going very well," declares UEL managing director Alessandro Osnaghi. Since Unix came to Europe, about 125 source licenses have been sold by AT&T to local vendors. UEL expects to sell another 30 licenses before the end of the year.

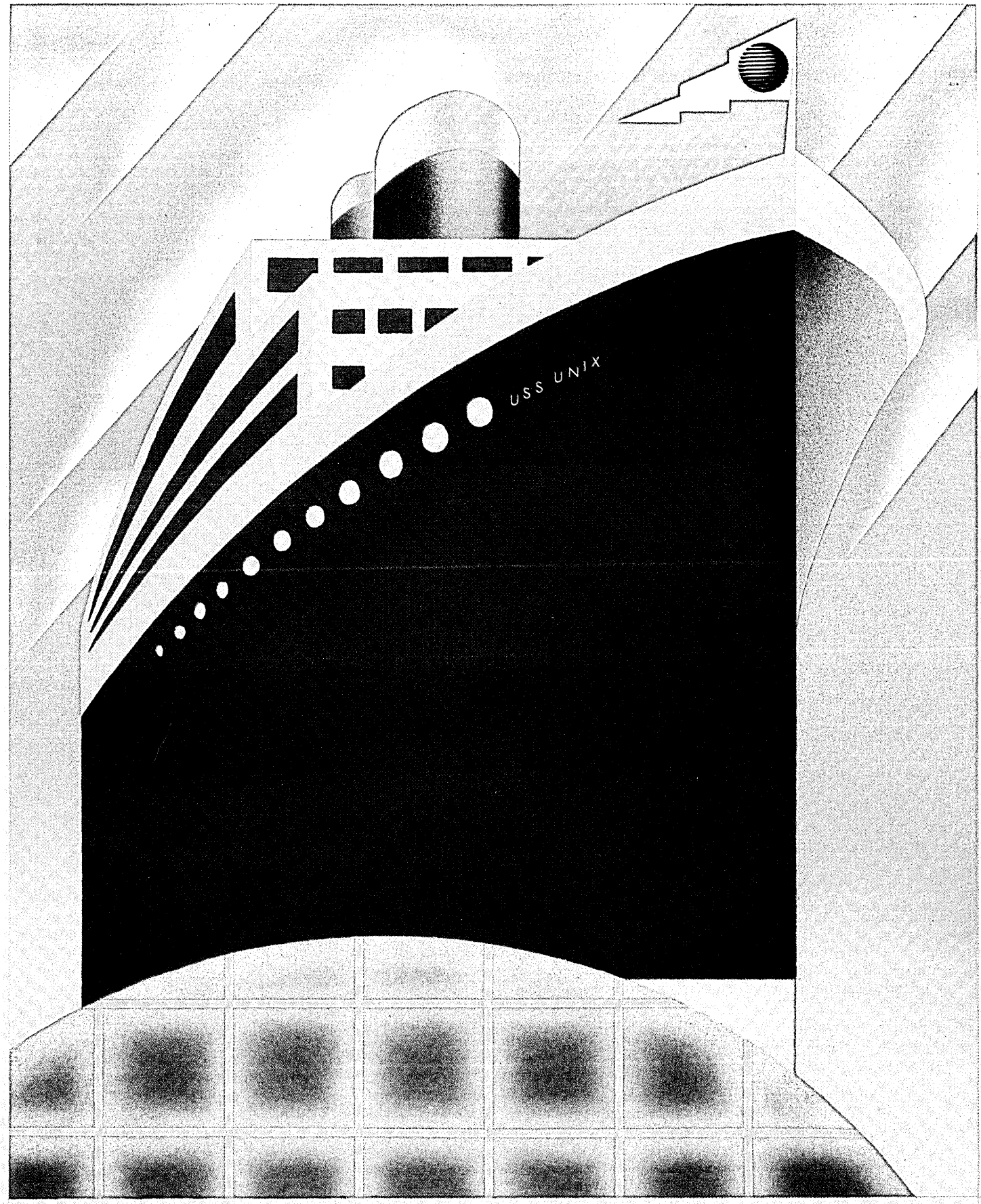
Osnaghi believes that thanks to the new group, Unix is closer to becoming a standard in Europe than anywhere else in the world. "European interest in a standard is much higher than elsewhere," he says. "It's a little too early to be looking for many products from the big boys—they move slowly. But my feeling is that they will be putting products onto the market by the end of the year."

Making a head count of how many people really use the system is difficult, since AT&T has apparently lost track of the number of binary licenses that have been issued. "Worldwide we don't have a clue," confesses one UEL executive. Estimates indicate that there were around 145,000 binary licenses for Unix worldwide at the end of last year. Approximately 20,000 of those licenses came from Europe.

Some of the confusion over the size of the user base stems from the fact that AT&T, which initially developed the system for internal use in 1969, was not allowed to peddle the product before it became deregulated in January 1984. To muddy the waters even more, numerous Unix variations such as Xenix were developed during this period.

Freed from the antitrust constraints

ILLUSTRATION BY ALEX ROMANOWSKI



TRAVEL UNIX

"Multi-user micro systems running on Unix are ideally suited for decision support applications."

last year, AT&T decided to get serious about Unix, launching a massive marketing push with its System V release. The company has much ground to gain, especially in the commercial field. Unix, which has been used heavily in academic applications and research labs, has yet to prove itself in the commercial sphere.

Most of the action in Europe has been in the U.K., where roughly 250 suppliers are offering Unix-based wares. England, which has around 5,500 Unix users, accounts for more than one fourth of the total installed base in Europe. Following Britain, which is also home to the European Unix Users Group, are France, West Germany, the Netherlands, and Sweden.

Business in Britain, however, has still been slow. "The industry has been longer taking off than some forecasters anticipated," according to a recent report on the U.K. Unix scene produced by software and systems house Digitus. The Unix push, according to the report, has been stymied by a lack of distribution channels and a shortage of special chips and Winchester disks. The inability of small retailers to cope with the complexities of multi-user systems also hasn't helped. Frustrated by these problems, some users have decided to wait for the multi-user IBM PC AT, which runs under Xenix.

Nevertheless, Digitus is convinced Unix is "off the ground and climbing quickly." The company sees the strongest growth coming from systems that cost less than $20,000. Digitus predicts that over the next four years the installed base of these systems will expand from 1,900 to 14,000.

There will be less dramatic gains at the high end on mainframe systems, according to Digitus. That's due to sluggish mainframe sales and to the more basic fact that Unix is simply not suitable to be a primary mainframe operating system. Unix will more likely be run side by side with a proprietary operating system like IBM's VM.

TOP U.K. VENDORS ARE NEW

The U.K. systems market is currently dominated by smaller suppliers that have grown up with the product. With the exception of Digital Equipment and ICL, all six of the top vendors in Britain are comparative newcomers. Altos, Fortune Systems, and DEC lead the pack in terms of the number of systems installed.

ICL is further down that leadership list. The British company, which plans to introduce Unix throughout its product range in the next two to three years, is taking a more cautious approach to the operating system. In fact, the decision to offer Unix is being left up to ICL's national sales managers. This country-by-country policy has been followed in marketing ICL's Clan system, which runs under System V. The Motorola 68008-based system is being sold outside the U.K. in several European countries. "We feel that the Unix-Clan combination offers a great opportunity for us to open up our trader market and that it is a better vehicle for the rest of Europe," explains Geoff Morris, ICL's business operations manager for Unix.

Like many of its European competitors, ICL has come to Unix late in the day. Loyalty to its own operating systems helps explain the lateness. So how will the company handle divided loyalties? "People should have no worry on that score," promises Morris. "We have a very strong commitment to get Unix to succeed. Our strategy is to run Unix and our own systems side by side."

One of the first companies to get into Unix in Europe was the U.K.'s Bleasdale Computer Systems. "Being early into the market," says Bleasdale's sales and marketing director Mike King, "doesn't necessarily lead to problems. The larger firms are providing a degree of market stimulation." Bleasdale got some stimulation of its own recently when it signed a deal for British Telecom to manufacture its Unix systems.

Across the channel in France, most of the Unix activity is also at the low end. Spurring that activity was Thomson's Micromega 32, which is based on Fortune Systems' U.S. machine. The Micromega 32 currently accounts for around 30% of the installed base of Unix systems in France. Several French ministries have even begun using the AT&T software.

"It was thanks to the Micromega that the government became interested in installing Unix," declares Dominique Maisonneuve, a developer at Unix software house CERG in Paris. "What was needed," she notes, "was some hardware with a

UNIX FRIENDLY

Software developers are hooked on Unix, addicted to the operating system's friendly interface that enables them to efficiently churn out scores of programs. Just ask Britain's Logica, the European distributor of Microsoft's Xenix version of Unix.

Logica reports that Unix has had a marked effect on its software developers' productivity. The Unix programming environment has enabled the company to manipulate the source code of one version of the Unix system and produce upgrades for seven processors. This task would certainly have been more costly and arduous under conventional programming methods and filing systems. The system's electronic mail facilities have also improved communication between programmers and allowed managers to have better control over large projects.

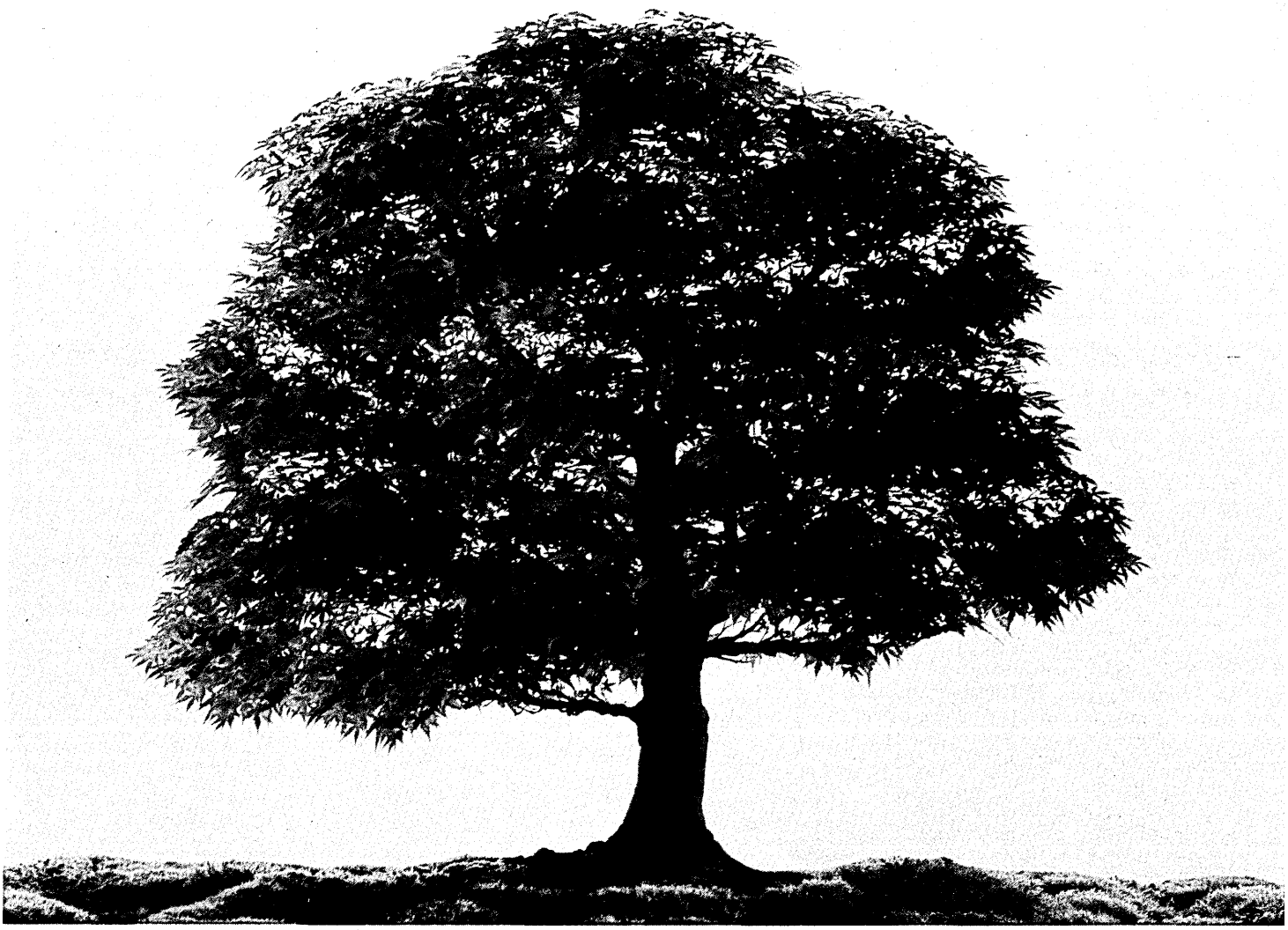
The operating system's human interface, which has been criticized for not being friendly enough for novice end users, seems to suit the programming needs of software developers just fine. This is a big plus for the overall Unix industry, which needs a slew of software to grow. "One of the keys to establishing a mature Unix market is applications software," points out Logica's commercial manager, Hector Hart. "Without that software, all the machinations of the hardware firms are likely to come to nought. And without the support of Europe's software companies, those systems aren't going to be built."

European software houses began taking a serious interest in Unix back in 1979. The microcomputer sparked that interest. Unix provided micro software developers with an efficient development environment, an environment that could be easily adapted to the clusters of single-user pcs that began to dot the dp world. Unix gave these programmers the opportunity to revert back to the more familiar multi-user minicomputer mode.

The appearance of Xenix, which can run on smaller DEC PDP-11s, coupled with lower Unix license fees, increased Unix's appeal. So, by the end of 1981, AT&T's portable operating system had established a firm foothold on European soil.

European programmers and software firms liked the way Unix could be reconfigured to add new users and take advantage of the larger and faster Winchester disks. The flexibility is important to bigger software houses that must be ready to work with almost any mix of large and small programming teams.

Unix is not without its flaws, however. While most of the early software bugs and documentation troubles have been worked out in current releases, performance still needs to be improved. These preformance problems are exacerbated by the programmers' natural tendency to exploit Unix functionality, which eats up machine resources. The final solution, which has yet to surface, lies in a fully distributed Unix coupled with hardware to match.



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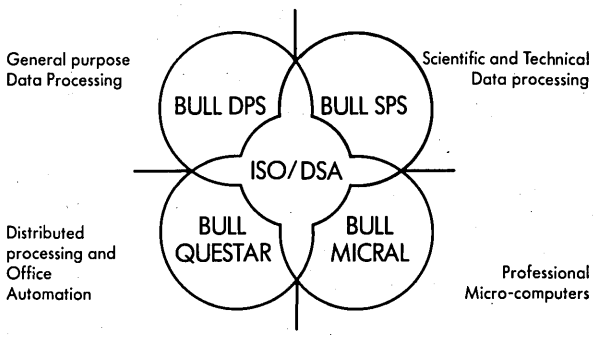

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French coloring."

A Unix fan, Maisonneuve insists that the operating system can handle more than just scientific and technical applications. "Multi-user micro systems running under Unix are ideally suited for decision support applications," she maintains.

Tell that to France's main dp supplier, Bull, which has decided to use Unix to zero in on the CAD/CAM and other industrial markets. "Now the essential thing is for a large library of Unix software and applications to be built up that are portable from one machine to another," explains Bull's Lorentz. "That is the attraction of Unix."

Italy's Olivetti is reveling in all this Unix activity. It certainly has reason to cheer, since its partnership with AT&T gives it a 50% stake in UEL. The company is also selling AT&T's 3B minis, which run under Unix software. At the end of last year, after nine months of marketing, Olivetti had pulled in orders for over 1,000 3B systems in Europe and Australia. Business is said to be even better this year.

Such success could cause conflicts for Olivetti, whose participation in the European Unix group is, to say the least, ambiguous. Responsible for upholding AT&T's Unix standard outside the U.S., the company must also go along with the separate development work being done by the European team. Things could indeed get sticky for Olivetti if the group decided to push an alternative open operating system.

1ST STAB AT OPEN SYSTEM

That alternative may be a better solution, according to some Europeans who feel that Unix is just the first stab at the open operating system problem. Michel Gien, an engineer at the Centre d'Etudes des Telecommunications (CNET) in France, says the current situation with Unix is similar to what happened in the micro world after the IBM PC was unleashed. "Compatibles are usually cheaper and just as good as the original. At the moment," he observes, "people want the real thing. But later on, when they acquire greater confidence, they will opt for the less expensive compatible."

Work on other open systems is going on all over the world. In Japan, for example, the University of Tokyo has come up with an efficient, real-time open operating system called Tron. In Europe, the popular Pick operating system continues to pick up devotees.

France has been working since 1979 on Sol, a Unix-like system that was the brainchild of developers at the national research institute IRIA (now INRIA). CNET's Gien, who worked on the project, says, "Sol was ahead of its time. We haven't finished with Unix yet and it is going to get bigger in the coming years. But users will start looking for compatible systems and there will be renewed interest in Sol, especially when people get fed up with paying royalties to AT&T."

The IBM issue is another troubling factor for European software companies trying to find the right path in the Unix jungle—a jungle haunted by hardware suppliers that are using every trick in the book to entice them into offering applications for the AT&T operating system. Many European software firms share the sentiments expressed by Ingemar Karlsson of Helikon Micro in Sweden: "The market is still ruled by IBM and, as long as it doesn't give Unix 100% backing, it is still too risky for us to develop Unix applications. And it isn't likely that IBM is going to push Unix because the product belongs to potentially their largest competitor, AT&T."

While IBM has said that it will support Unix, no one is certain just how strong that support will be or what form it will take. The international dp community is certainly much too wise to put too much stock in one of Big Blue's statements of direction.

Meanwhile, AT&T's Unix motives are not obvious either. On the hardware side, Unix is a great leveler, a leveler that will force AT&T to compete with every hardware vendor flying the Unix flag. Even on price/performance, the company's manufacturing muscle may not be enough to give it a competitive advantage over the Japanese vendor that can churn out cheaper iron in no time flat.

Unix could also rock the hardware boat so hard that some companies could fall overboard. That naturally wouldn't do AT&T any harm as it tries to set a steady, profitable course in the turbulent waters of the dp industry.

The companies in AT&T's dinghy may not be so lucky. There's no guarantee that those passengers buying the Unix ticket to travel will be around for the return voyage. ◉

Contributing to this article were James Etheridge, Peter Hidas, John Lamb, and Paul Tate.

THE SWEDISH MANDATE

Sweden is sold on Unix. Both the civil service and the military recently issued mandates that require users to standardize on the Unix system. The reason is simple. Over the next few years both government branches will make huge investments in software development that they want to protect by capitalizing on Unix's portability features.

"I can't see any alternative to Unix on small multi-user computers if you want to become supplier independent," declares Nils-Olov Qwerin, head of the Swedish Agency for Administrative Development's (SAFAD) procurement division. Earlier this year Qwerin chaired the committee that hammered out system specifications and carried out the Unix evaluation.

SAFAD was searching for what it calls a base computer. Approximately 50 of these systems will be installed per year to handle office automation work, communications chores, administrative packages, and program development.

With typical Swedish thoroughness, SAFAD detailed its system requirements. Responding to the bid were 21 local and foreign suppliers. Four of those firms ended up sharing the final victory. The only domestically developed system to make the grade was Luxor's ABC 9000 machine, which runs its own ABCenix version of Unix. Headquartered in Sweden, micro maker Luxor is owned by Finland's Nokia.

Sweden's Ericsson Information Systems also got a slice of the action with its 9000 system. Originally developed by Sun Microsystems in California, the micro runs under the Berkeley BSD 4.2 version of Unix. The two U.S. winners were Cromemco with its CS 300 and CS 400 machines, which use Unix System V, and Zilog's 8000, which comes with the Unix-compatible operating system Zeus.

In addition to the Unix-compatible operating system, the computers will be supplied with a number of software packages and tools. For office automation applications, civil service users will be able to choose from Uniplex, Q-office, and Alis. The Database management and inquiry/report generation tools will be Informix, Unify, Micro-Ingres, and a Swedish product, Mimer. Programming languages C, COBOL, and FORTRAN will also be available.

SAFAD procurement chief Qwerin believes the Swedish market will respond to the lead set by the government. "We expect many more programs to hit the market soon because we have created a need. We are hoping for business-oriented applications that are developed or modified to suit Swedish rules and regulations."

The Unix mandate from the civil service came on the heels of a similar move made by the Swedish military last year. Anxious to avoid dependence on foreign manufacturers, the military had originally considered building its own computers from available components. This project, called Structure 90, proved too complicated and was eventually scrapped in favor of Unix. So what the mighty military ended up with was 200 NCR Tower systems that run under Unix.

—Peter Hidas

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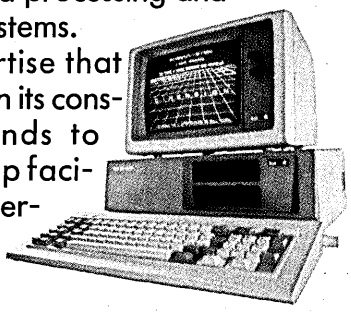

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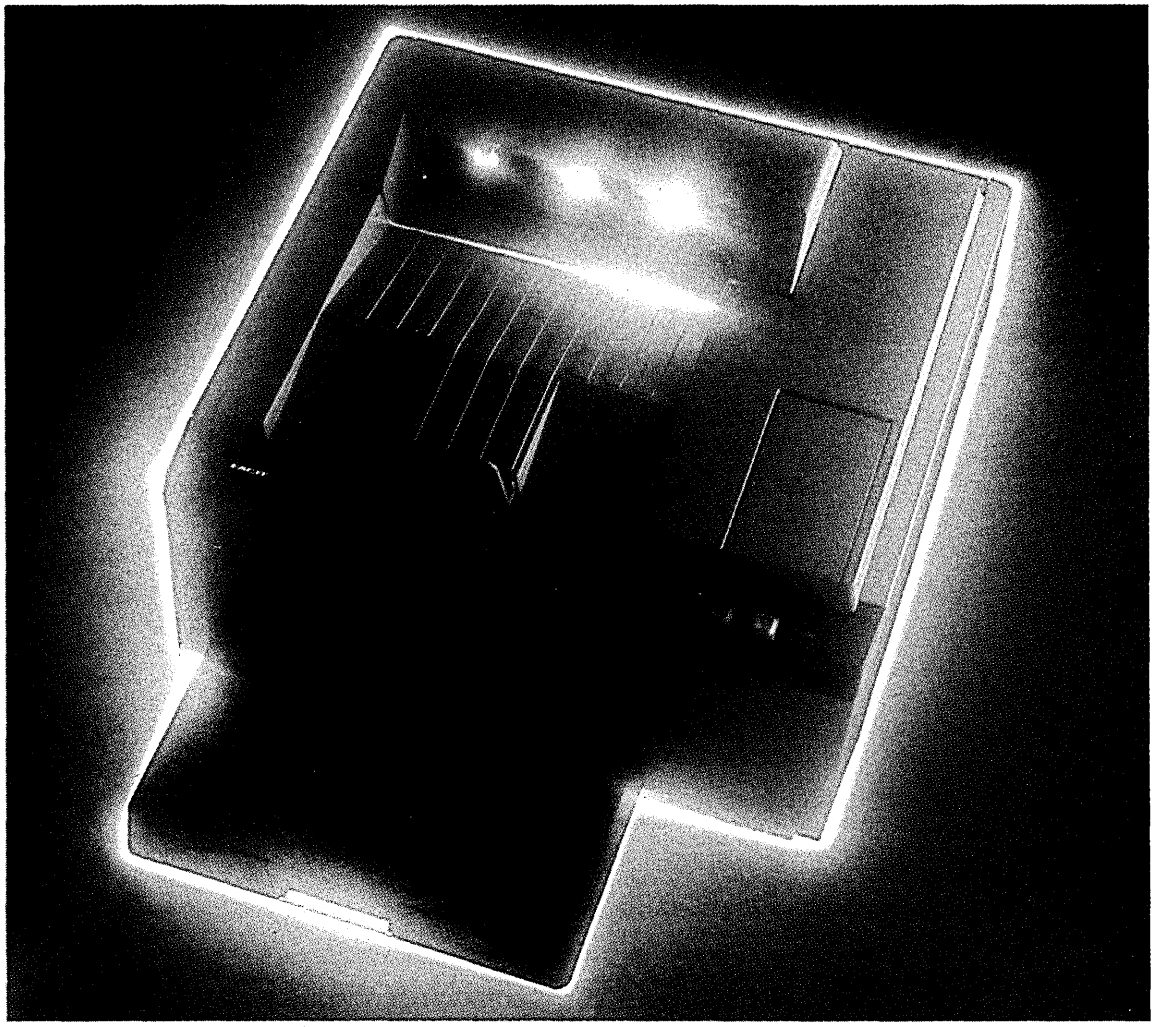

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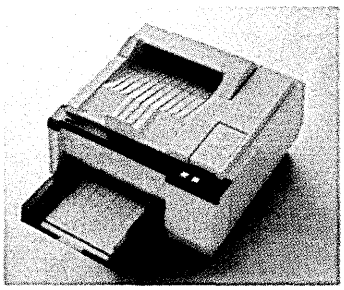

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A unique feature attracts Europe's commercial community.

PUSHING FOR PORTABILITY

What has Unix got that other operating systems haven't? The answer is portability—the salient system feature that's beginning to fire the imagination of Europe's commercial user community.

"What interests us," explains Bernard Laffineur, dp manager at French bank Credit Lyonnaise, "is that we will not be tied to a single vendor with Unix." Laffineur, who has installed several Unix systems for decision support applications, says that "all our experience so far suggests that we made the right choice."

Increasingly Unix is becoming the right choice for commercial dp users who are just beginning to warm to the idea of open software architectures. The appeal comes from the portability advantages these architectures provide. In a recent report from systems house Digitus in the U.K., users cited portability as the main reason for going with Unix. The development facilities and the compatibility it offers with existing systems had less appeal for these Unix users. "From the user's point of view," says Digitus, "the merits of one operating system can be less important than the problems involved in changing operating systems."

While portability is the favorite feature of Unix, users aren't falling for all the marketing hype. They want to see it work. So does Credit Lyonnais's Laffineur, who is currently testing Unix portability by transferring programs developed on Plexus hardware to Burroughs systems. "We have set strict and tight deadlines," he says. "If they are met, that will mean it was easy."

Unix specialist Christian Gallin, who is head of the military division of French software house Cap Gemini Sogeti, is skeptical on the portability point. "I'm not convinced that Unix programs are necessarily compatible or entirely portable. Our customers want Unix. They think that they will no longer be tied to a single vendor with Unix. But emulation is not enough. They are looking for real software portability—total software standardization. Unix isn't everything it's said to be," he insists. It isn't completely compatible.

All the sundry varieties of Unix on the market today are clouding the compatibility picture. "The proliferation of [Unix] versions is giving us problems," admits John Seymour, a member of the network team at London University. "With Bell, Berkeley, and Xenix versions, plus a mélange of releases within those, standardization is downright difficult."

The name variations of Unix routines, the differences in system commands, and the multiplicity of error codes all cause programming headaches. Problems can also result when Unix is too closely coupled with the hardware it's implemented on. "On a number of machines that purport to be Unix, you get involved in how the kernel software has been interfaced with the hardware. It's so awkward in some cases," Seymour complains, "that we can't introduce the network facilities."

This difficulty arises because network software is basically not designed to function like an applications program. Such software requires hardware optimization. When systems programmers dig down into Unix, they find things very confused. As one programmer puts it, "When you run applications, it's almost like driving a car. All you have to worry about is the petrol and oil. But when you get into networking and database applications, you have to lift the bonnet to put in a turbocharger. When you do that, you find that each make has a different instruction manual."

DECIDING ON UNIX PLUNGE

One man who knows a lot about both cars and computers is Jean-Paul Griveaux, central dp systems development manager at Automobiles Peugeot in France. Griveaux, who is setting up a multi-user network, hasn't decided whether to take the Unix plunge. "While we do need multi-user micro systems, it is too early to talk about the prospects for Unix in the company," says Griveaux, who is also quick to note the software's benefits. "It would save time and effort in software development," he concedes. "It takes months to transfer a program and its users from one system to another. That problem will be greatly reduced with Unix."

London University's Seymour also sings the praises of Unix. "For systems people like us," he declares, "Unix is excellent." London University is prime Unix territory. The university's computing operation, which runs everything from micros to Cray mainframes, services 60 educational institutions spread throughout London.

Unix has received a warm welcome in such academic settings. Its welcome in the commercial community has been decidedly chillier. Things could change however, as Unix matures.

"Unix is young and lacks a certain number of capabilities that we've had to add, such as operating and teleprocessing tools. If you want to use it for anything other than development, there are problems," warns Credit Lyonnaise's Laffineur.

Use of Unix in the European commercial sector is still in its infancy. "A lot of German commercial users still feel that Unix is not appropriate for them," explains Daniel Karrenberg, vice chairman of the German Unix Users Association. Some large German companies like Lufthansa and Daimler Benz, he adds, are testing out the operating system, particularly from the portability point of view.

While portability is important, user friendliness is also crucial to people who are first-time computer users. Critics charge that these first-timers would find it tough to use systems that run under Unix.

"Unix is excellent for application building," says Hans Johansson at Logica Sweden. "But it is very important to realize that the system is meant to be used by professional programmers, not by end users. End users should never work directly with Unix, only with specially designed application systems."

Digitus's Steve Feldman believes that user friendliness is up to the applications software designer. "The bulk of end users should not be able to distinguish Unix from any other operating system," he maintains. "After all, user friendliness is a matter of how you design your software."

Unix could improve its user-friendly image by simply providing such features as windows, icons, mice, and pointers—human interface niceties that are not automatically part of an operating system.

There are other problems with Unix that are not as easy to overcome. In its probe of U.K. users, Digitus uncovered complaints about the graphics and status

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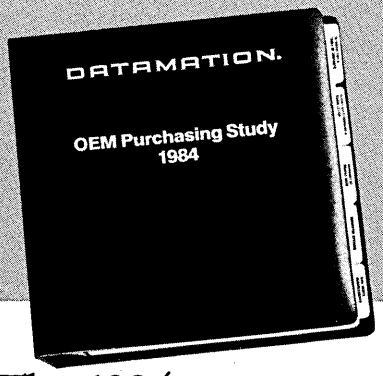

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"Most users should not be able to distinguish Unix from any other operating system."

APRIL IN PARIS WITH UNIX

Only a few weeks after the European Unix Users Group (EUUG) meeting was held in Paris last April, the secretariat of the French affiliate found itself out on the street. The ouster, which was not due to a lack of member support or even to a system failure, resulted from the bankruptcy of the firm with which it was sharing offices.

Like any good portable system, it was soon up and running again on another host. Whether the misfortunes of the French Unix Users Association are an omen for EUUG remains to be seen. Some rumblings that could cloud the future of the European federation have already been heard, however.

EUUG has been accused of being a closed club of academicians, researchers, and software developers. "Such unwordly specimens," according to one EUUG member, don't give an accurate picture of the user universe. "What about the wider dp fraternity," he complains, "those people who operate information systems in commercial and administrative organizations? Where are they?"

They're certainly not sitting in on EUUG meetings like the one held last spring in Paris. Evidence of this comes from EUUG itself, which estimates that half of its 800 members come from the commercial sector.

That membership is spread throughout its nine country-affiliates. The branch in Britain, the home base of the EUUG, accounts for 350 members. The U.K. contingent is the largest in the association, a fact that should come as no surprise, since England is the most active Unix market in Europe.

France, which pulls in around 250 members, has the second largest EUUG affiliate. Many of those members, however, didn't turn up for EUUG's spring get-together. Indeed, April in Paris didn't prove to be a big attraction with Europe's Unix users. Only 340 delegates were on hand for the conference, compared with a turnout of 400 at the autumn meeting in Cambridge, England.

The EUUG admits that the attendance was "disappointing and puzzling." Michel Gien, vice chairman of EUUG's executive committee, blames the small showing on poor publicity and timing. The Paris conference, he points out, was held during school holidays in France. A realist, Gien also concedes the meeting didn't have enough commercial appeal.

Focusing on technical and academic topics, the conference featured papers on such esoterica as Greek and Chinese characters. A hardware exhibition, held in conjunction with the meeting, gave conference goers a feel for the more basic hardware side of Unix. Most of the major Unix systems vendors had stands in the exhibit, which touted the advantages of AT&T's operating system.

AT&T seems to be keeping a low profile in its relations with EUUG. But not so low that EUUG executive Gien can't see AT&T's motives. "AT&T is very interested in these user groups and would like to have closer relations with us. In reality, AT&T would like us to be an association of AT&T users," he says, "and we don't want that."

—James Etheridge

reporting facilities on Unix. Users told Digitus that they'd like to have better transaction processing facilities and a real-time front end for time-sensitive applications.

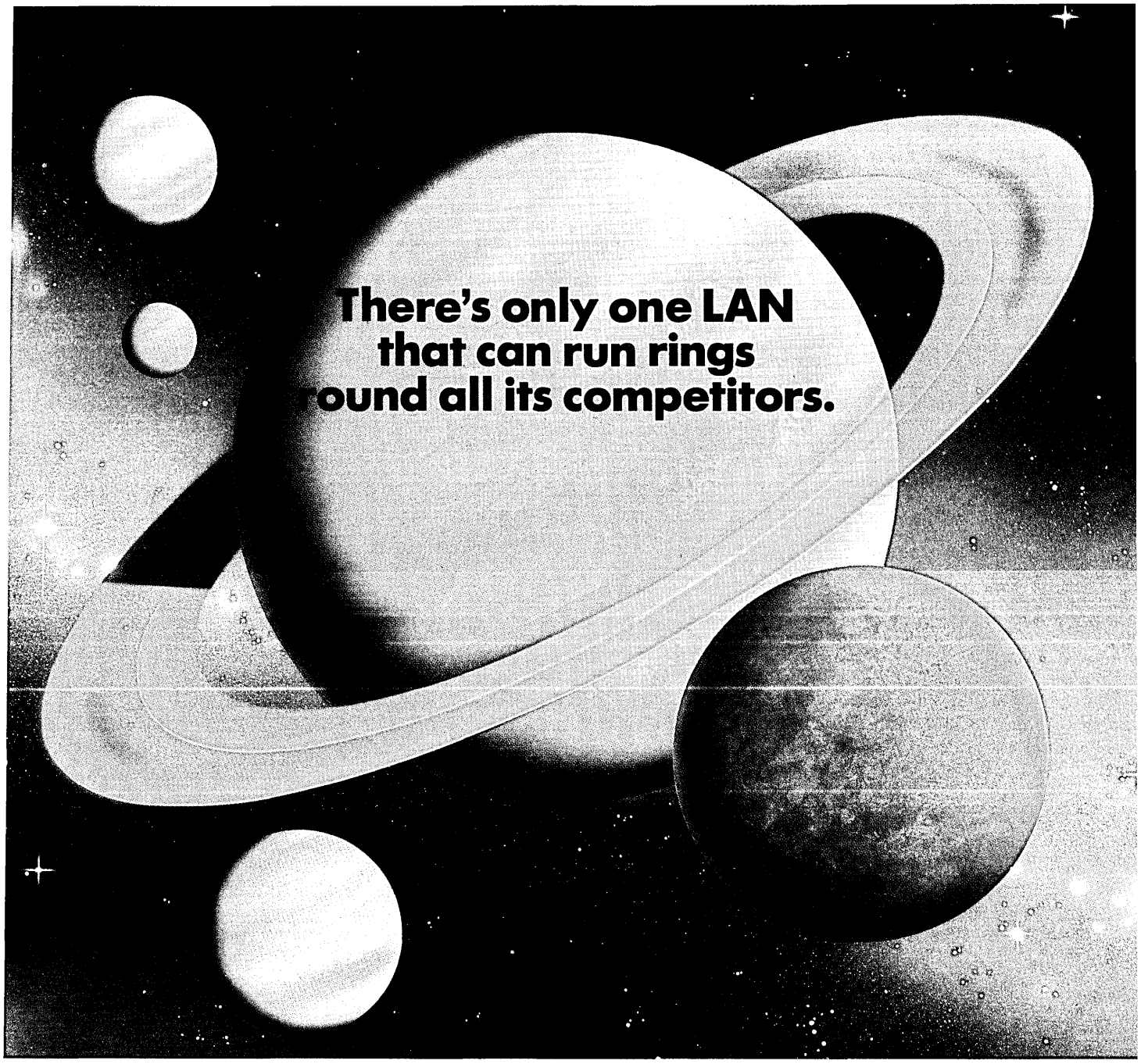
The Digitus findings hammer home another even more important point—that Unix is indeed breaking out of its traditional academic trappings, at least in Britain, which is Europe's most developed Unix marketplace. Roughly 40% of the U.K. users surveyed reported that they were running word processing applications under Unix. Next on the pop poll were applications for software development and accounting.

The use of Unix for development applications, as Digitus points out, could be an interim step, since it may reflect the overall effort to generate more applications software for Unix. More and more of this development work is going on, spurred on by hungry Unix hardware vendors that are pushing the portable product for all it's worth—and in some cases, for more than it's worth.

Spinning out of the academic sphere, Unix is finding more favor in the commercial world. Indeed, some academicians complain the software is already outdated. "Unix," carps one disenchanted user, "is a third generation operating system running on fourth generation hardware in a world that's moving to fifth generation computers."

Maybe so, but nobody out there in dp land seems to have a better idea. And until they do, users will continue to follow the Unix path to portability. ◉

Contributing to this article were James Etheridge, Peter Hidas, John Lamb, and Paul Tate.



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Fujitsu leads the island nation out of the IBM orbit.

JAPAN'S UNIX UNIVERSE

by Thomas Murtha

Fujitsu is the brightest star in Japan's Unix universe. In April, it became the first Japanese mainframer to make a major move on the Unix front. The company unveiled UTS, a new operating system for its mainframes and minicomputers, and based on Unix System V. The announcement came as no surprise, since Amdahl, which is 49.5% owned by Fujitsu, had already started selling an earlier UTS version for its plug-compatible mainframes made by the Japanese company.

Hitachi and NEC are also rumored to be working on virtual operating systems that support Unix. Unlike Fujitsu, Hitachi is taking a much more cautious approach to the AT&T software. "If our users request it, we'll consider running Unix on our mainframes," says Kanji Nakai, manager of the product planning department in Hitachi's computer division. "Although we support Unix on minicomputers and workstations, no one has requested it for our mainframes."

Fujitsu feels sure about its mainframe move, especially since it's got AT&T's support for the effort. "AT&T," explains Fujitsu planning manager Seiji Abe, "has a special arrangement to keep Amdahl and Fujitsu compatible with Unix improvements. We are quite confident that we can maintain our lead with Unix."

Fujitsu's lead in the Japanese Unix universe will probably enable the company to capture lucrative contracts from the Ministry of International Trade & Industry (MITI), which is sponsoring the Sigma project, a five-year, $10 million scheme to create an on-line network of Unix-based workstations and programming productivity tools (see "Japan's Software Squeeze," May 1, p. 72-13). The network will have 10,000 nodes when it becomes fully operational.

MITI is expected to pick the mainframes and software for the net this summer. Those wares will probably be supplied by Fujitsu, despite the fact that some of the project participants favor the Berkeley version of Unix, which has more powerful networking capabilities. "Since no other Japanese manufacturer now claims to support Unix on mainframes, it looks like Fujitsu is the best candidate for providing the central hardware for the Sigma network," says one source close to the project. "That gives Fujitsu," he notes, "an inside track for shaping the Japanese Unix standard."

It also gives Fujitsu much more control of the emerging third-party software market. "Cooperating with providers of third-party software is one of our priorities," confirms Fujitsu's Abe. "We plan on disclosing the interface for UTS to all interested parties. In addition, we may provide technical assistance to any companies interested in UTS."

While such sharing could fuel further development, Unix still has a long way to go in the Japanese market. "The Unix market in Japan is still mainly limited to small software firms and universities," points out Masatoshi Matsuo, manager of the software tools and technology group at Software Research Associates in Tokyo. "The big mainframers didn't see Unix as a moneymaker, so they ignored commercial product development. MITI's Sigma network should help get the Japanese Unix market off the ground. But, it's not going to happen immediately."

SPURS LOCAL MARKET

Working with Japanese industry, AT&T Unix Pacific is trying to spur the local Unix market. So far, AT&T has sold more than 300 source code licenses for Unix in Japan. The BUNCH companies, along with Digital Equipment Corp. and Data General, are also distributing their own binary Unix code in Japan.

In late April, AT&T Unix Pacific received a report from a Japanese industry advisory committee. The report specified the Japanese language capabilities that need to be incorporated in Unix System V.

AT&T is apparently heeding the language recommendations. "We should be providing source code for a Japanese version of Unix System V within a year," reports Larry Crum, managing director of AT&T Unix Pacific. "There is plenty of Unix activity here, but a major focus has been on using it as an in-house tool for engineers at workstations. Hopefully, Japanese language support will help open up the market for commercial products."

Fujitsu is talking the same language. "We hope to implement a Japanese language version of UTS within a year," reveals Fujitsu's Abe. "Amdahl and Fujitsu are also looking at the worldwide market for UTS. ICL and Siemens are our partners in Europe. Although the decision hasn't been made, we are also considering the possibility of marketing UTS to other companies."

Fujitsu forecasts that 500 installations of UTS will be made within the next three years on its M-Series mainframes and S-Series minicomputers. That's hardly enough to give IBM hiccups. It could nevertheless give Fujitsu the courage it needs to export mainframes bearing its own name. A move to put Unix on the Facom Alpha Lisp machine and on the firm's VP series of supercomputer is also "under consideration," according to Abe.

In the long term, Unix is unlikely to supplant Fujitsu's OS IV series of operating systems. "In the future, we will strongly support improved versions of Unix and OS IV on our mainframes," promise Abe. "We see Unix as the common link for our mainframes, minicomputers, workstations, and microcomputers. It's an alternative to the IBM MVS/VM world."

The AT&T alternative could indeed help the Japanese break out of the IBM mold. It also seems like an obvious panacea for the nation's nagging software problems. But for all its software development pluses, Unix still does not satisfy large-scale database management needs. Nor does it fill the bill for transaction processing.

Fujitsu's Abe recognizes these shortcomings. "Currently, UTS is not very suitable for commercial data processing because there are inadequacies in file security and transaction monitoring," he admits. "We have listed the required functions for these tasks and we plan to discuss implementation with Amdahl and AT&T."

Whether UTS can become a real dp workhorse on Japanese mainframes remains to be seen. Meanwhile, Japan's Unix universe will continue to revolve around developments in the outside world. If Unix gains popularity in the U.S. and Europe, the Japanese industry is likely to speed up its Unix efforts. ◉

INTERNATIONAL

The push to standardize pc products was on at this year's Hannover Fair.

MICRO MANIA

by Fred Lamond

The desktop microcomputer was once again the star at this year's Hannover Fair, staged recently in that northern West German city. The micro took the spotlight on the stands of all the established dp companies displaying their wares in the cavernous main exhibition hall. The Japanese and Taiwanese vendors, newcomers to the Hannover show, took the same low-end approach, highlighting their desktop devices on stands in Halls 4 and 18. Only West Germany's Siemens and Nixdorf, along with PCMers BASF and National Advanced Systems spared space for mainframe products. Minicomputers, which also got very little play, were only featured by such traditional mini makers as Digital Equipment, Data General, and Tandem.

The micro mania that dominated the Hannover hardware scene doesn't give users more choice in the microcomputer realm, however. In fact, there has never been such strong evidence of vendors adopting de facto industry standards. France's dp firm Bull and micro pioneer Commodore showed off PC/DOS-compatible machines, while Sweden's Ericsson and Italy's Olivetti announced their entry into the IBM 3270-compatible workstation market.

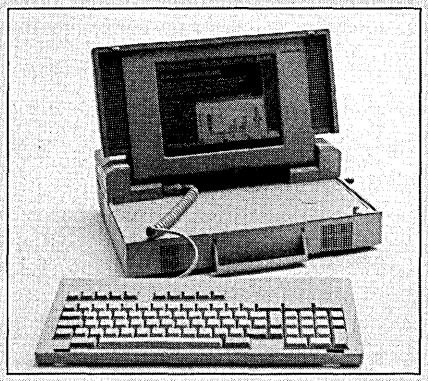
Rallying around the Unix standard were Nixdorf, Triumph-Adler, and Bull. Nixdorf took advantage of the Hannover venue to launch its 8832, a Unix-based fault tolerant system. The 8832 is the first product in Nixdorf's new line of Unix-based machines.

The move toward pc standardization and interchangeability has led to a price war among independent European dealers. A British survey quoted at the Hannover Fair predicted that one third of the U.K.'s independent computer retailers would be bankrupt or out of business by year-end. Such prognostications don't please micro manufacturers, many of which held press conferences at Hannover to discuss ways of stabilizing these distribu-

PC-COMPATIBLE PORTABLES

The Ericsson portable pc measures 4.5 by 15.4 by 12.2 inches (115 by 390 by 310mm) and weighs 16.7 lbs. (7.6kg). Like the Data General/One, it combines briefcase-sized portability with IBM PC compatibility—but weighs twice as much. While it can't run off batteries, its main adapter, which is switchable between 110V to 120V AC 60Hz and 220V to 240V AC 50Hz, meets the needs of transatlantic business travelers. Its greater weight and power consumption also allow it to offer an 11-inch yellow-on-brown-background plasma display that's readable in all lighting conditions. A choice of 640-by-400-point high-resolution or 640-by-200-point IBM PC-compatible graphics is standard. Its detachable 84-key keyboard includes 10 function keys and a 14-key numeric/cursor control keypad.

The Ericsson portable pc uses the same Intel 8088 processor as the IBM and Ericsson pcs with which it is compatible. A 256KB RAM that's expandable to 512KB and a 5.25-inch 360KB diskette drive are standard. Options include a 512KB ERGOdisc (RAM disk), a built-in acoustic modem, a built-in printer that handles both



thermal and plain paper, a second 5.25-inch diskette drive, and an expansion box for two IBM PC-compatible boards. ERICSSON INFORMATION SYSTEMS AB, Stockholm, Sweden.

FOR DATA CIRCLE 360 ON READER CARD

The Nixdorf 8810/25 compact pc, CPC, is the heaviest of the IBM PC-compatible portables, outweighing the Compaq by 5.5 lbs. and Olivetti's M-21 by 3.3 lbs. Like these machines, it offers only a 9-inch 640-by-200-point monochrome crt display. An external 12-inch 550-by-480-point color monitor can be added as an option. The CPC, however, does come with a thermal printer for 8½-inch-wide (216mm) paper. Its detachable 83-key keyboard includes 10 function keys and 10 numeric keys.

The 8810/25 CPC uses a 4.77MHz Intel 8088 processor that can be augmented by an 8087 mathematical coprocessor. RAM memory is expandable from 256KB to 640KB. The system unit is available in two versions: a twin 360KB diskette drive version, and a hard disk version that comes with a 360KB diskette and 10MB hard disk drive. External options include a 100cps matrix printer and an expansion box with space for three IBM PC-compatible cards.

The 8810/25 CPC supports IBM 2780/3780 BSC, 3271/3275 BSC, 3274 SNA/SDLC, 3278/3279 graphics, and Siemens MSV/LSV 1 and MSV/LSV 2, 9750, and MSV-Filenet protocols. A special 8810/25 Btx version can be used as a subscriber terminal for the German Bildschirmtext videotex network. NIXDORF COMPUTER AG, Paderborn, West Germany.

FOR DATA CIRCLE 361 ON READER CARD

Nixdorf also announced the 8810/65 pc that offers an Intel 80186 processor, 256KB to 1MB RAM, one or two 360KB diskette drives, and up to 10MB of secondary storage. It runs under Concurrent DOS that can multitask up to eight user application windows. The 8810/65, which uses a standard Nixdorf terminal screen, offers a choice between IBM and Nixdorf keyboard layouts. All IBM BSC and SNA/SDLC protocols have been implemented. There are also interfaces to token bus local area nets and Nixdorf's broadband LAN, as well as to the PTTs' ISDN interface. NIXDORF COMPUTER AG, Paderborn, West Germany.

FOR DATA CIRCLE 362 ON READER CARD

Triumph-Adler's Alphatronic P50 and P60 pcs use Intel 80186 processors with 256KB to 512KB RAM. Their amber-colored monochrome monitors, which are nonreflecting and flicker-free, offer 640-by-400-pixel resolution for graphics. The flat keyboard has 18 programmable function keys, separate cursor control and decimal keypads, and a special "alpha key" that allows word processing functions to be called up without interrupting the current application program. The P50-1 includes two 360KB diskette drives. The P60-1 comes with a 360KB diskette drive and 12.5MB Winchester hard disk. The P50-2 and P60-2 models substitute 800KB diskette drives compatible with TA's earlier 8-bit Alphatronic P3 and P4 models. TRIUMPH-ADLER AG, Nuremberg, West Germany.

FOR DATA CIRCLE 363 ON READER CARD

The PC10 and PC20 are built in Germany, where the earlier MOS 6502-based Pet and Commodore 64 series have mainly been sold for business applications. The PC10 includes two 360KB diskette drives. The PC20 comes with a 360KB diskette and 10MB hard disk. Both micros use the Intel 8088 processor and offer 256KB to 640KB of RAM, a 12-inch monochrome monitor, and five IBM PC-compatible expansion card slots. Options include a color graphics card and an Intel 8087 arithmetic coprocessor. COMMODORE BUSINESS MACHINES, Frankfurt, West Germany.

FOR DATA CIRCLE 364 ON READER CARD

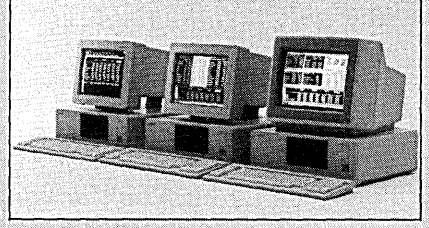
The Bull Micral 30 uses the Intel 8088 processor with 128KB to 640KB RAM, one or two 360KB diskette drives and one or two 10MB fixed disk drives. Four IBM PC-compatible expansion slots are available in the basic system unit. There are communications cards for all IBM BSC and SNA/SDLC, Bull (Honeywell) VIP and DSA, videotex and teletex protocols, as well as Datagraph's CAD/CAM control card.

Micral 30 supports two alternative operating systems. MS/DOS 2.12 is fully IBM PC/DOS 2.1-compatible. Prologue 2.2 supports all applications programs written for Bull's earlier Micral 80 and Micral 90 series, plus graphics and a relational database management system. It also supports MS/DOS 1.25 and CP/M-86 guest operating systems. BULL SA, Paris.

FOR DATA CIRCLE 365 ON READER CARD

The Ericsson Alfaskop 91 is a cluster system for up to 32 workstations. Its communications processor has a 256KB to 512KB memory for communications with different hosts. These may be any combination of IBM 3274 BSC, IBM 3274 SNA/SDLC, Digital Equipment Corp. VT 100/200, Sperry Uniscope 100/200, and Sperry UTS 400/4000.

Each workstation comes with its own processor and 64KB to 128KB memory that controls a screen and keyboard and its own diskette drive and printer. Three 15-inch screens are available: monochrome yellow-on-brown background, monochrome black-on-white background, and multicolor. Screen formats may comprise 24, 32, or 43 lines of 80 positions. Any workstations equipped



with a diskette drive can simultaneously perform local word processing along with mainframe terminal functions.

The PC TF 1 option expands the workstation's memory from 256KB to 640KB RAM. It can now execute any IBM PC program locally under MS/DOS 2.11, switching back and forth between local pc and mainframe terminal functions. The PC TF 2 option that has at least 320KB RAM allows the workstations to run under the IBM 3270 PC control program. It can simultaneously support up to seven windows: one local pc window, two notepads, and four terminal windows for different mainframe applications on the same or different hosts. ERICSSON DATA SYSTEMS AB, Stockholm, Sweden.

FOR DATA CIRCLE 366 ON READER CARD

The Olivetti M-24 is a 3270 workstation made up of an Intel 80186 processor with 256KB to 640KB RAM. It is available in 12-inch monochrome and 14-inch color versions. Its windows management software controls up to seven simultaneous sessions: four alphanumeric or graphics terminal sessions communicating with one or more IBM 370-compatible host computers, two notepads, and one personal computer session running under IBM PC-compatible MS/DOS 2.11. ING C. OLIVETTI & CO. S.P.A., Ivrea, Italy.

FOR DATA CIRCLE 367 ON READER CARD

The Nixdorf professional workstation offers a flicker-free monochrome display with 71.6Hz refresh rate. A choice of four screen formats is available: 25 lines of 80 positions, 33 lines of 116 positions, 27 lines of 132 positions, and 25 lines of 40 positions.

Its powerful Intel 80186 processor and 768KB to 1MB RAM that are backed by 5MB to 20MB hard disk storage and one or two 5¼-inch 800KB diskette drives are used to buffer up to eight simultaneous screen applications and images of up to 72 lines of 160 positions. One of these may be a local pc application running under MS/DOS. The other seven must be terminal applications running on the IBM mainframe or on the 8860, 8833, or 8864 processors. NIXDORF COMPUTER AG, Paderborn, West Germany.

FOR DATA CIRCLE 368 ON READER CARD

LOCAL AREA NETWORKS

The PC-Net is a 512Kbps baseband bus that links up to 20 Nokia pcs and Ergonomic Work Stations (EWS) with each other and an MPS 4A file server. CSMA/CD procedures are used to regulate traffic on the network.

The MPS 4A file server uses an Intel 80186 processor with a 256KB to 768KB RAM to control access to 10MB to 40MB of shared hard disk storage, which is backed by one or two 5¼-inch 1.2MB diskette drives or an optional 45MB backup streamer tape drive. When controlling access to shared disks and printers and passing messages between workstations, the MPS 4A runs under MS/DOS 2.11 and MS-NET.

Alternatively, the MPS 4A or any Nokia personal computer connected to the PC-Net can act as a communications server for a line to a videotex or teletex network or to an IBM 370-compatible or DEC host. The communications server then emulates an IBM 3274 1C, 3274 51C, or 3274 61C or DEC cluster controller, while other pcs and EWSs on the PC-Net emulate IBM 3278/3272 or DEC VT 100 terminals and 3287 printers. The pcs and EWSs can switch between terminal emulation and standalone processing under MS/DOS. NOKIA INFORMATION SYSTEMS, Helsinki, Finland.

FOR DATA CIRCLE 369 ON READER CARD

The Nixdorf PC-Net (NPN), a tree-structured broadband network with a 2Mbps throughput rate, is similar to IBM's PC-Net. Nixdorf 8832, 8855, 886x, and 8890 multistation processing systems are used as file servers, and 8810/8825 CPC, 8810/8865 SPC, and PWS workstations can be connected to the network. CSMA/CD procedures are used to detect and control collisions between simultaneous transmissions of file servers and workstations.

NPN comes in two versions. The cheaper, freestanding version is economical for networks of five or more workstations. The standard version maps the NPN on one of three or six 6MHz subbands of the Nixdorf broadband network. Each of the other 6MHz subbands can be used for videoconferencing or CCTV security. The subbands can also be divided by frequency division multiplexing into up to 20 parallel text/data channels that have 75Kbps to 19.2Kbps transmission rates. Separate packet communication units are shared by pairs of workstations or file servers to connect them to the NBN. NIXDORF COMPUTER AG, Paderborn, West Germany.

FOR DATA CIRCLE 370 ON READER CARD

MIGHTY MINICOMPUTERS

The Bull SPS 9 scientific processing system is a 32-bit megamini based on a reduced instruction set computer with a 125nsec cycle time. The user instruction set, which is implemented by microprograms, gives average performance in the 3MIPS to 4MIPS range. It is available in the SPS 9/40 single-user version and in the SPS 9/60 multi-user version.

Both the single-user and multi-user versions run under ROS, a virtual memory operating system that has 8GB address space that's based on Unix System V with Berkeley 4.2 extensions. Ethernet and OSI/DSA communications interfaces are available. BULL SA, Paris.

FOR DATA CIRCLE 371 ON READER CARD

Dansk Data Elektronik has added two entry-level models to its Supermax range. The Supermax Tabletop puts a 10MHz MC68000 with 512KB to 2MB RAM, 20MB or 36MB Winchester, 20MB streamer tape cartridge, and 560KB diskette into a box that measures 10.8 inches (27.5cm) high, 17.5 inches (44.5cm) wide, and 23.4 inches (59.5cm) deep, and weighs 77 lbs. (35kg). It can support up to 16 users or up to eight users with BSC, SNA/SDLC, or X.25 communications.

The alternative Supermax Compact puts the same basic components into a box that is 21.7 inches (55cm) high, 7.9 inches (20cm) wide, and 21.7 inches deep. Memory is expandable to 8MB and the unit can be field-converted to a standard multi-cpu Supermax system. DANSK DATA ELEKTRONIK A/S, Herlev, Denmark.

FOR DATA CIRCLE 372 ON READER CARD

European suppliers have been busy making their pcs and workstations more ergonomic.

tion channels. Solutions varied widely.

Victor Technologies, for example, which has just emerged from Chapter 11 under Swedish ownership, seems to be hedging its bet. The company, which just unveiled a cheaper, entry-level IBM-compatible system, also announced that it would be keeping a lid on the prices of its older Sirius 1 and Sirius 2 micros. The move is designed to give its dealers profit margins that will allow them to provide users with adequate after-sales support.

Wang, on the other hand, announced that it would be slashing retail prices on its PPC and PIC machines by 20%. As part of its rescue effort, Wang will give 50 of its most reputable dealers the right to sell and support its OIS and 2200 workstations side by side with the PPC and PIC. Systems houses will also be allowed to handle the VS series and Wangnet. Wang's plan, which is intended to boost the revenues of its selected dealers and systems houses, is also aimed at improving customer system support, which has been the weakest part of the U.S. company's European marketing effort.

Meanwhile, local European suppliers have been busy making their personal computers and workstations more ergonomic, an approach first taken by the Scandinavians. Last year Finland's Nokia Data became the first vendor to introduce a pc and workstation with a screen that displayed nonglare black letters on a white background. Canada's Northern Telecom adopted this workstation for its Vienna series. This year pcs and workstations with similar screens were announced and exhibited at Hannover by Ericsson, Nixdorf, Siemens, and Triumph-Adler.

While European manufacturers follow U.S. de facto standards in microcomputer operating systems, they lead the world in applying the new CCITT international communications network interface standards. All European pcs, intelligent workstations, and multi-user systems displayed at Hannover offered both Bildschirmtext (German videotex) and teletex interfaces as optional features. The only U.S. multinationals in step with these standards were IBM, SEL (ITT), NCR, and Sperry.

THIRD STANDARD APPEARS

A third communications standard also appeared for the first time on Hannover stands this year—the Integrated Services Digital Network (ISDN) digital interface, approved in 1983 by CCITT for all voice, image, text, and data services. No PTT yet offers ISDN subscriber interfaces to public switched networks. The earliest ISDN installations have been promised by the German Bundespost for 1987.

Nonetheless, all the leading PBX suppliers at the show were claiming ISDN compatibility for their digital switches. In most cases, this means that their switches' internal 64Kb voice/data time slots are grouped into the same 2Mb subbands as the 30-channel groups that PTTs offer larger PBX users. Siemens' new Hicom switch, however, uses internal 144Kb time slots that are indentical with CCITT's standard interface for individual subscriber lines.

The other German giant, Nixdorf, also made much ado about its communications capability, reaffirming its aim to become a full-fledged supplier of integrated dp and telecom equipment. Those products won't have much U.S. content if the company's chairman Heinz Nixdorf has his say.

Speaking at Hannover Fair, Nixdorf took a swipe at American-made wares. "We are tired of buying poor quality peripherals from the United States," he complained. "We are deeply hurt by the fact that the quality of U.S. products is not good enough for our customers."

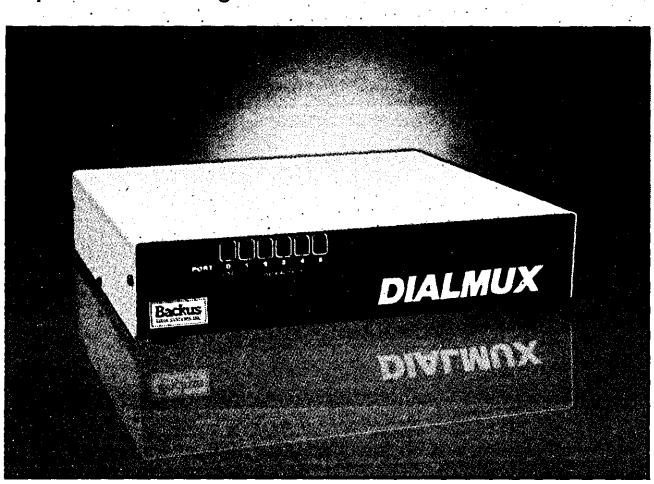
The unspoken implication is that European products are likely to incorporate more and more Japanese components and peripherals. That will certainly be a trend worth watching for at next year's Hannover Fair, which will be split into two parts. The CeBit office and information systems section of the show will be held first in the blustery month of March. While expanding in size, the mammoth Hannover exhibition will probably lose its uniqueness, since it was the only international show that encompassed all industries. ◉

"I never knew Rembrandt made applique potholders."

CARTOON BY REX F. MAY

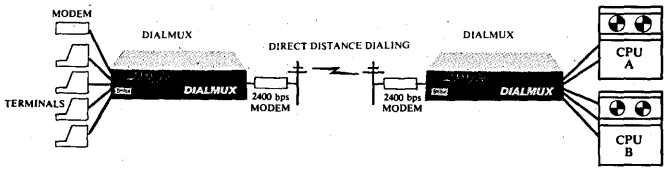
DIALMUX AND DIALCONTENDER

The system that provides an alternative to high priced hard to get leased lines!



CHANNEL SWITCHING MULTIPLEXER

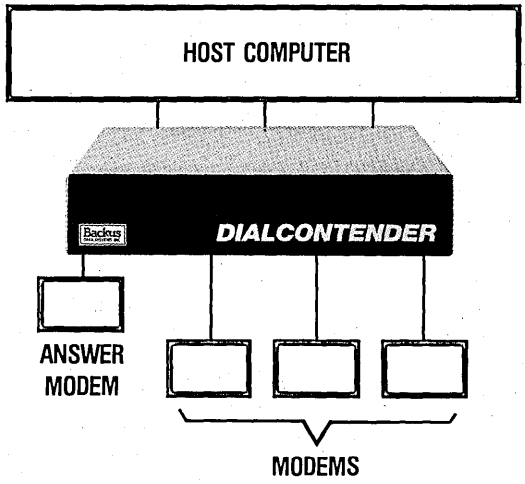
The new channel switching statistical multiplexer which uses the regular dial-up telephone network.



With the DIALMUX, once an automatic dial-up connnection is established, up to five users can simultaneously communicate and share the same 2400 baud data connection. Since the telephone line charges are based on the duration of the connection, in essence, five calls can be made for the price of one.

- Channel Switching
- Error control & retransmission
- Automatic data-link recovery
- Port access call-back security
- Programmable port parameters
- Host site access may be shared by multiple locations
- On-line system diagnostics
- Can be converted to leased lines operation
- Alternate route auto dial backup option

Minimize user frustration. Maximize computer use. Make your computer safe from intruders. DialContender, the easy and cost-effective solution to all of these problems.



Authorized users call your computer for an open port. The call is received by the DialContender. If a port is free, the user enters his ID and password, and hangs up. The DialContender verifies the information, calls the phone number that matches the ID and password, and connects the user to a free port. (As you can see, no unauthorized users can get past this double-check routine into your system.)

If all ports are in use when a call comes in, the DialContender will ask the user if he wishes to be placed in a queue for a call back. As soon as a port is free, the DialContender will call the user back and connect him to the computer.

The multi-port DialContender is easy to install between your host computer and auto-dial modems with no changes to existing software.

Additional DialContenders can be installed to accommodate any number of computer ports. An optional parallel printer port provides an audit trail of user activity.

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CIRCLE 39 ON READER CARD

NCC '85 visitors will find that businessmen, educators, and politicians have been working hard to get Illinois ready for the twenty-first century.

HIGH TECH IN THE HEARTLAND

by Bill Zalud

The hog butcher to the world is poised to cut itself a bigger piece of the high-technology pork pie.

Illinois, where the National Computer Conference will be held this month, already ranks third in the nation in total number of high-tech jobs, but like other states, it wants more. Chicago already has more software companies than any other city except New York, while Illinois as a whole ranks fifth in engineers and scientists.

For NCC attendees looking for high-tech signposts in the Chicago area similar to those in Silicon Valley, Route 128, Atlanta, North Carolina, and Austin, Texas, the best place to look is the Northwest Research Corridor. Located west of Chicago along the Illinois East-West Tollway (Route 5) and running from Oak Brook to Dekalb, the area employs more than 18,000 people engaged in various forms of R&D. Its main anchors are AT&T's Bell Labs and the Fermi and Argonne national laboratories. There are several other spots in the area, too, which Chicago hopes will blossom shortly, thanks to a variety of activities under way to cultivate technology-oriented businesses.

The priority areas for development are electronics, communications, and computers; manufacturing automation, including robotics, computer aided design and computer aided manufacturing; biotechnology, involving applications in agriculture, livestock production, medicine, chemistry, and pharmaceuticals; and energy management and control systems.

"The climate for high-technology business is better than ever before in Illinois, because the spirit of cooperation between state and city government, industry, and the academic community has never been stronger," comments Gerald Haller, president of the Illinois Software Association and Center (ISAC), and president of Unimart, a software house. ISAC was formed just last year with assistance from the state.

"We've shown that high-tech, start-up companies can do more than just survive in the Chicago area—they can thrive," observes Casel Cowell of USRobotics, a manufacturer of modems and telecommunications software. "What's most important is that high tech attracts high tech. We must feed the momentum that we have already created."

Robert A. Swick, computer management executive with Miles Laboratories believes, "Chicago can be a hot spot. With the universities we have here, the living environment, central location—these factors are all conducive to high-tech firms."

When planners began nosing around the area a few years ago, they were pleasantly surprised to find a good number of healthy high-tech businesses calling Chicago and northern Illinois home.

There was Motorola, a leader in cellular telephones; the pioneer of computer services, Statistical Tabulating Co.; Zenith Data Systems, an up-and-coming personal computer force; Centel, an aggressive telecom marketeer; and Ameritech, the prospering telephone operating company. There was also List Processing Co., the nation's largest name-and-address application software firm; Moore Business Forms; Gould Inc., a broad-based electronics company manufacturing minicomputers, test and measurement instruments, defense systems, and components; and SPSS Inc., a software company with a presence in universities and colleges throughout the world. Then there was Pansophic Systems, a noted software house; May & Speh, a computer services firm; and DBMS, a software company that is now moving to bigger facilities.

There's also the bellweather of the third-party computer leasing market, Comdisco. And when it comes to computer aided learning and training programs for computer personnel, many come to Deltak, headquartered in the Chicago suburbs. Honeywell and Rockwell International both have facilities here as well.

DOZENS OF SMALL COMPANIES

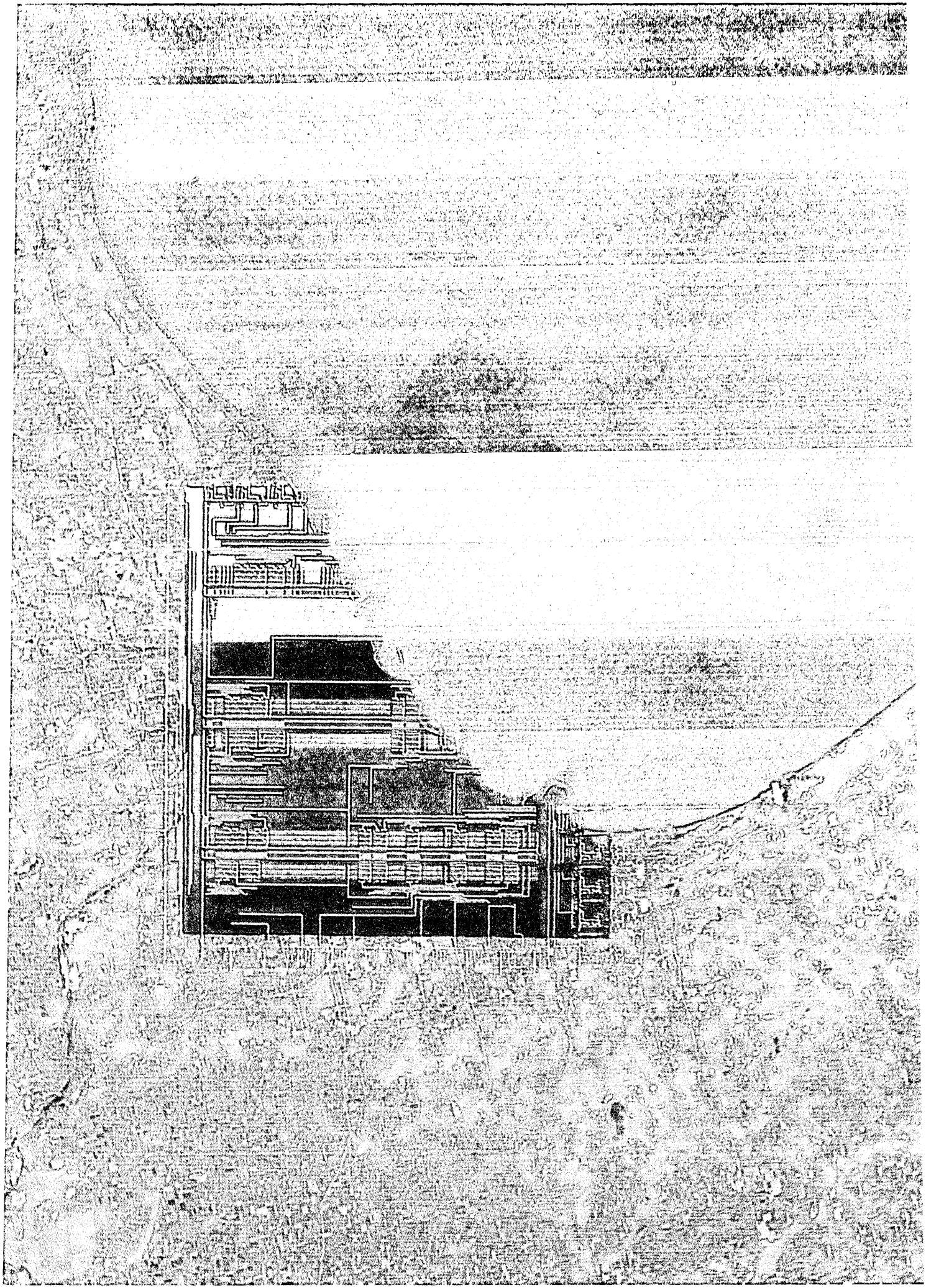
There are also dozens of small but growing businesses: Mark Williams Co., making a name and money for itself with C compilers; Zylab; Softa Group; Amethyst Corp.; Tellabs, started in 1975 and today a leading supplier of telecom products and services to telephone companies, common carriers, government, and private business; Cyborg; SIR Inc.; SKK Inc.; Schonfeld & Associates; CAD Design Systems Inc.; Autovative Computer Extensions Inc.; GCA's Industrial Systems Group; Applied Computer Co. The list goes on.

And, of course, there is AT&T's Bell Laboratories, whose Indian Hill facility is in Naperville. A cornerstone in the Northwest technology corridor, Bell Labs is "a national resource," many observers say, the most successful industrial research lab ever established. The 5ESS digital switch was developed at Bell Labs, as was the Autoplex cellular telecommunications system. Design and development of AT&T's computer line—the AT&T 3B computers and AT&T personal computers—took place at the lab. This facility alone provides jobs for nearly 30,000 Illinois residents. It boasted a payroll of nearly $1 billion in 1983.

"All the ingredients are in place. We can nurture emerging small startups and entrepreneurial companies," observes Andrew Filipowski, president and founder of DBMS Inc. "There are many pluses for our area—a central location, resources, support services. The economic climate is right. Office space is available and priced to attract many different budgets—and it's cheaper than Boston or San Jose.

"Of course, in this larger arena, turning around an economy is more difficult. We will need more momentum to

PHOTOGRAPH BY PETER ANGELO SIMON; COMPUTER CHIP BY PHILIP HARRINGTON



Chicago is a straightforward place—no nonsense, business oriented.

overcome traditional resistance."

Momentum is important, of course. "If high tech begets high tech, then Chicago and Illinois should be getting quite a lot," comments Casey Cowell of USRobotics. "We are doing much better than we were just a few years ago. We have in the past lacked a sense of identity and community of interest. What motivates high-tech companies to stay or come to the Chicago area is the success of high-tech companies already here." Cowell is chairman of the Chicago High Tech Association's promotion and attraction committee. That trade group, founded by the city of Chicago, is an organization of businesses, consultants, educational institutions, and research groups all intent on doing better for themselves and the area.

Cowell continues, "Chicago is a straightforward kind of place—no nonsense, business oriented. We have good access to markets, financial support, unique legal support, manufacturing support. We must consistently look for partnership activities amoung education, finance, support services, government, labor, and business."

This much-touted partnership has been noticeably strengthened by research and educational institutions in the area. The test-tube and ivy-covered worlds of science and academia have been encouraged to help business by, of all things, money.

Illinois traditionally has been at the small end of the stick when it came to receiving Federal research and development funds. Recently there have been some spectacular reversals.

TWO BIG GRANTS AWARDED

The biggest headline grabber in recent months has been designation of the University of Illinois (Champaign-Urbana) as a supercomputing center. There are actually two supercomputer projects of immense proportions. In early February, the U.S. Department of Energy and the National Science Foundation awarded a multimillion dollar grant to the University of Illinois Center for Supercomputing Research and Development, which is headed by computer science professor David J. Kuck.

Later that same month, the National Science Foundation awarded another multimillion dollar grant to establish the University of Illinois Center for Supercomputing Applications. This center is headed by astrophysicist Larry Smarr. His stated goal is to acquire the fastest commercially available supercomputer (a Cray X-MP) and make it available to scientists and engineers working in a wide variety of fields. The supercomputer's power and speed will be increased annually.

Scientists in Kuck's group plan to build an experimental supercomputer using pioneering ideas in hardware architecture and software. This project would make use of the Smarr supercomputer, and should contribute significantly to the development of the supercomputer industry.

Another national research program that is nearing a funding decision is the proposed national Superconducting Super Collider. The Illinois Institute of Technology's Research Institute, one of the largest and most influential nonpublic educational research organizations in the world, has been selected by the State of Illinois to present the case for building the accelerator in Illinois. While it is not definite that the facility will be at the Fermi Labs site, west of Chicago in Batavia, the new accelerator will certainly enhance research and business if it comes to the Land of Lincoln.

These same research centers and universities are working with Chicago area businesses. Says Norm Peterson of the Illinois Department of Commerce and Community Affairs (DECCA), the state's central agency for economic development and business support, "These institutions are changing in many ways."

For example, there has been a noticeable loosening of patent policies at Illinois colleges and universities. And there has been greater cooperation between academia and business.

Peterson says, "There are 32 vocational centers and 52 Illinois community colleges that are working closely with business and with the state."

University-business cooperation also can be seen in the emergence of research parks. Using combinations of government-subsidized office housing, shared support services, venture capital funds, and direct links to university facilities and instructors, these upscale enterprise zones are gaining strength.

On the west side of Chicago, near the University of Illinois, Chicago, is the Chicago Research Park. The area also shares a neighborhood with the Rush-Presbyterian/St. Lukes hospitals complex.

Says Charles C. Sklavanitis, director of the Office of Technology Development at the University of Illinois, Chicago, "State funds have been used to construct a 50,000-square-foot incubator for fledgling companies within the Chicago Research Park. There now are well over 60 companies ready to join the group." The Office of Technology Development coordinates faculty and support services. "We also are looking for better and quicker ways to transfer university-developed technology to the private sector," adds Sklavanitis.

Kare Hiiemae, who is responsible for research at the Health Science Center at the university, states, "There now is a strong belief that we, business and education together, can do a lot. You must realize that many business-oriented discoveries are made almost by accident and that researchers in a university setting are not always the best people to clearly define their work as being valuable as products or services in the marketplace."

GOOD NEWS FROM EVANSTON

There also is good news coming out of Northwestern University, a private institution located in Evanston, directly north of Chicago. The City of Evanston and Northwestern earlier this year proposed a master plan for a $400 million Evanston/University Research Park. The proposal already has attracted the attention of the federal government, which granted the university funds to design and construct a $25 million federal laboratory.

The Basic Industry Research Lab, designated as the national laboratory for applied research in energy conservation, will accelerate transfer of new materials, production, and environmental technologies to the region's industries.

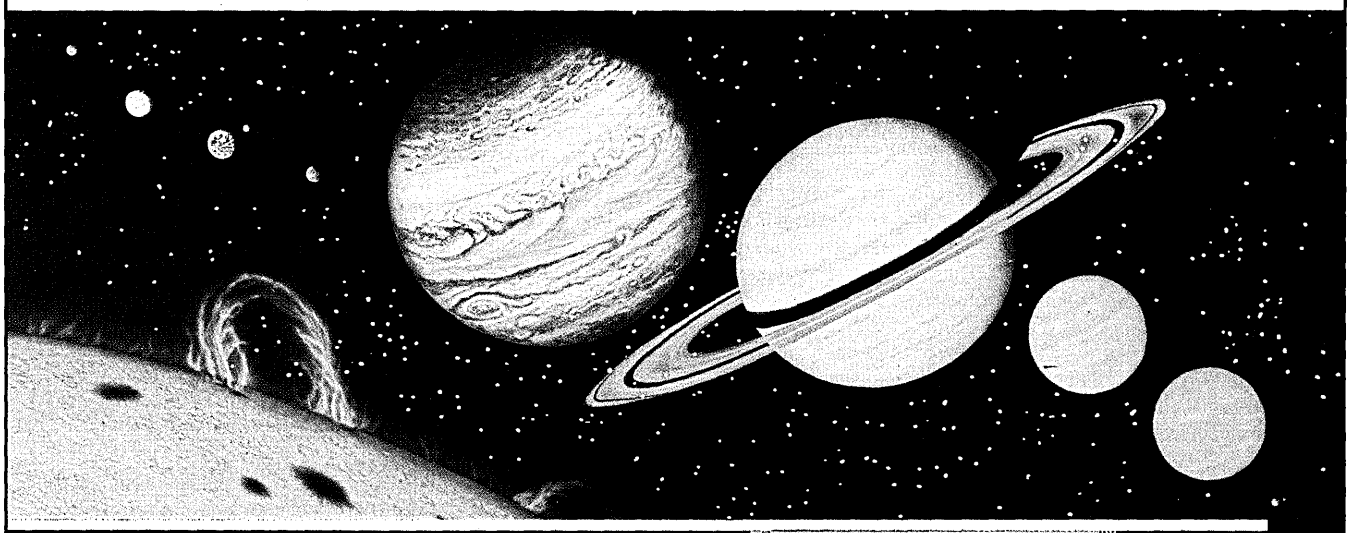
As with its sister park on Chicago's west side, the Evanston/University Research Park will house an incubator facility and a multitenant laboratory/office building and a major corporate research and development structure.

Another unique and energetic educational institution is the Illinois Institute of Technology (IIT), with a campus located on Chicago's near south side. IIT boasts an aggressive and successful Research Institute, a business ethics center, and a computer science department, as well as a series of televised training courses supplied to scores of high-tech and research businesses in the Chicago area.

"Education is turning things around more quickly," comments Dr. Robert Carlson, chairman of the department of computer science at IIT. "Just a few years ago, there were major universities in our area that just did not want to be bothered by business. Their task was education—period. Today, that is just not the case."

Getting from nowhere to such cooperative ventures took more than luck—it took a marriage broker. That broker has been state government.

While economists viewing the Illinois/Chicago high-tech picture tend to credit others for first highlighting the problem and suggesting broad-stroke solutions,



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CIRCLE 40 ON READER CARD

"We are looking for better ways to transfer university-developed technology to the private sector."

YOUR KIND OF TOWN: THE NCC-GOER'S GUIDE TO CHICAGOLAND

In the cornfield galaxy Chicago is the big time in all respects, from politics to finance, architecture, and industry. And when it comes to dining, culture, and nightlife, Chicago is nobody's second city.

If the 1985 National Computer Conference is bringing you to Chicago for the first time, one of the first things you may want to do is get a hawk's eye view of the city. You can do that from the John Hancock Center, 875 N. Michigan, 751-3681, or the Sears Tower, Jackson and Wacker, 875-9696; both have observation floors open to the public for a fee. For a view from the lake, try a boat tour from Shoreline Marine Sightseeing Co., 472-2900.

From a lofty perch, tourists get a glimpse of a flat prairie along a lake, with a river bisecting downtown Chicago. The Loop area, so called because of the elevated train line's route around the center of town south of the Chicago River, used to be the epicenter of the town's nightlife, but not any more. Michigan Avenue, north of the Loop, is now the main drag, the "Magnificent Mile" in local parlance, where the fancy shops—Neiman Marcus, Lord & Taylor, Gucci, Tiffany's, and others—have their posh emporiums. South of the Loop are McCormick Place and the University of Chicago; north of the glittery shops are the Near North Side, and the shops and gentrification of the Old Town section. And north of Old Town is New Town, site of restaurants, Equity and non-Equity theater companies, and miles and miles of yuppie flats—turn of the century limestone homes converted into three- or four-level condominiums.

Visitors should obtain a copy of *Chicago* magazine, the city's unofficial restaurant guide, for detailed information on more than 100 restaurants in the area. Most hotel newsstands carry it. Another good source is *The Reader,* a liberal-leaning free newspaper with extensive music and theater listings. *The Reader* can be found in some shops and bookstores on Michigan Avenue; it's easy to find in almost any store, restaurant, or newsstand on the North Side.

Dining out in Chicago can be whatever kind of experience you want it to be. White tablecloths and candlelight, steak and fries, a plate of nachos and a pitcher of margaritas—whatever you're in the mood for, there's a tremendous variety of restaurants and cafes to choose from, each offering a different sort of ambiance and cuisine. North Michigan Avenue is a popular spot with out-of-towners because of its many stores, hotels, and shops. On this avenue you'll find some of Chicago's best-known and upscale restaurants.

Le Perroquet, 70 E. Walton, is called "Chicago's most sophisticated restaurant" by *Chicago* magazine because of its superb nouvelle cuisine and dignified atmosphere. Not the place for a raucous office party, Le Perroquet is better suited for quiet conversation. The restaurant is famous for its daily specials, and features such delicacies as shad roe in beurre blanc and flourless chocolate cake with rum and hazelnuts. Lunch and dinner prices are set at $16.50 and $42.50 per person, respectively. Reservations are mandatory, and for weekend dinner, it is necessary to reserve at least two weeks in advance. In other words, by the time you read this, it may be too late to call for a reservation. But now you know what you're missing.

For a good steak dinner, there are several options. Lawry's The Prime Rib Restuarant, 100 E. Ontario, is an excellent place for steak and potatoes if you're already in the North Michigan Avenue area. Prime rib and roast beef are carved from a loin of beef on a cart in the dining room and served with real mashed potatoes, gravy, and Yorkshire pudding. No appetizers are served; dinner begins with bread and butter and salad. Lawry's offers an expanded lunch menu, which includes deviled rib bones, fresh fish, and other main courses.

For steak and lobster north of the Loop, try Morton's, Newberry Plaza, 1950 N. State, where diners can choose their meals from a cart displaying raw cuts of meat that waiters roll up to the tables. The atmosphere is typical for a steak house—somewhat loud—but the steaks are reportedly some of the best in Chicago. The menu also features baked chicken, veal chops, and lobster. Entrée prices are around $20.

Chicago's premier spot for ribs is Carson's, 612 N. Wells, with several other locations in the area. Be prepared for a long wait—Carson's is almost always crowded—but isn't that what you would expect for a restaurant that is surely Chicago's king of rib joints? The atmosphere is very informal and the menu includes a variey of portions, from a full slab of baby back ribs and "The Giant," a 22-ounce strip steak for $19.95, to smaller steaks, barbequed chicken, and three fish dishes. The au gratin potatoes at Carson's are a sublime way to ruin your diet.

Seafood lovers should try Nick's Market, located downtown at the First National Plaza. Nick's offers a wide range of seafare, including out of the ordinary dishes like Hawaiian fish, California abalone, and whole baby salmon. Entrees range in price from $18 to $23. Another seafood treasure is the Cape Cod Room, in the Drake Hotel, 140 E. Walton. The decor is decidedly New England, with an oyster bar and a wide assortment of fresh fish and shellfish.

While the Magnificent Mile is for most tourists the center for dining and shopping in Chicago, many fine restaurants are located outside the North Michigan Avenue area. South of the Loop, in a newly renovated section called Printers Row—so named because of the many loft buildings that were formerly commercial print shops—is Printer's Row restaurant, 550 S. Dearborn. Traditional American dishes are featured, including venison, breast of chicken, and duck. Reservations are recommended. The neighborhood may look somewhat deserted since com-

the state government has been more free to act, and has more carrot and stick measures to use.

Bringing business and others together as well as preparing Illinois' labor marketplace for high-tech opportunities has been the major responsibility of the Illinois Department of Commerce and Community Affairs.

"We have to go after high-tech," reports Norm Peterson of DECCA. "It's not a case of either/or. It's not a case of going after traditional industry or high tech. We must go after both. We must encourage our traditional industries as well as be more attractive to entrepreneurial activities," he says.

Just as it is with any successful business venture, the first step is good planning. Illinois has done that with an impressive Five Year Plan, following focus group meetings, commission reports, and public sessions.

There also has been a significant shift in roles for state government. Explains Peterson, "There's a visible change from a totally hands-on approach to that of a facilitator. For example, the state now has in place 39 small business development centers located conveniently throughout Illinois. Easy access to private and educational resources is the aim of these centers."

Following the dictates of the mar-

mercial development of Printer's Row is still in its infancy—though some of the residential loft buildings in the area are almost fully occupied. It's a good idea to stay within a block or so of the restaurant at night. Don't even think about walking there from the NCC or from a Michigan Avenue hotel.

Near the Merchandise Mart, located west of the lake at Wells and the Chicago River, in a neighborhood that also houses a number of art galleries and lofts, you'll find Gene & Georgetti's, 500 N. Franklin. Usually packed, Gene & Georgetti's is an informal, lively Italian steak house. Dinner for two with wine is about $60.

A short taxi ride to the North Side will bring you to Ambria, in the Belden-Stratford Hotel, 2300 N. Lincoln Park West. The restaurant is nationally known for its excellent nouvelle cuisine. The pate foie gras is superb, as are the fresh fish dishes. Those with a penchant for sweets should try the soufflé. After dinner, old-home addicts will enjoy a walk around the neighborhood.

If ethnic cooking is your preference, you won't have any problem finding a restaurant to suit your taste. Chicago has an abundance of ethnic restaurants, ranging from Japanese and Vietnamese to Mexican, Italian, and Armenian. Many of the neighborhoods where immigrants settled after World War II have retained their ethnic majority, hence you'll find Greek Town just west of downtown, Chinatown on the South side, Lithuanian Village southwest of the Loop, and so on. You don't necessarily have to travel to distant parts of the city, however, to find good ethnic restaurants. For instance, for Mandarin cuisine, try House of Hunan, located at 535 N. Michigan. Pasta lovers can find their favorite dishes at Spiaggia in the One Magnificent Mile building at the intersection of Oak and Michigan, or Avanzare, 161 E. Huron.

A trip to Greek Islands, 200 S. Halsted, offers a glimpse of a tiny old Greek neighborhood where Greek restaurants, grocery stores, and bars line the streets. The saganaki (flaming cheese) is salty and tangy, and don't be surprised when the waiters pour cognac and ignite the concoction at your table and shout "Oompah!". One of the best buys on the menu at Greek Islands is the combination plate, featuring a portion of mousaka (eggplant casserole), lamb, vegetables and rice, Greek-style meatballs, and stuffed grape leaves. The Grecian shrimp is also excellent. Greek Islands is often crowded, and the atmosphere can be boisterous, what with everyone getting into the act and yelling "Oompah!" Dinner for two with wine is about $25.

Chicago has some of the best Mexican food you'll find anywhere north of the Rio Grande. Just across the street from Happy Sushi is El Jardin, 3335 N. Clark, a fine Mexican restaurant that offers good margaritas and an outdoor garden. A few blocks north you'll find a noisy, friendly, neighborhood spot called La Canasta.

If you have any spare time during and after the show, take advantage of the museum scene. Art enthusiasts won't want to miss the Art Institute of Chicago, Michigan at Adams, 443-3500, or the Museum of Contemporary Art, 237 E. Ontario, 280-2660. History and science buffs may want to take a slight detour from the trip to and from McCormick Place to visit the nearby Field Museum of Natural History, South Lake Shore Drive at Roosevelt, 992-9410, and the Museum of Science and Industry, 57th and Lake Shore Drive, 684-1414.

Theater buffs should know that 1984 was the year Chicago theater came into its own. The Goodman Theater, 200 S. Columbus, 443-3811, last year exported to Broadway both the smash hit "Hurlyburly" and Pulitzer prize winner "Glengarry Glen Ross," written by Chicago playwright David Mamet.

And, of course, you can't talk about Chicago theater without several accolades for Second City, 1616 N. Wells, 337-3992, the improvisational theater company where such stars as the Belushi brothers, Shelley Long, Alan Alda, Bill Murray, Mary Gross, and what seems to be every big name comedian for the past 10 years first got started. The company is currently performing its 66th revue, "True Mid-West." The gags at Second City are almost always uproariously funny, but tend to have a definite local flavor. Out-of-towners may miss a few laughs because of this, but the shows are always worth seeing, whether you're a local or not. It's advisable to make ticket reservations in advance; weekend shows are often sold out.

Up-to-the-minute theater information can be obtained by calling the Curtain Call line, 977-1755, or by calling the Theater Tix box office phone, 853-0505. Half-price tickets are available for certain plays on the day of the performance at the Hot Tix booth, which is located at 24 S. State.

Live music shows are abundant in Chicago. Especially good are the jazz and blues clubs, particularly the Jazz Showcase, located in the Blackstone Hotel, 636 S. Michigan, 427-4300; Rick's Cafe Americain, 644 N. Lake Shore Drive, 943-0648; Orphans, 2462 N. Lincoln, 929-2677; and Lilly's, 2513 N. Lincoln, 525-2422. The Park West, 322 W. Armitage, 559-1212, has live pop music, usually a national act, and doubles as a fairly tame video dance bar. Adventurous types looking for rock and video clubs may want to check out Smart Bar, 3730 N. Clark, or Neo, 2350 N. Clark.

Tickets for the Chicago Symphony Orchestra may be difficult to obtain, but it's certainly worth a try to hear this brilliant group, led by Sir George Solti. Call Orchestra Hall for information, 220 S. Michigan, 435-6666. Somewhat easier to come by should be tickets to a Chisox-Indians game at Comiskey Park on the evening of the 18th.

—by Karen Gullo

ketplace is another dominant theme. "We let the market make the decisions for us, with the state channeling its resources, programs, and incentives in directions that the marketplace indicates," adds DECCA's Peterson.

During the past year, there has been a lot of channeling. Today, the state has a menu of exciting and unique programs which are having a measureable impact on the economic well-being of high tech in Chicago and Illinois.

One good example is the Technology Commercialization Program. In 1985, there will be $1.8 million from the state available in grants and seed money. The aim here is to be a window into what universities and research centers are doing as well as a window out so Illinois businesses can put that work to use.

This program is coupled with a Business Innovation Fund. Here, the state provides dollars to businesses and entrepreneurs needing the assistance of an Illinois university or not-for-profit research lab. Businesses receive seed money through the Technology Commercialization Centers, where stable dollars are mixed with grants and private funds to support research and product development.

In exchange, businesses agree to a royalty repayment so the state can share in the profits as well as the risks when prod-

ucts or processes are developed and sold in the marketplace.

VENTURE FUND SET BY STATE

To encourage more private investment in high-risk companies, the state also has established an Illinois Venture Fund. Jointly initiated with the private-sector Frontenac Venture Capital Co. of Chicago, this fund provides equity capital for startup and early-stage companies. Funds are normally used for product or final product prototype development and related research, testing, and production, as well as for initial marketing needs. In addition, the state is encouraging traditional financial sources to be more aware of high-risk and high-tech opportunities for investment. The Illinois Lender Commitment Program is a formalization of a private/public sector financial partnership.

Small business incubators also are being assisted by the state and by the research parks springing up. Work in Illinois has been aggressive and unique. Grants are awarded to enterprise zone areas while local private and public funds are used to match state funds dollar for dollar. The grants are used for leasehold improvements within the incubator, seed capital loans, and project management support.

The heart of the state's efforts is Governor James Thompson's Build Illinois program. "This is the strategy for implementing the state's Five Year Plan," says Norm Peterson. "This is a critical year for economic development in Illinois. During the past five years, the economic base of the state has changed dramatically. Industries such as farm implement manufacturing are no longer thriving, and the infrastructure the state must have to attract new industry and retain those industries that are already located here is in need of substantial renovation and expansion. To answer that need, we have proposed Build Illinois."

Within Build Illinois is a proposed Ilinois Investment Program, a unique approach to placing money where it will be most productive. It is a small business loan program on the state level and will gain in importance in relationship to support lost from the Small Business Administration, which will likely be drastically reduced by the Reagan administration's 1986 budget.

Such programs to encourage entrepreneurial efforts are overcoming a midwestern reluctance to "go it alone." Comments Art Beck, a long-time Chicago computer professional and president of Abeck Associates, "People here tend to stay loyal to their employers and don't easily venture out on their own. These incentives help spur more risk taking."

The state also will have an impressive presence at the National Computer Conference. It is cosponsoring a booth with the Illinois Software Association and Center. Says Evelyn Heaton, executive secretary at the association and a staff member with DECCA: "We will be displaying what the state has to offer, as well as spotlighting success stories in high technology."

These days, the hog and grain capital has more than a few of those. ◉

Bill Zalud is editor of *Data Management* magazine and director of publications for the Data Processing Management Association in Park Ridge, Ill.

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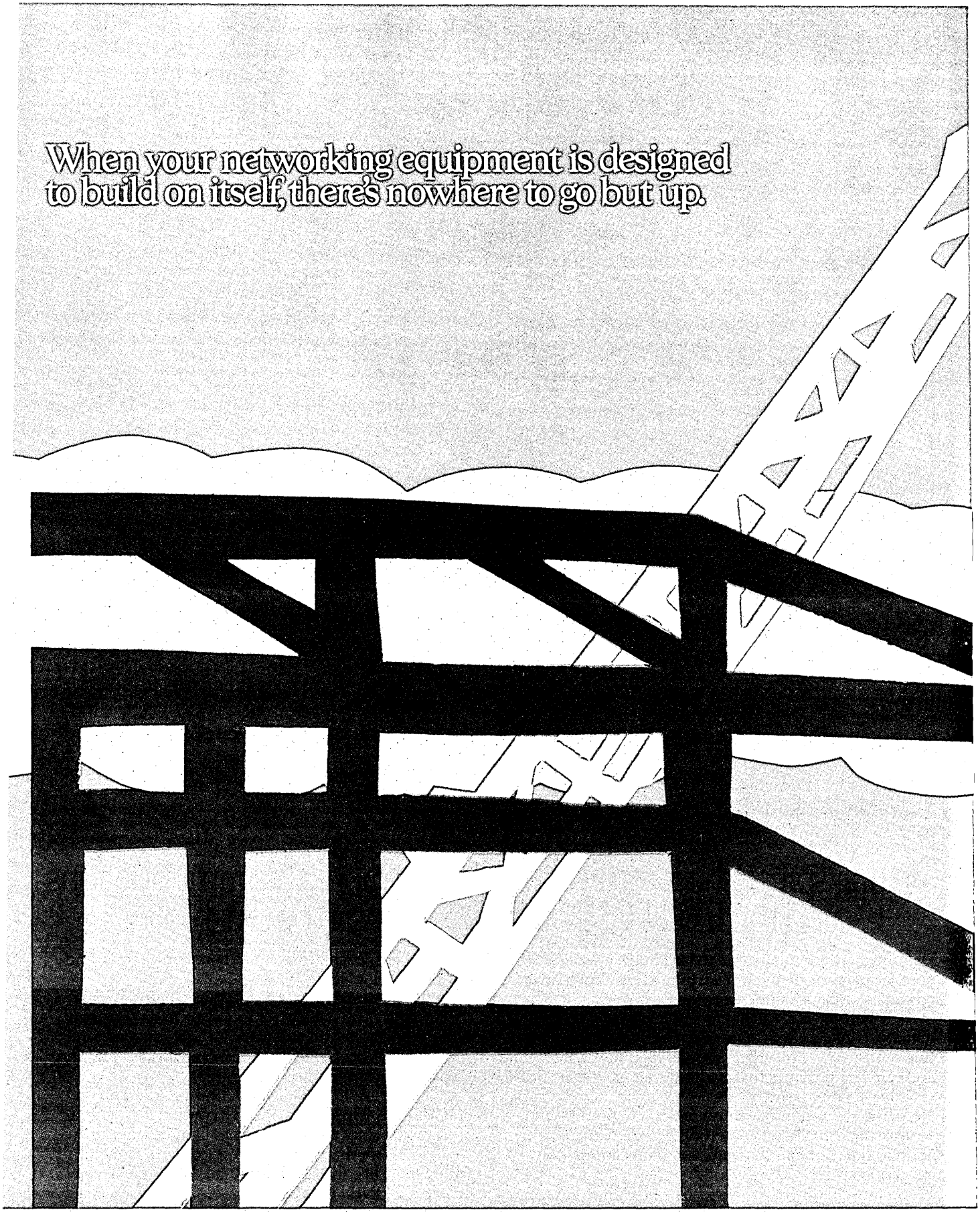

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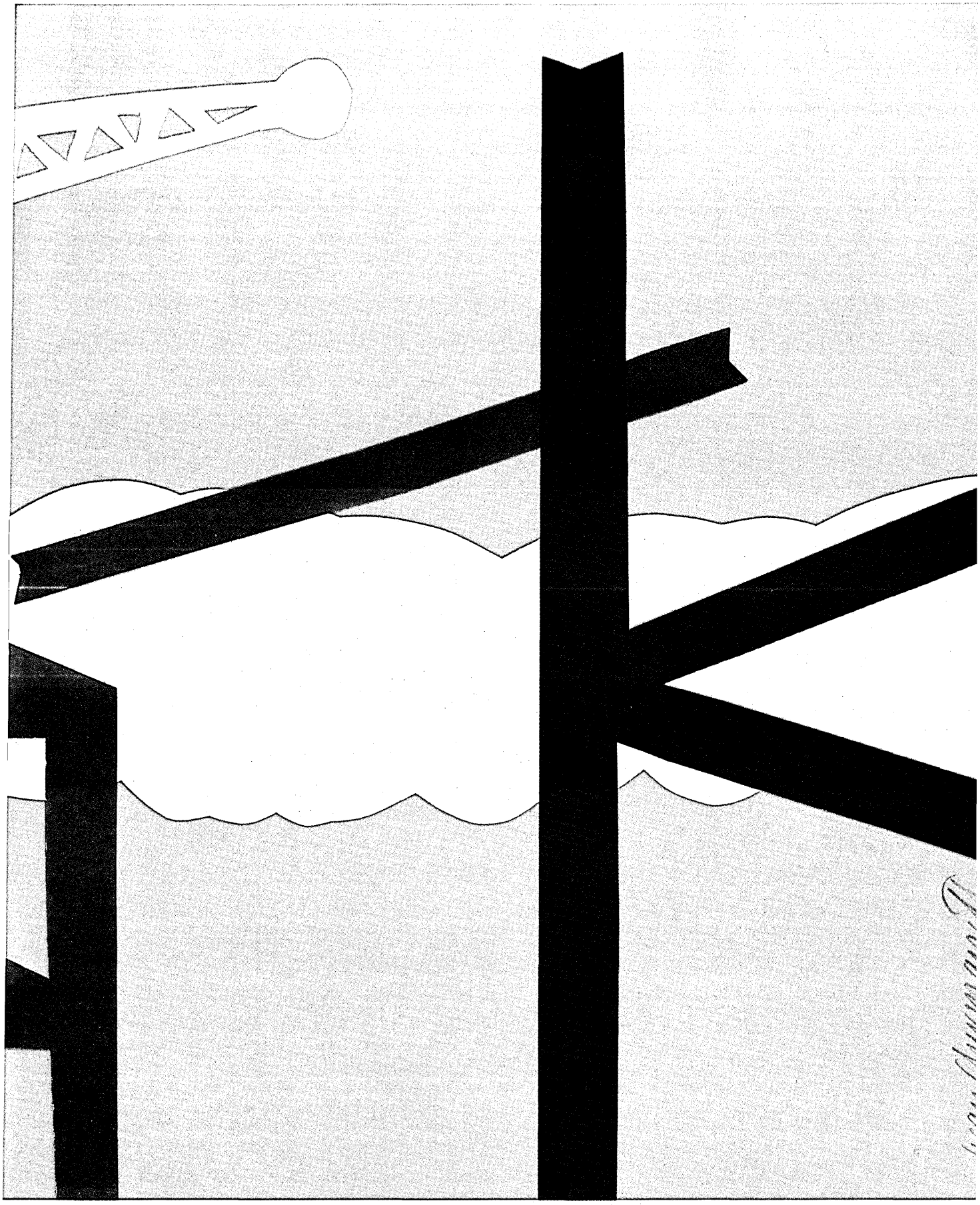

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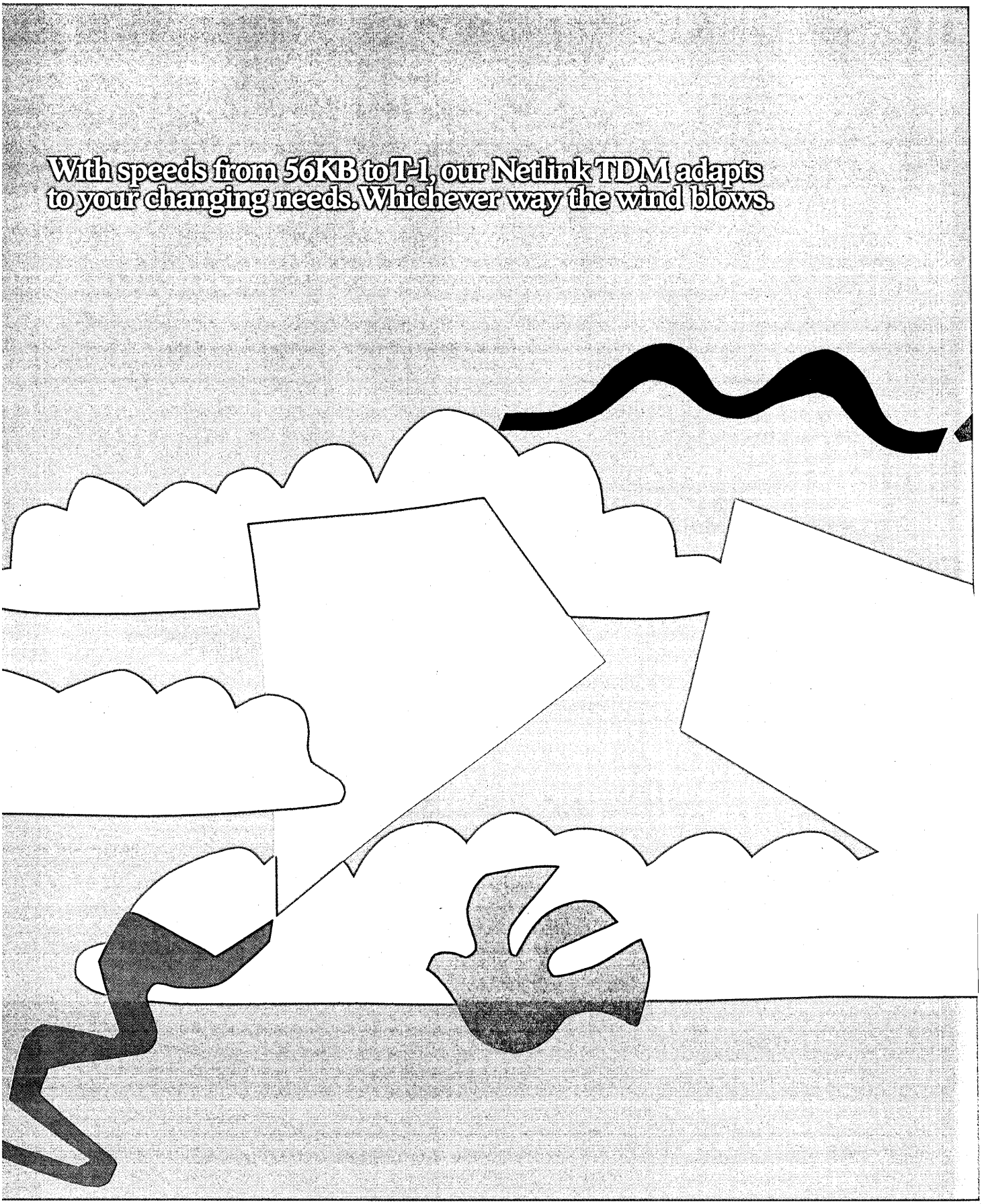

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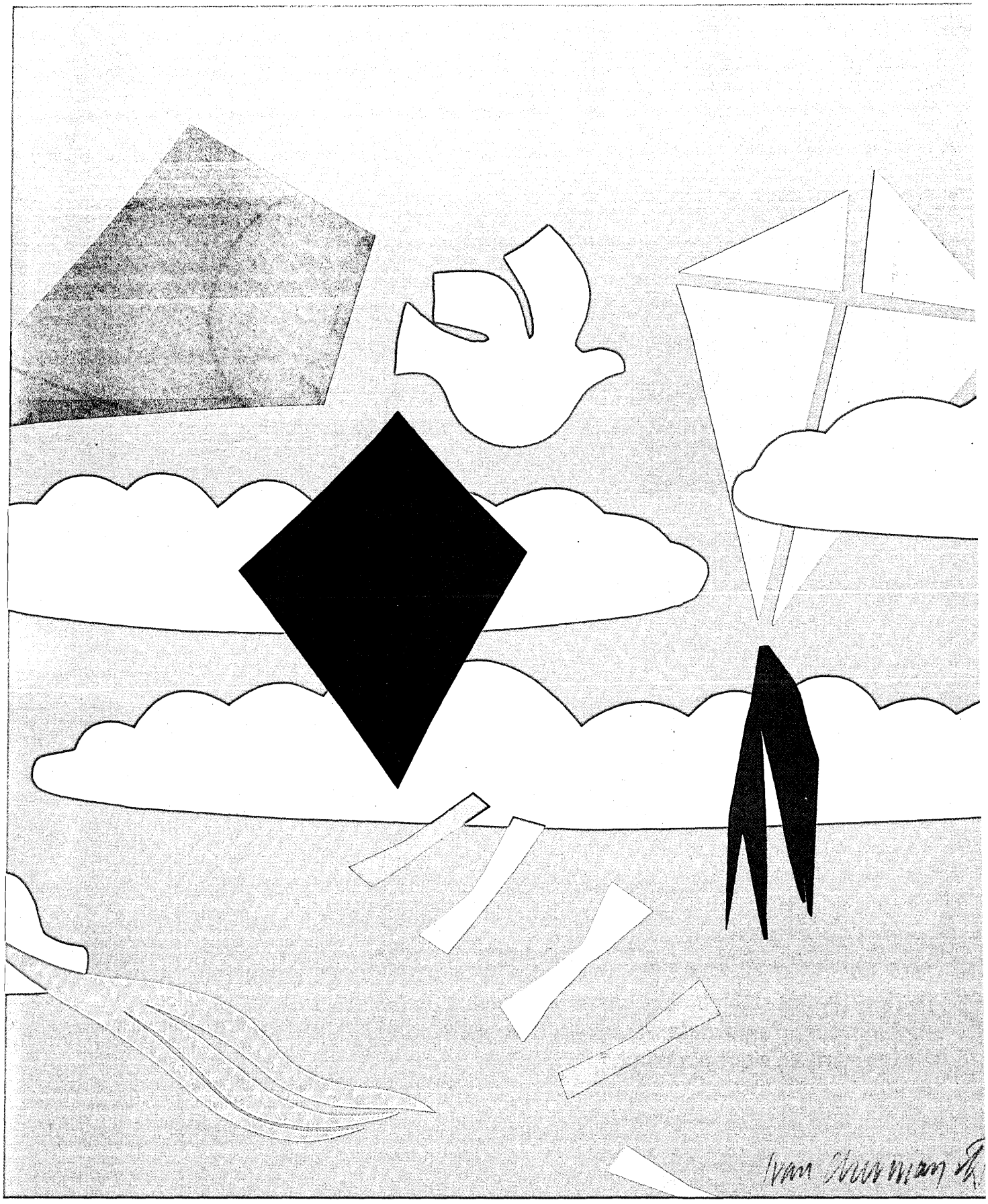

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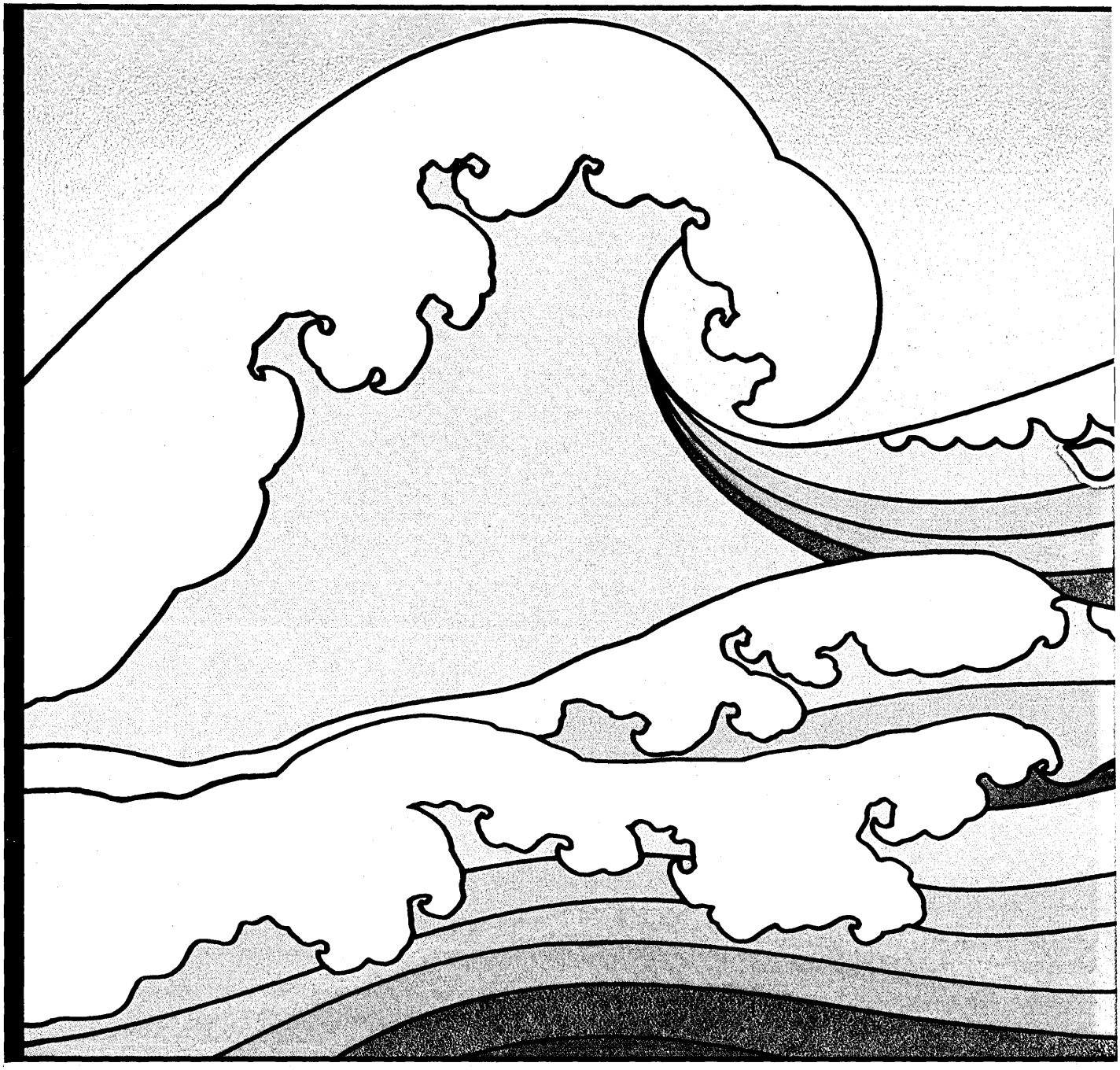


You say digital communications are confusing, expensive, and unstandardized? That doesn't mean it's too early to start planning.

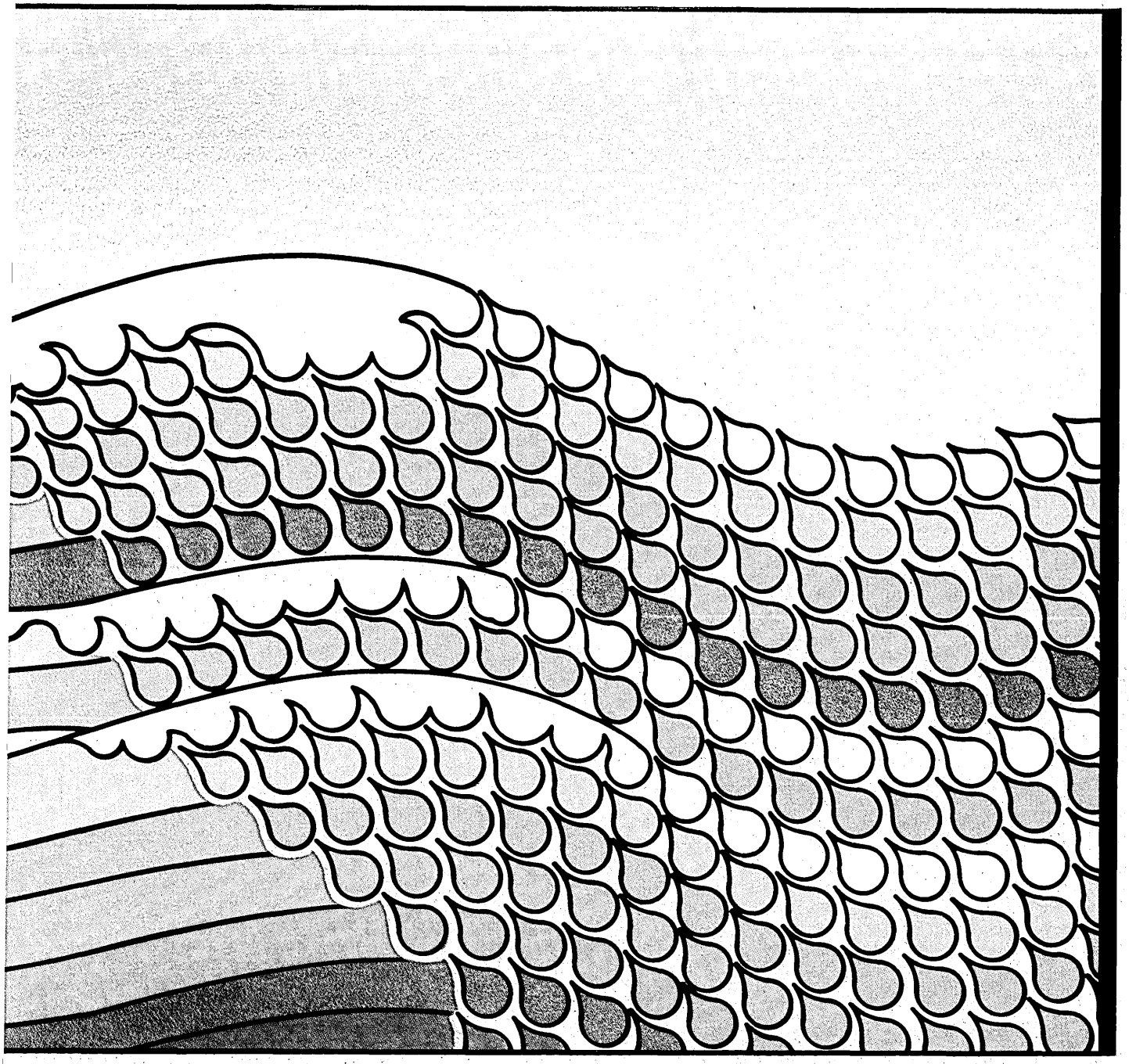
DIGITAL NETWORK STRATEGIES

by Peter G. Balbus and Brian M. NeSmith

It's been said that there are no such things as problems—only unanticipated opportunities. If that's the case, today's telecommunications managers are fortunate to be working in an environment with such unprecedented levels of unanticipated opportunities.

Perhaps the greatest opportunities of all are to be found in emerging digital networking technologies. The challenge for managers is to apply these new technologies for effective cost containment and network enhancement in view of the following facts:

- Networking standards are still evolving.
- A seemingly endless stream of powerful



new facilities and equipment are being thrust into an increasingly competitive telecommunications market.

- Digital facilities and equipment usually involve higher up-front costs than their analog counterparts, requiring a longer—and less certain—payback period.
- Networks are likely to comprise a hodgepodge of digital and analog facilities and equipment for some time.
- Ma Bell—the once beneficent mother—can no longer provide the end-to-end network management she once could, leaving managers to fend for themselves.

For many corporations, today's digital technologies may offer substantial cost savings and enhanced capabilities. Others, however, would be well advised not to take any drastic actions now—but should nevertheless ensure that today's decisions do not limit the potential for implementing future digital technologies. In this article, we will identify important considerations for formulating a successful digital migration strategy, outline critical managerial issues, and describe some new and some soon-to-be-available digital facilities.

Mahatma Gandhi once said, "There is more to life than increasing its speed." Gandhi, clearly, was not a network manager. Sometimes the network manager's very existence seems to be justified by his ability to provide faster communications. And faster communications is one of the most compelling promises of digital technologies.

Digital technologies are emerging at a time when network managers are already finding their traditional management structures challenged by three concurrent trends: the dawning recognition of communications—both voice and data—as a strategic resource, rather than a utility; the convergence of dp, office automation, and communications technologies; and increasingly complex equipment and facilities.

Many managers seem to have accepted the inevitability of the digital evolution—in some instances, almost against their wills. John Ng, director of telecommunications for PEPCO, Washington, D.C., laments, "As an analog carrier, we face the dilemma of converting to digital technologies economically. The problem is that analog products are being discontinued and manufacturers are abandoning analog technology. It would be more economical for us to stay analog—at least for a while—but it

ILLUSTRATION BY CYNTHIA STODDARD

The first phase of strategic planning must include redefining the role of corporate communications.

looks as though we'll be using fiber optics and overlaying our analog facilities with a digital link in the near future."

Network managers are finding that they need strategic communications plans to adopt and manage new digital technologies. The telecom director for a major oil corporation characterizes his planning approach to digital technologies by asking three questions: "Are they appropriate for my network today? If so, how do I ensure their smooth introduction into my existing system? And how do I design my network to take advantage of digital technologies?"

DIGITAL STRATEGY A MUST

For some corporations, the transition from analog to digital is a current issue; for others it will not become one for a few years. For managers in both kinds of organizations, however, formulating a digital evolution strategy is a must. Devising and implementing this kind of strategic plan is a complicated process that requires the strong support of senior executives. Adopting digital technologies may presuppose major organizational changes and may require large initial investment in communications equipment and staff training.

Gaining the support of top executives will require that the executives understand the rationale for implementing digital technologies. They will have to be shown that substantial cost savings can be realized down the road before they will take an active stance, realign their departments, and approve the up-front equipment and training costs. Observes Joe Sharp, manager of telecommunications for Riggs National Bank in Washington, D.C., "Adopting digital technologies may require higher initial costs than comparable analog technologies." Sharp notes, however, that his organization expects to recoup the added cost in a very short time—perhaps as soon as one year. "From 60% to 70% of the rewiring expenditures we made last year for employee moves, changes, and new applications could have been avoided if digital technologies had been in place," he says.

The first phase of the strategic plan must include redefining the role of corporate communications from a simple (but expensive) utility to a strategic corporate resource. The way to achieve this redefinition is by educating your boss on the role that communications plays in your business and helping him to understand that effectively applying communications technologies can leverage corporate resources and boost profits.

Before making any investment in equipment or training, it is essential that your corporation develop a communications management structure that can effectively manage the network and its evolution from analog to digital. For many organizations, this means merging the data processing and voice communications departments into a unified information resource managment (IRM) department.

If the two departments are not organized under a single administrative umbrella, the consequences are likely to be incomplete solutions—and cost penalties. For example, if a corporate office automation scheme is implemented, the form it takes probably will depend upon whether the dp department or the voice department evaluates the options. The dp department will likely lean toward a computer manufacturer's solution—Data General's CEO, for example, or IBM's PROFS, or DEC's All-In-One. The voice department will be more apt to choose a PBX-based solution from vendors such as Rolm, Northern Telecom, or AT&T-IS.

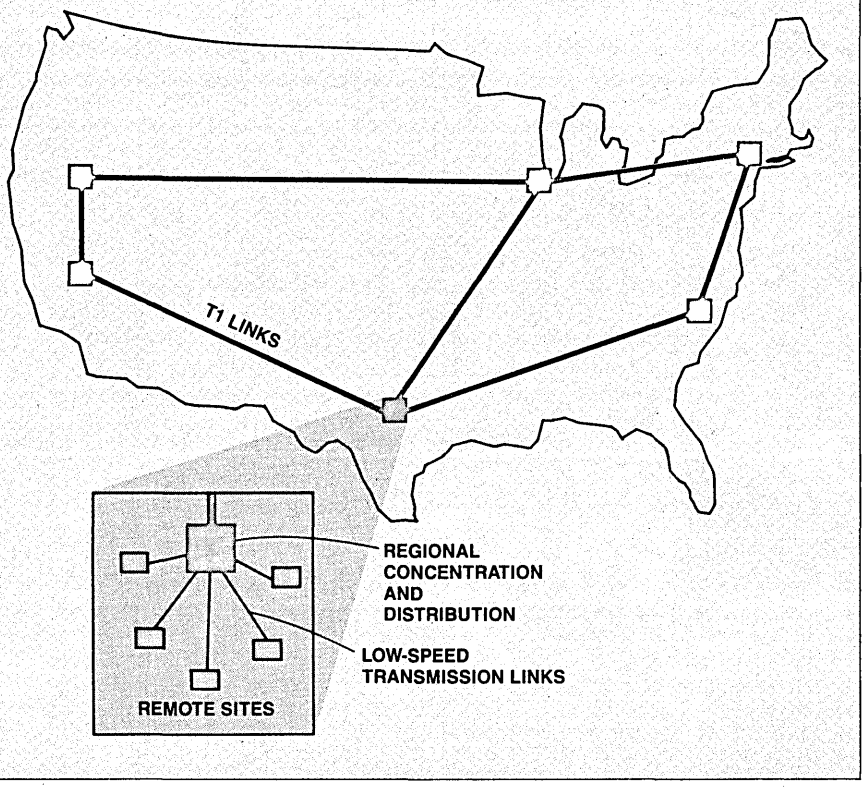
Likewise, if a decision must be reached for selecting a network to link desktop computers, the dp department will probably favor an expensive local network, while the voice department will likely select a PBX that may not provide the full functionality required for data transport.

With a unified voice and data department, reasonable alternatives are more likely to be evaluated fairly and with a greater appreciation for both voice and data requirements. If merging the voice and data departments is not immediately feasible, the IRM manager may want to consider forming task teams drawn from both departments.

According to Bob Kirkendall, vice president of sales for Universal Communications Systems, Roanoke, Va., "The situation is kind of like a train wreck waiting to happen, with the data people evolving an OSI or SNA architecture for their communications requirements, while the voice people are off on their own utilizing vendor-proprietary architectures. Each group is making decisions solely on the basis of its own requirements."

If your corporation maintains separate voice and data departments while implementing digital technologies, the opportunities for integrating voice and data and decreasing cost through economies of

FIG. 1
A CORPORATE BACKBONE NETWORK USING T1 FACILITIES



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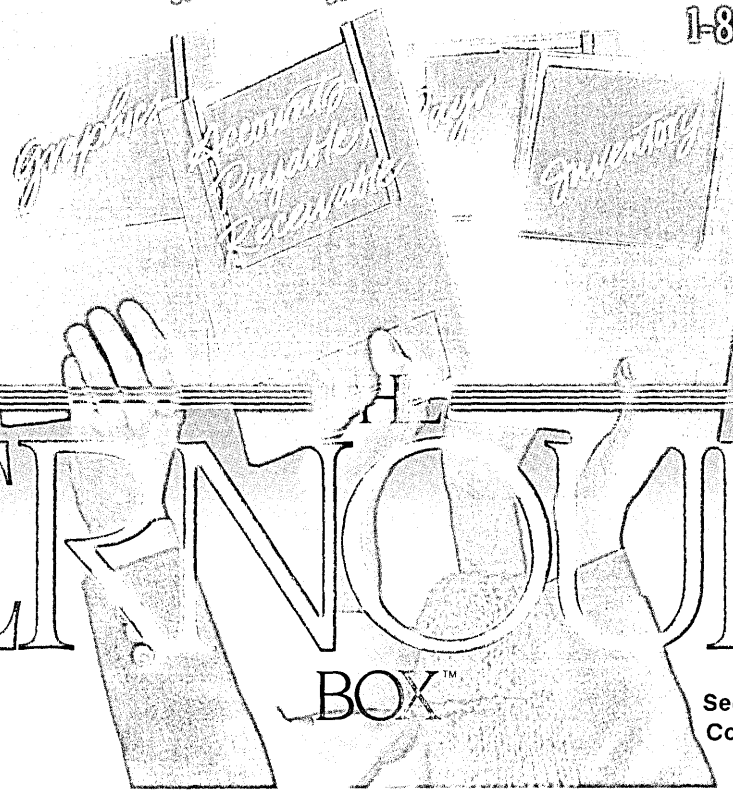

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The ultimate goal of strategic communications is synergy among communications-related departments.

scale are likely to be diminished. And network evolution is likely to be limited by corporate structure and political considerations rather than the technical or economic issues.

ULTIMATE GOAL IS SYNERGY

The ultimate objective of the strategic communications plan is to foster synergy among communications-related departments and corporate planners. The end result will be a corporate infrastructure geared for deciding digital implementation issues solely on the basis of cost and functionality. [1]

Two major technical questions many corporations face are the related issues of whether to adopt digital technologies and whether to evolve integrated voice and data networks. There is a common misconception that these issues are really two sides of the same coin. They are not. Network managers are not obligated to integrate their voice and data traffic solely because their networks are adopting digital technologies, and voice and data can be integrated on an analog network by means of modems.

On the other hand, one of the major things that makes the digital technologies so attractive is the expectation of integrated voice and data in the promised integrated services digital network (ISDN) (see "The Integrated Services Digital Network," Dec. 1, 1984, p. 68). Integrated voice and data promises substantial cost savings due to economies of scale (especially for transmission costs), and as Bill Burr, director of the National Bureau of Standards' Computer Learning Center, states, "Naturally, everything is going digital—digital is easier to integrate."

Digital technologies can be implemented in three different interdependent sections of the network. By dividing the network into these three sections, managers can identify and evaluate cost savings or issues related to each section of the network. The sections are

- user interfaces—telephones, terminals, executive workstations, and personal computers;
- switches—PBXs, LANs (a local network can be viewed as a complex virtual switch), communication controllers, and data switches; and
- transmission media—twisted pair, coaxial cable, fiber optics, and telephone company services providing virtual circuits.

User interfaces. The major challenge at the user interface is educating users on how to take advantage of the network's capabilities. Plan on spending considerable effort and money on training users how to use telephone and terminal equipment. If users do not or cannot use their terminals and telephones effectively, then the functionality provided by the network is at best an expensive ornament.

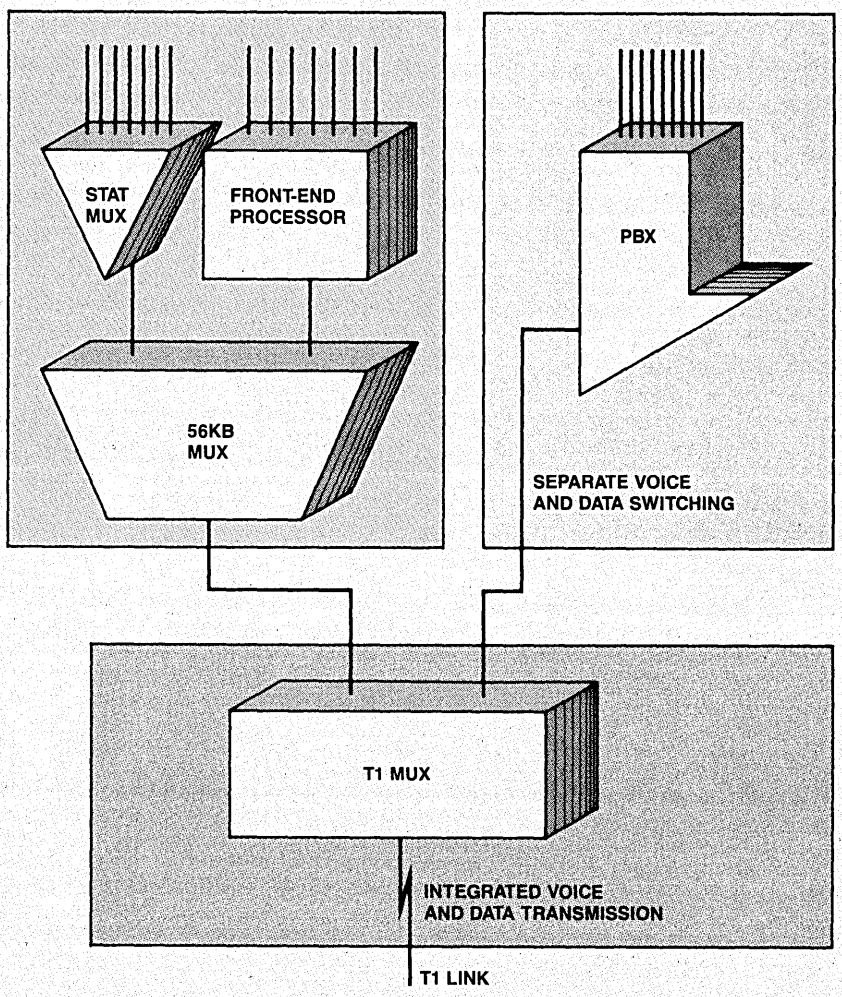
A secondary issue is whether or not to integrate voice and data. The combined voice and data workstations available today provide little more functionality than separate desktop terminals and telephones. In any event, it is generally accepted that all employees should have a telephone. It is not as generally accepted that all employees need terminals at their desks.

Adopting digital technologies at the user interface is not an absolute must—digital telephone sets may offer some added functionality, but they are still relatively expensive compared with standard analog models.

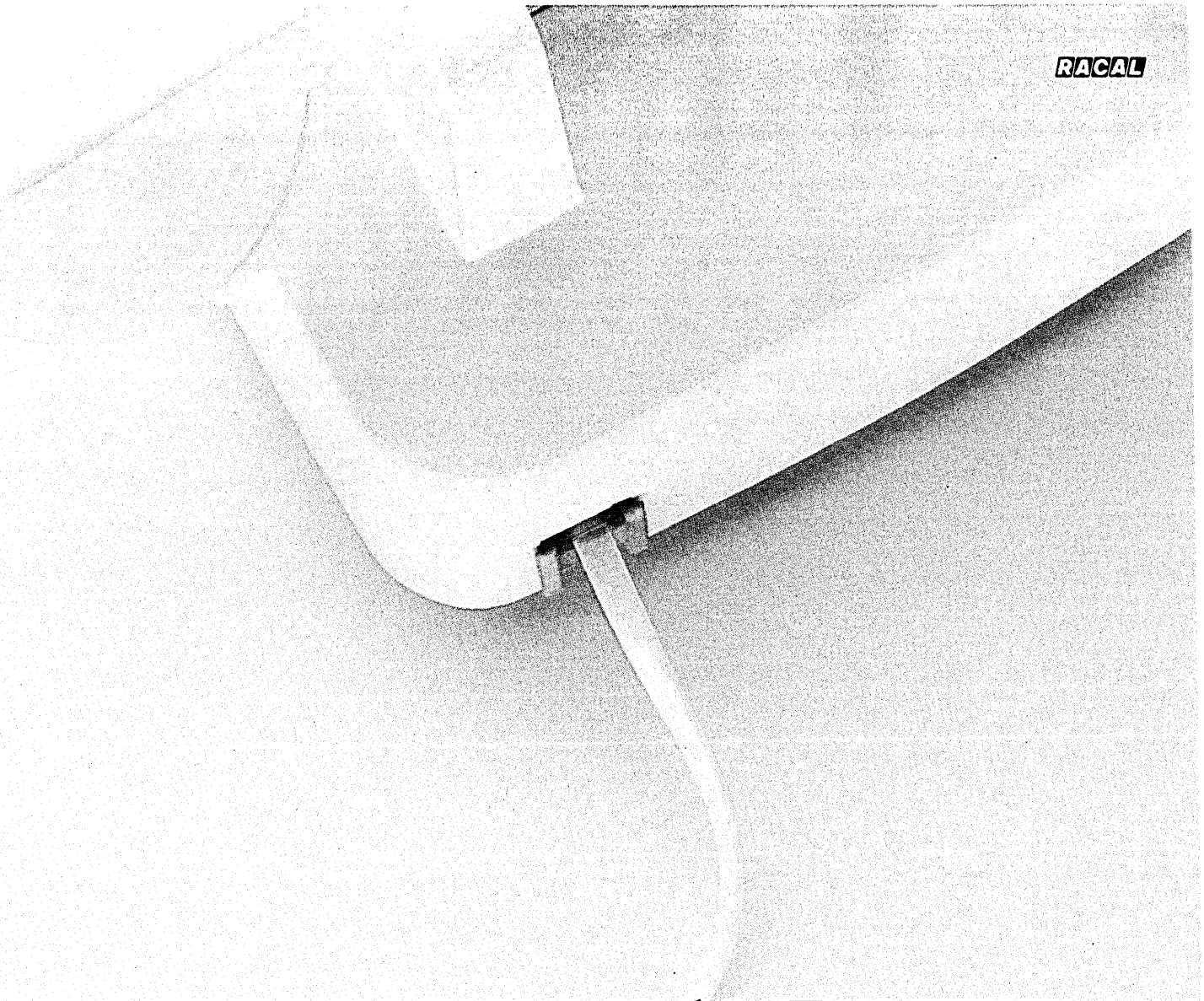
One option (a politically tricky one) is to furnish digital telephone sets only to those employees who really need them. The rest can use less expensive analog sets, although this may exclude them from some of the more exotic features available. The bottom line is that there's considerable flexibility at the user interface, especially since digital PBXs and Centrex systems will continue to support both digital and analog

FIG. 2

REGIONAL CONCENTRATION EQUIPMENT



In this regional data center, voice and data are switched separately, as shown in the upper half of this figure. The T1 multiplexor integrates the digital voice and data signals for transmission.



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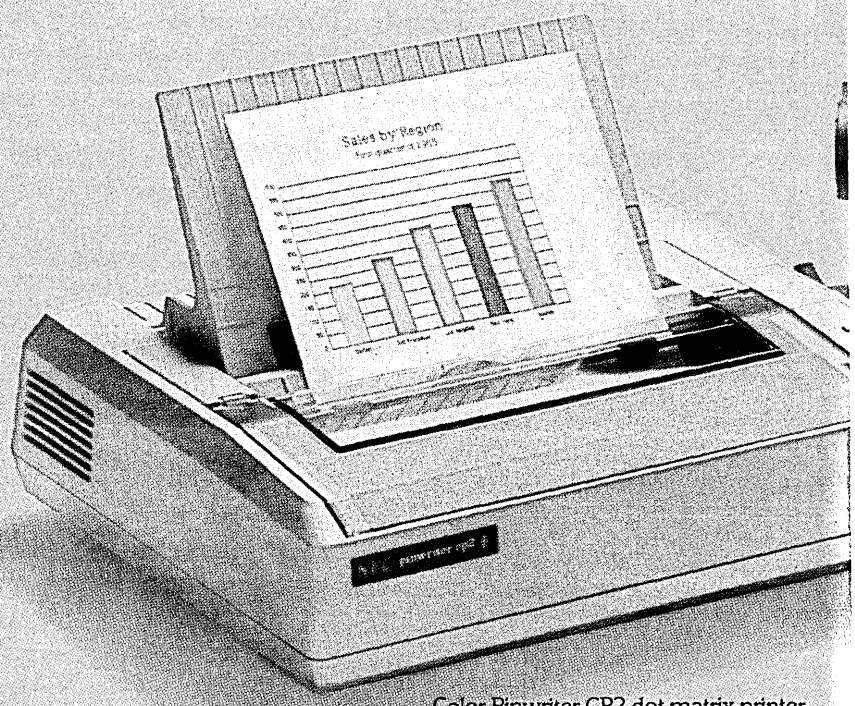

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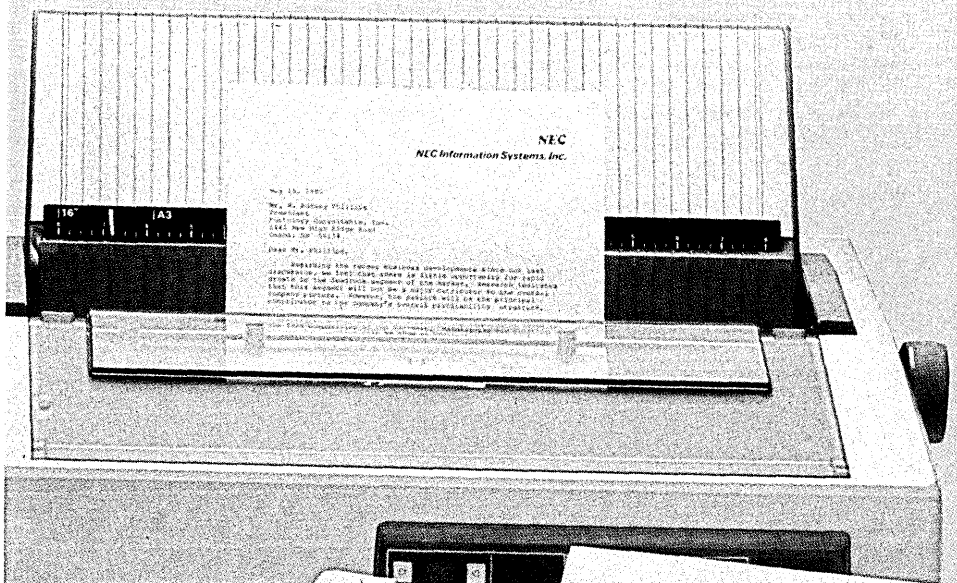

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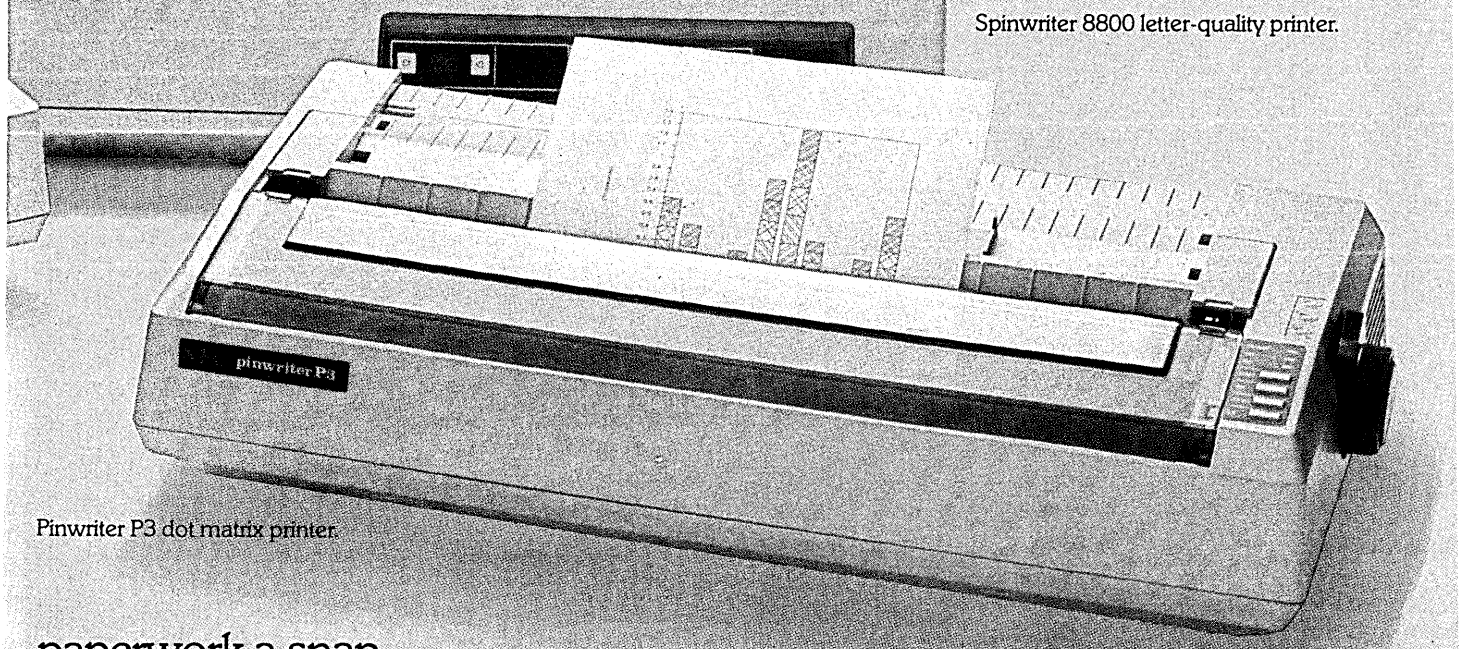

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telephone sets for the foreseeable future.

Switches. The major issue for the switch section of the network is not digital versus analog technology, but whether or not to integrate voice and data. Most of the newer switches, such as PBXs and LANs, are already based on digital technology. If you have a digital PBX in place, then it is the logical choice as the hub for integrating digital voice and data. The wiring is already present, and virtually every user already has a termination—the telephone jack. Morevover, the switch is much more easily expandable than its analog counterpart.

THE BIG THREE PLAYERS

The big-three players in the PBX market—AT&T, Northern Telecom, and Rolm—are all furiously developing data add-ons and upgrades for their PBX lines. They all claim to integrate voice and data to some extent, speaking in haughty terms about how the PBX is the "hub of the office" and the answer to the telecommunications manager's every problem. A few points to bear in mind:

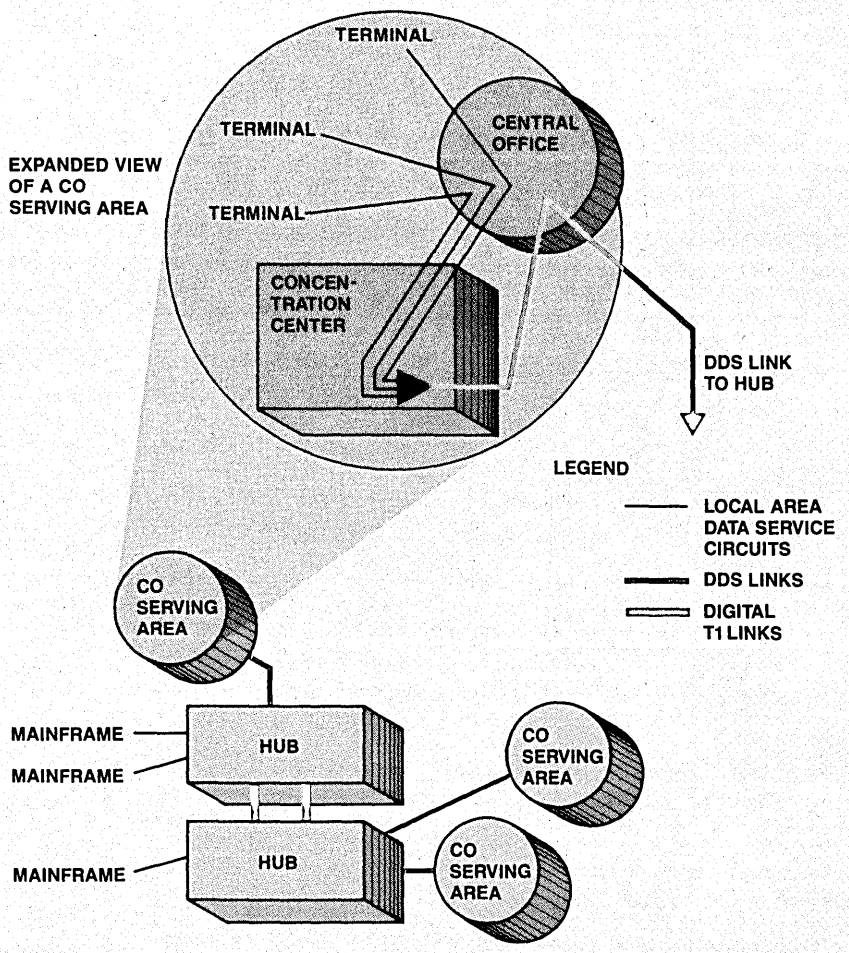
- Data and voice have different requirements.
- Even the most advanced PBXs still reflect an analog heritage; and LANs are primarily for data communications.
- Voice personnel may not be qualified to manage both the voice and data network effectively.

Voice conversations are characterized by short holding times and high bandwidth requirements, while data transmission is characterized by long holding times and relatively low bandwidth requirements. Users of voice communications will usually accept some level of blocking (not being able to complete the connection). On the other hand, data usually have nonblocking requirements. A switch that can handle both voice and data with their different requirements may be prohibitively expensive.

No PBX currently available has front-end processor capability comparable to an IBM 37X5; the 37X5, in turn, lacks the horsepower to handle voice communications. Therefore, integrating voice and data switching in an SNA network is not yet reasonable (although now that IBM owns Rolm, we are seeing progress in that direction.) In the future, integrated voice and data within an SNA network will probably be based on IBM's token ring technology. One PBX manufacturer is banking on it. The CXC Rose PBX works in a manner very similar to IBM's planned token ring LAN, and CXC of Irvine, Calif., has stated that when IBM finally brings the token ring network to market, it will modify the Rose to remain compatible.

FIG. 3

A METROPOLITAN AREA DATA NETWORK



Terminal traffic within each central office (CO) serving area is transmitted to CO concentration centers via local area data circuits. The terminal traffic is concentrated at concentration centers and then transmitted over Dataphone digital service (DDS) links to one of two hubs. Mainframes connect directly to one of the two hubs.

The hubs are combined concentration and switching centers. Traffic between the hubs is concentrated for transmission over high-bandwidth T1 links.

This is not to say that PBXs serve no useful purpose in an SNA network. Many PBXs—such as Northern Telecom's SL-1—can act as SNA gateways for asynchronous terminals or simple connections that eliminate coaxial cable between 3278s and the PBX. But true integrated voice and data switching in an SNA data environment is still several years away.

PBXs and LANs are complementary approaches serving different purposes rather than the adversaries they're often made out to be. PBXs can be employed as nodes on a LAN for gateways to other LANs. As PBX and LAN technologies evolve, it is becoming increasingly difficult to distinguish between the two. Integrated voice and data switching within a digital network will evolve to include both LANs and PBXs.

Transmission media. Adopting digital technologies for the transmission media offers the greatest potential for cost savings. Ford Motor Co., for example, expects to save about $2 million per year by utilizing digital links instead of leased lines in its 5,000-terminal network. (Ford's network traffic, like that of most major organizations, is about 80% voice and 20% data.)

The transmission medium can be divided into two subsections, the first of which lies between the user interface and the switch. Integrating voice and data on this subsection is largely dependent on the types of terminals, phones, PBXs, and LANs in use. The primary reason for integrating voice and data traffic between the user and

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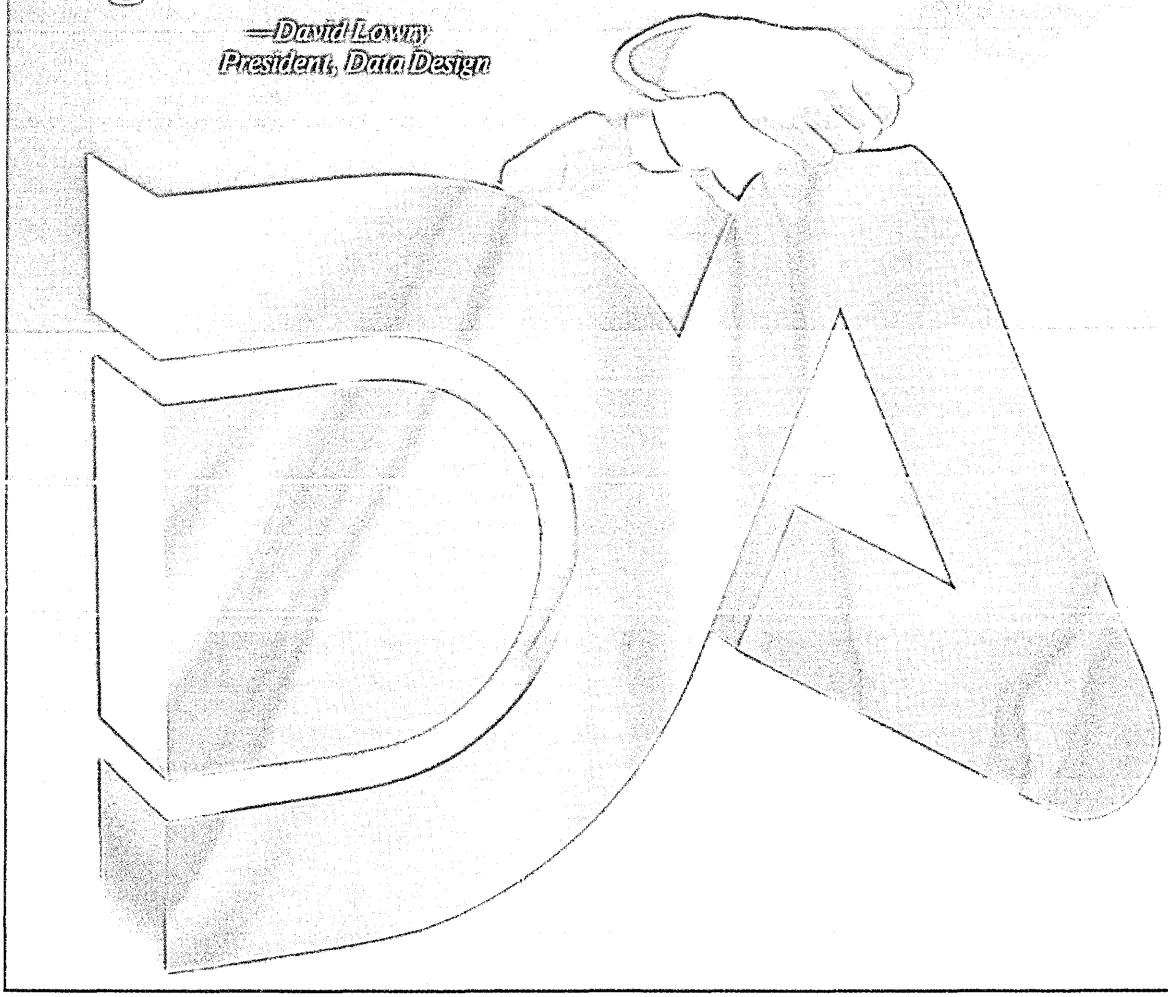

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AT&T, Northern Telecom, and Rolm are all furiously developing data add-ons and upgrades for their PBX lines.

the switch is cost avoidance realized through not having to pull new in-house wiring. Many PBX manufacturers are building switches that can handle voice and data traffic through both analog and digital technologies.

The most common analog method of combining voice and data over this subsection is Data Over Voice where the data is frequency multiplexed above the voice traffic. This allows the use of the extant twisted pair wiring to transmit both voice and data traffic back to the switch. At the switch, voice and data traffic may be separated for switching.

WHAT THE NEW PBXS CAN DO

The newer PBXs provide the functionality to digitally integrate voice and data traffic. Integrated voice/data workstations, which can digitally multiplex voice and data traffic, are available from most PBX manufacturers. Some PBX manufacturers also offer add-on modules that can digitally multiplex voice and data traffic from separate telephones and terminals.

The second subsection of the transmission medium is the connection between switches. This may be a physical wire owned by the user, or a virtual circuit purchased as part of the service provided by the telephone company. When designing networks, managers need to be cognizant of mileage costs (the per-mile cost of leasing a circuit between two or more points), termination costs, and reconfiguration costs. The network must also be designed with network management in mind.

Using digital network facilities will not minimize mileage, but when combined with digital multiplexing schemes, total mileage and number of terminations can be reduced. The significance of the number of terminations should not be overlooked. Recent AT&T tariffs impose much stiffer installation, reconfiguration, and termination costs, while reducing mileage costs. Thus, one cost-reduction strategy for network managers is to reduce the number of terminations through the employment of concentration techniques, in combination with digital high bit-rate links.

For example, one leading brokerage firm relies heavily on the principle of multiplexing and concentration onto high-speed backbone links to minimize terminations in its nationwide fiber-optic network. As shown in Fig. 1, the corporate backbone network consists of T1 links connecting regional concentration centers. Each regional concentration center switches voice and data traffic separately, as shown in Fig. 2, but on the transmission medium traffic is integrated. This illustrates clearly that voice and data integration can occur in selected sections of a network.

This solution has not limited the firm's ability to integrate voice and data in other sections of the network or adopt new technologies in the future; the network has been designed to support the firm's communications requirements well into the next decade.

As an alternative example, a large metropolitan government chose not to integrate voice and data in its selection of an architecture, switching scheme, and network topology to support the data communications requirements of more than 25 agencies. The recommended solution, as detailed in Fig. 3, involves connecting ter-

A T1 TUTORIAL

The T-carrier system is the North American telephone industry standard for interconnecting digital communications systems. It is a hierarchy of digital transmission and multiplexing standards ranging from T1, which operates at a data rate of 1.544 megabits per second, to T4, which operates at a data rate of 274.176 megabits per second. As discussed below, the T-carrier system is highly structured in terms of signaling and framing format.

For the last 25 years, T-carrier links have supported digitized voice transmission between central offices of telephone companies. Quite recently, these T1 facilities have been made available to end users in many major metropolitan areas. High bandwidth applications like CAD/CAM, videoconferencing, multiplexed voice, and multiplexed data can often be accommodated more economically with T1 links than with multiple lower-speed lines.

T1 links transport data according to a signaling format called DS-1. DS-1 stipulates that data be transmitted in 192-bit frames, followed by a framing bit. The framing bit is used to synchronize the clocks in both user and telephone company equipment. The frames are transmitted at a rate of 8,000 per second. Take 193 bits/frame, multiply it by 8,000 frames/second and, voilà, you get 1.544 megabits/second.

DS-1 also specifies that the signal maintain a minimum density of "ones." At least one "one" must be included in every 24-bit sequence. The density specification is employed to preserve synchronization throughout the network.

AT&T has specified another signaling standard, DS-0, which divides frames into virtual channels. The DS-0 standard evolved from requirements for transmitting voice over T1 links. Since T1s are intrinsically digital, voice transmitted over a T1 link must be digitized. The most common method of digitizing voice is called pulse-code modulation (PCM). In today's telephone network, voice is effectively limited to 4,000Hz; with PCM, voice is digitized by sampling voice signals at a rate of twice the effective bandwidth—i.e., 8,000 times per second. Each analog sample is digitized to a resolution of 8 bits. Since there are 8,000 samples per second and each sample is 8 bits, each voice signal requires a data rate of 64 kilobits per second.

Twenty-four voice channels are multiplexed on a T1 link by interleaving DS-0 channels—each an 8-bit sample—within each frame. The equipment that multiplexes DS-0 channels together onto a single link is called a digital channel bank.

If a T1 link should fail (and they sometimes do), the loss of 24 voice circuits and possibly more data circuits could have a pronounced effect on a network's functionality. Critical network connections may require two T1 links—one primary, one backup.

Since individual data applications rarely operate at the T1 rate of 1.544 megabits per second, users can acquire multiplexors to economically aggregate lower-speed traffic for transmission over T1 facilities. The T1 multiplexor is as critical to network operation as the T1 link, and vendor offerings must be carefully evaluated in light of

- the number of low speed channels they can support;
- their ease of reconfiguration;
- their modularity;
- their redundancy; and
- the types of traffic they will support (e.g., asynchronous, synchronous, voice).

There is a wide range of options available in today's T1 multiplexors, but even more powerful offerings will be available tomorrow. In a sense, the T1 market is in a stage of development similar to that of the modem market immediately following the 1968 Carterfone decision: an unforeseeable array of new T1-based products are likely to emerge over the next few years. One thing, however, is somewhat more certain. As their technologies and markets mature, T1 multiplexors are likely to offer improved functionality and lower prices.

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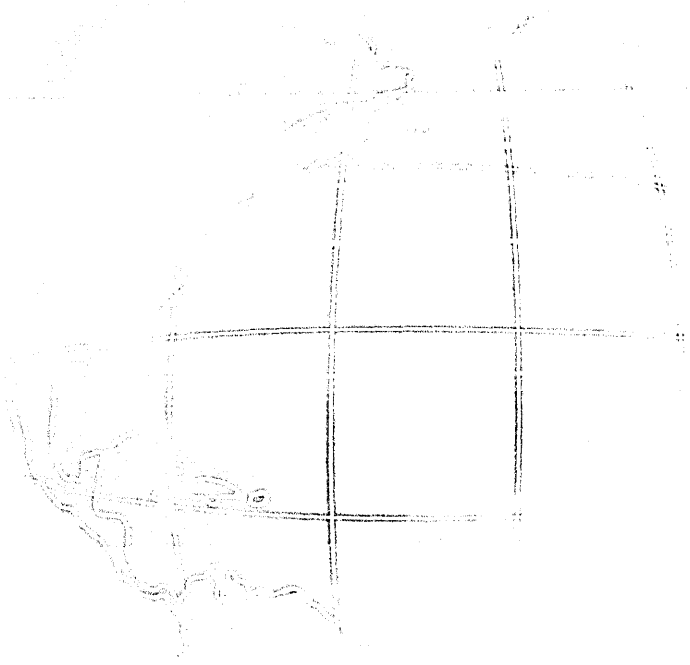

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CIRCLE 6 ON READER CARD

Recent AT&T tariffs impose much stiffer installation, reconfiguration, and termination costs, while reducing mileage costs.

minals to regional concentration points via local area data services circuits. Each concentration point and host is connected by a 56Kbps or 9.6Kbps DDS line to one of two hubs. (A Dataphone Digital Service line is a digital circuit offered by AT&T.) The two hubs are connected by multiple T1 links. This design is projected to cut anticipated overall communications costs by nearly 40% over the next five years.

Another use of digital links is between PBXs in an electronic tandem network (ETN). A T1 link can be used to replace 24 tie lines between PBXs. This decreases the number of terminations by 46. (There are 48 terminations in the tie-line network, versus two in the T1 network.) The attractiveness of using T1 trunks will become even greater when 32Kbps voice replaces 64Kbps voice as the standard for digitized voice. In place of 24 voice circuits, users will get 44 voice circuits over the same T1 link (not 48 voice circuits because additional bandwidth is used for signaling).

Using a T1 link may sound as if it's only appropriate for companies with exceptionally large bandwidth requirements, but this is not quite true. A good rule of thumb for using a T1 link between two points is when there are six DDS data lines of 9.6Kbps, or more than two DDS data lines of 56Kbps. The costs are comparable and the extra bandwidth is icing on the cake. These costs vary according to the mileage and the number of termination points, and are subject to change. Network managers should carefully consider T1 and DDS links as a cost-effective alternative (see "A T1 Tutorial," p. 112).

It's been said that the future isn't what it used to be. This is certainly the case for telecommunications managers. Those managers who take careful advantage of digital opportunities now are likely to find their jobs easier down the road. But in order to maximize the benefits of digital technologies, telecommunications managers must begin to change the way corporate management thinks about communications. The first step for network managers who seek to enhance their network capabilities and simultaneously protect the corporate coffers is the formulation of a strategic communications plan.

Achieving the cost savings made possible by the integration of voice and data onto a unified digital network will likely demand the unification of diverse factions within the corporate structure—the data processing, voice communications, and office automation departments. Internal turf battles are certain to be waged, but when the dust settles, the firms that have brought the three departments into some form of détente will emerge as stronger competitors, especially in industries where communications plays a pivotal role. ◉

Pete G. Balbus is a strategic planning consultant at Network Strategies Inc., Burke, Va., a consulting firm specializing in the planning, design, implementation, and growth management of communications technology.

Brian M. NeSmith is a communications consultant at Network Strategies whose client activities focus on the technical and management issues associated with digital voice and datacommunications technologies.

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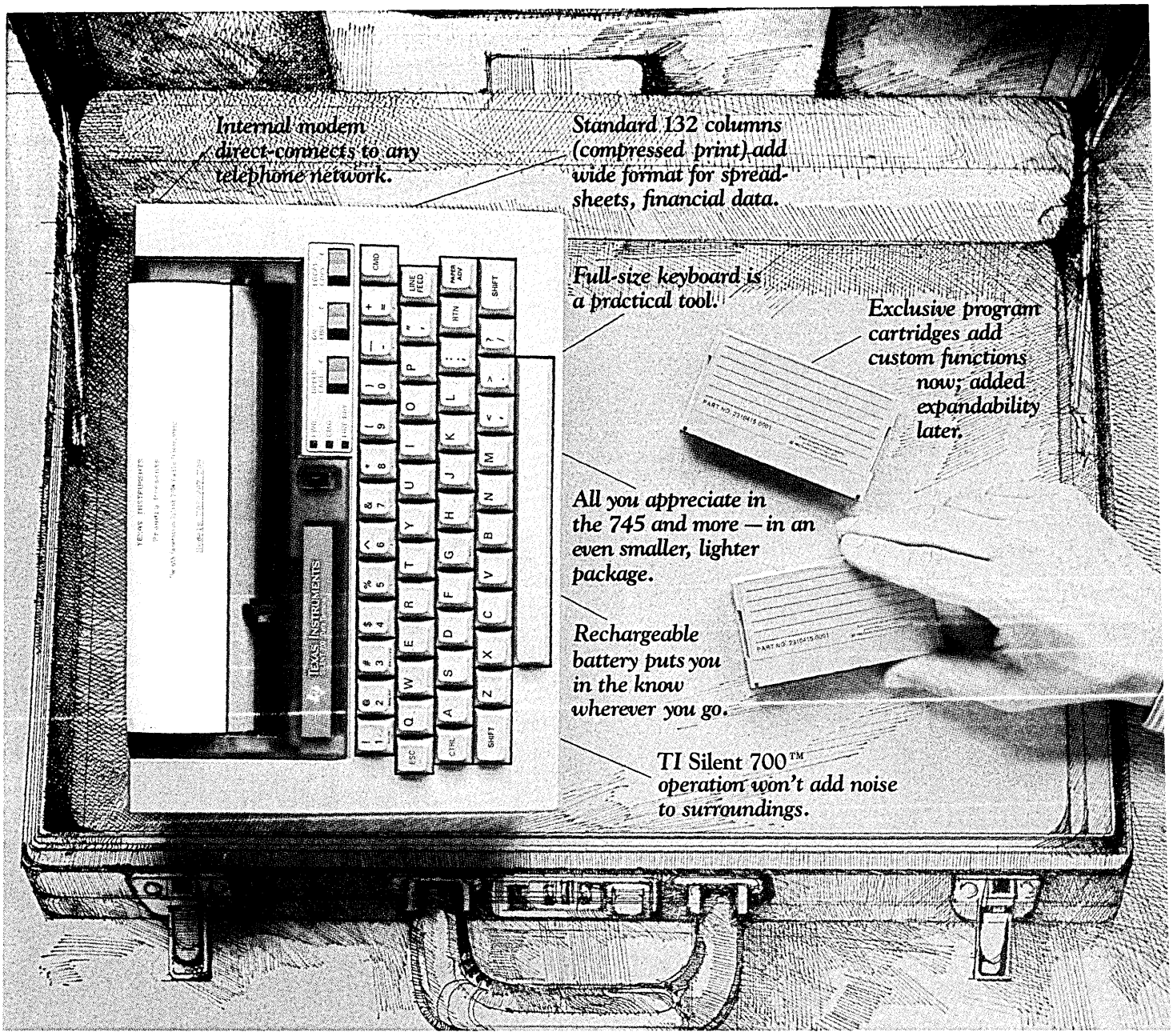

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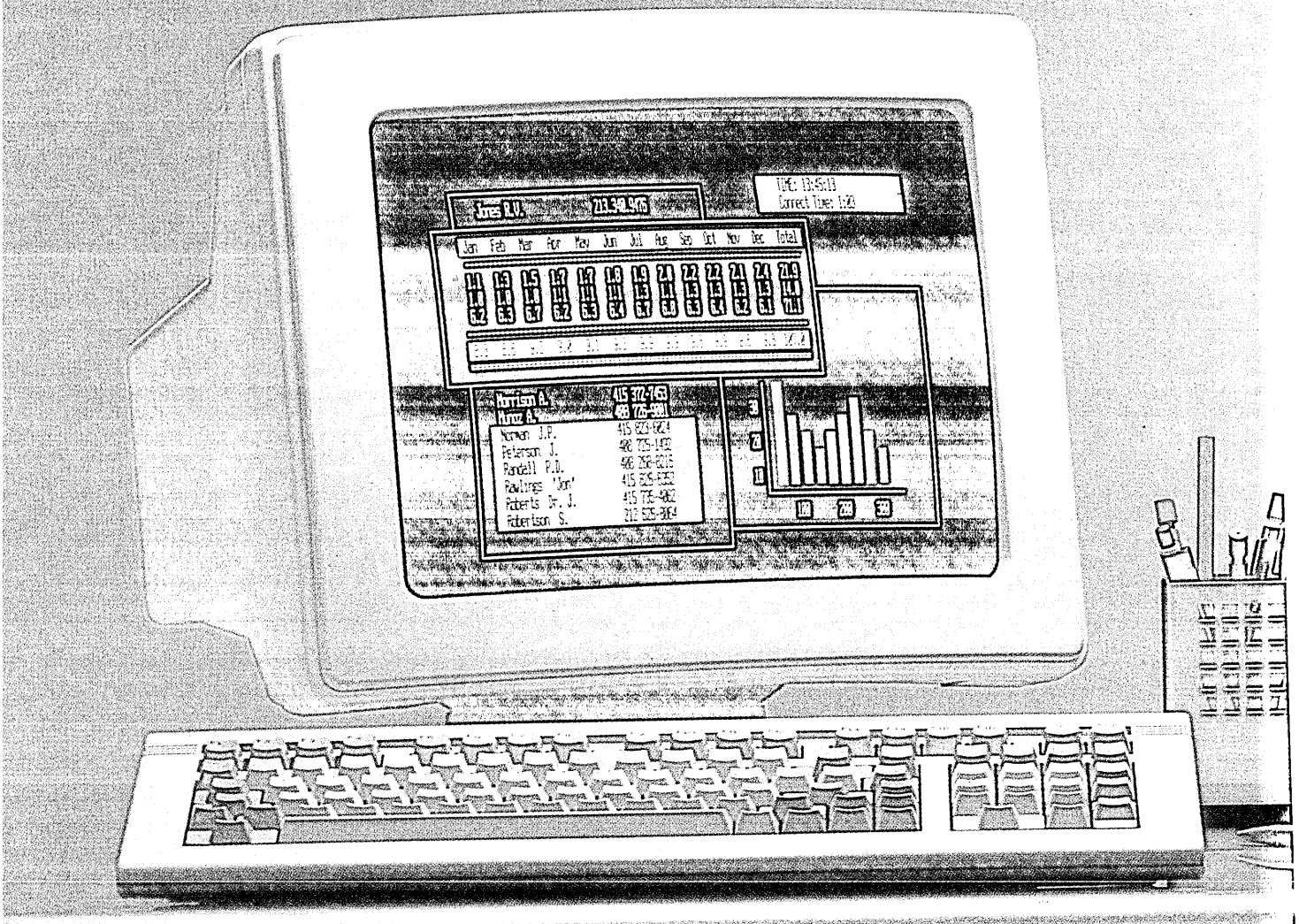

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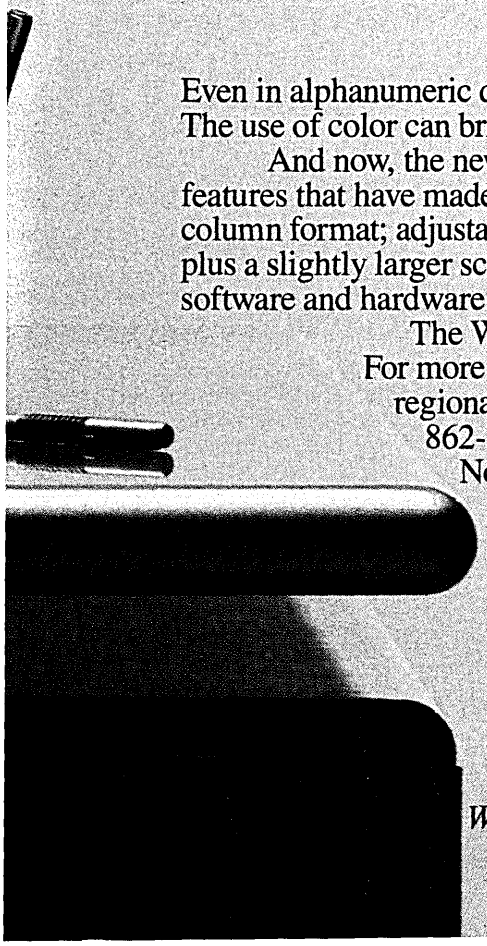

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CIRCLE 112 ON READER CARD

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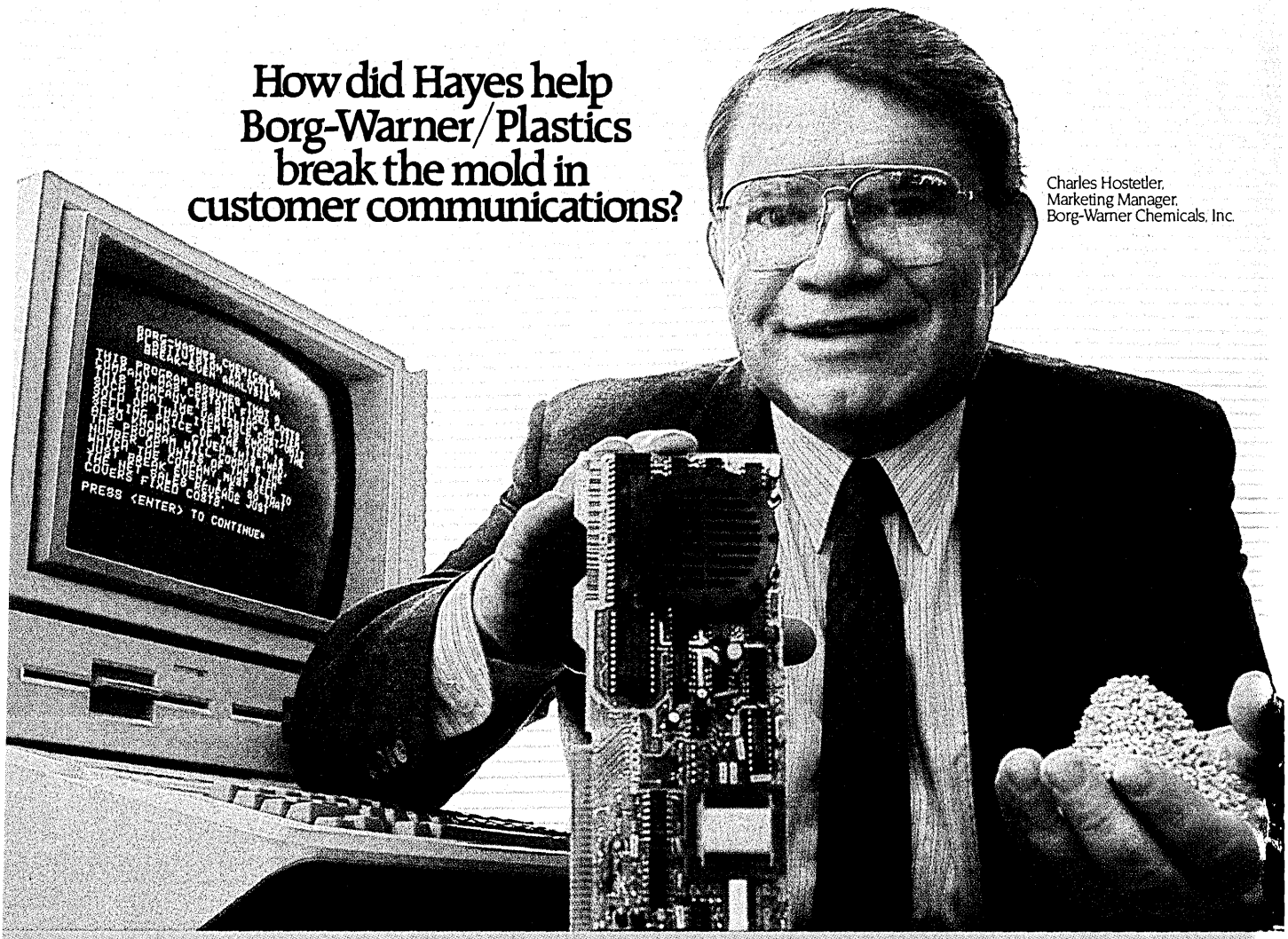

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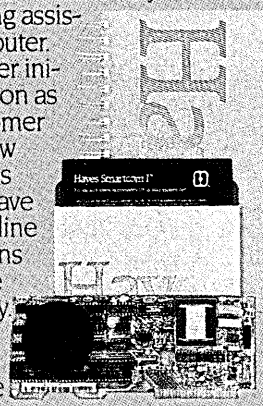

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CIRCLE 50 ON READER CARD

An ambitious project to bring computing to children results in angry micro makers in Europe and the U.S.

FRENCH MICRO LESSONS

by James Etheridge

It began with customary French idealism. In January France's Prime Minister Laurent Fabius announced a $200 million project designed to catapult a generation of French schoolchildren into the computer age. The ambitious plan to install 121,500 microcomputers in French schools was described by Fabius as "an essential element in the modernization of the country."

Two months later that project had angered micro suppliers in both the U.S. and Britain, raised awkward questions about French protectionism, and led to the resignation of the man behind the plan, Jean-Jacques Servan-Schreiber, head of the Paris-based World Computing Center.

That's the trouble with ideals: they often get poisoned by practicalities. Social idealism has been the hallmark of most French governments since the revolution. In recent years that national idealism has been rigorously applied to France's information technology sector. The result has been a plethora of projects that affect local dp firms as well as the general public.

The French government has completely reorganized the local dp industry, merging the old CII-Honeywell Bull, Transac, R2E, and Sems companies into Groupe Bull. The country has also begun doling out money to user companies in an effort to help them introduce new technology. In the public sector, it has started replacing paper telephone directories with a videotex database that can be accessed through free terminals.

The microcomputer scheme for schools, which is called Informatique pour Tous (Computing for All), is only one of many micro programs being undertaken by the French administration. The Computing for All effort, however, is much more ambitious than the others, since it's aiming to have 155,000 machines installed by year-end. At the beginning of the year, 35,000 micros had been shipped to French schools.

The other microcomputer projects involve the French PTT, which plans to install 20,000 micros along with videotex and point-of-sale (POS) terminals in post offices around the country. Police stations will also be equipped with micros at the rate of 500 per year over the next several years. France's justice and finance ministries will also be moving to micros as part of their overall office automation efforts.

What makes the school project so important is the fact that it could well set a precedent for the way micro contracts in France, and even elsewhere, are handed out. That's why the international micro vendors were anxiously awaiting the outcome.

Anticipating massive sales from the mammoth project, French manufacturers jealously fought to preserve their privileged position in a market they consider to be their birthright. Foreign suppliers, particularly Apple and Hewlett-Packard in the States and Sinclair and Applied Computer Techniques (ACT) in the U.K., also fought hard for the business. Reacting with philosophical resignation to the French government's plans, these suppliers recognized that the local producers would inevitably get the lion's share of the business.

That recognition was partly due to actual experience in the French market, which is notoriously difficult for foreign vendors. It was also partly due to remarks made by the man responsible for the school program, Gilbert Trigano, chairman of the successful French holiday firm, Club Méditerranée. Trigano was appointed head of a special interministerial commission that was set up by Prime Minister Fabius to promote new areas of education and training. Despite the fact that there's no government mandate on which wares to buy, there was general support for Trigano's comment that while "there's no question of automatically rewarding French industry, it is inconceivable not to give that industry a real opportunity in the project."

FIG. 1

WHO SOLD WHAT IN THE FRENCH SCHOOL PROJECT

PROFESSIONAL MICROS*	
Bull	6,500
SMT-Goupil	3,000
Léanord	750
Matra	750
Foreign Suppliers	2,700
TOTAL	**13,700**

HOME MICROS*	
Thomson	93,000
Matra	6,000
CGCT	9,000
TOTAL	**108,000**

*Estimates

FRENCH SNAP UP CONTRACTS

And that is just what happened. In fact, very few crumbs from the Education Ministry's table fell into the laps of foreign vendors. French suppliers, who snapped up contracts for all the 108,000 home/educational machines, also won orders for 11,500 of the 13,700 professional micros (see Fig. 1). What is more, those contract awards clearly don't reflect the reality of the French micro marketplace, which is dominated by U.S. and U.K. firms.

The big loser in all this was Apple. After company representatives were invited to a rare lunch with President François Mitterrand to discuss the project, the U.S. firm, which was once considered to be the front-runner in the competition, was not even asked to bid. That was a particularly bitter pill for Apple to swallow, since serious consideration had been given to installing up to 300,000 Macintoshes in French schools and public computing workshops. The government's micro machinations also came as a blow to Servan-Schreiber, who originated the Computing for All concept. Servan-Schreiber resigned after the Apple snub and headed for the States (see box).

Once the Apple option was discarded, the bulk of the business went to two local companies. Bull got a big contract for its IBM-compatible Micral 30 machine and Thomson-CSF inked a deal for its small TO-7 and MO-5 home micros. While those French contracts are juicy, they nevertheless pay unspoken homage to IBM, which has succeeded in imposing MS/DOS as the market standard. The choice of the MS/DOS

standard came nicely on cue for Bull, which had launched its Micral 30 last December. It was no surprise that the other French manufacturers of IBM-compatibles—Léanord, SMT-Goupil, and Matra—were also given slices of the micro pie.

HP NOT ASKED TO BID

With the exception of Olivetti, which owns local company Logabax, the only foreign firms that were initially invited to bid on the professional micro deal were IBM and Britain's ACT, which has had a subsidiary in France since May 1984. Hewlett-Packard, which has had a micro manufacturing plant in France for years, wasn't even asked to bid—much to its annoyance.

Another company that was annoyed was the U.K.'s Sinclair, which wanted to compete for the home micro contract with its Spectrum machine. The British micro maker was eventually asked to bid, but only at the last minute after chairman Sir Clive Sinclair intervened. In a sharply worded letter to Prime Minister Fabius, Sinclair pressed for the Spectrum to be considered and threatened to call in the European Commission to force France to open the bid to other European companies. Following the French decision to go with national suppliers, British members of the European Parliament did indeed ask for an investigation into France's protectionist policy—a policy that contradicts pan-European trade rules and the strictures imposed by the General Agreement on Tariffs & Trade (GATT).

The French, left with egg on their faces, obviously didn't anticipate the animosity they'd raise by buying local wares. The controversial contracts were awarded with the clear intention of boosting the French microcomputer industry. But that boost may in fact only benefit Thomson, which could now jump ahead of Sinclair to capture first place in the home micro market. And that may have happened anyway, since Thomson's 18% market share in 1984 was already close to Sinclair's 21%, according to Intelligent Electronics Europe in Paris. The micro research house predicts that 80,000 home computers will be shipped in France this year. Government purchases will account for around 13% of those shipments. That means big business for Thomson, which will derive up to 50% of its sales from the government micro buy.

In the professional sector, government orders will represent less than 10% of total shipments. This is of course good news for Bull, which will reap most of its micro revenues from the government award. Bull's Micral 30 has also been selling well outside government circles. Intelligent Electronics expects Bull's share of the professional micro market in France to rise to 10% this year.

The government, however, can do nothing to prevent IBM from taking the number one spot in the French business micro market. IBM, which had 27% of the local micro market last year, is expected to have a hefty 37.5% share this year.

So in the long run, maybe even the short run, those fat local micro contracts awarded by the government will do little to change the micro scene in France. What they will do is get the ball rolling on the Computing for All project, which should be a boon to the French public.

By the end of this year, each of France's 33,000 small secondary schools will get a home micro. The 8,000 high schools and 2,300 colleges in France will each get a cluster of six home microcomputers that will be connected to a professional machine. France's 400 universities will also each receive 10 professional micros. All of this hardware will be supplied with a range of educational software, most of which has been developed in France.

The major obstacle to implementing the computer literacy program this year is training the thousands of instructors needed to teach the children how to use the new microcomputers. Training has also been the big bugbear in Britain, which has been shipping micros to schools since 1980.

In the U.K. this computer wealth has not been shared with the general public. This will not be the case in France, where computer workshops in colleges and universities will be open to the public. Meanwhile in schools, computing will now become part of the regular curriculum. Students will be required to spend at least 1½ hours in front of the screen. The result the government hopes for is a new computer culture among France's younger people.

But while it may be characteristic of the French to consider computing as a culture rather than as a mere tool, abstract idealism doesn't help turn computer literacy into economic strength. It remains to be seen whether this massive investment in cultural evolution produces the expected financial rewards. ◉

MIFFED OVER THE MICRO

What French children probably won't know when they sit down for the first time in front of their schools' new microcomputers is that the man who created the government's Computing for All plan resigned because of the machines they are using.

A mixture of visionary, egotist, and political catalyst, Jean-Jacques Servan-Schreiber first announced his dream of a nationwide network of computing workshops last summer. In that dream he envisioned 50,000 computer centers, each equipped with five or six microcomputers. These computer literacy centers, spread throughout France, would initiate the French citizenry in the use of technology, which he believed could liberate people from their most humdrum and arduous activities.

In his vision of things, the liberator he chose was Apple's Macintosh. Apple, which agreed to make the technology available to France on very attractive terms, was going to grant a manufacturing license to a local company. The scheme would have cost up to $600 million.

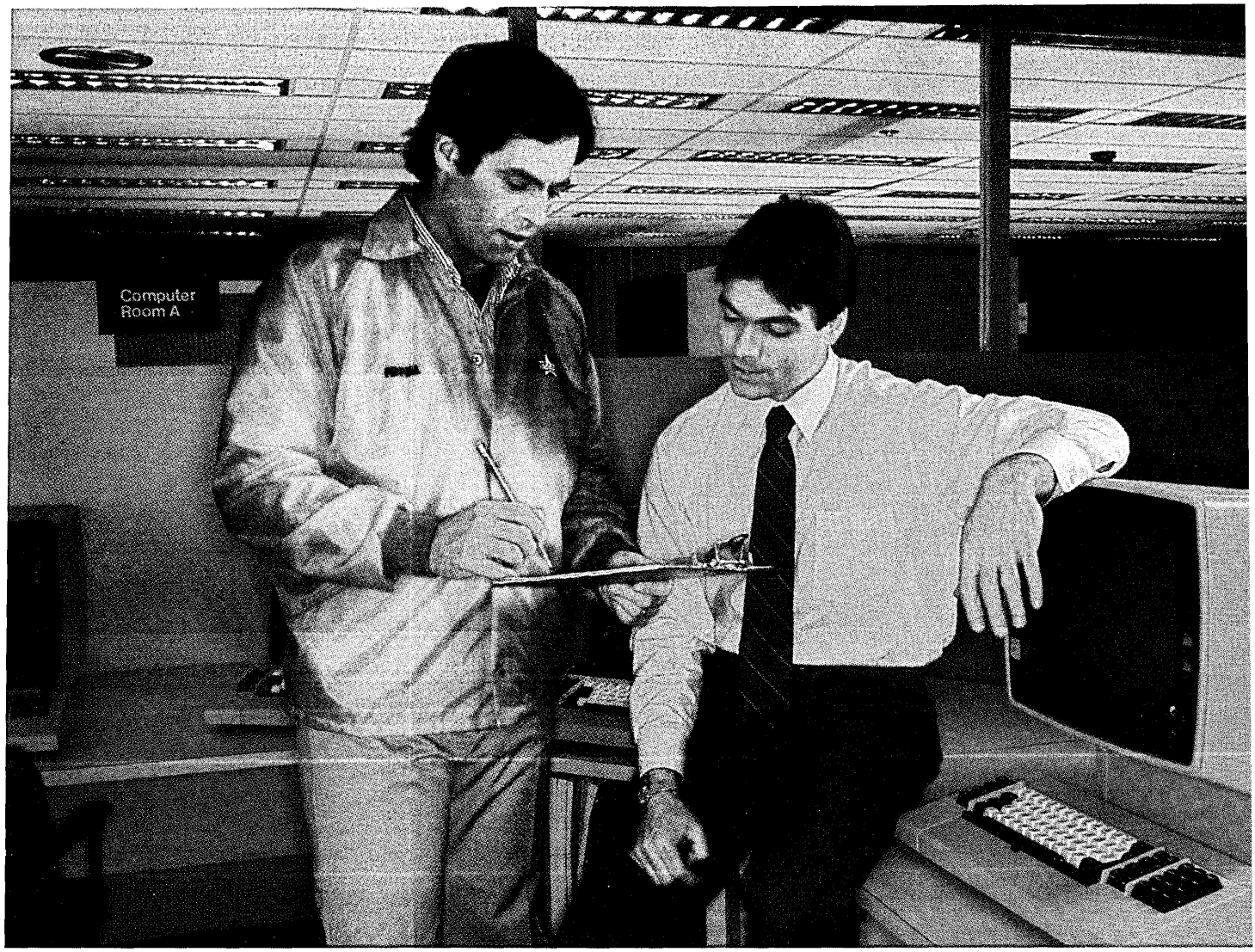
The French government thought that was biting off more than it could chew. So instead it went for local wares, saving half the cost on a scaled-down project that would also provide a crutch to the ailing French microcomputer industry.

Servan-Schreiber was miffed. First of all, he objected to Apple being tossed out in favor of French machines, which he didn't feel were as appropriate as the Macs. He also was not happy about the fact that the "Servan-Schreiber Plan" ended up as the "Fabius Plan," named after the French prime minister who introduced it.

To demonstrate his disagreement with the government, Servan-Schreiber resigned from his top post at the World Computing Center at the end of March when his job came up for renewal. In his letter of resignation to President François Mitterrand he wrote, "My earlier fears about the government's choices in the delicate and critical field of social computing [hardware and software] have only become more acute, especially regarding the project for a network of community workshops." He went on in a similar disillusioned tone: "Only the right choices in the field of computing, advanced and daring ones if necessary, can liberate the immense human resources of our people."

On that note, he left the project, his job, and the country—temporarily at least. He also left the World Computing Center to carry on without its contentious leader. And while there is no doubt that he felt bitter about the school program, his reasons for quitting may have had more to do with the center than with the micros that French schoolchildren would be using.

Set up to preach the gospel of mass computerization and do research into leading-edge dp, the World Computing Center was beset by divisions and disagreements from its inception (see "Center of Controversy," June 1983, p. 240-31). What's more, French government auditors had the place under close scrutiny. So Servan-Schreiber's exit, whatever the reason behind it, seems to have come at an opportune time.



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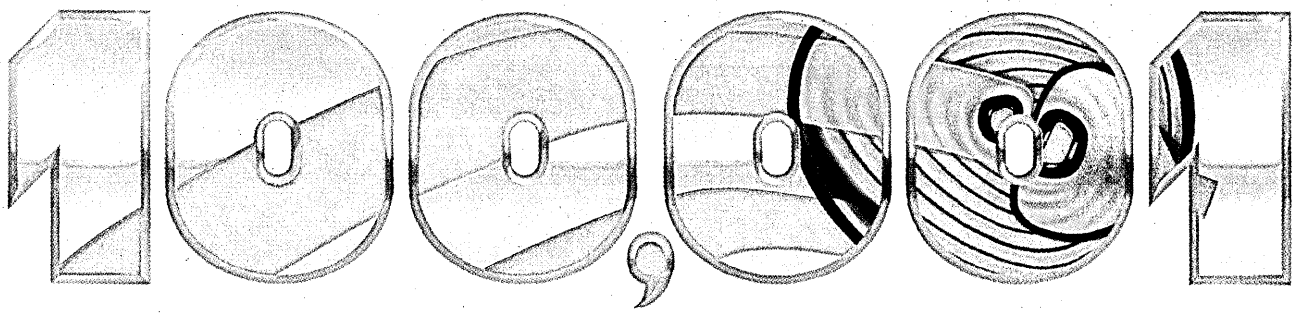

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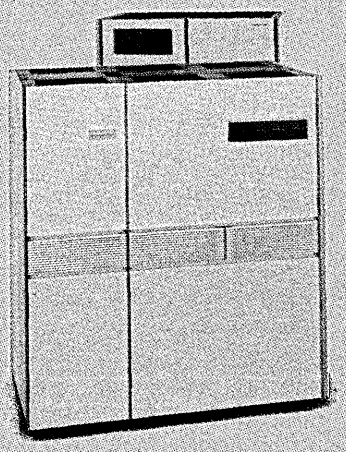

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DATAMATION
January

In which it is shown that forecasting technology is much like telling fortunes: you win some and you lose some.

BACKCAST

by Frederic G. Withington

Six times during the last 15 years I have written technology forecast articles for DATAMATION (Fig. 1). This is a retrospective review, a "backcast," of those articles. Seeing how close their predictions were is mildly interesting; more important are the lessons to be learned by planners and those tracking the evolution of computer technology. These are summarized at the end of the article.

The six articles were prepared as by-products of technology forecasting work that Arthur D. Little Inc. has performed over the years. As a result, the articles differ widely in scope and time horizon. Most interesting, perhaps, is the third article, "Beyond 1984: A Technology Forecast," for it was the most specific, providing detailed specifications and prices for future products. Also, that article's time horizon was 1985: today's products are the test of its 10-year-old forecasts. The other articles had various forecasts of interest, highlights of which follow.

First, let's take credit for some successes.

- The 1975 article forecast that in 1985, "microcomputer systems" would be available for $4,000 to $6,000, and would contain 8-bit or 16-bit microprocessor cpus, 500 kilobytes of storage, 5 megabytes of disk, and an interactive display interface.

In 1975, no personal computers had been announced, not even the Altair. Five hundred kilobyte stores were reserved for large mainframes at high prices. I'm pretty proud of this one.

- The 1975 article also forecast that large computers of 1985 would cost $1 million to $2 million and would contain at least two large processors supported by several smaller ones. The processors would share 8 to 64 megabytes of memory and a solid-state backing store of 100 to 500 megabytes. The combined processing capability of the system would "approach 100MIPS."

This sounds pretty much like the IBM 3090, although the throughput and price forecasts were optimistic. Not too shabby, though, considering that the latest large IBM computer of 1975 was the 2MIPS 370/168.

These relatively successful forecasts testify to the validity of a market-oriented forecasting approach. Since we appreciated the users' requirements for large storage and high processing power to deal with on-line transactions and extensive program residence, we could foresee the sizes and powers that customers would be buying. We also borrowed courage from the forecasters of electronic components, whose long-range forecasts for microprocessor, logic circuit, and memory price/performance underlay the system forecasts.

Another success of the user-oriented approach:

- The 1972 article forecast that display terminals would become "terminal subsystems," which would "combine in surprising ways the functions of data processing with those of today's office machines, and will probably cause considerable change in today's office routines."

The users' needs to combine media for convenience, cost, and space saving were evident by 1972, and the technology potential was also evident.

STORAGE DEVICE FORECASTS

Another matter of some pride is that from 1970 onward the articles have consistently forecast that the entire hierarchy of storage devices in large computers, from cache through archival, would be managed virtually as an integral system, with material moved up and down the hierarchy automatically in accordance with demand. Systems have just about reached that level now—it took 15 years instead of five, but at least the direction was right.

The articles hit a couple of software forecasts pretty well, too. The 1975 article forecast that in 1985 the manpower required to code a large program might be reduced by as much as half, using modern program development aids—but only if they were used in a structured programming environment. (The article specifically noted that the new aids would be of little use in an unstructured, haphazardly coded environment). It also forecast that by 1985 systems programs would be separately priced and would have become a major budget item. Specifically, the article forecast that the systems programs for a large computer would typically cost $180,000 to $200,000 on a purchase basis. I remember how much courage it took to make that forecast in 1975, when only a few systems programs were unbundled by any manufacturer (never the operating system), and at very low prices. Actually, calculating the life-cycle cost of ownership for the systems programs of a machine like the 3090 shows that our forecast was much too low!

Having taken credit for some successes, I will now balance the equation by confessing to some significant failures.

The articles frequently missed the boat in forecasting the rate at which new technologies would appear in commercial products. In 1970, for example, I forecast that semiconductor memories (which were then quite new) would eventually squeeze out both magnetic core and thin-film memory, but not by 1975 (the article said semiconductors would be restricted mainly to cache memory in 1975). In fact, IBM announced the 158 and 168 with semiconductor main memory in 1972, and they were not the first machines to have it.

The 1972 article, on the other hand, forecast that magnetic storage technology would be seriously challenged by alternative technologies in the late 1970s. (Here it is 1985 and optical storage, the only major contender, is still only on the threshold.) In 1975, my article perpetuated the error, forecasting that "either magnetic bubble or charge-coupled device technology will be in

PHOTOGRAPH BY TOGASHI

The articles frequently missed the boat in forecasting the rate at which new technologies would appear in commercial products.

widespread use by 1983," in competition with standard semiconductor storage. Score zero on that one. The article also forecast the use of holographic archival storage by 1983: another zero.

All of the articles were too optimistic about novel forms of input-output technology. The forecast of 1970 was for much wider use of optical character recognition (OCR), audio output, microfilm interfaces, and graphics (one out of four isn't so good). The 1975 article again forecast that a wide range of OCR devices would be in use within the next decade. Slightly compensating was a forecast that voice input technology would see only very limited use in 1985.

There were also a few major-league errors about system capabilities. The 1972 article said that by 1980 large computers would cost one tenth as much as they did in 1972, and that most users would therefore be paying one tenth as much for their hardware, since few could use higher-power computers than they already had. (It's hard to believe I ever said that!) At least I corrected the error: since 1975 the articles have forecast that future large systems would cost about as much as current systems, the expected decreases in component costs being offset by escalation in compute power and memory size.

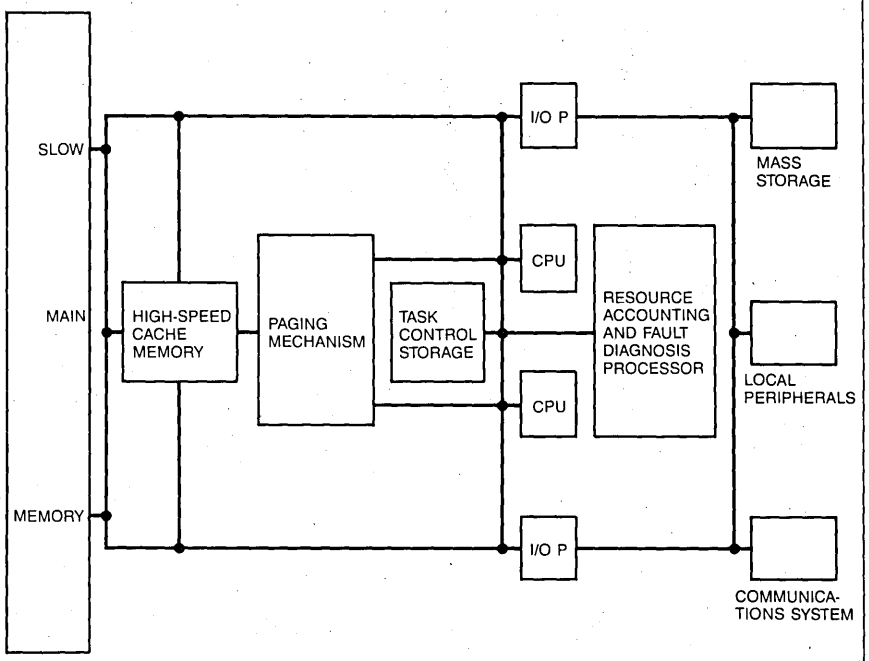
FIG. 1

TECHNOLOGY FORECAST ARTICLES

TITLE	PUBLICATION DATE	FORECAST TIME FRAME
1. "Trends in MIS Technology"	February 1970	1975
2. "The Next (and Last?) Generation"	May 1972	1980
3. "Beyond 1984: A Technology Forecast"	January 1975	1985
4. "IBM's Future Large Computers"	July 1978	1983
5. "Winners and Losers in the Fifth Generation"	December 1983	1997
6. "IBM: Mainframes in 1990" (with Norman Weizer)	January 1985	1990

FIG. 2

A 1970 FORECAST FOR 1975



AIRBALLS AND TWINGES

Compatibility and overhead issues produced some airballs. The 1972 article forecast that systems of 1980 and beyond would offer "versatile emulation of past generations of software and hardware-conversion pains should have dwindled to mere twinges." The 1970 article said, "Unless a reduction of operating system overhead is accomplished, the spread of MIS will remain severely constrained." I overestimated the rate of software improvement, and I underestimated the patience of the customers.

The articles were generally a little too bullish on the improvement potentials of existing component technologies. The forecast in 1970 was for a "tenfold or twentyfold combined cost/performance improvement of circuits" during the coming five years.

The 1975 article more conservatively forecast a tenfold improvement in cost/performance during the coming decade. Actually, the 1970-1975 improvement factor was about sevenfold, and the 1975-1985 improvement was more like twentyfold (the first surge of very large scale integration occurred during this period). The 1970-1985 result wasn't far off, but the shape of the curve was wrong.

Forecasts of improvement in magnetic disk technology were consistently optimistic. The 1970 article forecast a five- to tenfold reduction in the cost per byte of magnetic disk drives by 1975; improvement was only twofold. The 1975 report forecast a fivefold reduction in the cost per byte of disk storage from 1975 to 1985; it was actually only another threefold.

Rather surprisingly, the articles were consistently too optimistic in forecasting the rate of decline of component costs, not too pessimistic, as I had supposed before I checked back. (The overoptimism remains: 1983's forecast included the availability of a multichip, 64-bit microprocessor by 1986—no one's even talking about one of those yet.)

A major theme in all the articles was the architecture, or overall design, of the large computers of the future. The 1970 article forecast a trend toward multiprocessing and increased intelligence in peripheral controllers, which would become independent of central processors. It forecast the appearance of separate fault diagnosis and accounting processors, and of

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fault tolerance through the use of multiple cpus. It also forecast that multiple processors would share the same cache memory (synchronized cache is pretty much the same thing), and that hardware would be used to assist software execution in several ways: by the implementation of kernels of system software in microcode (right), the use of hardware associative memory for paging (right), and the use of hardware pushdown stacks for job queues (wrong).

These ideas were repeated in the 1975 forecast, which predicted further that future computer product lines would be composed of a few standardized "component processors" that would be combined in various ways to form a broad product line of systems.

The architecture of operating systems and other system programs was expected to follow the evolution of the hardware. The 1975 article, for instance, expected 1985's operating systems to consist largely of microcoded kernels forming part of functional monitors (e.g., for batch or transaction processing), all under control of a virtual system monitor. Variations on this theme appeared in all articles since then.

Figs. 2 through 6, reproduced from five of the six articles, show the evolution of these concepts. They look very different (partly because of the evolution in DATAMATION's graphic style), but they are conceptually more similar than they look. Fig. 2, the earliest, shows four coequal processors of two kinds and all the subsequent figures also show multiple coequal processors of a specialized nature. All of the figures (except Fig. 4) also show a bus-oriented architecture with intercommunication between modules occurring over a common communications line.

There were some evolutionary changes in the figures, however. From Fig. 2 forward, file controllers and communications processors appear at the same level as cpus and input-output processors; from Fig. 5 forward, the central memory has been broken up. Figs. 2 through 5 show a common memory (in separately powered banks in Fig. 3, but that doesn't matter) shared by all the processors. Figs. 5 and 6 show each processor with a large independent memory, sharing data and programs via crosstalk and in a shared file processor that controls the entire pool of both data and program storage.

These architecture forecasts have proved too optimistic, though the trends predicted appear to have been in the right direction. Communications processors evolved pretty much as forecast, but not file processors. At the level forecast in the

FIG. 3

A 1972 FORECAST FOR 1980

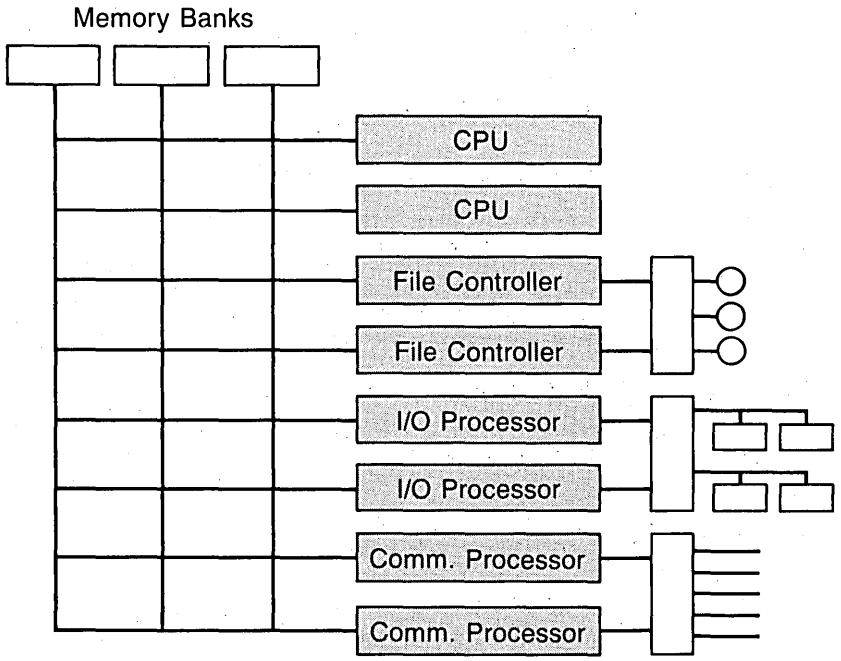
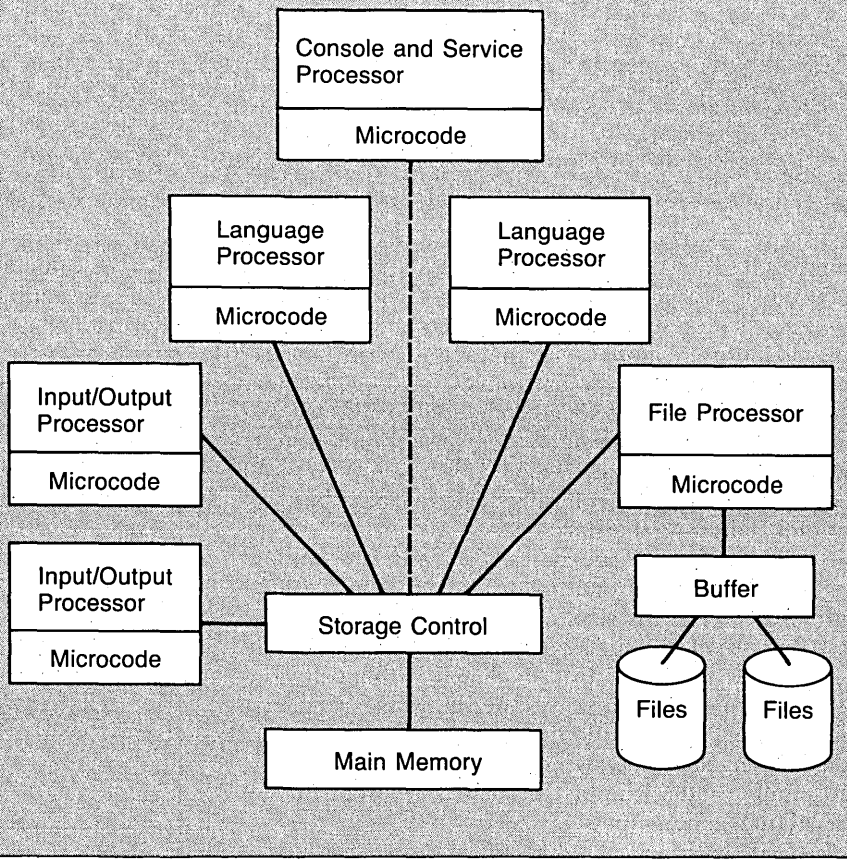


FIG. 4

A 1978 FORECAST FOR 1983



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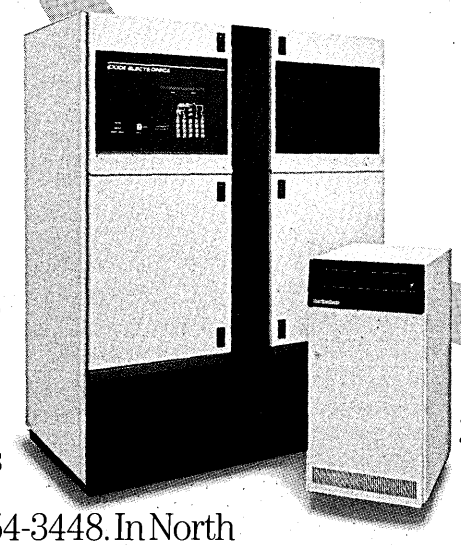

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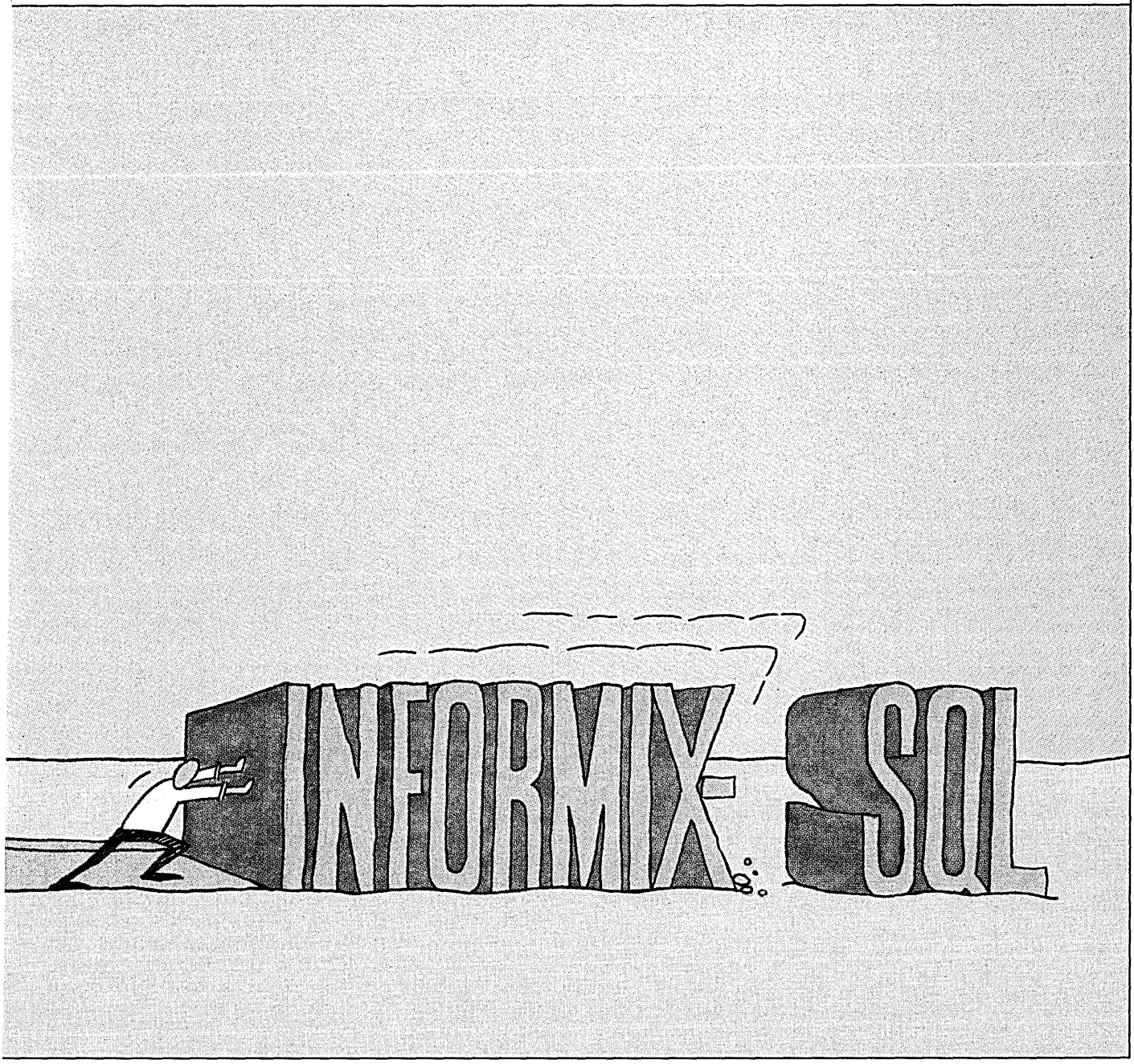

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The architecture forecasts have proved too optimistic, though the directions were correctly foreseen.

system architecture, file processors have become universal in smaller computer systems, but have yet to be fully implemented in large machines (which were the focus of the articles). The breaking up of main storage has only recently appeared with the cluster architectures adopted by a few of the mainframe manufacturers, and it is debatable whether a cluster system is as tightly integrated as these articles had envisioned.

The 1983 forecast for 1997 and the 1985 forecast for 1990 may still be correct in that all of these architectural principles will soon be in general use, but the record indicates that we should not hold our breath.

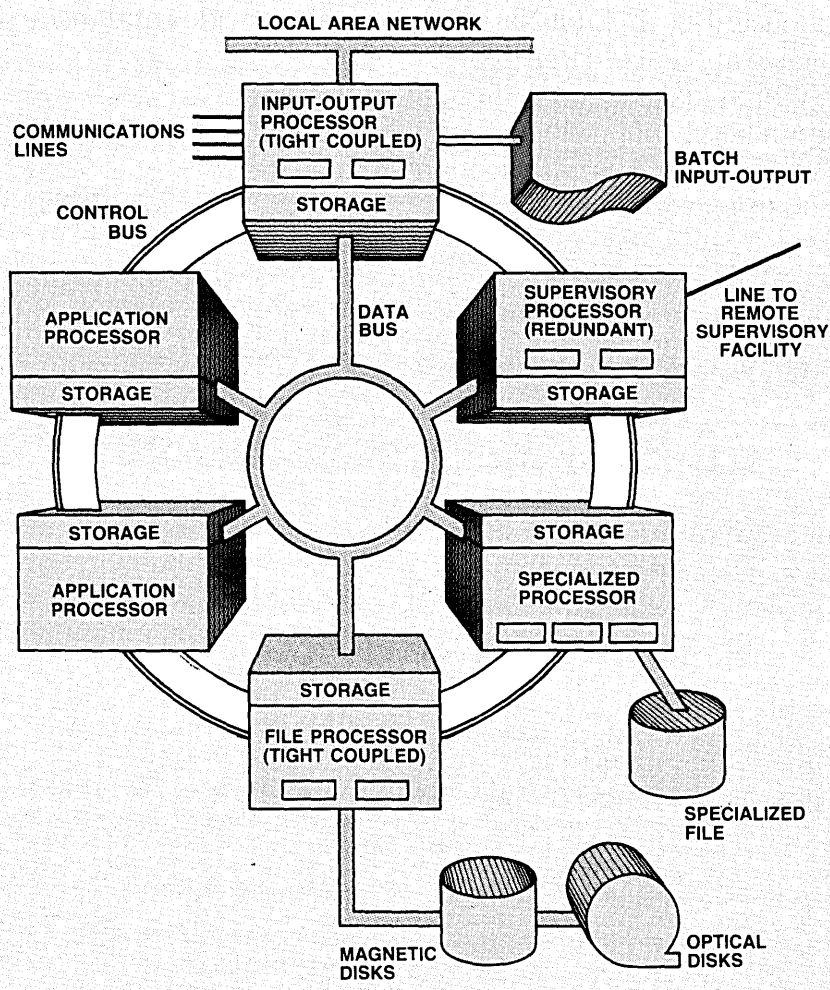
INDULGING IN WISHFUL THINKING

When discussing the user interface, the articles consistently indulged in wishful thinking. The 1970 article forecast that the 1975 systems would perform self-diagnosis, would generate their own performance and billing statistics, and would "respond to simpler programs, inquiries, and directions by using implicit brute-force methods for processing and by performing housekeeping functions automatically, without operator intervention or even knowledge." The 1972 article suggested that "it should be possible for the user of the late 1970s to employ computer systems without ever 'lifting the hood'; without knowing, for example, how his files are structured or indexed or what the machine is doing at any given moment." This idea of the "virtual system" appears in various words in all the subsequent articles. The 1975 article introduces the additional idea that the systems' command languages would become simpler, requiring less technical knowledge, and would be combined with inquiry and report generating capabilities for end-user use. (No wishful thinking here—right-on for the fourth generation languages.)

Some of the newer and smaller systems, less constrained than the larger ones by backward compatibility and performance constraints, can fairly be said to have achieved all these objectives. Examples range from the IBM System/38 downward to the more sophisticated pcs and across the small business systems of Burroughs, NCR, and others. The larger systems have made some progress toward fulfilling these forecasts, but only slowly and painfully: as the 1978 article said, "One unfortunate fact about most of these techniques: they involve doing things in a standard, brute-force way, which is generalized and takes care of everybody's job, but which is not optimal for anybody. They suboptimize to gain generality, which means inefficiency and higher systems program overheads than users now experience."

FIG. 5

FUTURE GENERAL PURPOSE COMPUTER SYSTEM



Source: Arthur D. Little Inc.

This observation suggests the first of the lessons one learns from reviewing this sequence of forecast articles:

Innovations in system control and operation appear first at the lower end of the price spectrum. The user of the lower-priced system has less commitment to existing program libraries, and cannot afford to put up with the complexity that the user of the larger system accepts. To be fair to the manufacturers, too, the large users' demand for high throughput impedes use of brute-force simplifications except in limited end-user-oriented environments. Nevertheless, one might have hoped that proven innovations in the smaller systems would have worked their way up the hierarchy faster than they have. Maybe one factor is that:

Large systems users are endlessly patient. System complexity, fragility, and the overhead of system programs have not impeded market growth for the larger machines. I thought it would and said so in the 1970 article. Moving to hardware:

Novel hardware technologies rarely make it. Semiconductor electronics and magnetic storage have fought off their promising new competitors throughout the 15-year period these articles have addressed. Does this mean that promising new technologies like optical storage, biochips, and speech recognition have a poor prognosis?

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Lesson number one: innovations in system control and operation appear first at the lower end of the price spectrum.

It's hard to distribute control. It is difficult to design a fully peer-oriented system in which the cooperating functional processors are coequal. Throughout this period, evolving large-system architectures have increasingly offloaded detailed work to subordinate processors, but most of the architectures still retain a hierarchical structure in which there is a center of overall system control. Perhaps this indicates that the recent talk about future general purpose processors that employ a high degree of parallelism should be treated with some skepticism.

It's hard to break up main memory. This is probably a corollary of the difficulty of breaking up hierarchical control in a computer system. It's no longer a matter of economizing on memory because memory cost is nearly insignificant, but the added time required to broadcast transactions and routines between processor memories over a bus has led to retention of shared memory in systems designed for high throughput.

There are also some lessons in forecasting methodology.

PROVIDING ACCURATE FORECASTS

Learning curves forecast are reliable for hardware technology. For a technology that has a history, such as semiconductor memory or magnetic storage, projecting past progress into the future with a gradual slowing as physical limits are reached provides good forecasts. The forecaster needs product history data (readily available) and advice on probable physical limits (often addressed in the technical literature). Forecasting the success of a novel technology with no learning curve data is a much more speculative matter, however—at least, my record (and that of most venture capitalists) is pretty poor.

The market-driven forecasting methodology is reliable. All of these articles started by assessing unmet user demands and then matched the potentials of technology to them. The result has been a generally reliable compass direction, though the rate of progress has frequently been misestimated.

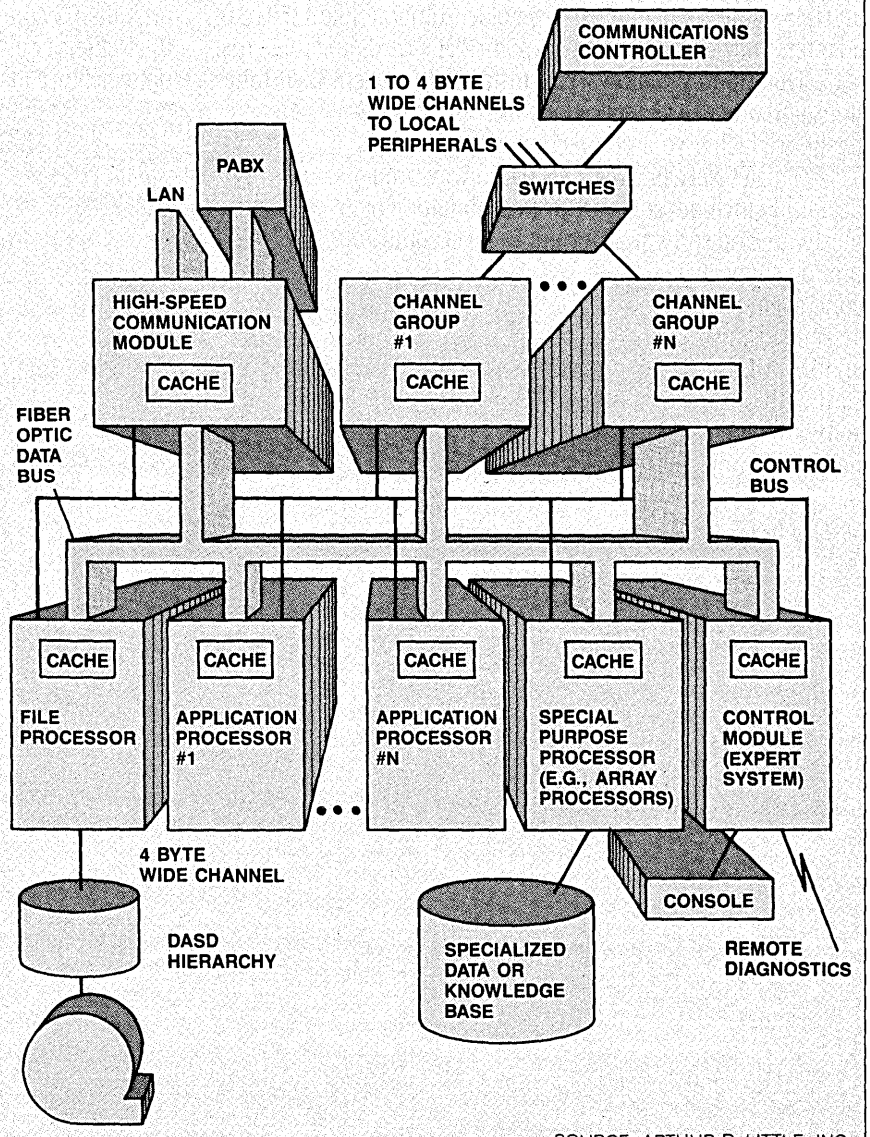
It's easy to underestimate large user demand for MIPS and memory. None of these articles forecast *higher* levels of processing power or memory than were actually acquired by users, and the earliest forecast was much too low. Similarly, system costs were generally forecast on the low side. Is this appetite (and willingness to pay) insatiable?

Clearly the development of large systems is constrained by a higher degree of inertia than I have believed. They keep getting faster and more powerful, and over 15 years there have indeed been major changes in the architecture and functionality of large systems, but changes have come slowly. Most long-range planners in user organizations have been safe in ignoring functional changes for any single generation of system replacement.

The situation has been very different for smaller systems aimed at novel applications (e.g., the intelligent workstation supporting fourth generation languages). Their evolution has been driven by interface software innovations, such as word processing command languages, spreadsheets, and fourth generation programming languages. These are very hard to foresee, so it is in these novel product and market areas that forecasters have been most tested and user planners most surprised. ◉

FIG. 6

IBM 1990 MAINFRAME HARDWARE ARCHITECTURE



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Frederic G. Withington is vice president at Arthur D. Little Inc., Cambridge, Mass., where he tracks the information processing industry. A longtime DATAMATION advisor, he has written over 30 articles and papers.

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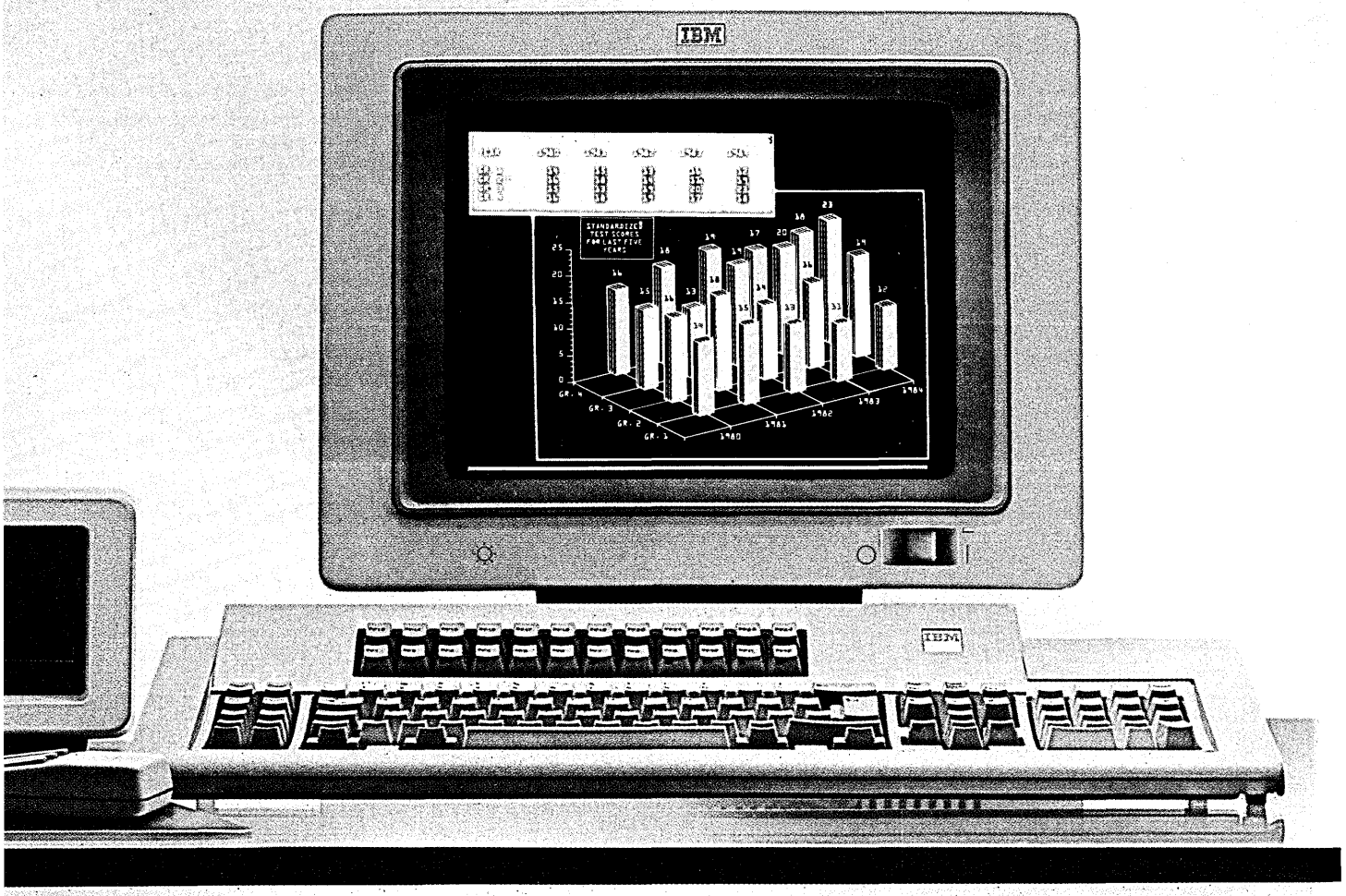

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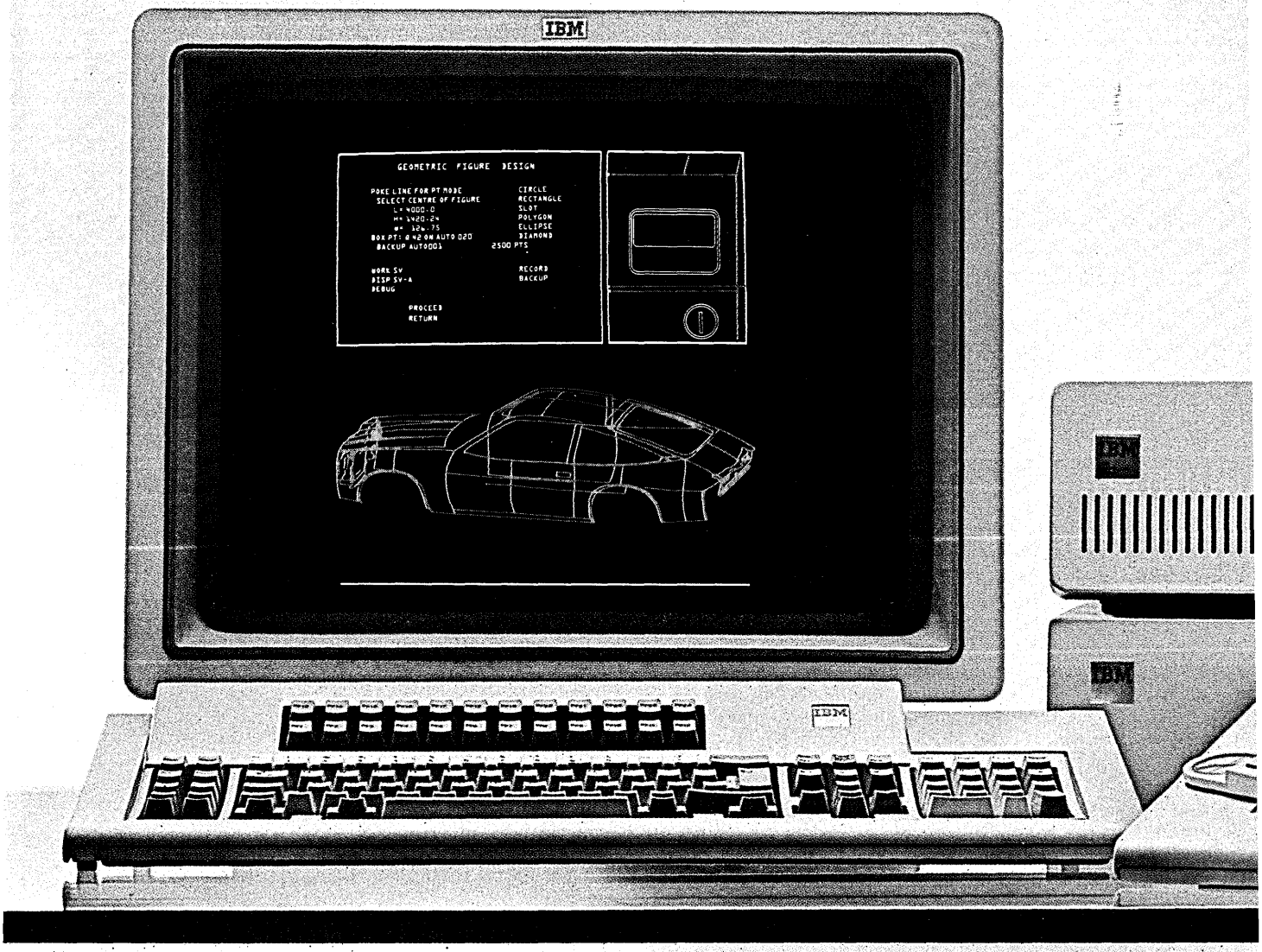

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INDEPENDENCE DAY IN THE PARK

by Jackson W. Granholm

The California sun set softly in the west. To the east the near-full moon rose out of the San Cretinismo Mountains. Day turned into evening in the beautiful Castoro Valley.

Handsome, competent Alvin Melvin "Tex" Hollowquill, operations director of the Santa Cloaca Recreation and Park District sat at his desk in the Civic Center. He gazed out his office window across the valley to the shining surface of Laguna Occidentale. This magnificent, albeit artificial, lake was the centerpiece of the vast and sprawling array of pseudo-Spanish residences that made up the sparkling new city of Santa Cloaca.

Tex Hollowquill shuffled the papers on his desk. It was apt to be a long and tiring evening, he reflected. The board of directors of the Santa Cloaca Recreation and Park District would meet this evening. For Tex, who had to attend, the meetings were always a pain, but this upcoming one was apt to be especially bad. Our great national holiday, the Fourth of July, was only a few weeks away. The directors would insist on setting up plans for the great fireworks display. This event had become a tradition in Santa Cloaca, and the Recreation and Park District was, because of the studied default of all other local governmental agencies, the fairy godfather of fireworks.

That evening, at 7:30, the board convened. Chairman Rodney Utterphlug rapped his gavel to call the meeting to order. After such preliminaries as the flag salute and a few gripes from the audience, K.Y. Urch, director, asked to be heard. He spoke to the first agenda item—the Fourth of July fireworks.

In the middle of the muddy basin of Laguna Occidentale was a large island, created by bulldozer and magnificently landscaped with Australian shrubs. The entire surface of the island was the property of the Recreation and Park District. It was known as Del Fango Park, and had little walking trails and somewhat silly gazebos here and there. Del Fango Park served primarily those fortunates who had homes on the shore of Laguna Occidentale. They came out to the island in their quiet little electric boats to enjoy the view of their overpriced homes and to stroll on the beautiful beaches, which were decorated with artificial sand and imported seashells.

It had become the practice over the years for the Recreation and Park District to use Del Fango Park for a wondrous annual display of fireworks on the Fourth of July. The entire populace of Santa Cloaca could view this display from the surrounding hills. It was a magnificent sight. There was actually no question that the district would, once again this year, use the island for the same purpose.

Nonetheless, Urch put forth a motion requesting that the district stage a unique fireworks display in Del Fango Park on Independence Day. The motion passed without opposition, and the staff was directed to proceed with the planning and report to the board at a subsequent meeting.

LET THE NEW MAN PLAN IT

Back in his office the following week, Tex Hollowquill had a brainstorm. He would break in a new employee by having him plan the fireworks display. After all, it was now so cut-and-dried after years of being repeated that even an incompetent weenie could hardly louse up the fireworks display. Give a new man a simple job to help build his confidence, Tex thought, remembering the useful things he had learned in Agency Management 401 at USC.

So Tex summoned Merle Legrindfussen, park assistant planner, the newly hired graduate of Cal State Northridge.

"Merle," Tex said.

"Yes sir!"

"I'm going to assign you a vital responsibility here."

"No sweat, boss!"

"What?"

"Yes sir!"

"I see. Well, I'd like you to take over the planning for this year's Fourth of July fireworks display on the Laguna Occidentale island, out in Del Fango Park. We'll need a comprehensive plan by next Tuesday. Miss Campylos will find you the summaries of previous years' events. Just ask her. If you should run into any difficulties, you can call me. Now please report back to me on Monday so we can go over everything."

"Yes sir."

The following Monday, Merle was back in Tex's office.

"Well, sir," Merle said, eagerly, "I've found out what's been wrong with the fireworks all these years."

"Something was wrong?" asked Tex.

"You bet," Merle said. "Do you realize, sir, what's been happening out there?"

"Out where?"

"Out there on the island. Past performance-wise, that is."

"Well, I suppose that . . . I guess . . . what's been happening?"

"The men from this fireworks company we've been contracting with, they just haul a barge out there to the island. They take out all their fireworks, and they put them in place. Then, when it's time to set off the fireworks they light their big torches, walk around through the fireworks, and light them."

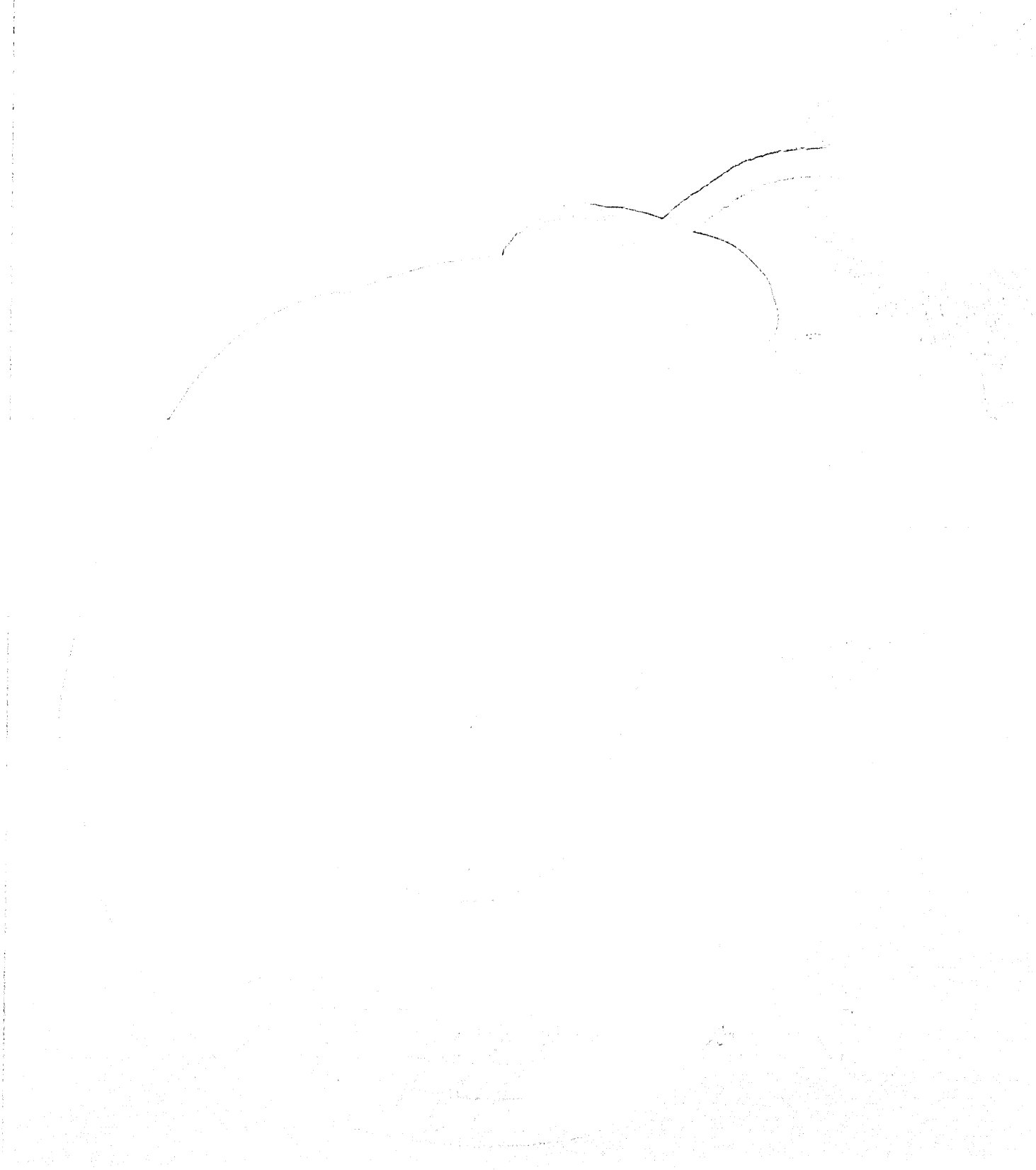
"So?"

"Well, there's just no system to it. The whole show should be automated, you know, controlled by computer.

"Kid—I mean Merle—you may have something there. I think the board would probably like that idea. But how can we do it? Are you a computer expert?"

"Well, not actually, although I did have two quarters of Meta-COBOL at Northridge, and I attended Professor Gruenberger's lectures on the role of memory in computer design. Today, though, it's no problem. We've got computer retail stores all over town. They're staffed by experts.

3-D ILLUSTRATION BY JOAN STEINER; PHOTOGRAPH BY LAWRENCE DOCKERY



The machine had a blue case with yellow trim and looked very scientific.

All we have to do is walk in and say what we want."

"Great! Follow up on that. Meanwhile, show up at the board meeting tomorrow night. Be prepared to present this report in person. I think we may earn a few extra points here."

And so it came to pass that Merle Legrindfussen, boy wonder, presented his plan for automated fireworks to the board of directors of the Santa Cloaca Recreation and Park District. His outline for action was enthusiastically received, and though director Urch had a few misgivings, there was a unanimous vote to proceed.

The following week, Merle headed over to the nearby Computerbitty Shops Inc. store where he was greeted by Horace Sazzas, computer applications expert.

"How may I help you?" asked Mr. Sazzas.

"I'm with the Recreation and Park District. We need a computer to perform a system control job in sequencing a complex switching array under program control. What would you recommend?

"What?" replied Horace.

"I said, we need a computer to perform a system control job in sequencing a complex switching array under program control."

"I better get the boss."

The boss, somewhat annoyed, informed Horace Sazzas that any machine they had on the floor could easily handle the job. Therefore, the choice should be made on the basis of color and printer type font.

BITBANGER THE RIGHT MACHINE

After due deliberation, Merle decided that the BITBANGER-9, made in Sonova Beach, Calif., was the right machine for the district's use. It had a blue case with yellow trim, and looked very scientific. It also talked through a simple interface to a GUTENBERG printer, built by Nippon Electronics and Trash Can Ltd. Merle went back to the district office to get a purchase requisition with the required 23 signatures.

When the BITBANGER-9 arrived the next day, Merle remembered that he had forgotten to buy disks to fit the two drives included in the BITBANGER-9's reasonable price. He went back to Computerbitty, purchased 10 disks, and then wasted the next two days trying to read the software manuals.

Finally Merle went back to the Computerbitty store. He asked Horace Sazzas for help.

"It's real simple," Horace said, "You sit down at the machine, see. Turn it on. When it says 'A>' on the screen, you type in HELP. The machine will tell you what to do."

And so began Merle Legrindfussen's introduction to the wonderful world of menus. He launched into his work with vigor, spending hours typing Y or N in response to queries such as "DO YOU WANT TO PLAY THE SUPERSLEUTHING GAME NOW?" or "DID YOU REMEMBER TO HIT THE ESCAPE KEY BEFORE KEYING TABS?"

These informative queries were punctuated with enigmatic warnings and alarms, such as "DISK CRASH—BAD OXYGEN IN THE ROOM ATMOSPHERE," "CS-MOS ERROR ON DRIVE A [or B]," and "CHECK THE XSKB-99 FOR KEY WORD LOADED FROM THE HHB+BUS."

But Merle proceeded, undaunted, through the content-free text and the Pidgin Greek instructions of the BITBANGER-9. From the cartographic staff engineer of the district he got a topographical map of Del Fango Park. Then, placing a grid on the map, he laid out the planned locations of pyrotechnic devices, imagining what would, he thought, make a gripping display. He loaded the coordinates of the fireworks devices into memory in the BITBANGER-9. In a couple of weeks he was ready to present his scheme to Tex Hollowquill.

"Gosh, that's impressive." Tex said, not understanding a word of Merle's description. "Can we present this at the next board meeting? They'll be overwhelmed."

"Yes sir. We sure can," Merle replied, "But there's something else we should do right away."

"What's that?"

"We need to talk to the fireworks people. Do we want to use the same ones we had last year?"

"Sure. Why not? Let's see here. That was Amalgamated Pyroblast of Brea, Calif. I'll have Miss Campylos call them."

Two days later Flash Erquist, field superintendent for Amalgamated Pyroblast, sat in Tex's office. He listened as Merle Legrindfussen gave an impassioned explanation of the plan for an automated fireworks display to be scheduled for Del Fango Park on July Fourth. As Flash listened his scowl grew ever darker.

When Merle finished, at long last, Flash spoke.

"Nope," he said.

"What do you mean, nope?"

"We ain't touchin' that job with a 10-foot pole. Git somebody else."

"But . . . but . . . ."

Flash rose to depart.

"Nope," he said, closing the door softly as he left.

"I'll be damned," Tex said, "Isn't that rude?"

"Maybe he doesn't understand, boss."

"Maybe he does. Are you sure we know what we think we're doing here?"

"No question, sir. It's just too progressive for him, that's all. He sees his job security going down the drain. He can be replaced by a computer."

"You're probably right."

"Yes sir!"

By the time the subsequent board meeting came around, Merle Legrindfussen had gotten so immersed in the purported capabilities of the BITBANGER-9's graphics software that he was able to bring up on the screen a facsimile of the map of Del Fango Park. He then superimposed little blinking asterisks, each of which represented a skyrocket or a Roman candle or an aerial bomb exploding on the island. The asterisks looked positively beautiful on the BITBANGER-9's blue screen.

Unfortunately, since the BITBANGER-9 had no real-time capability, and Merle was not that well versed in its minuscule software, he continually had to key instructions into the machine to make the asterisks flash. Even so, the directors of the Santa Cloaca Recreation and Park District, looking over Merle's shoulder one at a time, were suitably impressed.

PREPARING AUTOMATED DISPLAY

Tex Hollowquill found that People's Republic Fireworks of South Carson, Calif., was perfectly willing to work with Merle in preparing for an automated fireworks display. Merle was able to enlist the willing support of Harley Benjamin, maintenance supervisor of the district, to string electric energy to the island, and to have his people wire all the signal wires to the ignitors of the fireworks, under Merle's careful direction. The people from the fireworks company stood well back during this operation, but all came off without mishap.

By now folks at the local newspaper, the *Santa Cloaca Trombone,* had got wind of the fact that this year's fireworks would be automated. They published an interview with Merle and Tex, augmented by special remarks of director Urch on the social values of progress.

At last the great day came. Merle got up early in the morning. He sent his wife and children to the civic weenie roast and can-kicking contest in Cloaca Community Park. But Merle himself went to the office for one last run-through of the program prior to taking the BITBANGER-9 out to the island and hooking it up for the eve-

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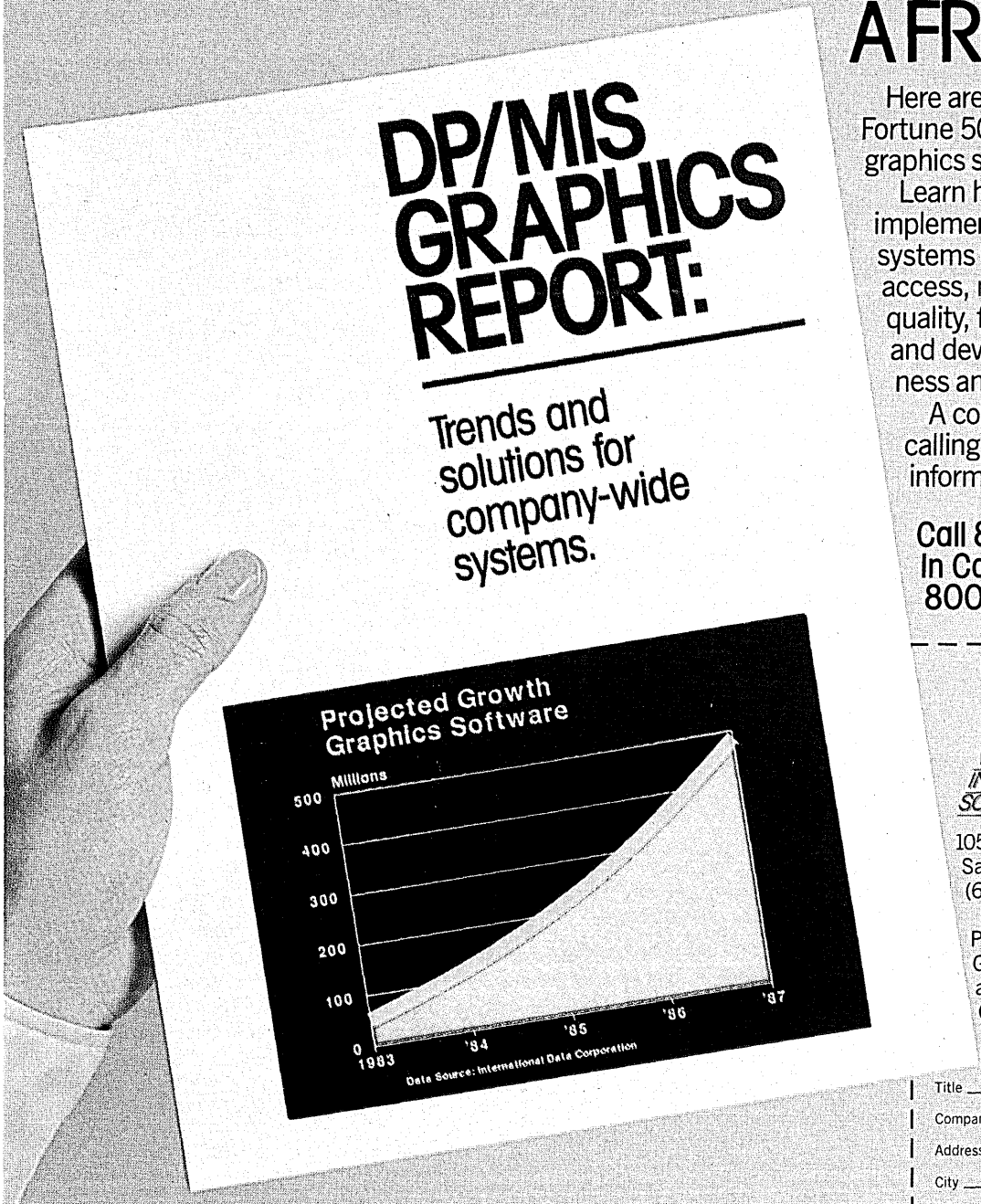

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CIRCLE 59 ON READER CARD

As the BITBANGER dutifully erased all the contents of disk B, he realized he had never copied the current version.

ning's show. Everything seemed to be working properly.

Just as Merle was about to wrap it up, he inadvertently keyed in CONTROL-B instead of CONTROL-V. The BITBANGER dutifully erased all the contents of disk B as it had just been commanded to do, and then Merle realized he had never copied the current version of his work. The fireworks code had just been booted into outer space.

Frantically Merle tried every code he could think of, including ETAOIN SHRDLU, trying to yank back his lost code. Too bad. Nothing worked.

But Merle was no dummy. He remembered essentially everything he had written, having worked with it so long. He formatted a fresh disk, shoved it in the slot, and waded into rewriting. It was 6 p.m. before he finished.

Merle called his wife. She was at home, going quietly insane, wondering where he was. Merle told her of his difficulties, and made her promise to take the kids out to the shore of Laguna Occidentale as dusk fell so they could see the results of his rewritten masterpiece.

At about 8 o'clock, Merle went out to the island in the district's little electric boat. Gingerly he took the BITBANGER-9 with him. Two copies of his software disk were in his camera bag, which he hung around his neck.

Merle connected to the interfaces, hooked everything up, and powered up. The blue screen of the BITBANGER-9 lit up with its reassuring message: "HELLO, KEY ON PLEASE."

Out on the lake people were beginning to gather in their little electric boats. The mayor's opulent electric barge drew out to a prime viewing spot. Director Urch had the honor of being the mayor's guest. The two of them sat on deck chairs and sipped mint juleps.

THE MAGIC HOUR IS AT HAND

On the shores of Laguna Occidentale, and throughout the surrounding hills of Santa Cloaca, people were gathering. Car lights dimmed throughout the city as the magic hour approached.

It seemed to Merle that darkness fell instantaneously with his arrival on the island. His earphones crackled with a message. Tex Hollowquill was in his office, for the view was magnificent from the Civic Center, yet he was behind a safety glass picture window.

"It's time, kid," Tex's calm voice said, "Let her rip!"

Merle keyed in the starting commands, followed by "CONTROL-GO."

Nothing. There was no action whatever. The blue screen just stared back at him.

Merle tried a second time.

Again nothing.

Merle tried a manual override. He keyed in the starting commands and then keyed in BLAST OFF, his imaginative code to start a rocket. An entire bank of 50 rockets on one side of the island went off in a blinding flash and a deafening roar. High in the sky the rockets rose to burst in a vast and confused pattern of reds, greens, silvers, blues, and every fireworks color imaginable, all commingled. The intertwined patterns of fire were punctuated by blasts and crackles from some of the rockets.

A great chorus of voices rose in appreciation from the surrounding boats and the shoreline. Never before had the good citizens of Santa Cloaca witnessed such a concatenated pyrotechnic mistake.

The great blast-off was followed by some five minutes of null mode from the BITBANGER-9, however, as it went round and round some obscure loop of code, and Merle tried in vain to interrupt and get it back on track.

Just as he was about to faint from frantic exhaustion, another entire battery of rockets went off from the opposite end of the island. Merle watched as the fire filled the sky and the sound of appreciative voices filled the environs of the lake.

But some of the fire from the rockets didn't fly high enough. Merle watched in terror as great gobs of silver flame descended upon him. Two burning rockets landed directly in his lap. In jumping rapidly to his feet, Merle put his entire forearm down across the keyboard of the BITBANGER-9. Instantly 30 display mortars discharged simultaneously from the north shore of the island. Their burning shells landed squarely upon the mayor's electric barge, ripping a large hole in its bottom planking.

The mayor and director Urch leaped overboard with their wives to escape the flaming mortars. They found themselves doing head stands in four feet of water on the muddy bottom of Laguna Occidentale.

Meanwhile Merle crawled frantically through the brush, zigzagging to escape the falling rocket warheads. All of the ornamental Australian bushes on the island were ablaze, and the smoke rose high into the night sky. The earphones were screeching in Merle's ears as Tex's voice pleaded, "What the hell's happening, kid?"

The following week Merle submitted his formal resignation. He had been hired at a substantial increase in pay as manager of computer operations for the City of San Ruttare, just a short way down the freeway. ◉

"Say! What a nice office!"

CARTOON BY MIKE TWOHY

Jackson W. Granholm was first published in DATAMATION almost two decades ago.

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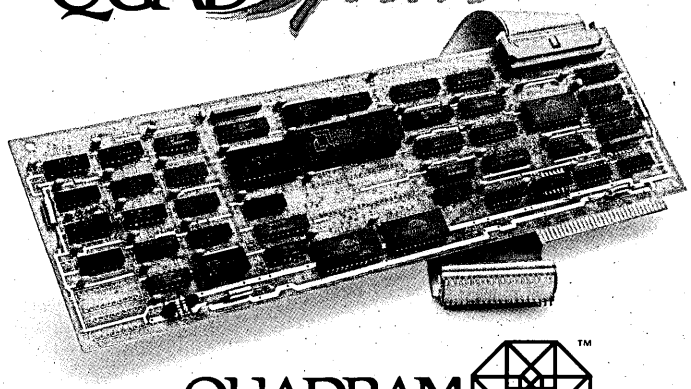

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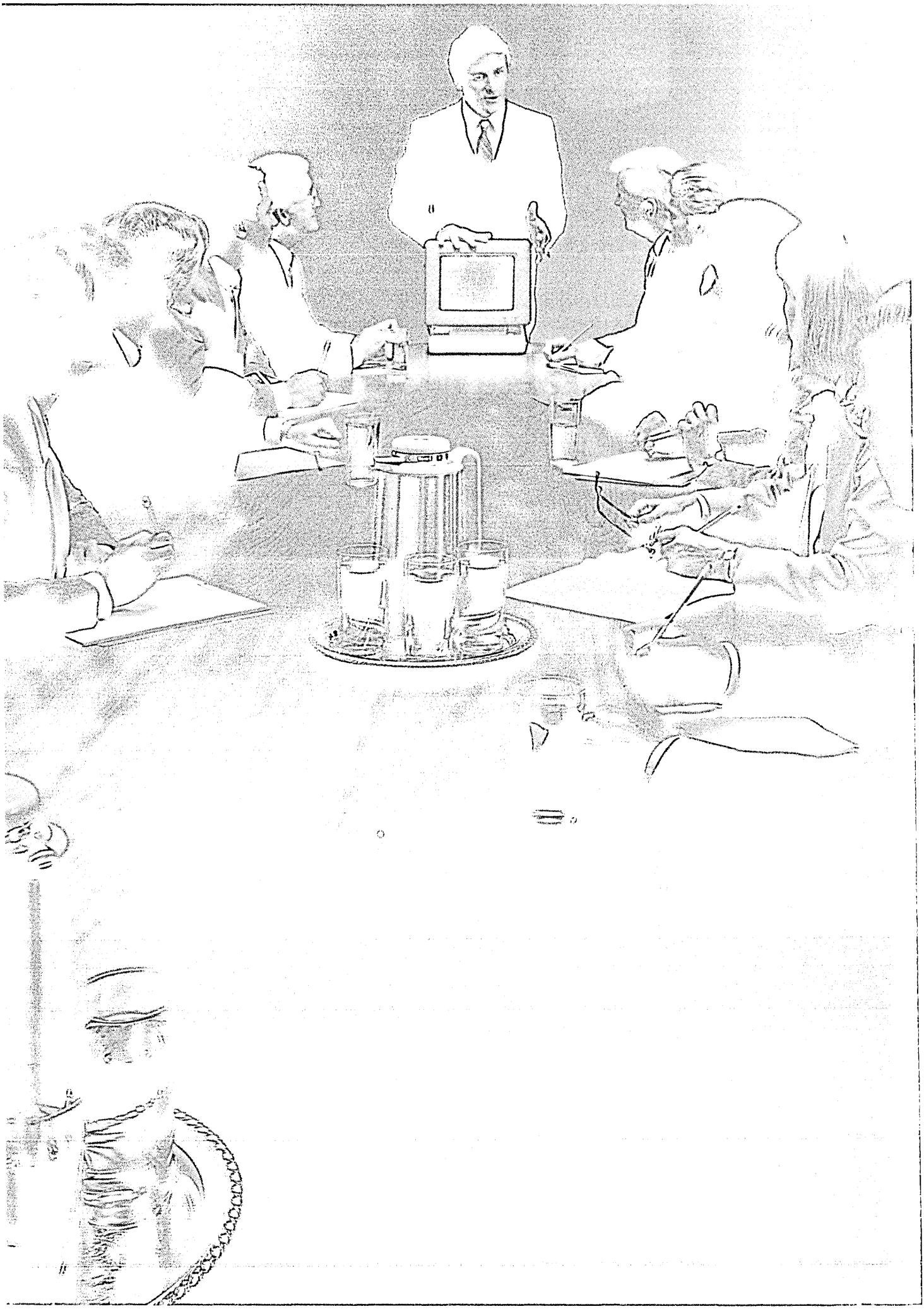
CIRCLE 60 ON READER CARD



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WE OFTEN SELL SMALL.
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Not only does it fit today's smaller workstations, it works within the bigger picture of our compatible 3270 networking systems. Which means you can expect the 1700's immense contributions to go on far into the future.
Just as important, its high-resolution screen, large characters, and other ergonomic features are tremendously popular with the operators that use it every day.
And so are its handy light pen and display attached printer options.
After all, we realize that no matter how big a company thinks, it can never forget that people are still the key to office productivity.
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Our Compact 1700 design is really big on productivity.
CIRCLE 61 ON READER CARD

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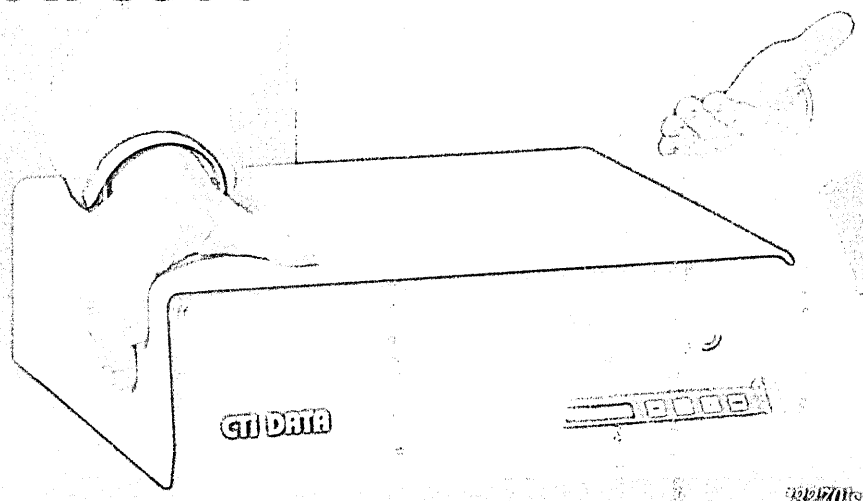
CTi's New 5000.



3270's must be plug compatible

The new CTi Series 5000 has done away with protocol converters and attachment cards. That's one nice thing about it.

Another is that if you've been looking at a cost of roughly $700 per port for a remote workstation cluster communications controller, we can offer you more flexible communications for about $500 per port.

But the best reason for buying the CTi Series 5000 is the fact that it's the only workstation attachment device that does everything it does. It connects as many as seven devices – 3270 "A" Coax and Asynchronous terminals and printers as well as PC's with host interface cards – either hardwired or through dial-up modems, to any IBM host.

The Series 5000 supports Bisync Communication or SNA/SDLC at speeds to 9600 baud.

CTi's Series 5000 not only ties your terminals, PC's and printers to the host cheaper, it does it better. But don't take our word for it. Try it. If it doesn't do everything you expect it to as well as you expect it to, call us and we'll come get it. That's a promise.

DATA CORPORATION

5275 North Boulevard, Raleigh, NC 27604, Phone (919) 876-8731. Or call CTi DATA toll free at 1-800-334-8473, Operator #50.

CIRCLE 62 ON READER CARD

Computer advertising is on the upswing, reflecting some fundamental trends in the industry.

COMPUTER ADVERTISING, 1985: THE $2.1 BILLION PRIZE

by Efrem Sigel

Veteran readers of the *Wall Street Journal* may have felt they were in a time machine this spring when three silvery bullets kept turning up in issue after issue. But it was not the return of the Lone Ranger in triplets: the legend next to the ammunition read, "We're Gunning for IBM." The ads were the start of Wang's spring offensive—and a most costly one—for its VS system, against the IBM System/36. In a three-week period beginning Feb. 20, Wang ran the equivalent of 12 full pages in the *Journal,* at a total cost of around $900,000. The ad campaign, developed by Boston agency Hill, Holliday, Connors Cosmopulos, could hardly be ignored. "Just give us one shot and we'll blow IBM off your short list," the ads threatened.

Wang's "marketing problem," as described by a company public relations officer, was to get the attention of data processing directors and top management in order to show that "at the departmental level, Wang has a better solution" than IBM.

In such a situation, the purpose of advertising is to achieve awareness among top managers who don't normally hang out with computer salespeople. Joseph Grimaldi, senior vice president at Mullen Advertising, Beverly Farms, Mass., which is handling a heavy schedule of ads for Apollo Computer, Chelmsford, Mass., explains the rationale. "When you're talking about a high-cost item [like a multihundred thousand dollar network of Apollo's design workstations]," he says, "someone in management wants to know about it—and wants to feel comfortable about the supplier." Suppose it comes down to a one-to-one choice between another supplier and Apollo, Grimaldi muses, "The last thing you want is for someone sitting across the desk to say, 'Who?' when your client's name is proposed."

This double target—general management as well as dp specialist—is much in vogue for mini and superminicomputer systems suppliers these days. At Tandem Computers, Cupertino, Calif., which began a print campaign around the theme "computer fat" early in 1985, advertising manager Claudia Hudson explains the reasons for trying to reach top corporate decision-makers as well as dp/MIS directors.

"Our systems are typically bought by a steering committee," she says. "The chief financial officer often sits on it, along with another member of senior management." It's the data processing experts who bring in a recommendation of what to buy, but it's the financial and general managers who sign off. And at the end of the nine months that it takes the leading maker of fault tolerant computers to close a typical sale, it doesn't want to lose out because the financial vice president has never heard of Tandem.

What is striking about the advertising strategies of Wang, Tandem, and Apollo is that none of these companies lives and dies from sales of high-volume personal computers, where advertising, brand recognition, and retail razzmatazz are regarded as crucial. Wang, Tandem, Apollo, and other firms with growing ad budgets—Digital Equipment Corp., Data General, Prime, Computervision—are selling systems to medium and large customers. The value of a single order can range from $25,000 for a bare-bones mini to hundreds of thousands of dollars for a Tandem NonStop, a VAX, or a Prime supermini. All these companies employ hordes of well-paid salespeople and customer service reps to make the sale and keep the customer happy. So why advertise?

The reasons include all the ones that ad men usually give—to educate and inform the customer, to stimulate demand, to pull customers into the showrooms or onto the trade show floor, to open the doors to salesmen, to make those who've already decided feel comfortable about their choices. And of course there's another, compelling reason: when your competitors are advertising heavily, you often have no choice but to go along.

BASIC INDUSTRY TRENDS

The growing volume of computer advertising reflects a couple of fundamental trends in the computer industry. One is the need to explain products to an ever larger and more diverse audience—a need that has been made especially apparent by the rise of the personal computer. Another is the high degree of competition in many—but not all—segments of the industry. In mainframe computers, where IBM's dominance is overwhelming, neither IBM nor its beleaguered

If your competitors are advertising heavily, you have no choice but to go along.

competitors spend much on advertising. But in superminis, office automation systems, CAD/CAM workstations, personal computers, software and peripherals, where the number of competitors ranges from several to several dozen, advertising is on the upswing.

Communications Trends Inc., of Larchmont, N.Y., maintains a database of advertising spending by more than 100 computer companies in every aspect of the business, from mainframes to minis to pcs to software and services. An analysis of these data shows the following trends.

Worldwide advertising outlays by U.S. computer companies are up 191% since 1981, to $1.87 billion from $640 million. In the same period, the percentage of industry revenues going for advertising has increased from a little under 1% in 1981 to 1.6% in 1984. Fig. 1 shows the growth in computer advertising as projected from 101 companies that represent more than 90% of industry revenues.

Not only has total advertising grown significantly, but its makeup is changing. Computer periodicals, ranging from DATAMATION and *Computerworld* to *Byte* and *Personal Computing,* still carry the heaviest volume of ads ($346 million worth last year, up from $164 million two years earlier). But the fastest growing choices have become television ($264 million in '84, up from only $78 million in 1982) and business magazines and newsweeklies ($258 million in 1984 vs. $110 million in 1982).

The increase in computer industry advertising outlays is closely tied to the rise of the personal computer, the broadening of the base of computer buyers and users from a few hundred customers in the 1950s to hundreds of thousands in the '70s to millions in the '80s. As the computer audience has taken on some of the characteristics of a mass market—at least in gross number—the need for techniques of mass communication, especially advertising, publicity, and promotion, has correspondingly increased.

Fig. 2 shows the relation between personal computer advertising and all computer advertising between 1982 and 1984. Personal computer advertising is up by 332% in this three-year period, and now accounts for more than half of all computer advertising. Nevertheless, advertising for other computer products and services has still grown by an average of 20% compounded annually over the past two years.

Who spends the most to advertise computer products and services is only partially related to absolute size. Although advertising averages only 1.6% of revenues for the industry as a whole, many personal computer companies allocate 5% to 10% of sales to advertising, with some software companies spending as much as 12%. Yet mainframe companies, certain computer services firms, and the vast array of oem suppliers in the industry usually devote under 1% of revenues, and sometimes as little as one tenth of 1%, to advertising.

IBM is the biggest computer advertis-

FIG. 1

GROWTH IN WORLDWIDE AD SPENDING, U.S. COMPUTER COMPANIES

1981-84 (IN $ MILLIONS)

	1981	1982	1983	1984	% CHG., 1981-84
Advertising outlays, 101 companies	575	768	1,256	1,697	195.1
Advertising outlays, entire industry	640	850	1,380	1,865	191.4
Advertising as percent of revenues	.89	1.0	1.43	1.64	

Source: Communications Trends Inc.

FIG. 2

PERSONAL COMPUTER ADVERTISING IN RELATION TO ALL COMPUTER ADVERTISING

1982-84 (IN $ MILLIONS)

	1982	1983	1984	% CHG., 1981-84
Personal computer advertising	220	577	951	332.3
Other computer advertising	630	803	914	45.1
All computer advertising	850	1,390	1,865	119.4
Personal computer advertising as percent of total	25.9	41.8	51.0	

Source: Communications Trends Inc.

FIG. 3

10 LARGEST COMPUTER ADVERTISERS

1984 (IN $ MILLIONS)

COMPANY	COMPUTER AD BUDGET	AS % OF COMPUTER REVENUE
IBM	518E*	1.2
Apple	180	11.8
Digital Equipment	91	1.6
Tandy	74E	8.1
Hewlett-Packard	65E	2.0
Commodore	62	4.9
NCR	60E	1.5
Control Data	42E	1.1
AT&T	40E	4.0
Wang	39	1.8
Total, 10 firms	1,171	1.8

*E = estimated. Other figures as reported to the Securities & Exchange Commission for calendar or fiscal 1984.

When comparing multiplexers, you'll find ours at the bottom.

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a subsidiary of **AMP** Incorporated

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When evaluating statistical multiplexers for your data communications network, you'll probably look for specific features that provide flexibility and solid performance. Features like port, modem, terminal, and network capacity. At rates up to 9600 bps. With traffic control, dynamic buffering, error correction, diagnostics, automatic bypass, and the like.

Chances are when you evaluate Q-LINK™ and BI-LINK™, you'll find them at the top of your features and performance list.

And if you proceed to examine factors like reliability and quality, Q-LINK and BI-LINK will probably still be at the top. But when you compare price, our statistical MUXs sink to the bottom.

They're the lowest priced, highest performers in the market.

That's because we think being on the bottom will put us on top. Discover more about Q-LINK, BI-LINK, and the other data communications products manufactured by Carroll Touch. Call 512, 244-3500 for the name of the dealer in your area.

See us at NCC, Booth 7151

CIRCLE 63 ON READER CARD

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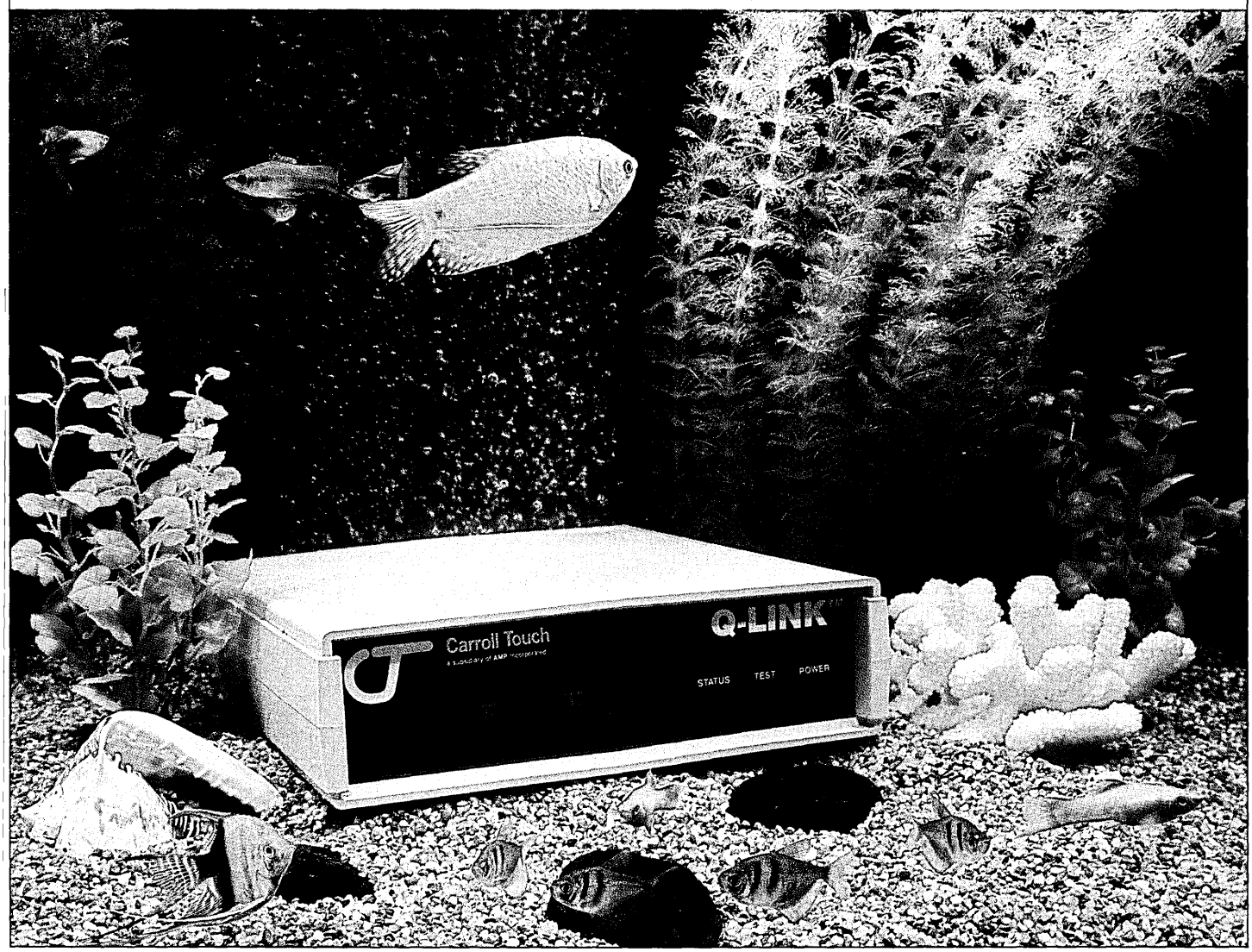

The purpose of computer advertising is to create awareness among top managers who don't hang out with computer salesmen.

er, but its proportion of industry spending is far less than might be expected from its size. Communications Trends estimates that Big Blue spent $518 million on worldwide computer advertising in 1984; probably 70% of that total was spent in North America. Yet IBM's ad budget is only 1.2% of revenues. Whereas IBM accounts for 40.5% of the computer revenues of the 101 companies in the CTI database, its advertising outlays represent only 30.5% of combined ad spending by those companies. The next largest computer advertiser, Apple Computer, spends a third what IBM does, although its sales are less than one twenty-fifth as large.

FIG. 4

SELLING, GENERAL & ADMINISTRATIVE COSTS, 101 COMPANIES,
1982-84 (IN $ MILLIONS)

CATEGORY	1982	1983	1984	% CHG., 1982-84
Total computer revs.	76,400	87,850	103,600	+35.5
SG&A costs	19,300	22,100	25,600	+33.0
as % of costs	25.2	25.1	24.8	
Computer advertising	768	1,256	1,697	+121.0
as % of SG&A	4.0	5.7	6.6	

Source: Communications Trends Inc.

FIG. 5

THE SLOWING RATE OF COMPUTER ADVERTISING INCREASES
1982-85

YEAR	TOTAL ADVERTISING	$ INCREASE OVER PREVIOUS YR.	% INCREASE OVER PREVIOUS YR.
1982	850	210	32.8
1983	1,380	530	62.3
1984	1,865	485	35.1
1985P*	2,140	275	14.7

*P = projected
Source: Communications Trends Inc.

ADS PLAY BIG ROLE FOR SOME

Moreover, for Apple and other big spenders, advertising has strategic importance that it will never have for IBM. It is hard to imagine the IBM board of directors agonizing over whether to approve a tv spot, as the Apple board reportedly did before airing the now famous *"1984"* commercial to launch the Macintosh in January '84. Or to imagine an IBM chief executive saying, as John Sculley did in November '84, that a huge advertising budget was one way of preventing Japanese domination of the American personal computer industry.

Fig. 3 lists the 10 largest computer advertisers in 1984 and shows their computer ad spending as a proportion of computer revenues. These 10 firms accounted for $1.2 billion in spending, or an estimated 63% of all industry advertising last year.

Although IBM with its low advertising-to-sales ratio, and Apple, with its high one, are both anomalies, there is no denying that advertising decisions have become more central to the way a computer company presents products and deals with customers. When Tandem got rid of its agency of eight years and awarded its account to tiny Matsumoto-Herzog in Los Angeles, two members of senior management sat on the selection committee; the final decision went to the board of directors for approval.

At Wang, a spokesman said that the company's "gunning for IBM" ads went "right up the line" to president John Cunningham and chairman An Wang for approval. (As a measure of its touchiness on the subject, the company also clamped what it and the agency called a "gag order" on those involved in the advertising program.) Moreover, Wang continued to run the ads at a time when it was reporting highly disappointing financial news, including the revelation that sales growth in the January-March '85 quarter would be only 10%, the entire company would shut down for two weeks in July to get inventories back in line, and top executives would deal themselves a pay cut.

Compared with total marketing and administrative costs for computer companies, advertising is still a minor proportion. But it's growing. What the computer industry spends on selling, general, and administrative costs—SG&A—would be enough to run most countries of the world. The tab in 1984 was $25.6 billion, or 25% of revenues. As Fig. 4 makes clear, this percentage has remained flat for three years—has in fact even edged downward—despite SG&A dollar expense rising 33%. Advertising, however, is taking a notably higher proportion of SG&A today (6.6%) than in 1982 (4%).

Software companies such as Applied Data Research, Cullinet, Computer Associates, and MicroPro have the industry's highest SG&A ratios—for these four the range is between 54% and 70%. The proportion reflects not so much high salaries or lavish spending at headquarters (though that may exist), but the fact that the cost of goods sold is very low for these firms; their products cost very little to manufacture in quantity.

Because advertising is a reflection both of sales anticipations and sales results, trends in spending over time indicate not only where companies have been, but where they think they're heading. Watching the success of Apple, Compaq, Lotus, and Hayes—four successful personal computer companies that are very significant advertisers—many companies figured the way to break into the front ranks was by promoting heavily.

FEW WINS, MANY FAILURES

There are a few successes but many failures: Televideo doubled its advertising in fiscal '84, but sales fell 2%; Kaypro increased advertising fivefold but the company lost money; Data General went on tv to push its laptop portable and other new products, but conceded that sales were falling well short of expectations.

A fickle market for both minis and micros in 1985 is finally slowing the computer advertising stampede to a trot from a gallop: the Communications Trends fore-

You know that choosing the right software is serious business. So does WATCOM.

So before you make any decisions about your software needs, talk to WATCOM—the people major software users around the world have trusted for years.

WATCOM has the products you need to get the job done right. Proven performers like WATFOR*, WATFIV*, WATBOL*, and SCRIPT. Plus new leaders in software for PC workstations and micro-to-mainframe communications. Networks, language interpreters and compilers. Text preparation and data management.

All WATCOM products are human engineered to provide the optimum in people efficiency and productivity. And they're designed to run compatibly on IBM mainframes and PC's, Digital mainframes and micros, and Commodore micros.

Whatever you need is backed up by WATCOM's innovative maintenance and support services. You'll be kept up to date with the latest in product enhancements and information. And our publications and seminars will help you get the most out of your software investment.

WATCOM. Quality products. Professional service. And a reputation built on more than 150,000 licensed mainframe and micro software programs throughout the world. So talk to us before you decide. After all, choosing the right software is serious business. For you. And for WATCOM.

Make the Right Choice: Waterloo C for IBM 370

Full implementation of the C language*, run-time library, and macro-processor make Waterloo C from WATCOM the right choice. Waterloo C is available for both the IBM 370 VM/SP CMS and MVS* systems. Full implementation combined with fast compilation makes programmers more efficient. Porting existing C software to the IBM 370 is simple. New applications are easily written.

Waterloo C is ideal for file processing, graphics, numerical analysis, and system software. It produces production-quality object code. And it has all-important system-specific facilities for both CMS and MVS.

Make the right choice. Call or write WATCOM today and we will tell you all about Waterloo C or any of WATCOM's other people-efficient products.

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DAT-5

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A fickle market for both minis and micros is finally slowing the computer advertising stampede to a trot from a gallop.

cast is for a 15% increase in ad budgets this year, down from 35% in 1984 and from 62% in 1983. Fig. 5 shows the deceleration in the rate of growth over the past four years. Even so, more than $250 million in additional advertising dollars will pour into the market in 1985.

John Sculley was always too smart to imagine that selling computers was very much like selling Pepsi. Many other people, however, both in computer marketing departments and in advertising agencies, have not understood that communicating the benefits of a computer is far more complex—and demands a different approach—than hawking soft drinks or breakfast cereal.

The most extreme cases of irresponsibility involve the avid promotion of nonproducts, as for example in Ovation's advertising of an integrated software package that was never shipped. More common, however, is the case of advertising claiming benefits that no product can deliver, certainly not one that takes as much work and investment as a computer system. Three software companies that have tried tv in the past year—Lotus, Ashton-Tate, and Cullinet—have all produced commercials ranging from the incomprehensible to the downright silly, by trivializing what it is they have to offer.

But these companies aren't the only perpetrators. There is an irritating aspect to much of Apple's Macintosh advertising, one which indicates that the Mac's slow penetration of the corporate market has as much to do with Apple's misunderstanding of that market as with business conservatism. For a large company to adopt a new system like Macintosh in volume means a massive re-creation or conversion of files, not to mention plenty of ongoing, routine typing and data entry—mundane, time-consuming tasks that are barely acknowledged in Apple's cutesy "point and click" copy.

In contrast, most of IBM's advertising is commendable for its understatement and sense of proportion. Even the humorous and widely appreciated Little Tramp commercials for the PC are properly hedged; the voiceover tells the listener that with an IBM PC a person can manage his business better, not that the millenium is at hand.

Whatever the slowdown in the rate of growth in 1985, big computer advertising budgets have become a fact of life for the industry; there is no going back to a less promotional era. Because one of the contributions of advertising is increased knowledge and awareness, computer advertising has played a role in creating rising expectations among all computer customers. This process ultimately will work to the advantage not of companies that have the best advertising, but of those who produce products that are worthy of their promotional claims. A tough standard, yes—but who can blame customers for applying a yardstick that computer advertisers have taught them to wield? ◉

Efrem Sigel is president of Communications Trends Inc., Larchmont, N.Y., which publishes a newsletter on computer advertising as well as "Computer Industry Advertising & Marketing Forecast," an annual survey with information on the budgets of 101 individual companies.

Most people think heart disease happens only in the elderly.

It happens in children as well. Things like rheumatic heart disease and congenital heart defects. Each year, nearly one million Americans of all ages die of heart disease and stroke. And 20,000 of them die from childhood heart diseases.

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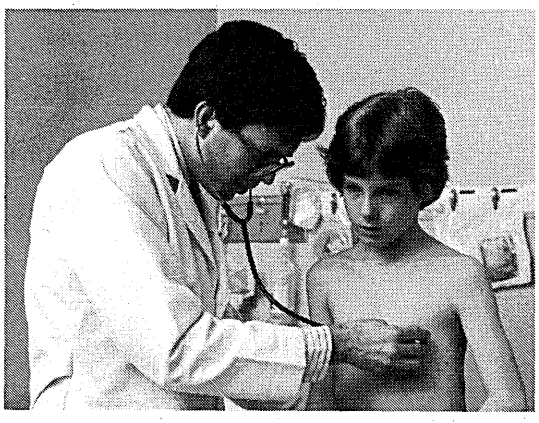
But more needs to be done.

You can help us save young lives by sending your dollars today to your local Heart Association, listed in your telephone directory.



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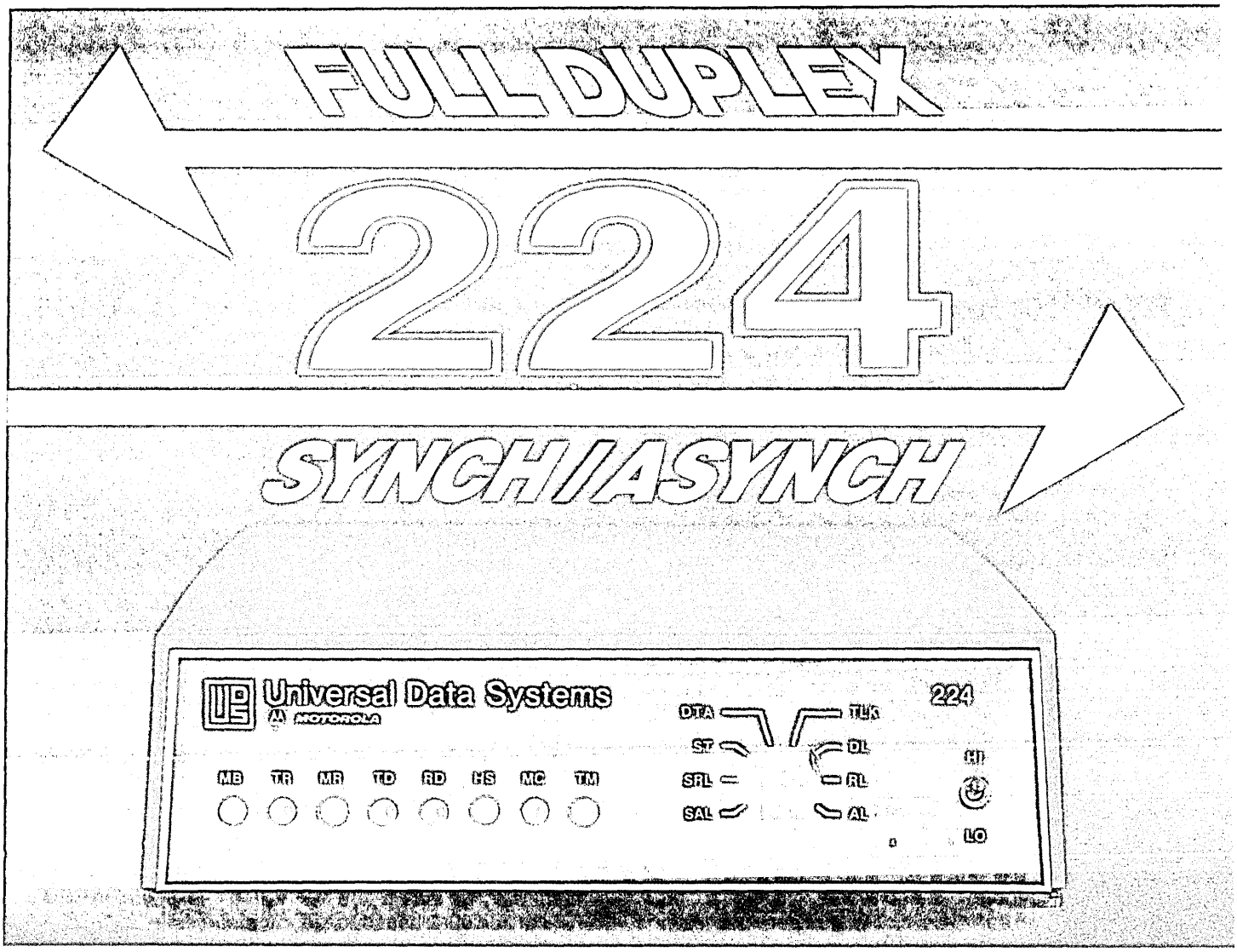
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SYNCH/ASYNCH

2400/1200 bps for dial-up data communications

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CIRCLE 65 ON READER CARD

Created by Dayner/Hall, Inc., Winter Park, Florida

Software AG Users spell it out...Datapro™ survey rates ADABAS

E-X-C-E-L-L

Where the future
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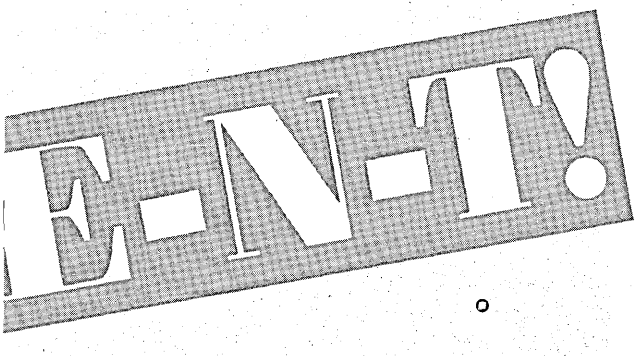

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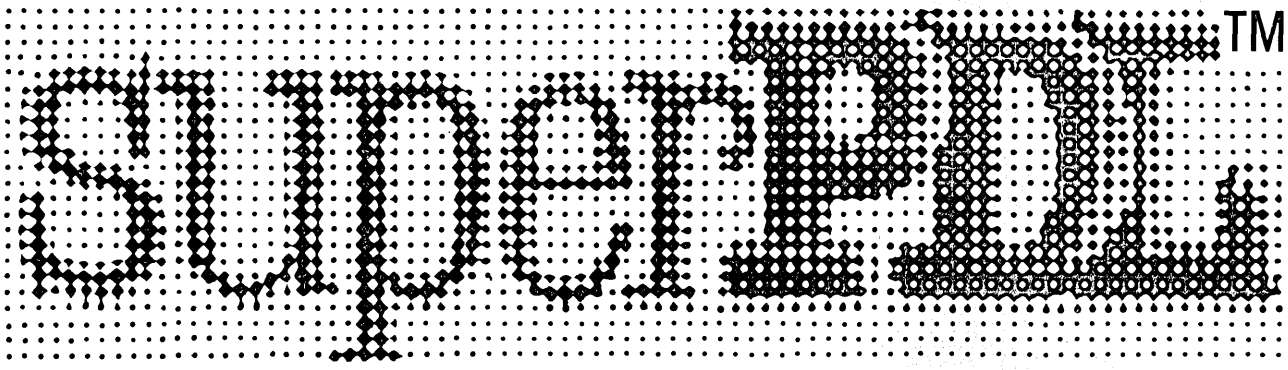

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Life can be hectic in the modern corporation; dp gets more than its share of the blame.

THE PSYCHOLOGICAL COSTS OF MASTER COMPUTER

by Willem A. Wagenaar

Despite much research, few conclusions have come from the worldwide attempt to establish the psychological cost of working with computers. Once computers are introduced into the workplace, employees complain of tired eyes, aching backs, insomnia, mood and character changes, social isolation, and deep depression, but it does not always make good sense to blame the computer. In a recent study conducted for the Dutch Ministry of Social Affairs and Employment (Padmos et al, 1985), nearly 400 publications and reports discussing the effect of computers on their users were analyzed critically. The conclusion is that users should be blamed more often than the computers.

Why is there such readiness to accept, without proof, that computers are the cause of so many problems experienced by employees in modern enterprises? At first glance, it is quite obvious that the introduction of a computer system can change a person's job considerably. These changes are not always for the best. A few of them, concomitant with computerization, are discussed below. They are polarization, pacing and bullying, monotony, and abstractness and alienation.

Polarization. For some people computers are really fun—the planners who see their possibilities enlarged beyond their wildest dreams; managers who are able to control their businesses more effectively; and software specialists who have become the crucial stock of their firms because no one else understands the extremely complicated and baffling programs governing the enterprise. This effect of computers in the workplace is called job upgrading.

Computers, however, often cause people to experience a degradation of their jobs. Many interesting tasks are taken over by computers—the pride of a craftsman is replaced by obedience to a machine. Take, for instance, the specialist who had a complete knowledge of all the types of nuts and bolts used in the Air Force. He could recognize thousands of different types; he knew where they were used; and, most important of all, he knew how to find each one of them. He was unique and considered himself the pivot around which the organization turned. Overnight he was replaced by a computer and reduced to a slave, typing messages in clumsy formats dictated by the machine.

Job degradation does not occur only because computers take over our tasks. A more important source of degradation is the often forgotten fact that computers enable us to perform tasks we would never consider doing without them. Thus, the introduction of computers often creates jobs that simply did not exist, many of which are just plain boring. Think of all the transactions that used to be performed between people directly with paper money. Many of these are now performed by data-entry typists, who handle abstract money that exists only in the memories of computer systems. Polarization, the simultaneous upgrading and degradation of jobs, creates dissatisfaction because it provides work that suits only the very talented and the very untalented. Assuming that talent is a more or less normally distributed commodity, polarization gives the large mass of people with average talents jobs that are either too easy or too difficult.

MACHINES CAN BE BULLIES

Pacing and Bullying. Computer systems necessarily incorporate many decisions about how a job is to be performed. Even the most user-friendly systems reflect decisions made by their designers. The user can't choose options not on the menu nor give responses that were unanticipated. User friendliness itself can be a source of frustration, as it is difficult to accept that systems asking questions in everyday language cannot understand perfectly normal answers, nor ever learn to do so. Machines bully their users into bizarre behavior because they lack the capacity to be bullied themselves.

The frustration is even greater when computers not only tell the user what to do, but also when to do it. The machines often make users wait for a response, and, more often than that, they enforce a high and pitiless speed without release.

Monotony. Jobs in nonautomated environments used to combine many different subtasks. But computers are changing that. In the clerical sector, for instance, automation often leads to a redefinition of tasks. Many tasks will be more monotonous because of the company's desire to use the expensive equipment efficiently. Interaction with the computer system will be limited to those who, by their full-time dedication, become specialists.

Tasks being performed in many branches of an organization tend to be centralized when automation progresses. Centralized information processing departments, however, may increase monotony along with efficiency. Indeed, according to a study by Çakir, the main drawback experienced by administrative workers in adjusting to automation was a marked increase in monotony. Machines do not find it difficult to do the same thing over and over again, and they have not yet refused to do so. People tend to dislike performing a difficult but repetitive job because it forces them to pay much attention to something that is in essence boring.

Abstractness and Alienation. A direct consequence of automation can be that certain tasks that used to be performed by groups are now carried out by a single person. This person is separated from others, without much contact with colleagues. Combined with centralization of computer systems, this relocation and redefinition of the job may imply that the information to be processed will be generated at an entirely different department, at an entirely different place, and by entirely anonymous people. Even the meaning of the information might constitute a riddle, thus leading to a very abstract level of operation. For example, a cashier would be quite surprised paying a million dollars in cash as a monthly payment to a retiree. On the other hand, the operators in the computer department of a bank, keying in the same amount, would be much less surprised because to them the amounts of money are essentially random, meaningless numbers. A million is as good a number as any other amount. This change toward the abstract does not only lead to difficulties of error checking, it may also cause a loss of interest, motiva-

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tion, and satisfaction in workers. Apart from that, the lack of contact with real people might be a cause of stress in and of itself. After all, who wants to spend the day with a complete moron as a colleague, doing boring and pointless work?

It is clear that in theory the switchover to computers can have many adverse effects, but how bad is it in reality? Çakir found in the study he did in 1981 that out of 450 respondents, 347 thought the computer had taken away too many of their work responsibilities. Of that same group, 360 persons thought they could get a promotion without further education. Entering text on computers instead of typewriters initially leads to a certain satisfaction, but later on people complain that meaningful responsibilities like designing a layout or hyphenating text are taken away from them. Farber and his collegues found many complaints about pacing and a lack of autonomy. It is clear that these factors are related to the total organization work, of which the computer is but a part. The same authors report that job satisfaction is much higher when the computer is employed in such a way that autonomy is high and pressure is low. Weltz and coworkers report complaints about isolation and alienation, although other people may value the same aspects of the job, calling them independence and autonomy.

HIGHER STRESS IN PAUSES

Physiological measures of stress have been collected, but the results are not always conclusive. Çakir found high activation levels (i.e., rapid heartbeats and high metabolic rates) for punch typists and operators who use more than one vdu simultaneously. Farber et al. observed, however, that operators working in data entry departments had higher activation levels during their resting periods than during work hours. The explanation was that coping with stress continues or accumulates during pauses. Obviously this interpretation stems from the prior conviction that entering data must be stressful, otherwise the straightforward conclusion that entering data is less stressful than eating lunch would have been accepted.

Smith et al. compared the stress level felt by clerical vdu users and nonvdu users doing the same jobs. Some salient results are presented in Fig. 1. Generally the vdu users were experiencing heavier stresses at work. Sauter and his colleagues, however, do not report such differences in a very similar study. The same incongruency is observed in the measurement of moods. Smith observed some remarkable differences between vdu users and nonvdu users, especially with reference to fatigue, anxiety, and depression. Sauter could not confirm these results, or rather, he obtained the opposite.

FIG. 1

STRESSES FELT BY CLERICAL WORKERS, VDU USERS VS. NONVDU USERS, DOING THE SAME JOBS

STRESSOR	VDU	NONVDU
Bored with work	48%	23%
Unable to choose own work	96	82
Dislike workload	45	21
Behind in work by at least one week	27	8
Dissatisfied with pace	41	18
Worried about reprimands	24	8

MEDICAL PROBLEMS REPORTED

Medical complaints are reported by vdu workers more often than by others. Smith had in one site 3.9 frequent or constant health complaints reported per vdu worker, against 2.8 per nonvdu worker. At another site the difference was even bigger: 11.3 versus 4.7.

Apart from the fact that some results are conflicting, there are other reasons why this research cannot lead to reliable conclusions. The most important reason is that the effects of computers are never studied experimentally. In a true experimental setting, one would randomly select two samples of workers to whom the same work is assigned. One group would work in a nonautomated environment while the other group would work with computers. The only difference between these two groups would be the presence or absence of the computer system. The two groups would have to be studied for a considerable period of time, without the knowledge that the working arrangement is temporary.

Obviously, these conditions cannot easily be met and so the design of most studies is quite different and scientifically unsound. Either one compares two groups working in different organizations, performing different tasks, and drawn from different populations or one compares the same people before and after the introduction of computer systems, neglecting the fact that many other aspects of their work environment would have changed as well, that some people may have a built-in resistance to change, and that other people have a fixed need to complain whatever the conditions are. Results of post hoc studies can be reproducible and even comprehensible. Still, they are not interpretable since we cannot relate effects to their causes.

Specifically, we cannot attribute dissatisfaction and complaints to the computer as such. Many other things might have changed as well. It is possible that computers are more often introduced in specific types of companies. Or management, eager to follow up its costly investment, could tend to exhibit a different sort of behavior toward employees. Or, those who could not find other jobs might have been left in newly computerized departments. In this way the expectation of adverse effects of automation could be a self-fulfilling prophecy.

This does not imply that the well-documentated problems do not exist. It only means that the problems need not be caused by computers, and that the problems will not go away when the computers are taken out of the system. Many people will find their jobs boring and dissatisfactory because they are boring and dissatisfactory. The jobs were simply not designed to give satisfaction. If the introduction of computers does not remedy this problem it is only natural that, being a salient part of the work environment, computers receive most of the blame. The complaints will only go away when the computer is intentionally used to create better jobs. The real problem is that this vital option is not the first priority of the people buying and installing the systems in the first place. ◉

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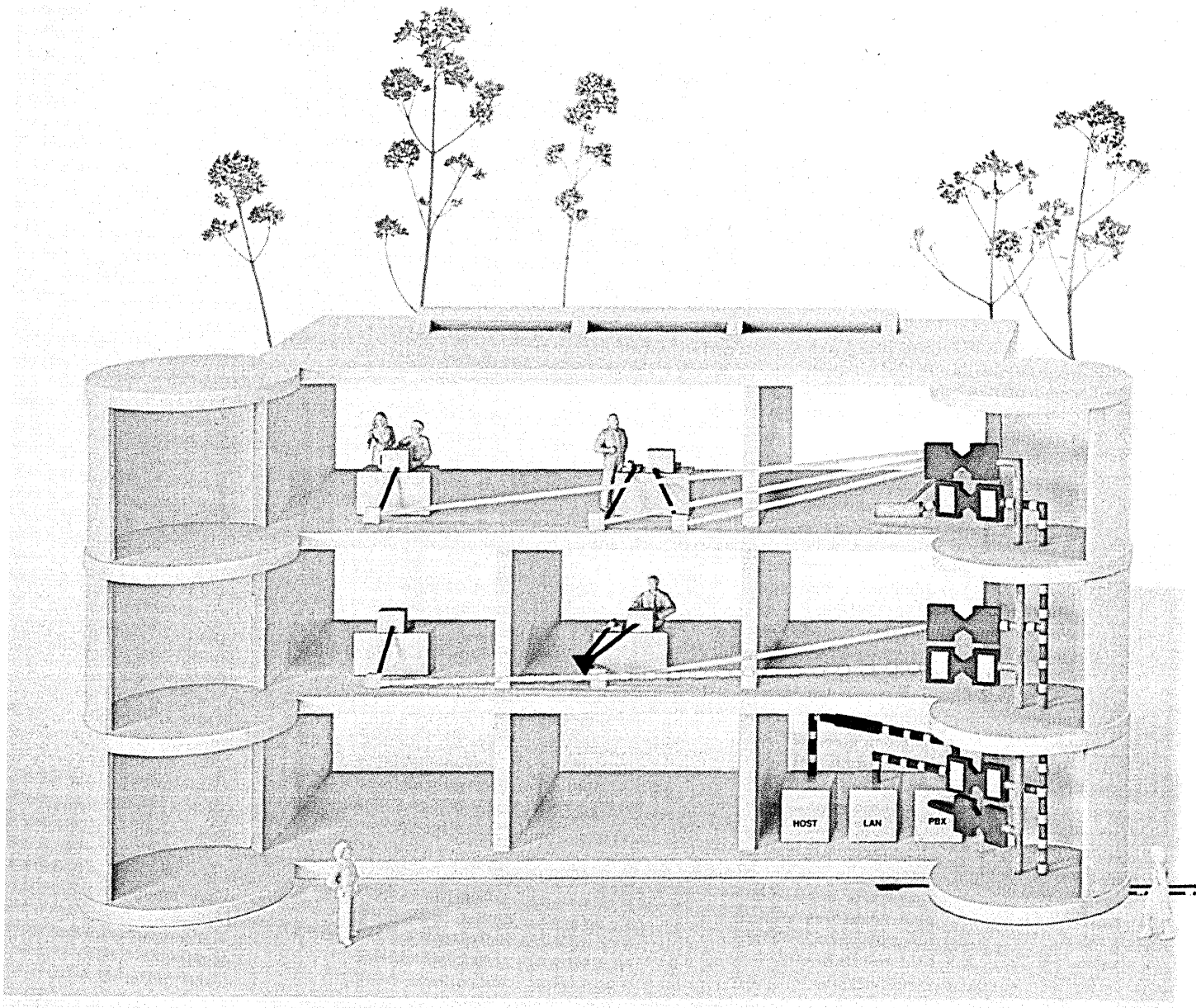

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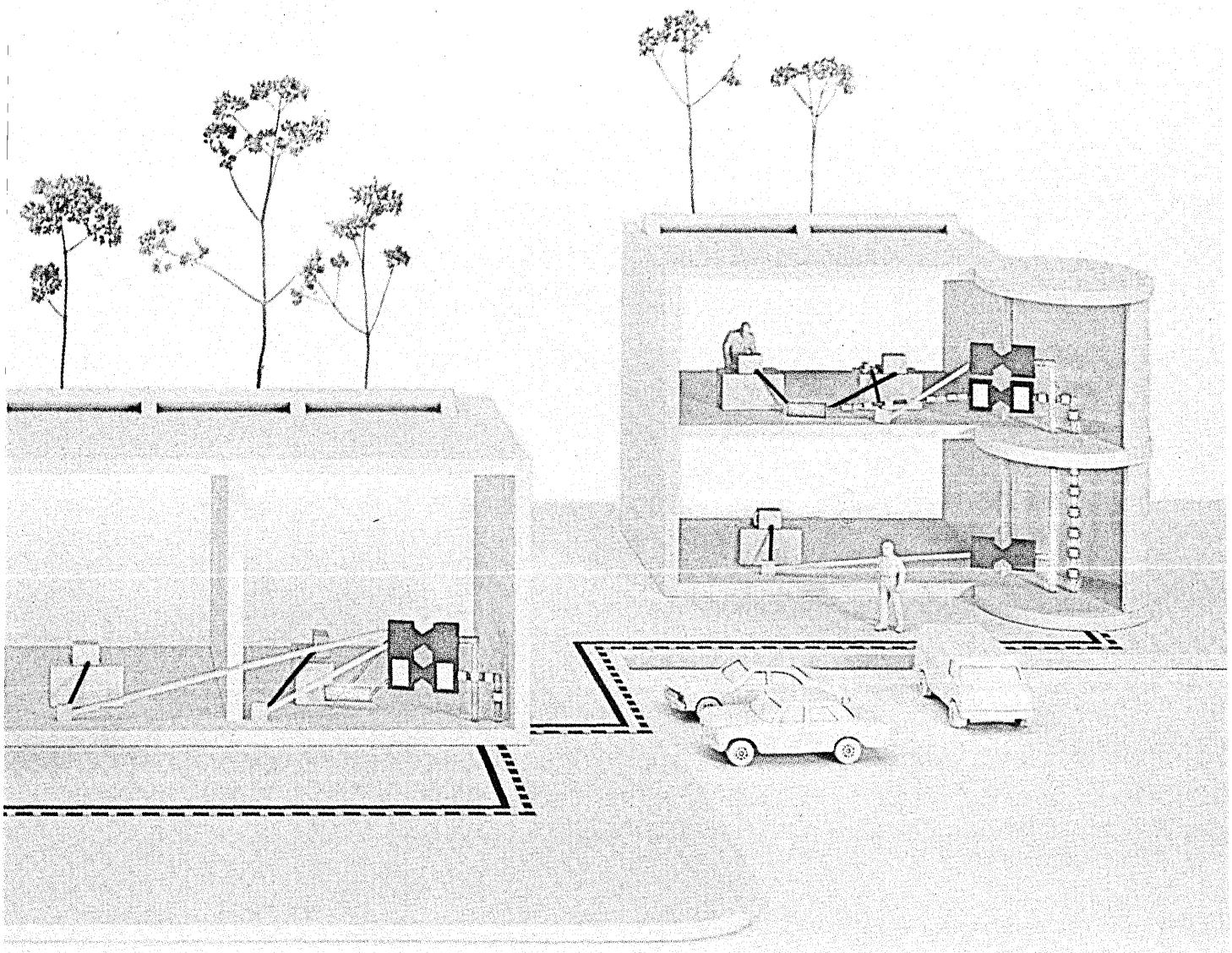

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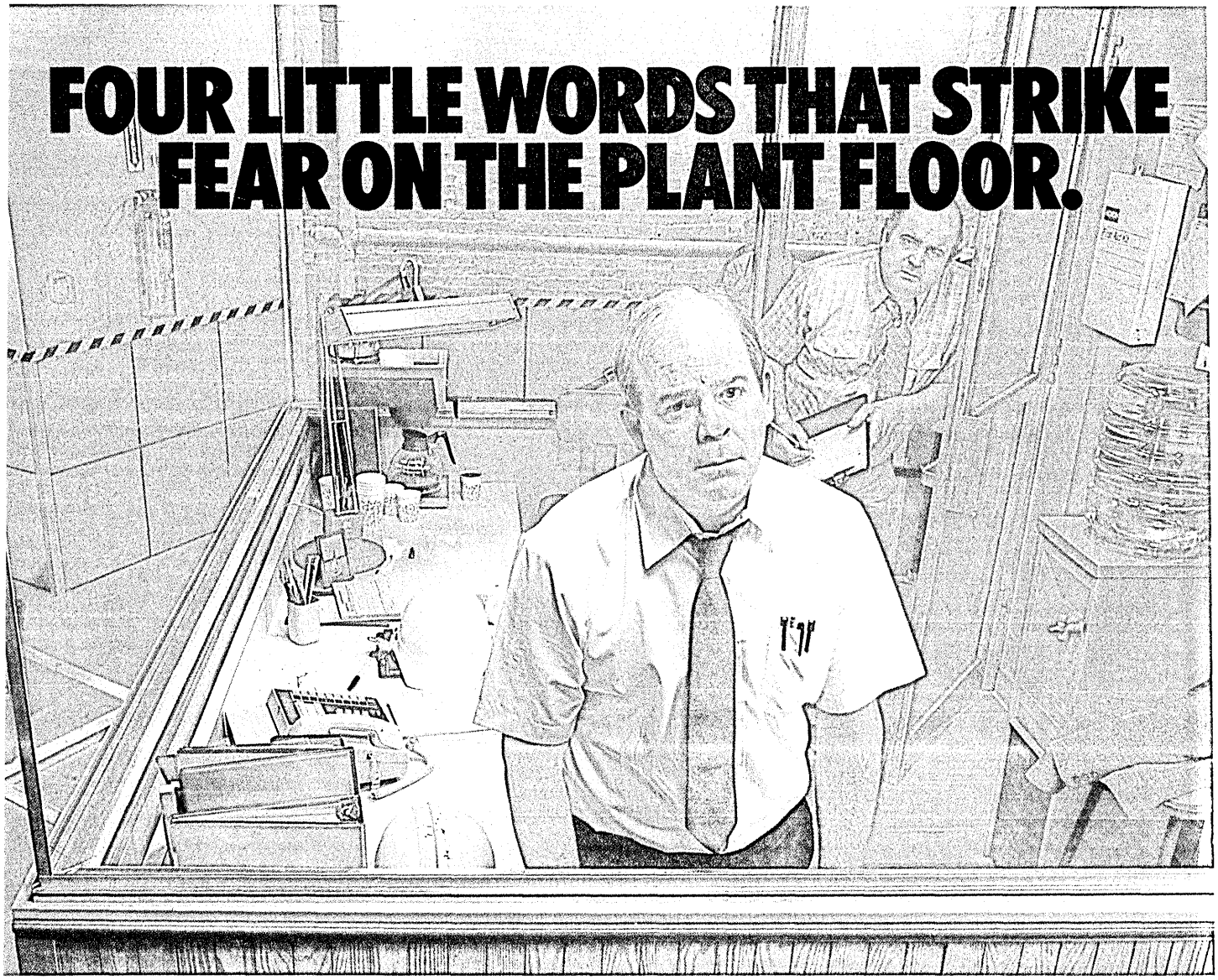

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The 1985 National Computer Conference is shaping up as an accurate barometer of economic conditions.

SO WHERE ARE THE PRODUCTS?

by Robert J. Crutchfield

High tech meets the smokestack industries this month in Chicago at the National Computer Conference. But if the industrial Midwest is slowly coming out of the recession, the computer industry is in the midst of a real slump. This summer minicomputer and personal computer vendors are feeling some of the recessionary pains that have plagued the automobile and steel industries for some time. It looks like a long, hot summer for high-tech companies. Some firms have already discharged employees on a temporary or permanent basis and others are considering a similar response to lackluster sales.

Indeed, the National Computer Conference, held in Chicago's McCormick Place from July 15 through 18, seems to be an accurate barometer of economic conditions: it is in the same slump as the rest of the computer industry. Booth reservations as well as attendance expectations are down. The NCC sponsor, the American Federation of Information Processing Societies, has signed up approximately 562 vendors this year compared with 581 exhibitors who attended NCC '84 in Las Vegas.

While not exactly following the footsteps of NCC '85 dropouts Apple and Wang, Harris Corp. has scaled down its exhibit to comprise only a small booth. Also missing from the show are many software vendors. MSA, Cullinet, Cincom, Micro Focus, and Digital Research plan to exhibit their offerings, but Ashton-Tate, Lotus, Microsoft, and many of the mainframe software vendors are staying away in droves, despite many new product announcements geared for this market over the past several months.

"The industry has been down and a lot of folks don't have the money they had last year," an AFIPS spokesman says, adding, "We look forward to a successful show."

What the 50,000 or so attendees will see, however, is a multitude of computer systems and components that may or may not be able to talk to one another. The rise of local area networks as intermediate steps for full connectivity among dissimilar systems may be the industry trend for the next year or two. The question is whether the customers have the money, and the optimism, to buy the new fixes.

Some computer industry watchers say companies have money to spend on dp equipment, but they say a lack of confidence is stopping users from stepping to the plate and taking a swing at all the new hardware and software in the marketplace these days. Too much vaporware, too many half-fulfilled promises may have dampened the enthusiasm of even the most rabid techie. Meanwhile, NCC, like the Spring Comdex in May, doesn't appear to be shaping up as a show for major new product announcements this year. Instead, exhibitors will probably display products that follow trends that began last fall.

The hot ticket products this year will be in the areas of communications and PC AT-class machines. Vendors like AT&T, Honeywell, and Digital Equipment Corp. are all offering connections to the IBM environment with SNA-to-their-box links. Sperry is communicating with IBM mainframes through a back-end database machine oemed by Britton-Lee (see "Database Machines Take Off," May 15, p. 52). The fast-rising Britton-Lee is expected to show a personal computer-based relational database management server for local area networks or clusters of microcomputers. The Relational Server can accommodate up to 100 users and handle 10 simultaneous queries. It is compatible with the vendor's larger IDM 500 series.

XEROX TO SUPPORT STARLAN

In addition to supporting SNA, Xerox Systems Group, El Segundo, Calif., will also support AT&T's Starlan Network. The recent AT&T announcement of its link to IBM mainframes personifies the mood of the non-IBM world that has gone—at least in the area of communications—from head-to-head competition to peaceful coexistence. Look for more announcements for more connections to IBM mainframes from controllers on the factory floor to departmental minis.

In addition to the SNA connections, there will be many local area network offerings that adhere to or are compatible with IBM's networking scheme. Companies with LAN offerings should include Sytek, Xerox, AT&T, 3M, DEC, and Sperry.

While its hard to see an SNA communications link operate on the NCC floor, the IBM PC AT and all the compatibles will be there en masse. Even though IBM has stepped up PC AT production, vendors are praying—at least in the short run—that there will be a sufficient gap between the demand for the AT-class machine and what Big Blue can supply. A drawback to this strategy is the anticipated shortage this fall of the 80286 chip.

Exhibited at the show will be AT-like offerings from Compaq, TeleVideo, NCR, AT&T, and Texas Instruments. TI's offering is particularly intriguing: an AT-class machine that can run PC/DOS as well as software written for the not-quite-compatible TI Professional Computer. At press time, Sperry hadn't announced who would oem its AT-like offering or whether it would be on display at NCC, but in Tokyo Mitsubishi Electric has announced receipt of a Sperry contract. According to Mitsubishi, first shipments will cross the Pacific before the end of the year. Mitsubishi currently ships about 85,000 pcs for Sperry, which has had relatively significant success in selling pcs to its own installed base, compared with the dismal records of the other BUNCH companies. While the AT clones tend to outperform the IBM PC AT, the prices for the AT look-alikes are a lot closer to the price of an IBM PC AT than the PC clones were to the IBM PC just a few years ago.

Still, there will be some PC and PC XT clones from companies like Compaq, TeleVideo, NCR, Tandy/Radio Shack, and Sperry. Compaq and Tandy have lowered the prices of their PC-like machines.

Other micro offerings will include

Data communications gear and PC AT clones may be the highlights of the show.

new or remodeled lap-size computers from Grid, Data General, Tandy, and Texas Instruments. The Grid now has a unit that is IBM PC-compatible and designed for use by salespersons. And while the lap-size products are getting more powerful, they still tend to cost in excess of $2,000 for serious computing power.

In the area of microcomputer peripherals, some vendors say this is the year for tape backup to take off. In that connection, look for products from companies like Cipher Data. (Tallgrass Technologies, Overland Park, Kans.,which is pushing its own standard, PC/T, was scheduled to exhibit at NCC, but has withdrawn from the show.) Though tape backup is probably more a Comdex-oriented product, expect to see more interest because of the sheer number of PC AT and compatible sales with larger hard-disk capacity.

TWO TAPE BACKUP STANDARDS

Since there are at least two standards for every microcomputer product from disk size to operating system, why should tape backup be any different? At this point two standards are emerging. The tape backup vendors are expected to support either the QIC-24 (Quarter Inch Compatible Committee-24) or PC/T. At this point, IBM doesn't offer tape backup for its PC line and hasn't announced support for any tape backup standard. IBM's recently announced venture with Cipher may indicate that QIC-24 has the inside track as a de facto standard, once Big Blue announces a product. Expect to see half-height disk drives from vendors like Quantum Corp. with 50MB to 80MB of storage capacity to support the AT-class machines.

Look for lower pc printer prices and for printers with multiple printheads and more functionality. IBM recently introduced a dot matrix printer for around $500 that can print single sheets of paper and envelopes without removing the paper roll. Toshiba will exhibit a printer that provides access to seven different type faces at one time. Like printers, there were numerous modem introductions over the past year. Expect to see plenty of 2,400 baud modems at NCC and deals and discounts on the 300 to 1,200 baud modems.

Lots of terminal vendors are expected at NCC—maybe more than the market can sustain. Prices for these products are moving in two directions: down for the basic ASCII terminals and up for the integrated voice/data terminals. At the low end San Jose's Qume is offering an ASCII terminal for under $400. Lear Sigler, Ampex, Falco, TeleVideo, and Telex have also lowered the price on some models. At the high end, companies like AT&T, Northern Telecom, and Compaq are offering sophisticated voice/data terminals with telephone management and simple user interfaces for around $2,000. Lee Data, CIE Terminals, ITT Courier, and Telex will also be exhibiting a line of 3270-compatible terminals. Following the trend to connectivity, many vendors will show terminals that offer multiple emulation.

In the area of departmental computing, the key is that vendors are attempting to offer complete solutions. DEC will feature the All-In-1 office system, running on everything from a Rainbow pc through a VAX superminicomputer system. The company has also introduced a software package that turns an IBM PC into a VT220 terminal. On the Unix front, NCR will display its recently upgraded Tower series along with its expanded line of pcs and terminals.

AT&T will exhibit its Unix PC along with its AT clone and its line of minicomputers. Burroughs will be at the show with its Convergent Technologies products, including its departmental cpus and OA workstations. Sperry, which recently announced another micro-to-mainframe Unix offering, will be at NCC with its oemed minicomputers and pcs. The Pennsylvania mainframer is also pushing its Sperrylink office automation system. Xerox will display its recently introduced line of micro and minicomputer offerings for the office. Pyramid Computers is also expected to introduce a new line of superminicomputers at NCC.

With more than 500 exhibitors at NCC, expect some surprise announcements, since many vendors are unwilling to divulge new product plans before the show. Several others will undoubtedly decide not to exhibit their pet projects yet. "Just a minor glitch in the software," they say.

We've heard that one before.

The Hardware and Software departments in this issue contain a sampling of what some of the vendors have recently introduced or will announce at the show. In addition to these announcements, many other vendors will display new products in the areas of pc maintenance equipment (such as disk-drive cleaners), high-density diskettes, ergonomic furniture, third-party maintenance, service bureaus, mainframe and micro storage, test equipment, and power protection. ◉

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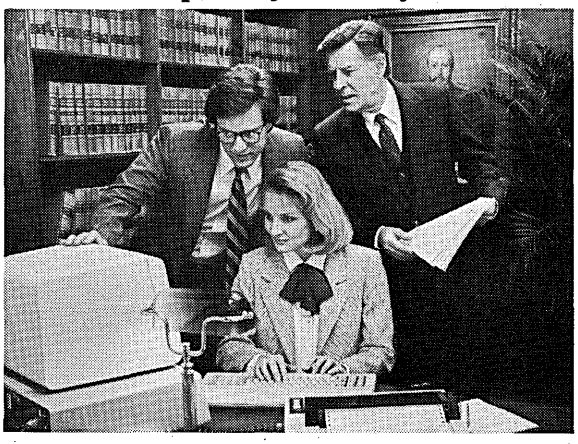

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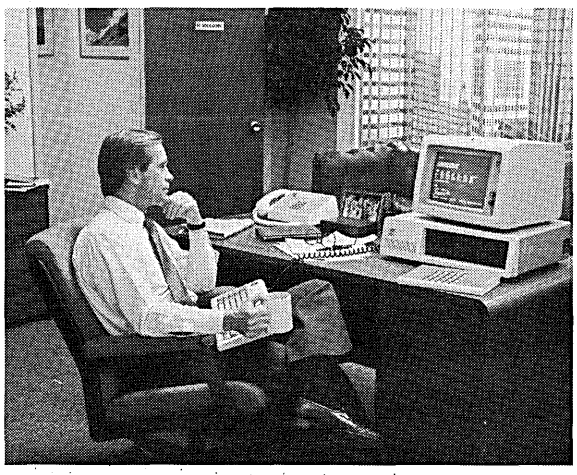
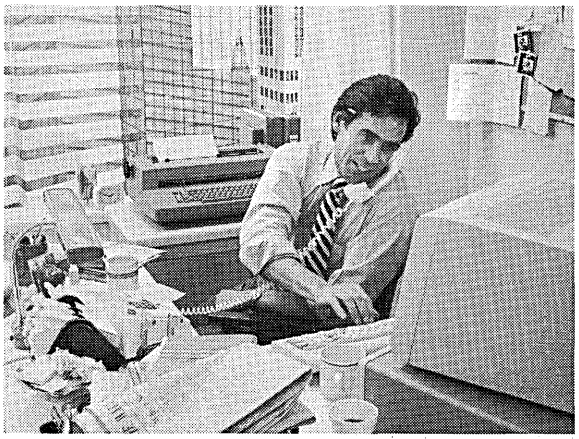


News/Retrieval supplies news on stock market activity, and Dow Jones Quotes—current and historical—to help spot performance trends. Or users can review economic and earnings forecasts or SEC, Merrill Lynch and Standard & Poor's reports. Best of all, there are no communication costs and no expensive equipment to buy. All that's needed is a personal computer and modem, a communicating word processor, or a time-sharing terminal.



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CIRCLE 71 ON READER CARD

DATA BASE FAT.

HOW TO AVOID IT, FROM THE LEADER IN ON-LINE TRANSACTION PROCESSING.

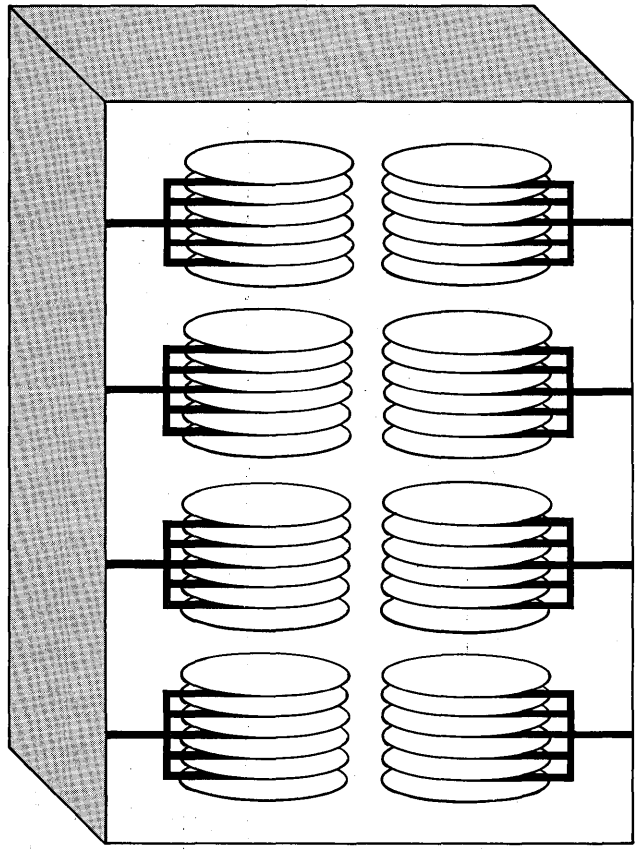
WHAT DATA BASE FAT IS.

It's a waste of time and space—the time it takes to access data and the space required for the storage. It's a hardware problem and a software problem and Tandem has solved them both.

NEW NON-FAT HARDWARE.

Introducing a new disc drive product called the Tandem V8.

The data base that would normally be stored on one large, conventional disc has been split up over eight small, high-density discs.



NEW TANDEM V8.
8 disc drives, 8 actuators in one cabinet.

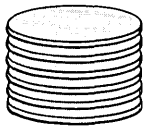
Instead of one actuator handling I/O requests sequentially, eight actuators can now work simultaneously. No disc space goes unused.

The Tandem V8 gives you high throughput, stores 1.3 gigabytes of data, yet remarkably takes up only six square feet of floor space.

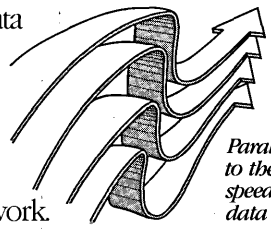
Maintenance is easy, too. Each disc drive can be removed and replaced in a few minutes. And the Tandem V8 can stay on line even while it's being serviced.

NEW NON-FAT SOFTWARE.

We've developed new data base software that allows our relational data base to operate 50% to 100% faster on the same hardware. That means you can boost your throughput without buying new hardware.



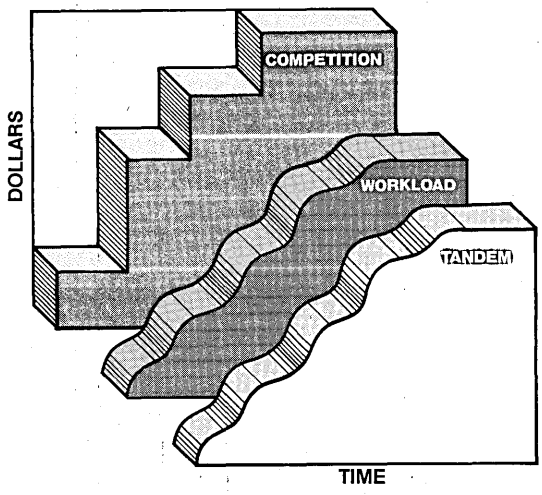
Massive amounts of data can be made easily and instantly available to hundreds of users, even if they're geographically distributed over a worldwide network.



Parallel paths to the disc speed up data access.

TANDEM'S GROWTH ARCHITECTURE.

When you outgrow a Tandem system, you don't replace it. You just add to it. You can start with two processors in a local system and expand at any increment you choose, all the way to 4,080 processors worldwide. You never buy more than you need.



Tandem matches need. The competition overspends it.

With Tandem, your software expands, too. So you only write applications once. It's also a fault-tolerant system that stays on line without using idle backup components. Instead, each component has at least one identical copy with which it shares the workload. No single failure can shut you down.

LET'S CHEW THE FAT.

Tandem systems are already at work for FORTUNE 500 companies in banking, telecommunications, manufacturing, transportation, retailing and energy, as well as several branches of the U.S. Government.

To find out what we can do for you, call us. Or write for our annual report. Corporate Headquarters: 19191 Vallco Parkway, Dept. 762, Cupertino, CA 95014.

TANDEMCOMPUTERS

CIRCLE 72 ON READER CARD

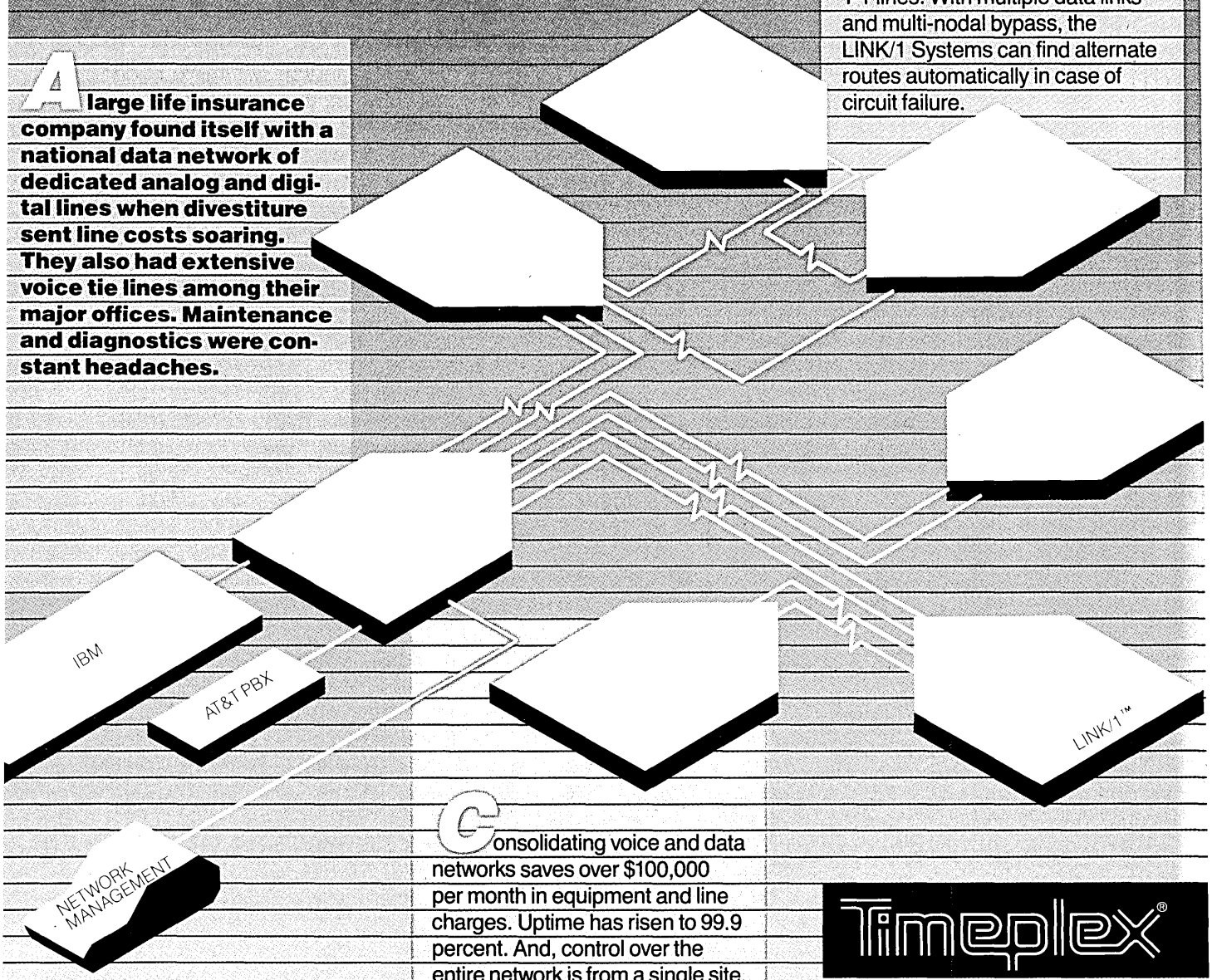
INTERNATIONAL OFFICES: AUSTRALIA, MELBOURNE, 613-267-1577 BELGIUM, BRUSSELS, 322-648-7330 CANADA, TORONTO, 416-475-8222 DENMARK, COPENHAGEN, 452-525288 FRANCE, PARIS, 331-738-2929 HONG KONG, 8523-721-8748 ITALY, MILAN, 392-308-7386 JAPAN, TOKYO, 813-564-6000 MEXICO, MEXICO CITY, 905-585-8688 NETHERLANDS, THE HAGUE, 3170-824131 NEW ZEALAND, WELLINGTON, 644-723286 NORWAY, OSLO, 472-123330 REPUBLIC OF SINGAPORE, SINGAPORE, 65-533-7611 SPAIN, MADRID, 341-442-5199 SWEDEN, STOCKHOLM, 468-734-0340 SWITZERLAND, ZURICH, 411-461-3025 UNITED KINGDOM, NORTHOLT, 441-841-7381 WEST GERMANY, FRANKFURT, 4969-5007-1

T-1 Transmission Facilities Management:
A Case Study

The Networking Solution

A large life insurance company found itself with a national data network of dedicated analog and digital lines when divestiture sent line costs soaring. They also had extensive voice tie lines among their major offices. Maintenance and diagnostics were constant headaches.

Timeplex designed and installed a seven node network that combines central site control and diagnostics with full redundancy in the LINK/1™ Facilities Management Systems. The new network replaced all the analog lines with digital facilities, both DDS and T-1 lines. With multiple data links and multi-nodal bypass, the LINK/1 Systems can find alternate routes automatically in case of circuit failure.



Consolidating voice and data networks saves over $100,000 per month in equipment and line charges. Uptime has risen to 99.9 percent. And, control over the entire network is from a single site.

If you've got a networking problem looking for a solution–look to Timeplex.

Timeplex®

A multinational manufacturer of systems and equipment for telecommunications networks.

Timeplex, Inc.
Woodcliff Lake, NJ 07675
201-930-4600

Timeplex Canada Inc. 416-475-1961

CIRCLE 73 ON READER CARD

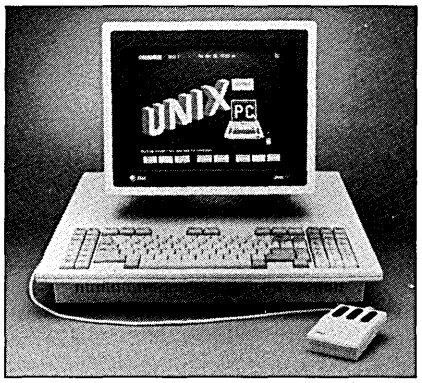
HARDWARE

Here is a sampling of the many products that will be exhibited by vendors at the National Computer Conference in Chicago this month.

AT&T INFORMATION SYSTEMS

AT&T will be exhibiting many of its recent product introductions at NCC. The AT&T Personal Terminal is one of a variety of new voice/data terminals that will be demonstrated.

This terminal provides managers with one-touch access to voice and data information and all System 75 and 85 PBX unified messaging services. Voice and



data communications are fully integrated through a single digital port in the System 75 or 85. All functions are learned through a touch-sensitive screen. The Personal Terminal costs $1,800 and connects to the AT&T Unix PC.

The Unix PC is a multitasking system that accommodates up to four users. It integrates computing with voice and data communications. It runs under Unix System V and features a user interface that includes menus and windows to shield users from Unix commands. The Unix PC sells for $5,000.

Also on display will be the AT&T answer to the IBM PC AT. Instead of offering an entirely new computer, IBM is offering enhancements that will give users the ability to upgrade the current PC 6300 to an AT-class machine. The upgraded PC 6300 sells for $6,000.

Starlan is a low-cost, high-performance local area network that links workstations, terminals, computers, and other peripheral equipment through ordinary phone lines. It connects DOS machine to DOS machine, Unix machine to Unix machine, and Unix machine to DOS machine. In addition, connections will be provided between the Starlan network and other networks, including SNA. Starlan costs approximately $720 per user.

Also of interest is the WE32100, a cpu with 180,000 transistors on a fingernail-sized silicon chip. According to the vendor it has the processing power of a superminicomputer. This recently introduced cpu incorporates CMOS technology, on-board cache memory, and separate 32-bit address and data pathways. AT&T INFORMATION SYSTEMS, Morristown, N.J. NCC Booth 5341

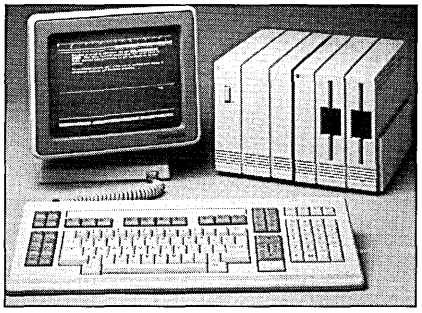
FOR DATA CIRCLE 300 ON READER CARD

BURROUGHS CORP.

In addition to its new logo, Burroughs will also be showing a new word processing system. The OW 25 combines the vendor's B 25 microcomputer hardware with a specially designed keyboard and new word processing software. It is designed for both office automation and data processing environments.

A choice of software enables clerical personnel and management to use the system in ways that are suited to the occupational requirements of each group. For example, the professional-level word processing software is designed specifically for managers who use it as a tool instead of a primary responsibility. The secretarial-level word processing is aimed at frequent users of word processing who require text editing capabilities.

A new layout and 14 additional keys offer an improved method of cursor movement, text identification, and mathematical input. The OW 25 is based on the vendor's B 25 microcomputer, a small business system. It features a cpu with



512KB of memory, a 12-inch display, and 10MB of fixed disk storage. The system can be integrated with other Burroughs office automation products. BURROUGHS CORP., Detroit. NCC Booth 5563

FOR DATA CIRCLE 301 ON READER CARD

CLARY CORP.

This vendor is introducing compatible 750VA and 1KVA on-line uninterruptible power systems. The UPSs are compatible with nonlinear loads caused by switching power supplies and they provide complete power protection for microcomputer systems with no interruptions in the event of power outages. The products offer a static bypass switch. Additional features include a UL design, the ability to handle high-inrush starting loads, and a transient response of ±7% for a 50% step load change with a 2msec recovery time. The computer interface will signal abnormal conditions such as loss of utility power, low battery, inverter or charger failure, and UPS in bypass mode, and will enable computer-controlled shutdown of the system. CLARY CORP., San Gabriel, Calif. NCC Booth 1430

FOR DATA CIRCLE 302 ON READER CARD

CODEX CORP.

The company will demonstrate its 4000 series local area network and SNA gateway products and will display a number of new LAN products for the first time at NCC. Codex will also introduce an ASCII terminal that can be used in conjunction with local and wide area networks in the

IBM and Digital Equipment Corp. environments. The vendor will also display an array of modem and other communication products. CODEX CORP., Mansfield, Mass. NCC Booth 5541

FOR DATA CIRCLE 303 ON READER CARD

COMPAQ COMPUTER CORP.

Compaq will be demonstrating its long-awaited response to the IBM PC AT—the recently introduced Deskpro 286 desktop personal computer and the Portable 286 portable personal computer. Both computers are compatible with the PC AT.

The Portable 286 provides the power and speed of the 80286 microprocessor, a 20MB hard disk, an optional internal fixed disk drive backup system, and up to 2.6MB of RAM. The Deskpro 286 is an 80286-based personal computer with up to 70MB of disk storage, 8.2MB of RAM, and capacity for four more internal storage devices than the PC AT.

Both systems provide the vendor's optional internal fixed disk drive backup system and the dual-mode monitor capable of displaying text and graphics on the same screen. Both micros run under MS/DOS 3.1 and IBM PC Xenix operating systems.

The products run all popular software programs and add-ons available for the PC AT, including TopView and the IBM Enhanced Graphics Adapter. Both also provide a security lock to prevent accidental interruption of operations and prohibit unauthorized access to data in the systems.

Suggested retail prices for the Compaq Portable 286 Models 1 and 2 are $4,500 and $6,300, respectively, and for the Compaq Deskpro 286 Models 1 and 2, $4,500 and $6,250 (including monitor). At the same time, the vendor also is announcing reductions ranging from 4% to 20% in the suggested retail prices of other computers in its product line. COMPAQ COMPUTER CORP., Houston. NCC Booth 1762

FOR DATA CIRCLE 304 ON READER CARD

PLUS DEVELOPMENT CORP.

A 10MB hard disk on an IBM PC plug-in board will be introduced at NCC by this vendor. Called the Hardcard, it allows users to add an internal hard disk to an IBM PC or compatible. It is targeted for corporate users who need hard-disk space but can't justify the purchase of a PC XT and the "power" home user.

The system comprises a formatted, 3½-inch, 10MB disk drive with electronics, controller, and file management and installation software all on a plug-in card with dimensions of 4 inches by 13 inches by 1 inch.

The two-pound product consumes 10.9 watts when operating and has an average access time of 65 milliseconds and takes up one expansion slot. The disk drive has 3370 heads, cobalt-doped oxide media, a rotary wedge servo actuator with an optional encoder, an airlock system, and a SASI controller specially modified for the IBM PC bus. It costs $1,100. PLUS DEVELOPMENT CORP., a Quantum company, Milpitas, Calif. NCC Booth 6041

FOR DATA CIRCLE 305 ON READER CARD

DATAPRODUCTS CORP.

The Dataproducts 8250 is a shared resource, color, dot matrix printer with paper handling capabilities and storage/recall functions for the multi-user business systems market. The printer can switch in 30 seconds from printing data processing output on continuous forms to printing word processing documents on automatically fed sheets, the vendor says.

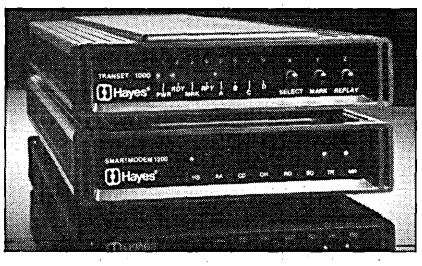
The product's paper handling design allows users to store a combination of continuous forms, cut sheets, and envelopes or labels within the unit to be called up for use through a control panel. Cut sheets can be fed automatically. The optional paper express permits dual-bin automatic cut sheet feeding plus a third bin for automatic envelope feeding.

Its 16-digit LCD readout displays English-like messages. Three additional switches are used in conjunction with an interactive menu on the display to configure the printer and set all parameters. The entire set of parameters can then be stored as a single job in the printer's nonvolatile memory. Up to seven different jobs can be saved for future recall. In the draft mode of 400cps, the printer has a minimum throughput of 150 lpm printing full 132-character lines. Text-quality speed is 100cps and near-letter quality is 50cps. Graphics are produced with a resolution of 240 by 240 dots per inch at a speed of 10 ips. The Dataproducts 8250 sells for $2,650. In quantities of 100 they cost $1,900 each. DATAPRODUCTS CORP., Woodland Hills, Calif. NCC Booth 5541

FOR DATA CIRCLE 306 ON READER CARD

HAYES

Along with its line of modems and software, this vendor will exhibit the recently introduced Transet 1000, a multifunction device that provides print and communications buffering, I/O switching, and port expansion to personal computer users. The product frees a pc by performing multiple tasks, including simultaneously sending or receiving data via a modem while directing a printer to produce hard-copy. It can also act as a standalone 24-hour mailbox.



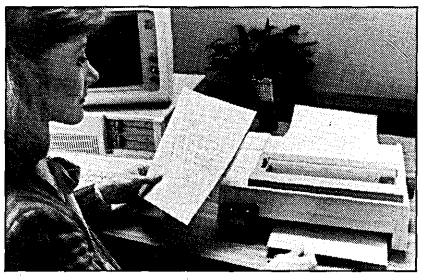
The product is aimed at the business market for use as an intelligent buffer for printing and communications. It can compensate for the different speeds at which peripherals receive and process information. The device can receive data from a computer at up to 19,000bps and then hold the data until it is sent at slower speeds to printers or modems.

Communication features include time/date stamping, overflow control, and dynamic memory allocation. Features of the mailbox include log-on messages as well as options for sending, scanning, and printing mail. The print capabilities include space compression, pagination, automatic page numbering, format control, collated printing of multiple copies, and time dating. It also offers the Xmodem protocol and has 128K of memory, a 68008 microprocessor, and software-controlled switching for peripherals. It is compatible with any device with an RS232C port. The product works in several configurations. Transnet 1000 sells for $400. HAYES MICROCOMPUTER PRODUCTS INC., Norcross, Ga. NCC Booth 6241

FOR DATA CIRCLE 307 ON READER CARD

IBM CORP.

Of interest at IBM's booth will be some of Big Blue's latest peripheral offerings for its Personal Computers. Among the recently introduced new products on display will be two low-cost, desktop printers that produce graphics and near-letter-quality text for PCs.

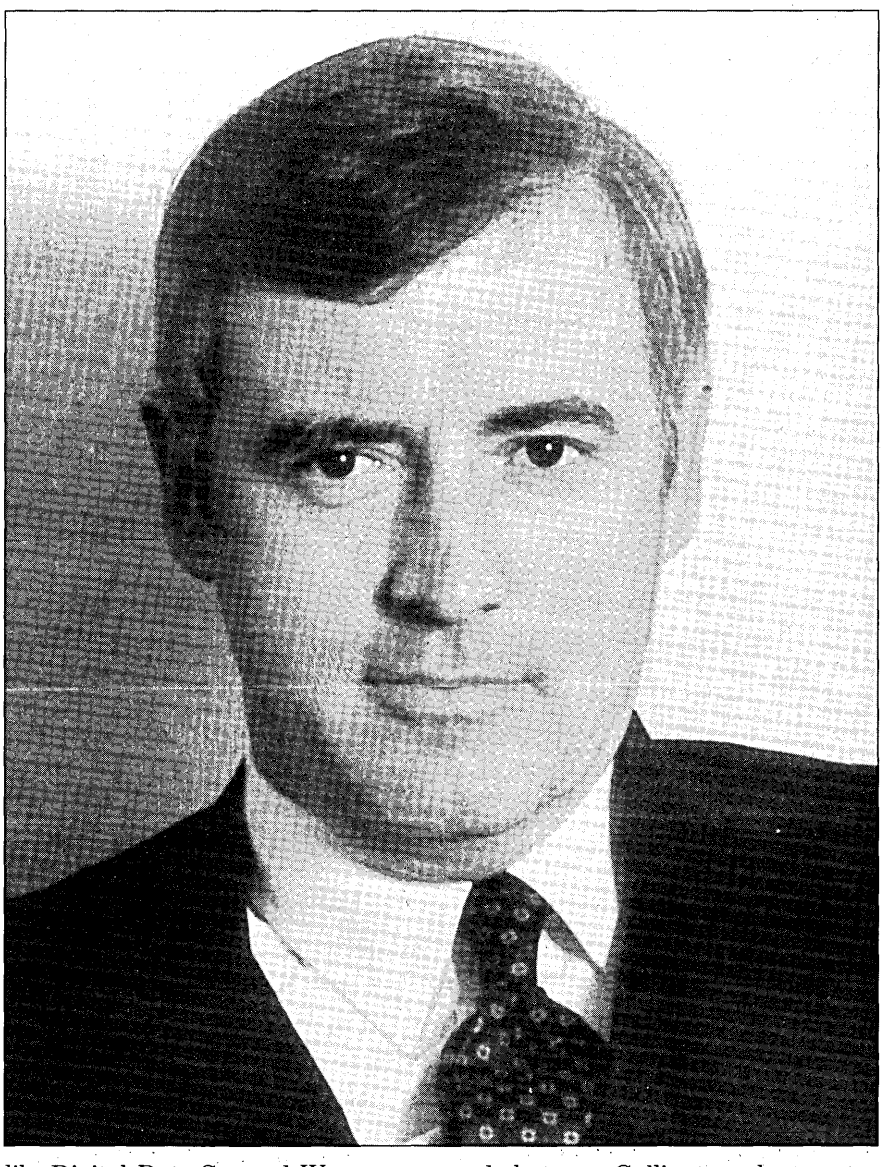


The Proprinter is manufactured by IBM and designed for office or home use, and replaces the vendor's current Epson printer offering. An open slot in the front of the dot matrix unit can be used to feed single-sheet paper, multipart forms, and envelopes. Continuous form paper, fed from the top, can be used for high-speed drafts or long reports and left in place while letters and envelopes are inserted in front. It costs $550.

The Color Jetprinter is oemed by

JOHN CULLINANE

On the Information Center Strategy

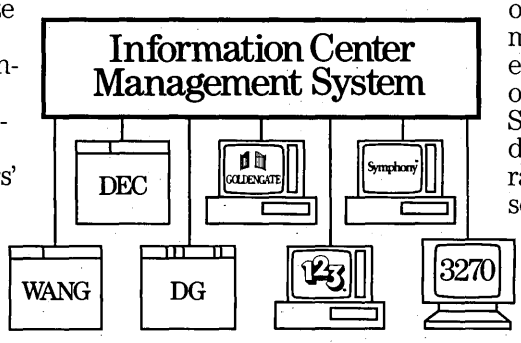


Today, virtually every IBM mainframe user is attempting to implement an information center. Formulating a successful information system strategy for the 80's and 90's requires it.

However, one of the major problems many companies face is the variety of software and databases located on different mainframes, departmental minis and personal computers. The challenge is to create an environment that integrates this diversity, is responsive to the corporate user community in meeting its information needs and, most importantly, provides access that is consistent and transparent. This is why open system architecture is key in implementing an information center strategy.

> "Open system architecture is key in implementing an information center strategy."

It also makes particular sense for a software company like Cullinet to adopt a policy of open system architecture that allows corporations to standardize on Cullinet's products without losing a significant investment in other vendors' products—whether they are mainframe applications, microcomputer software such as Lotus 1-2-3, Symphony and other PC products or departmental minis from companies like Digital, Data General, Wang, Hewlett-Packard and others.



That's why Cullinet has introduced the Information Center Management System. It's one part of a strategy that makes it much easier for the VP of Information Systems to standardize on the full range of Cullinet software, including our proven mainframe database and applications and our integrated GOLDENGATE microcomputer software.

Our strategy makes sense not only because Cullinet products are designed to work together, now and in the future; but also because our open system architecture means that data processing management will be able to accommodate satisfied users of other software while anticipating the introduction of new products.

For more information about the Information Center Management System and the full range of Cullinet products, I encourage you to phone, toll-free, 1-800-225-9930. In Massachusetts, the number is 617-329-7700.

Cullinet

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CIRCLE 74 ON READER CARD

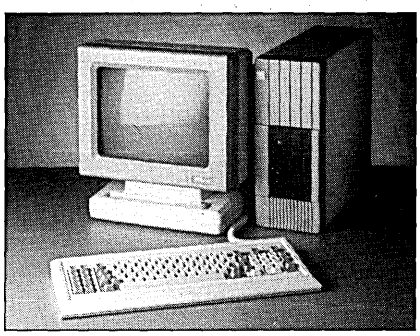
IBM from Japan. It is designed for businesspeople who want to incorporate up to seven colors into charts, graphs, spreadsheets, or high-quality text. It sells for $750.

The Proprinter and Color Jetprinter will attach to the entire IBM Personal Computer line and compatibles, the vendor says. IBM CORP., Rye Brook, N.Y. NCC Booth 6229

FOR DATA CIRCLE 308 ON READER CARD

ITT INFORMATION SYSTEMS

At the ITT Information Systems booth will be its ITT Xtra XP, a personal computer that competes in the IBM PC XT range.



It combines an Intel 80286 processor with on-board zero wait state main memory. According to the vendor, it was designed for users of memory and processor-intensive programs who want to save time. Aimed at the power user who requires high performance, the XP follows a repositioning of the overall ITT Xtra product line designed to give the vendor's dealers and customers better price/performance. Included is a minimum of 512KB of zero wait state RAM on the motherboard expandable to 640KB. An additional 1MB of main memory is available for the XP on a proprietary expansion board. It supports ITT DOS 2.11, runs PC software, and has five IBM PC XT-compatible expansion slots. Prices range from $4,000 to $4,500. ITT INFORMATION SYSTEMS, San Jose, Calif. NCC Booth 5369

FOR DATA CIRCLE 310 ON READER CARD

INTERPRETER INC.

At NCC, this vendor will introduce two new models to its Interpreter CCU line. The Interpreter is a device that will allow dissimilar brands of office automation equipment to communicate with 100% integrity, the vendor says.

The new models are the CCU-4 and the CCU-W. The CCU-4 is a four-port model with optional port configuration and two floppy disks with 256KB store and forward capabilities. Up to four dissimilar systems, either async or bisync, can communicate with one another and retain the full integrity of the documents being exchanged. The price of the Interpreter CCU-4 is $12,500.

The CCU-W is a six-port model with a Winchester hard disk providing 10MB store and forward capabilities. Automatic queuing, password protection, and menu access control are among the features. Automatic queuing will allow up to five users with dissimilar systems to send documents to a receiving system as the receiver is ready to accept the documents. This feature is advantageous to users of port concentrators, data switchers, or multiplexors. The CCU-W costs $19,000. INTERPRETER INC., Wheat Ridge, Colo. NCC Booth 5315

FOR DATA CIRCLE 309 ON READER CARD

LEAR SIEGLER

The Data Products Division of Lear Siegler Inc. will display its recently introduced ADM 11plus general purpose video display terminal. The product incorporates all of the features of the ADM 11 with additional function keys and editing capabilities. It is compatible with Lear Siegler as well as other terminals.

The conversation mode terminal features 16 function keys for 16 programmable and 16 nonprogrammable functions, and will handle transmissions up to 19.2 baud without handshaking. The terminal also features three edit keys and a break key, which can be programmed to perform an additional seven functions. Editing features include character/line insert, character/line delete, line erase, and page erase. Additional features include four visual attributes. A two-level English language setup and a 25th status line is also provided. Options include international character sets, answerback

memory, and a 14-inch green or amber screen. The ADM 11plus sells for $700. LEAR SIEGLER INC., Data Products Division, Anaheim, Calif. NCC Booth 5162

FOR DATA CIRCLE 311 ON READER CARD

NCR CORP.

NCR is bolstering its micro and mini offerings with several new products including a PC AT-like microcomputer called the PC8. It can be used as a standalone unit running PC/DOS-compatible NCR/DOS 3.1, as a multi-user, multitasking system running under Xenix, or as a file server/requester for a local area network. In a multi-user environment, up to 16 users can be connected. Like most PC AT clones, this one boasts better performance than IBM's offering. Prices range from $3,800 to $5,500.

The PC6 is positioned against the IBM PC XT, but resembles Compaq's Deskpro. The PC6, like the Deskpro, operates faster than the PC XT and includes hard disk storage, two floppy disk drives, and a streaming tape drive. The basic model sells for $2,600.

Even though NCR no longer stands for National Cash Register, this company is still very much involved in point-of-sale equipment. The Retail Personal Computer is based on the vendor's PC4 and includes a hard disk drive, color monitor, 256KB of memory, a retail multifunction board, a cash drawer and till, and retail software. Ranging in price from $4,300 to $8,700, it is aimed at small business.

Also on display should be new Tower offerings at the high and low end. The NCR 9400 is a 32-bit supermini utilizing VLSI technology. It has a processing cycle of 150 nanoseconds and is priced from $67,000 for a base system. The MiniTower is a new low-priced model that runs Unix System V. NCR CORP. Dayton, Ohio. NCC Booth 5811

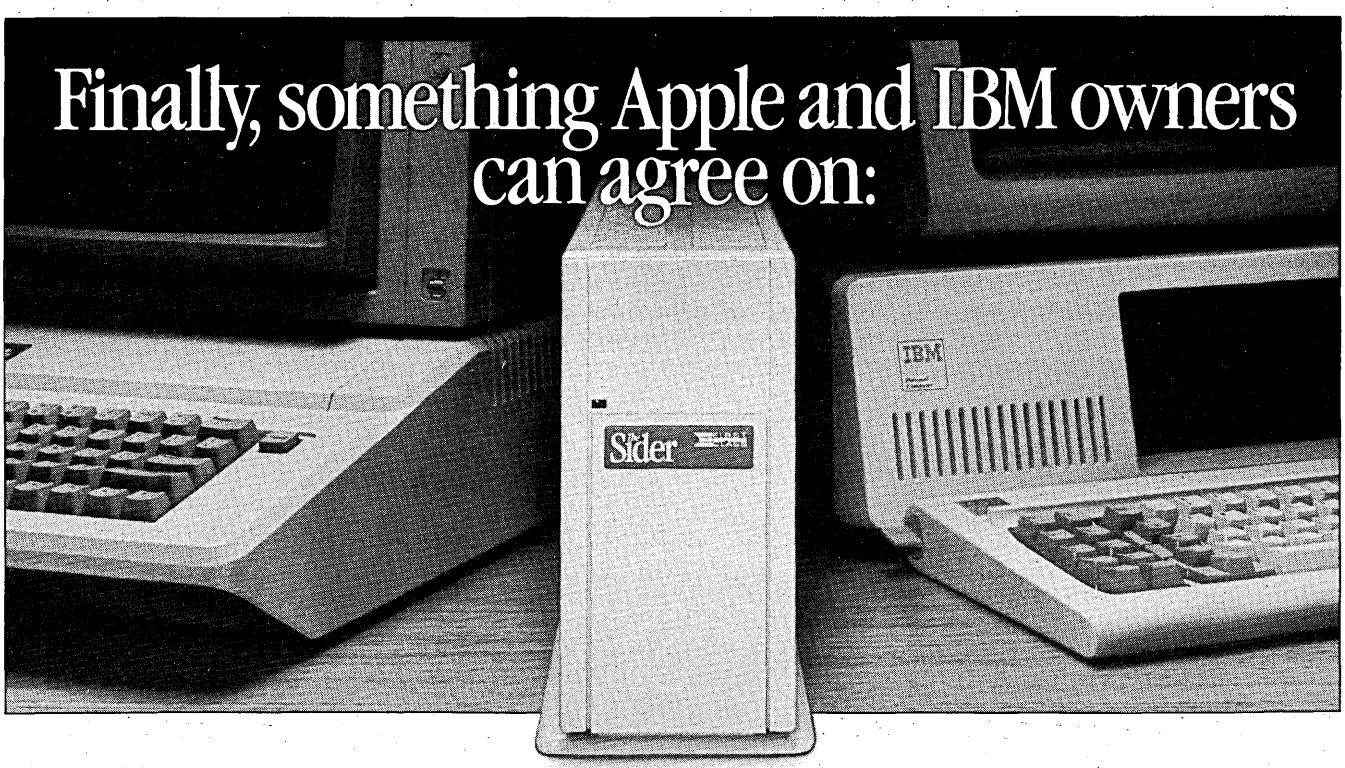
FOR DATA CIRCLE 312 ON READER CARD

SOLA

Sola will introduce the 1200VA standby power source (SPS) and a power-line monitor with a printer. The SPS will be available in three models and will carry UL and CSA approval. It is designed to provide economical off-line battery/inverter protection against power outages in less critical applications where clean, continuous power of a UPS system isn't required.

The unit switches from line power to battery/inverter power within four to 10 milliseconds when line voltage drops below -15% of nominal. When AC voltage returns to within 10% of nominal, retransfer occurs within two to four milli-

Finally, something Apple and IBM owners can agree on:



The Sider™ 10 MB hard disk

from First Class Peripherals

Decisions, decisions. First you had to choose between Apple and IBM. Now you have to decide which hard disk subsystem to purchase—and they all seem about the same. *But are they?*

First Class Peripherals can make your hard disk decision a lot easier. Because whether you use an Apple II+ or IIe...or IBM PC* or XT...we offer a Sider 10 MB hard disk subsystem just right for all your storage needs.

The most reliable, affordable 10 MB hard disk on the market

The Sider features state-of-the-art Winchester disk technology. Direct booting without floppies. Self-contained power supply. And compatibility with the most popular Apple or IBM software.

In addition, the Sider is *plug and play.* Everything you need for quick, easy installation is included: cable, host adapter, software and manual.

Built to last by Xebec

The Sider has won rave reviews for its performance and reliability. That's because it's manufactured exclusively for First Class Peripherals by Xebec, the industry's leading manufacturer of computer disk drives and controllers. And it's sold *direct to you,* so there are no dealers or distributors to hike up the cost.

Full guarantee and free tech hotline

You can choose your Apple or IBM Sider with confidence. Simply order and use your Sider for 15 days. If you're not 100% satisfied, return it for a full refund. Keep it, and you'll enjoy a full one-year limited warranty...plus access to our toll-free hotline, should you ever have a technical or service question.

It's easy to order your Sider

The Sider is priced at just $695 for the Apple model...$795 for the IBM. *That's hundreds of dollars less than what you'd expect to pay for the comparable "big name" models.* To order, use the coupon below...or for faster service, order by phone using Visa, MasterCard or American Express. Call toll-free:

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Extension 704

*Must contain hard disk ROM.

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☐ Yes, please send me the Sider, including 10 megabyte hard disk drive, host adapter card, cable, complete installation software and documentation for my: ☐ **Apple II+ or IIe** ☐ **IBM PC or XT**

I prefer to pay as follows:

☐ I've enclosed my check or money order for $695* ($795* for IBM-compatible Sider) plus $15 shipping and handling, payable to First Class Peripherals.

☐ Please bill the following credit card account for $695* ($795* for IBM-compatible Sider) plus $15 shipping and handling:

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Card # *Exp. Date*

Signature

*Residents of CA, NV and PA, please add appropriate sales tax.

Name

Address

City

State *Zip*

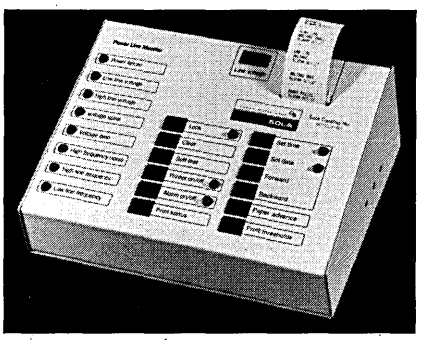
Telephone (area code)

Mail to: First Class Peripherals
3579 Highway 50 East, Carson City, NV 89701

704

CIRCLE 75 ON READER CARD

HARDWARE



seconds. When supplying battery/inverter power, the standby power source provides clean sine-wave output with voltage regulated to ±3% of nominal and total harmonic distortion limited to less than 5%. The 120V, 60Hz sells for $1,245. Starting price for the 220/240V, 50Hz units—one with British plugs/outlets, the other with European plugs/outlets—is $1,340.

The line monitor offers power disturbance detection benefits and continuous, unattended analysis of power-line quality. It features user-adjustable thresholds and detailed printouts of disturbance values. It sells for $1,600. SOLA, a division of General Signal, Elk Grove Village, Ill. NCC Booth 6077

FOR DATA CIRCLE 313 ON READER CARD

SYTEK INC.

Sytek will unveil the 6050 Network Translator at NCC. It addresses the limitations of the IBM PC Network. Currently the PC Network is limited to 72 nodes and a distance of 1,000 feet from the IBM PC Network Translator Unit. According to the vendor, the network adapter card is capable of existing in large network designs, networks of 1,000 nodes, and distances up to 5 kilometers from the network translator. It can be installed in the same rack mount and connected to the same broadband cable as the LocalNet 50/50 translator operating in the LocalNet 20 system. SYTEK INC., Mountain View, Calif. NCC Booth 1115

FOR DATA CIRCLE 314 ON READER CARD

TRUE DATA CORP.

This vendor will announce a wall-mount version of its Source Data Terminal at NCC. Designed for data collection from the factory floor, the unit mounts on any wall in a manufacturing environment where work surface space is limited or at a premium. It is an intelligent data collection device that incorporates an employee identification badge reader, an optical card scanner, a 32-column LCD, and a 16-key touchpad. Information entered from the employee ID badge, data cards, or from the keypad on the shop floor is then polled by a host computer in real time over an RS232C or RS422 serial interface.

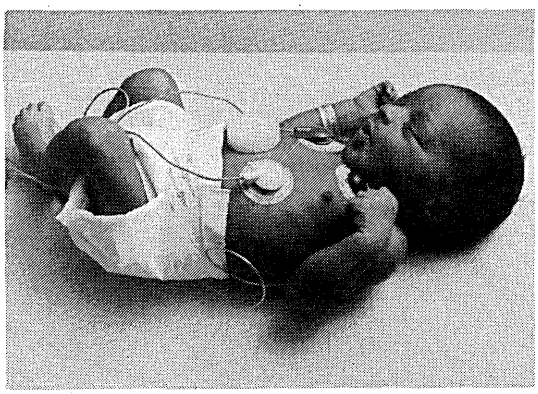
Prompt codes instruct the terminal to display appropriate prompts needed for a particular transaction. Up to 64 user-defined prompts stored in the memory may be evoked by the appropriate codes. This feature permits the user to tailor the system for specific applications. The unit sells for $2,000 and works with the vendor's manufacturing software. A

desktop version is available. TRUE DATA CORP., Irvine, Calif. NCC Booth 3709

FOR DATA CIRCLE 315 ON READER CARD

—Robert J. Crutchfield

We want to take heart defects out of the nursery.



It almost breaks your heart to see it. She's two days old and there's a question about a hole in her heart. She's fortunate. Something can be done about it. Each year, 25,000 infants are born with heart defects which can disable them for life.

The American Heart Association is fighting to reduce this form of early death and disability with research, professional and public education, and community service programs.

But more needs to be done.

You can help us save young lives by sending your dollars today to your local Heart Association, listed in your telephone directory.

Put your money where your Heart is.

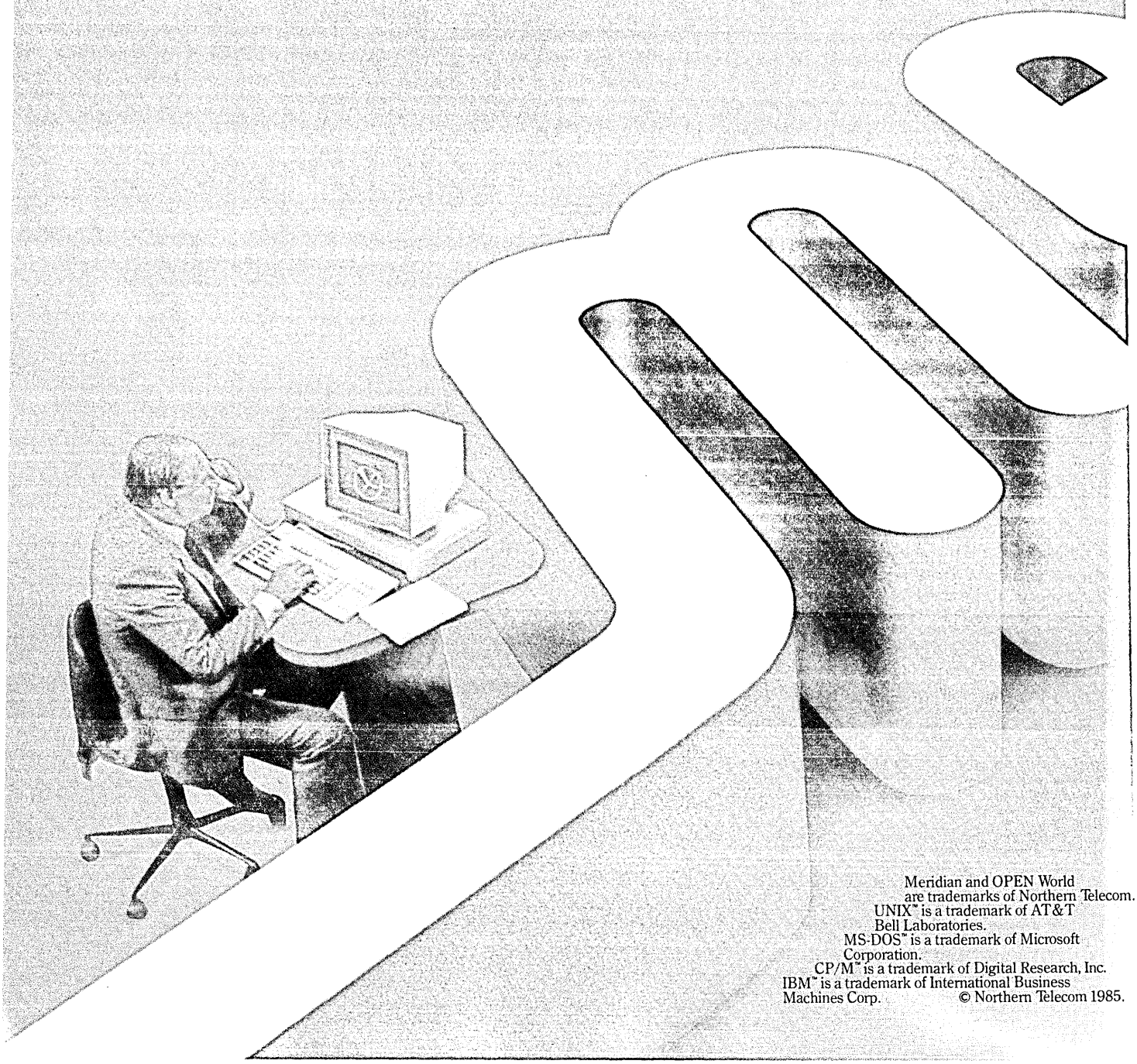
American Heart Association

WE'RE FIGHTING FOR YOUR LIFE

Where can you find a powerful data processing system that integrates voice, uses multiple operating systems, and delivers voice and data at 2.56 Mbs to the desk over twisted pair telephone wire?

Northern Telecom invites you

The Meridian DV-1 DataVoice System. A direct result of our commitment to OPEN World™ and the simultaneous integration of data, voice, text and graphics.



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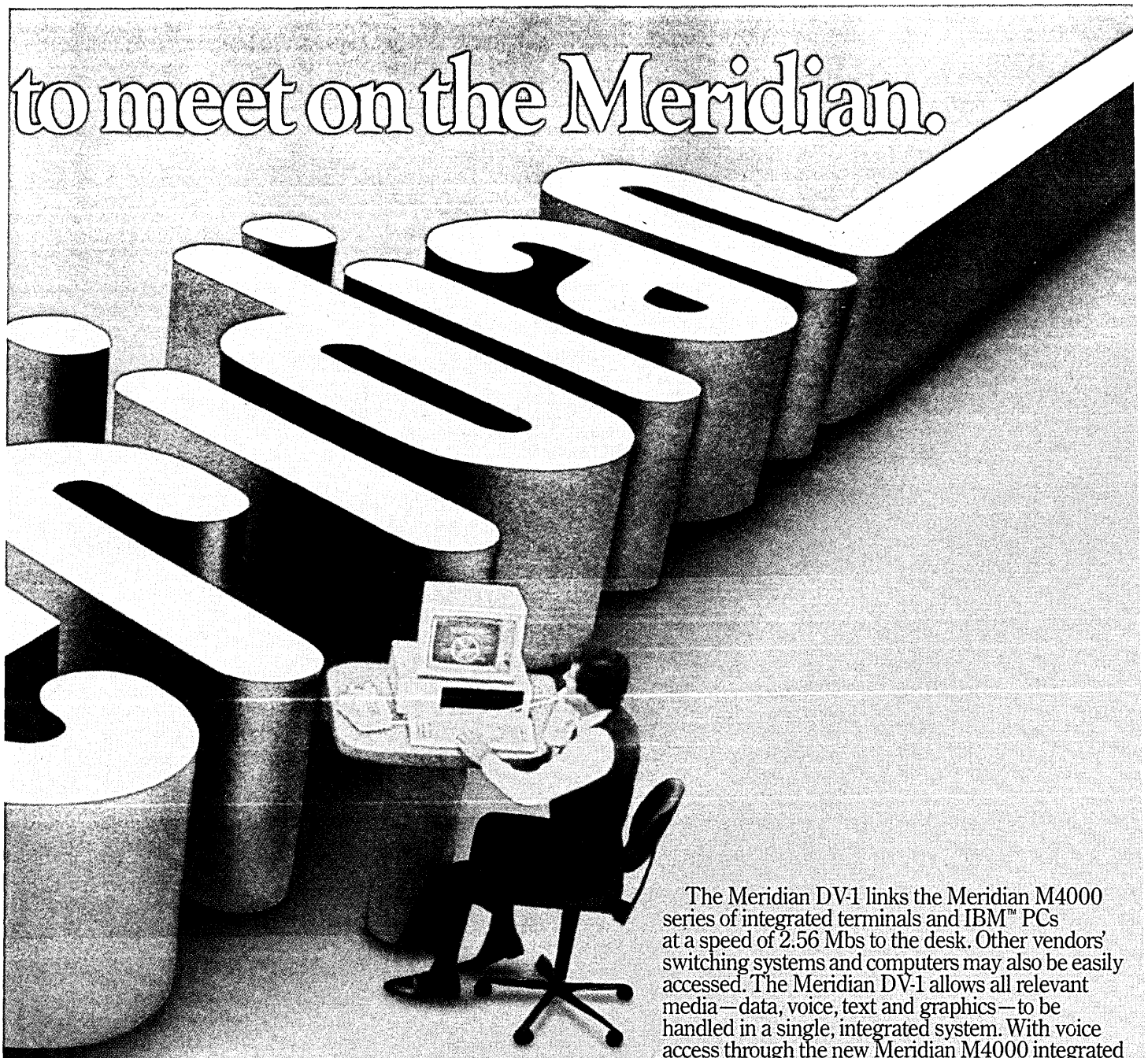
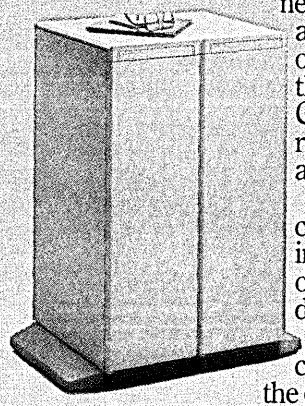
to meet on the Meridian.



The Meridian™ DV-1 is a system designed for departmental and branch office use for up to 100 users, moving data and voice over twisted pair telephone wire at speeds of 2.56 Mbs to the desk.

Because of its multi-processor architecture, users can have multiple applications running simultaneously, enabling them to switch from application to application at the touch of one or two buttons. They can access their preferred UNIX,™ MS-DOS™ and CP/M™ based application software, running on multi-user industry standard operating systems.



Users can develop their own applications using standard languages including "C," COBOL, FORTRAN, or BASIC with the aid of application development tools like generators, editors and debuggers. Applications can be programmed to interact with the call processing capabilities, delivering integrated voice and data solutions.

The Meridian DV-1 links the Meridian M4000 series of integrated terminals and IBM™ PCs at a speed of 2.56 Mbs to the desk. Other vendors' switching systems and computers may also be easily accessed. The Meridian DV-1 allows all relevant media—data, voice, text and graphics—to be handled in a single, integrated system. With voice access through the new Meridian M4000 integrated terminals or standard telephones, users have not only a multi-functional data terminal but also sophisticated phone features from which to choose.

And, because it's based on Northern Telecom's digital telecommunications experience, the Meridian DV-1 is a system that has the reliability you'd expect from a telephone system. And with the same ease of relocation.

For more information on the Meridian DV-1 Data Voice System, write Northern Telecom Inc., P.O. Box 202048, Dallas, TX 75220; or call (800) 328-8800, ext. 404. In Canada, call (800) 361-5883.

When there's business to be done, business meets on the Meridian.

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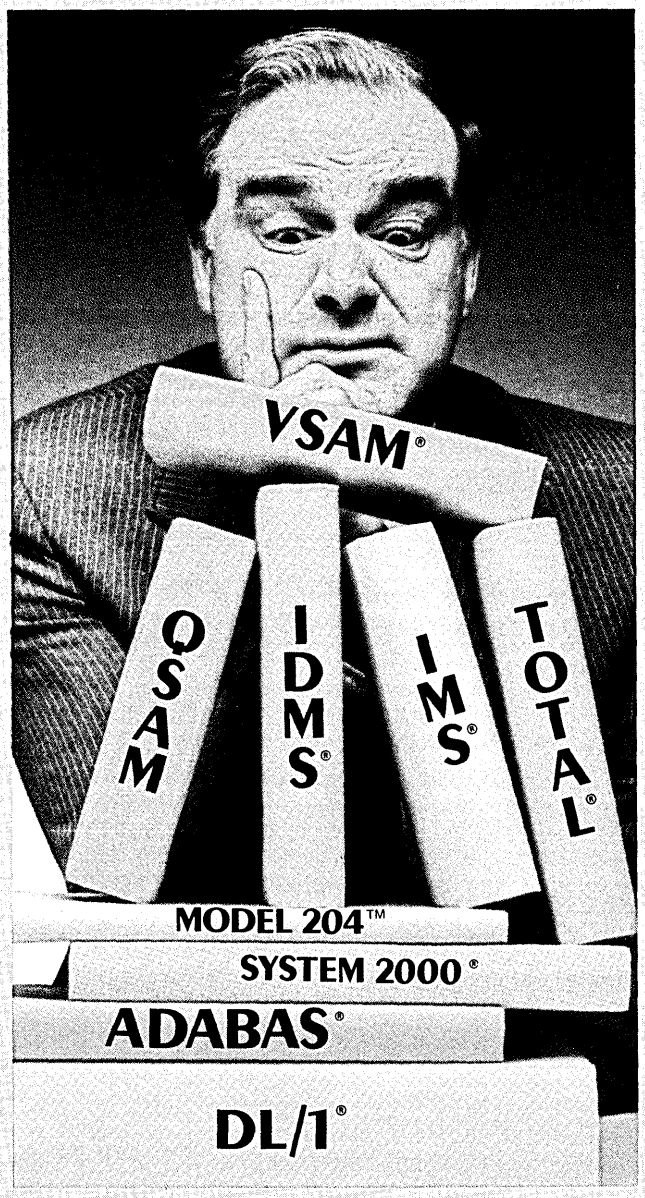
CIRCLE 76 ON READER CARD

NOW AVAILABLE ON DOS/VSE

MULTIFILED?

TO QUERY AND REPORT FROM ALL THE FILES IN YOUR DATACENTER,

YOU'D NEED TO KNOW ALL THESE PROTOCOLS



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OR ONLY THIS ONE.

FOCUS

You can leverage the value of all your existing data files with FOCUS, the industry's leading 4GL/DBMS. It's powerful, **non-procedural** language enables you to easily create reports, graphs, financial models and sophisticated spreadsheets from any existing file in your installation, including QSAM, VSAM, IMS, SQL/DS, DL/1, IDMS, TOTAL, ADABAS, MODEL 204 and SYSTEM 2000 ...preserving your investment in them.

Plus, FOCUS' relational technology permits you to dynamically JOIN data from different files such as VSAM and IMS, without cumbersome programming and file merging activity.

Cross CPU Data Sharing

And for installations with multiple CPUs, or multiple operating systems under VM/CMS, FOCUS' Cross Machine Interface (XMI) enables data sharing! For example, a VM/CMS user can easily generate reports or populate a spreadsheet from data stored in a DOS/VSE DL/I database on the same or different CPU.

Multi-level Security

You can protect data access in FOCUS at the file, logical record, data field and "value-within" data field levels. This extensive file security complements FOCUS' powerful data analysis facilities, and works hand-in-hand with virtually any other security system you may have in place, such as ACF2.

PC Compatibility

You can also have all these FOCUS facilities on your PC, with PC/FOCUS. It enables you to easily download, manipulate and/or upload data that FOCUS can extract from any mainframe file. The extracts can be in ASCII, DIF, SYLK or LOTUS PRN formats.

So turn your "computer center" into a real Information Center with FOCUS. The 4th generation language that makes sense of your multi-files.

For details, write to Don Wszolek, Dept. F4 Information Builders, Inc., 1250 Broadway, New York, NY 10001.

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CIRCLE 77 ON READER CARD

SOFTWARE AND SERVICES

The Software section in this issue contains a sampling of the many products that will be exhibited by vendors at the National Computer Conference in Chicago this month.

ALTERTEXT

This company sells document conversion hardware and software and offers a document conversion service. At NCC, the vendor will have information about its expanded software library. With the explosion of microcomputers in the office, the issue of document conversion is becoming more prevalent as users attempt to exchange documents between dissimilar word processors and personal computers. According to the vendor, many CP/M and MS/DOS systems are "work-alikes" and Altertext has been able to add many new source/target combinations. With the vendor's current software library, more than 400 different microcomputers, word processors, and typesetting systems can exchange files. When all possible combinations are taken together, more than 10,000 source/target combinations are available to users.

The vendor says that many users in business, government, and education are still not aware that documents can be converted from one system to another without losing the format of the documents involved. ALTERTEXT, Boston. NCC Booth 7411.

FOR DATA CIRCLE 325 ON READER CARD

BRIDGE COMMUNICATIONS

A major software revision incorporating six local area network function enhancements has been introduced for this NCC exhibitor's Ethernet LAN communications server products. The CS/1 allows eight to 32 devices supporting the RS232C interface to be networked on Ethernet. The CS/100 supports from four to 14 devices.

Features on both products include a global rotary capability, long break support, Hewlett-Packard ENQ/ACK flow control, increased network security, support for terminals with nine-bit characters, and enhanced network management capabilities.

The vendor's original ability to "rotary" through devices attached to a single server and hunt for the first free device has been expanded to allow a global rotary that crosses server boundaries. For example, if a particular printer or modem is busy, the CS/1 or CS/100 automatically finds the user another, even if the peripheral is attached to a different server on the network. This happens transparently to the user and helps enforce load balancing so that demands on shared resources can be evened out.

The long break support feature optimizes the interface between Bridge servers and other PBXs. For environments where security is critical, the vendor has implemented the ability for network managers to disable the "enter command mode" command for users. The network manager simply writes a power-on initialization macro that prevents users from gaining access to any but the authorized resources. The "show net map" command has been extended to show the software running on each server, thus identifying various server types as well as indicating any servers that recently have become inactive on the network.

This new software release will be shipped with the vendor's communications servers. Existing users can upgrade their software for $150 under the terms of the annual software license fee. The CS/1 and CS/100 units running the new software are fully compatible with earlier versions. BRIDGE COMMUNICATIONS INC., Mountain View, Calif. NCC Booth 3332.

FOR DATA CIRCLE 326 ON READER CARD

CULLINET

Cullinet will display many of its recently announced software products. Of interest will be the Information Center Management System (ICMS), a product for IBM mainframes. It gathers, organizes, and dynamically maintains the vast amount of corporate information stored in mainframe and subscription databases, departmental minis and personal computers, and makes it available to users in a wide variety of familiar formats.

Features enable organizations to utilize existing hardware and software resources in conjunction with the product. With ICMS, the benefits of micro-to-mainframe integration that are enjoyed by users of the IDMS/R database management system and the Information Database have been extended to users in the rest of the IBM world.

As a result, companies that utilize other database management systems or VSAM files can now offer integrated ICMS solutions to their executives, managers, and professional staff.

Through previously announced agreements with minicomputer suppliers Data General Corp., Digital Equipment Corp., and Wang Laboratories Inc., the vendor's ICMS also provides the capability to link such departmental systems with the IBM mainframe environment.

When used in conjunction with Goldengate or the recently announced link products for Lotus 1-2-3, Symphony, and other PC-compatible software, ICMS also facilitates the flow of information among personal computer users. CULLINET SOFTWARE INC., Westwood, Mass. NCC Booth 5113.

FOR DATA CIRCLE 327 ON READER CARD

DIALOGIC SYSTEMS

Dialogic/One is the vendor's new software system used with IBM and compatible mainframes to extend mainframe resources, improve the productivity of programmers for the development of application programs, and lower the cost of terminal support. It combines what the

vendor calls a midframe computer and a fully integrated set of software tools for program development in the MVS/TSO environment. DIALOGIC SYSTEMS CORP., Sunnyvale, Calif. NCC Booth 3259.

FOR DATA CIRCLE 328 ON READER CARD

DIGITAL COMMUNICATION ASSOCIATES

Among its many communications products, DCA will also exhibit at NCC its recently introduced software package, IRMAlink/Windows, which allows users to have simultaneous pc, mainframe, and notepad windows for information management on an IBM PC, PC XT, PC AT, and compatibles.

The product can support and retain up to 10 active window profiles. Each window profile can include one pc window, one mainframe window, and two notepad windows. Text editing is supported in the notepad windows and as many as three passwords can be generated for the mainframe window. Users can switch back and forth between the windows or copy information from one window to another. The product displays windows in as many as 16 colors and enables the windows to be sized, zoomed, overlaid, shaped, placed, added, or deleted.

The package contains a terminal emulation which operates like E78, IRMA's terminal emulation program, and essentially replaces E78 when used with IRMA. Therefore, the transition from using E78 to using IRMAlink/Windows will be smoother. An on-line help feature is contained in the program. Files can be uploaded to the mainframe or downloaded to the pc via a question and answer session or through the use of a command line. The product supports the transfer of CMS or TSO mainframe files using IRMAlink FT/TSO or IRMAlink FT/CMS. Files can be transferred from the pc's disk while the user is working in any of the windows. IRMAlink/Windows sells for $150. DIGITAL COMMUNICATIONS ASSOCIATES INC., Norcross, Ga. NCC Booth 5669.

FOR DATA CIRCLE 329 ON READER CARD

DIGITAL EQUIPMENT CORP.

The announcement of the Ultrix-32 operating system for the VAX 8600 computer broadens DEC's VAX family in the Unix marketplace by allowing all VAX products to be utilized in the Unix environment. The Ultrix-32 operating system provides a uniform programming environment through the vendor's VAX computer line, from the MicroVAX I and the recently announced MicroVAX II through DEC's latest large-scale offering, the 8600. Ultrix-32 and the MicroVAX version, Ultrix-32m, are native language implementations of the operating system. They are compatible with version 4.2 of Berkeley 4BSD, version 2.0 of Ultrix-11, and AT&T Unix System V.

In the communications area, DEC will also show its link to the IBM SNA environment as well as its solution to turn an IBM PC or compatible into a VT 220 terminal. The vendor is expected to make other announcements in the communications area at NCC. DIGITAL EQUIPMENT CORP., Maynard, Mass. NCC Booth 4911.

FOR DATA CIRCLE 330 ON READER CARD

HONEYWELL

On the heels of its latest mainframe announcements, Business Graphics Option software has been added to the Honeywell Financial and Corporate Planning System (HFCS) for the DPS 8, DPS 88, and DPS 90 large-scale computer systems operating under GCOS 8. The product analyzes data and provides a base on which an organization can build interactive models for problem solving. Data can be merged from various sources, so the information required for analysis and reporting can be stored and integrated by the user.

The business English and math used by HFCS can then produce easily understood models. The software translates these models into full-color histograms, pie charts, bubble plots, and line and star charts. The modeling and simulations capabilities can be used for applications such as investment and acquisition appraisal, short- and long-term strategic planning and forecasting, resource and manpower planning, and econometric modeling. Currency conversion and inflation analysis is also available. HFCS is available for a license fee of $54,000. The Business Graphics Option is offered for a license fee of $13,500.

Honeywell has also introduced TEXTO, an interactive document management and information retrieval system for use on DPS mainframes running under GCOS 8. It is a productivity tool for the organization, storage, and retrieval of textual data. It allows the user to create a document database, then cross reference the stored documents through user-defined key words. The user builds a library of documents, catalogs, or index files by entering information on blank forms, which TEXTO supplies. The system can then create form letters, mailing labels, sorted and formatted lists, or user-defined reports. The license fee is $35,000.

Moving to maintain its position in SNA communications, Honeywell has added an Application Interface Facility to its software that allows the DPS 6 to communicate with IBM computers in SNA networks. The facility enables user-written DPS 6 COBOL or assembler programs to establish application-to-application communications with programs executing in CICS or IMS on IBM mainframes. HONEYWELL INC., Minneapolis. NCC Booth 5531.

FOR DATA CIRCLE 331 ON READER CARD

KODAK

Besides photographic, reproduction, and floppy disk products, Kodak will also offer eight software packages designed for data communications applications. The Eastcom Syncra software was developed to enhance the vendor's internal data communications efficiency. It allows businesses to inexpensively interface mainframe, minicomputer, and microcomputer systems, running varied operating systems, for fast and reliable data exchange.

The software runs on a variety of IBM computers, selected DEC systems, and IBM-compatible microcomputers. The packages support IBM 308X, 303X, 43XX, and 370 series mainframes with synchronous or bisynchronous protocols. Software packages for these systems are available in two versions to provide compatibility with OS or DOS. Other packages support the DEC VAX and PDP-11, IBM System/32, 34, 36, 38, IBM Personal Computers, and compatibles.

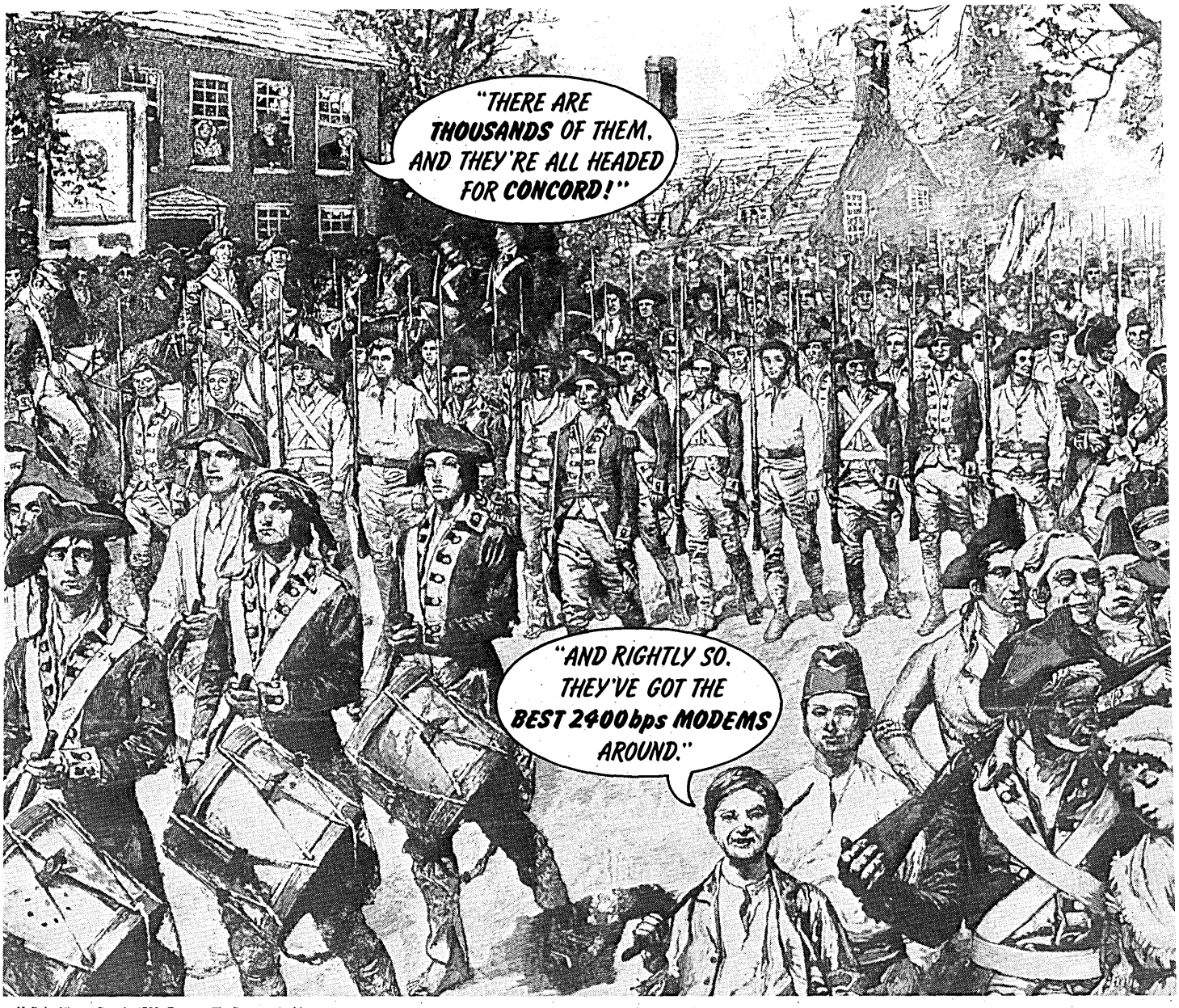
Advantages include the ability to permit trouble-free data sharing among systems of different sizes and, in some cases, among computers manufactured by different vendors. Each package is written in the native language of the system on which it runs. For error-free transmission of source and object programs, as well as word processing files containing special characters, the software sends data in a full 8-bit binary mode. When necessary, however, it can also convert data between 8-bit EBCDIC computers and 7-bit ASCII computers. This interpreter/bridge approach lets any system with Eastcom Syncra software communicate with another computer equipped with Eastcom Syncra software. EASTMAN COMMUNICATIONS, a division of Eastman Kodak Co., Rochester, N.Y. NCC Booth 4941.

FOR DATA CIRCLE 332 ON READER CARD

MSA

MSA will be at NCC with its line of application software for a variety of mainframe computers. MSA Expert Series is one of the company's latest software offerings. It is a complete line of integrated applications software systems based on Information Expert, the vendor's fourth generation productivity and reporting tool.

In addition to a line of integrated and standalone products for the commercial/general business market, the compa-



H. Pyle. *Victory Parade*, 1783. Courtesy The Bettman Archive.

If you're ready to join the ranks of thousands who are saving time and money with 2400bps dial line communications, go with the leader – Concord Data Systems. Our CDS 224® is today's largest selling 2400bps modem, chosen by companies such as Tymnet,® ADP® Autonet,℠ Dysan and others. Surprising? Not when you realize that Concord Data was installing thousands of 2400bps modems throughout the world before most companies had their products off the drawing board.

Concord Data modems are built to give you years of trouble-free service. Based on *proven* VLSI designs and Concord ingenuity, our modems pack more high-performance features and time-saving options than any other 2400bps dial line modem on the market. You can choose automatic dialing, error protection, statistical multiplexing and more. We have stand-alone units, plug-in PC-compatible cards, and industry's only single-card rackmount modem that operates at 2400, 1200 and 300bps. With prices starting at $450,* Concord Data modems are not only your best bet, they're your best buy. To get in step with the communications leaders, call us at (617) 890-1394 or write 303 Bear Hill Road, Waltham, MA 02154, telex 951793.

Concord Data Systems

Leading the Communications Revolution

CIRCLE 78 ON READER CARD

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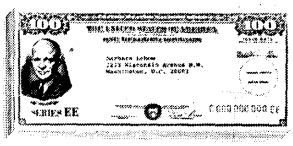
Bridalveil Fall, Yosemite National Park, California c. 1927. Photography by Ansel Adams. Courtesy of the Ansel Adams Publishing Rights Trust. All rights reserved.

SOME OF THE GREATEST THINGS IN AMERICA NEVER CHANGE. SOME DO.



Paying Better Than Ever.

Through photography, Ansel Adams immortalized the unspoiled beauty of Bridalveil Fall for all America to see.

Some things never change.

But one great American tradition *has* changed—U.S. Savings Bonds. Now Savings Bonds pay higher variable interest rates like money market accounts. That's the kind of change anyone can appreciate.

Just hold Savings Bonds for five years and you get the new variable interest rates. Plus, you get a guaranteed return. That means you can earn a lot more, but never less than 7½%.

You can purchase Bonds at almost any financial institution. Or easier yet, through the Payroll Savings Plan where you work.

Buy Savings Bonds. Like the wilderness, they're another part of our proud heritage.

For the current interest rate and more information, call toll-free 1-800-US-Bonds.

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Paying Better Than Ever

Variable rates apply to Bonds purchased on and after 11/1/82 and held at least 5 years. Bonds purchased before 11/1/82 earn variable rates when held beyond 10/31/87. Bonds held less than 5 years earn lower interest.

A public service of this publication.

SOFTWARE & SERVICES

ny will market the MSA Expert Series to various industries, and each of these will include a variety of industry-specific software applications. Examples are the MSA Expert Series for manufacturing, the public sector, and health care.

MSA Expert Series provides on-line, real-time, and database options for applications systems. The foundation of the software is Information Expert, a fourth generation line of products that enables users to retrieve information in a borderless fashion from multiple MSA and non-MSA software systems. The product includes reporting and retrieval, data dictionary, and screen painting. The vendor's micro-mainframe software ties into personal computers with the MSA Expert Series through ExpertLink, MSA's micro-mainframe link. MANAGEMENT SCIENCE AMERICA INC., Atlanta. NCC Booth 3117.

FOR DATA CIRCLE 333 ON READER CARD

POLAROID

Polaroid is another company associated with film and camera products that is offering products to computer users. The company recently announced a data recovery for its magnetic disk users. The service, available to users of Polaroid professional-quality flexible magnetic disks, allows them an opportunity to regain data from floppy disks that have been damaged or mishandled.

Using a proprietary process and equipment, the data recovery service allows users to return damaged diskettes to Polaroid to be restored. According to the vendor, when a diskette is accidentally damaged through exposure to foreign materials or heat, the user can contact Polaroid's customer service toll-free number. The company will send the user a mailer to ship the diskette to the Polaroid data recovery center in Cleveland.

The vendor says the data recovery service will be of particular interest to business and professional users who have sensitive applications where data losses cannot be tolerated. POLAROID CORP., Cambridge, Mass. NCC Booth 4119.

FOR DATA CIRCLE 334 ON READER CARD

SAMNA

Samna will be at NCC with Release 3.0 of Samna Word III and Samna+ office software packages for the IBM PC. The vendor also introduced special versions of Samna Word III and Samna+ that will run on local area networks from Novell Inc. and 3Com Corp.

Release 3.0 provides more than a dozen features beyond those of the earlier versions of either product. According to the vendor, two of the most significant enhancements are a faster operating speed and support for the DCA (Document Content Architecture) revisable form text portion of IBM's DISOSS. Users who have returned their warranty registration cards can update to Release 3.0 of Samna Word III or Samna+ free of charge within 30 days of purchase of an earlier version. Other users can purchase an update for $50.

The networking versions of the software don't just "stretch" the standalone products. Instead, the software is designed especially for networking environments. SAMNA CORP., Atlanta. NCC Booth 3354.

FOR DATA CIRCLE 335 ON READER CARD

SAS

At NCC, SAS Institute will exhibit new training services as well as add to the hardware the SAS Software System can run on. For the first time, users can learn how to use the SAS System directly from SAS software, not from a simulation. The initial course in this series, "Fundamentals of the SAS Software System," is designed for beginning SAS software users. It allows users to learn, revise, and reinforce basic concepts through a variety of skill building activities.

Users learn to write and execute a simple test program using the SAS display manager system, a full-screen facility for interacting with all parts of an SAS job including statements, output, and system messages. The course covers creating SAS data sets, generating reports, and producing hardcopy output. On-line help screens offer reminders, hints, and reviews in each of the course exercises.

In addition, the SAS System will soon be available under PC/DOS. The SAS System under PC/DOS is delivered on diskette. For the first time, SAS jobs can be created and run locally without mainframe tie-in. Users can test and develop applications on the pc and then upload them to the mainframe production runs with larger files. In turn, smaller applications can be downloaded to the pc to save mainframe computer resources. Routines are provided for converting DBF and DIF files into SAS data sets. That way, the SAS software user can take advantage of the data already residing on the pc.

The SAS System under PC/DOS is licensed on an annual basis with fees based on the number of personal computer workstations supported. First year fees for corporate customers with up to 50 workstations are $2,500 for the basic product and $1,500 for the SAS/IML programming facility.

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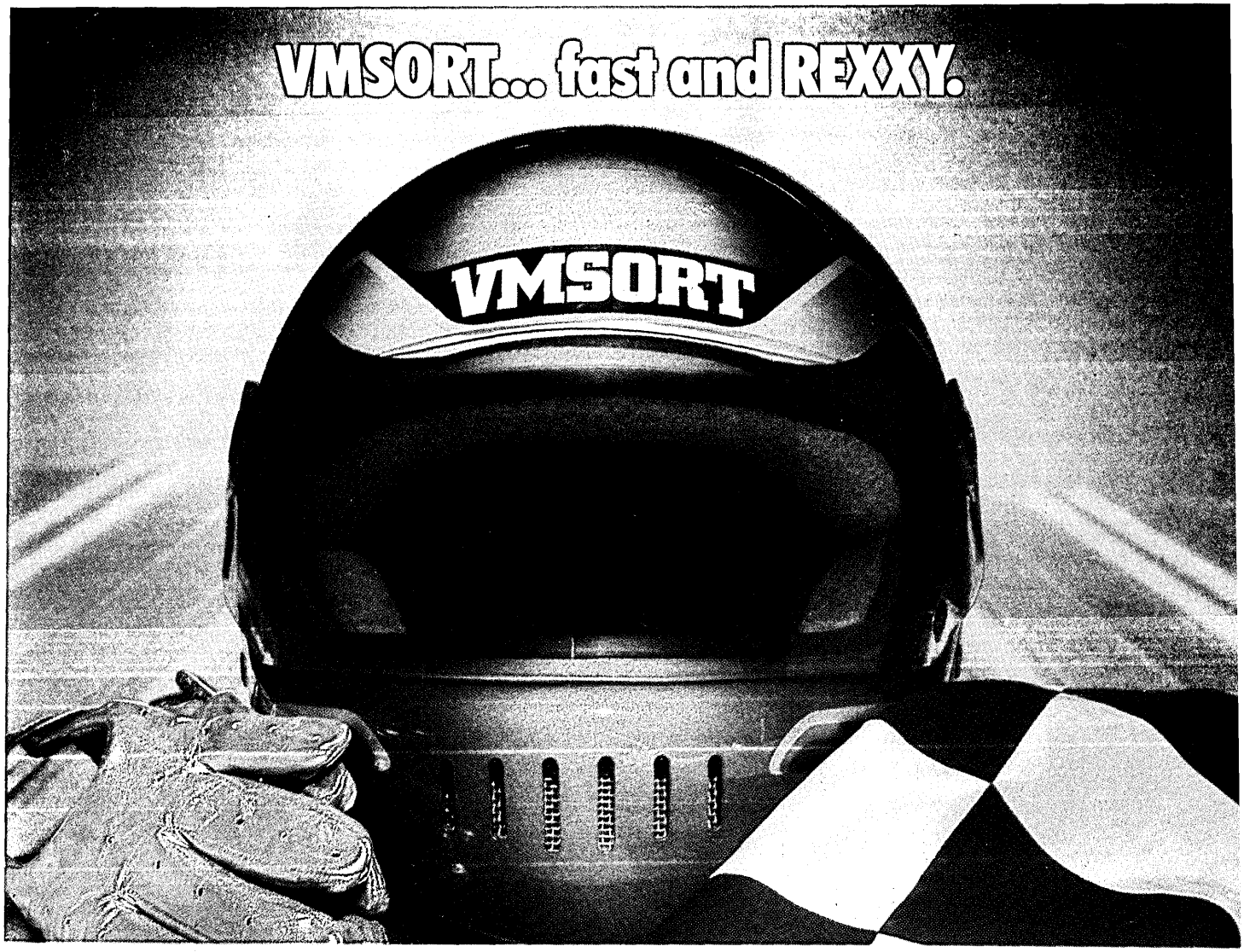
—Robert J. Crutchfield



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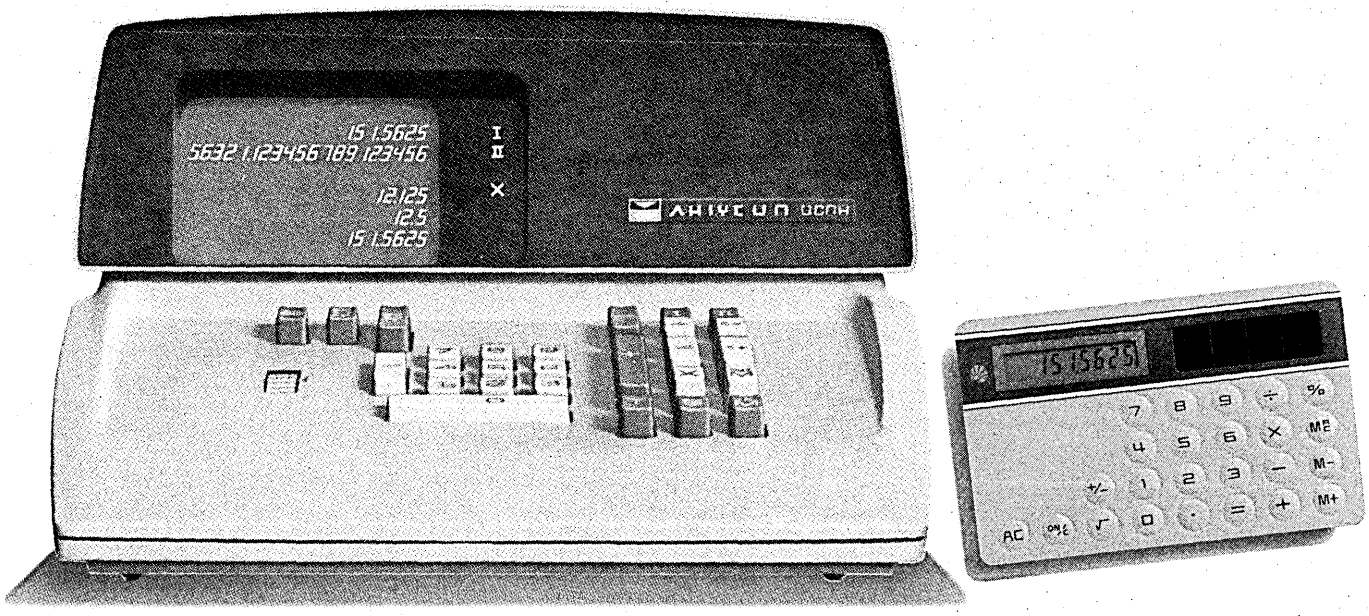

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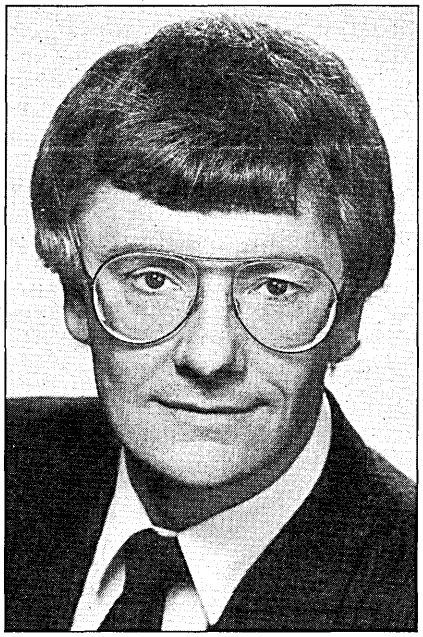
It's an unlikely place to find one of IBM's most influential European users. Huddled away in a wood near Aachen close to the Dutch border lies one of West Germany's largest scientific institutes, the KFA nuclear research center at Jülich. Here, 4,500 staff members tend an impressive array of nuclear reactors, particle accelerators, and associated laboratories.

Like physicists the world over, KFA's 900 resident scientists are hungry for computing power. To study the invisible worlds of matter and energy—KFA specializes in multiparticle systems and energy—these researchers are continually developing and refining computer simulations.

Serving that demand are two IBM 3033s, an IBM 3081, a Floating Point Systems AP-190, and—at the heart of this battery of boxes—a Cray X-MP. Directly attached to the systems are over 180 gigabytes of storage and more than 1,000 terminals and local computers.

The man responsible for feeding the Cray's appetite for data is Dr. Burkhard Mertens, KFA's communications and installation manager. Despite the Cray's domination, KFA is still an IBM shop, and Mertens is currently president of the IBM large systems user organization SEAS (SHARE European Association).

Although universities and research establishments account for only 27% of SEAS' 440-strong membership, academics tend to be the activists in the organization, he says. "SEAS represents a good cross-section of IBM users, but it is really only the academics who can take the time off to become involved in SEAS projects."



BURKHARD MERTENS: "I tried to pursue a line that ran along two rails: nuclear physics and electronics."

Among SEAS' current projects are examinations of expert systems, industrial automation, personal computing, and supercomputing. "We are very interested in the technical side of data processing, and in trying to push forward the state of the art."

Yet at the moment Mertens's quest for the state of the art centers on the Cray, upholstered in black plastic and looking like a round settee of the sort you might find in a hotel lobby. It looks out of place in Jülich's computer center, the more so because it has been unceremoniously split in two. The segments containing I/O circuits have been removed from the ring to enable engineers to effect running repairs on the main processors; as a result, the portion left behind looks like Pac-Man.

Mertens is exploring ways to smooth the path to the Cray by replacing KFA's homegrown network, called Joker, with a commercial product, such as a Hyperbus from Network Systems Corp., Minneapolis. Concurrently, he is doubling the number of terminals that can attach to a secondary Dataswitch net, which handles slower traffic, by halving the number of wires required for each connection.

"The demands for access to the mainframes are increasing so rapidly that we have just exhausted our wiring," Mertens says. "Sometimes it is difficult to keep up."

Mertens spotted this demand for data processing early in his career. A physicist by training—he did a postgraduate stint at the Max Planck Institute in Heidelberg—Mertens was the first member of Cologne University's physics department to program a computer, back in 1965. "I did it for fun," he says now.

But it was not long before Mertens took computing more seriously. "I saw that dp people were more in demand than nuclear physicists, so I tried to pursue a line that ran along two rails: nuclear physics and electronics." By 1974 he was head of the operational systems section at KFA, and in 1982 he reached his current position.

This year, Mertens has begun working on a more public stage, through SEAS. The organization has been pressing IBM for several years to bring out its own supercomputer, a machine that it hopes would bridge the gap between vector pro-

PEOPLE

cessors like the Cray and the stacks of conventional front-end mainframes that act as the Cray's butlers, performing housekeeping chores and applications that cannot be vectorized.

Last year, SEAS' campaign for a scientific machine operating at rates of between 30 and 50MFLOPS paid off: IBM agreed to develop such a machine. "Our objective as a first step is to get a machine that the smaller universities and research institutes can use. We do not necessarily want a vector processor, but something compatible with IBM's top end," Mertens explains.

The SEAS specification surpasses IBM's current mainframes—even a 3090 model 200 would top out at about 12MFLOPS—but in turn is dwarfed by the Cray X-MP's 400MFLOPS. Mertens and his KFA boss, Dr. Freidel Hossfield, an old campaigner on the supercomputer front, expect IBM to bring out later this year an integrated vector processor running under MVS with 32MB of main memory. The new 3090-class device would be offered as an attached device, they believe.

SEAS doesn't always get such pleasing results. Mertens has sparred recently with IBM over the company's object-code-only and software licensing policies, the lack of a full function VM/XA, software support, and VSPC. Mertens is also worried about the way in which IBM products deal with the special characters—accents, cedillas, and umlauts—used in European languages.

The problem, Mertens says, is not that these characters don't exist in text produced on IBM systems but that the characters are encoded differently on different systems. So German text produced on a Displaywriter complete with umlauts will lose those diacritical marks when transmitted to a mainframe for output onto a laser printer.

"The trouble is that IBM does not use ASCII code throughout its systems, and this means we can't integrate office work into text processing without changing the software to take account of the special characters."

KFA also must produce its own manuals for office workers who use IBM office systems, despite being one of IBM's largest customers in West Germany, the computer giant's most important European market. "The dp professional must be fluent in English, but dp is going more and more into nondp areas, and there English will not do."

SEAS faces its own language difficulties because it conducts its business in English, Mertens says. That suits the Germans, Dutch, and Scandinavians just fine, but it leaves southern Europeans cold. Consequently, the bulk of SEAS' membership is from northern Europe. "It's a pity, because we would like more users from Latin countries to be involved in SEAS."

SEAS' positions on issues has only an indirect influence on policy in Armonk—or even in Paris, where IBM Europe is headquartered. The firm details a manager to meet with the user group regularly and to channel user requests, requirements, and concerns to appropriate sectors of the company. IBM then responds by labeling these issues "future objective," "accepted," or "available."

"As a user organization we find it very hard to determine whether a change made by IBM was due to our pressure or not," Mertens says. "But in some areas we have had our successes." Arithmetic support on the 3090 was introduced to relieve user pressure, he says.

"If you have a requirement that is mutual benefit you can be sure you have a chance that the company will accept it. But we are not out to reorder the market. We can do our job only if we cooperate with IBM. On the other hand, IBM is profit-oriented, and there you have it."

—John Lamb

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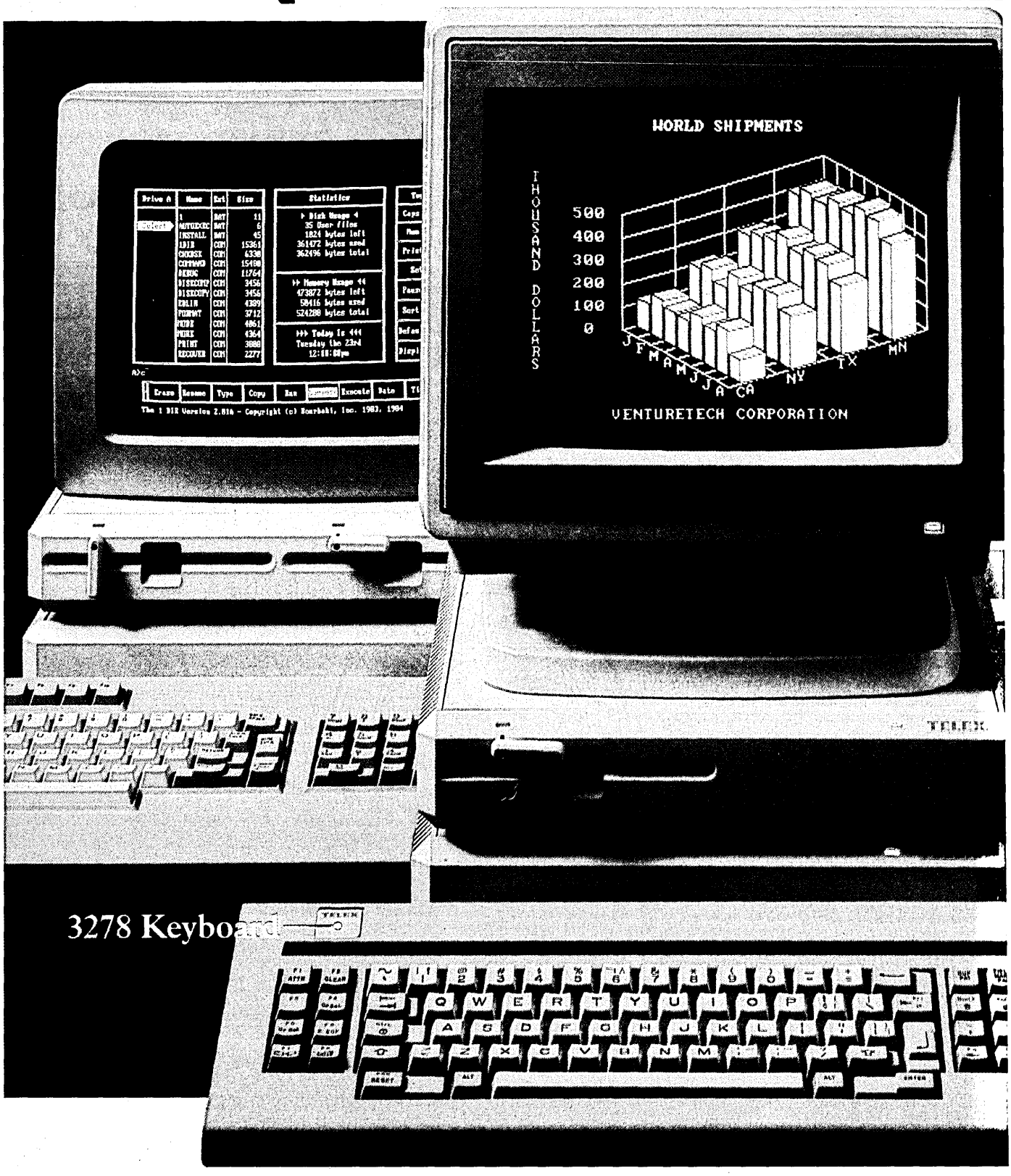
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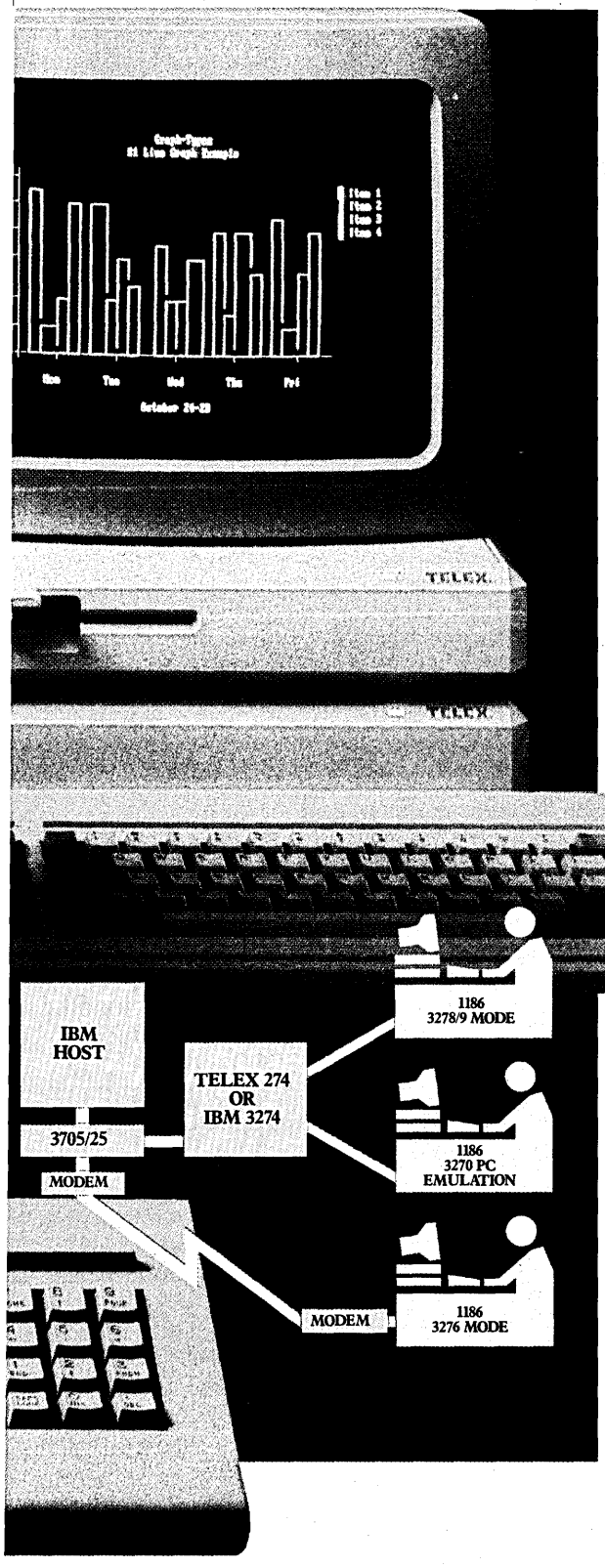

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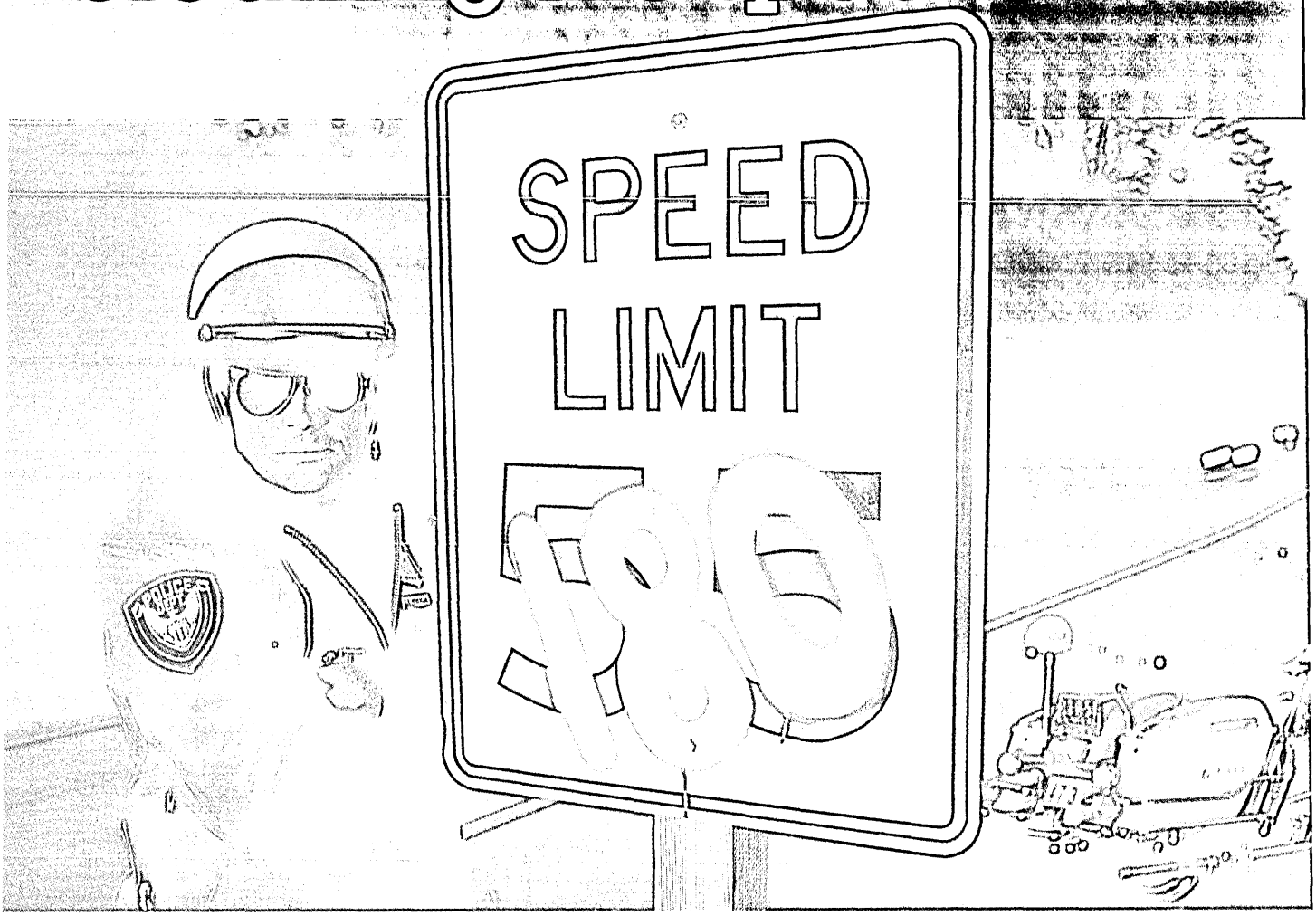

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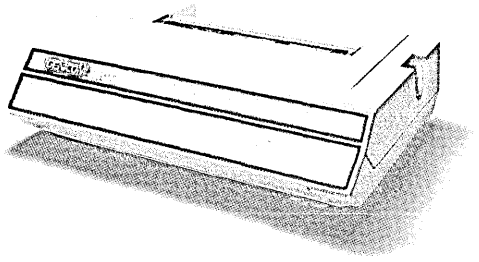

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BOOKS

INFORMATION AND THE CRISIS ECONOMY

by Herbert I. Schiller

So seldom are the societal effects of information technology reviewed critically that any book that attempts the task deserves close attention. A small library of books about computers and the changes they are bringing to our lives has been published in the last decade, but few of them have approached the subject with any degree of skepticism.

Instead, authors have competed to present the rosiest picture possible of what the electronic future holds in store. It is conceivable that these optimistic accounts of the so-called information society have sold as many machines as the combined advertising budgets of the major manufacturers.

Herbert Schiller's new book will not sell many computers and that alone may ensure that it receives less attention than if it were another joyful hymn of life in the era of the personal computer.

The book, *Information and the Crisis Economy,* presents a bleaker view of the future than those in the computer industry are accustomed to. Any serious student of the information society should read it for its perspective and the challenge it presents to conventional wisdom.

Schiller has been a serious critic of society through his writings since his *Mass Communications in the American Empire* was published in 1969 (Beacon Press, Boston). This latest book should be read in conjunction with another of his books, *Who Knows: Information in the Age of the Fortune 500* (Ablex Publishing, Norwood, N.J., 1981), which criticized corporate control of electronic information resources (reviewed in DATAMATION March 1982, p. 231).

Schiller's argument is that information technology, in which he includes computing and telecommunications, has a double-edged effect on the societies that use it. On the one hand, by displacing labor the new technology increases productivity, creating additional products and enabling companies to invest. In national economies haltingly emerging from a series of economic crises, information technology provides one of the few areas of substantial growth.

On the other hand, the redistribution of power within society toward the owners of that technology creates conditions that could destabilize social relations. On an international scale, that may affect relations between the U.S. and the third world.

Schiller sees little evidence that information technology as it is presently owned and operated serves society as a whole. It concentrates greater technical resources and economic power in those sectors of the economy that are already powerful.

To conceive of the emergence of a socially beneficial use of information technology in those circumstances is unrealistic, according to Schiller. An incremental approach to that goal would be thwarted by the economically powerful.

The development of the technology of computers and telecommunications is so much a product of the relations of power in society, he argues, that to structure the technologies differently would require wide social change.

This is definitely not the message spread by some personal computer enthusiasts who see information technology as an effective instrument of social change. Greater fairness, more equitable distribution of power, and other similar social objectives will not occur as a by-product of information technology, claims Schiller. Part of the computer hacker ethos currently receiving so much attention regards computers as universal tools enabling their owners to use information to enhance their power. Notions such as the free exchange of information and freedom of access to data and software are central to hacker thinking.

Yet Schiller points out that the trends in society at large run contrary to that way of regarding information. The development of the notion of information as commodity relates freedom of access to an ability to pay.

In some significant respects we are already losing universal, low-cost access to information. There is a growing trend to privatize information collected at public expense by giving corporations the rights to its electronic distribution. Public libraries have been subject to funding cuts and free distribution of information from them has been endangered by the adoption of commercial principles in its dissemination. A case in point is the practice of passing on-line search costs to library users.

Deregulation of the telephone system may make it easier for large institutions to reduce long distance telecommunications costs and establish their own networks, but it has also meant higher monthly charges for basic telephone service. The telephone system's restructuring does not make it easier for ordinary citizens to participate in the information "revolution" because it undermines the notion of service open to everyone.

The combined influence of developments such as these will lead to increased social division, says Schiller. Information delivered electronically may be distributed according to a hierarchy of consumers distinguished by their economic resources. On an international scale, he claims, the U.S. is headed for a confrontation with the third world over the question of information. Increasingly, the doctrine of free flow of information over national borders is seen by the rest of the world as a cipher for U.S. foreign policy. The free flow position sees any national inhibition on transferring data as a violation of U.S. interests rather than a

legitimate response by other countries to growing dependence on U.S. technology and information.

As long as the U.S. occupies a position of dominance, and the free flow doctrine is pursued as an instrument for increasing international dependence, other countries will remain skeptical of U.S. motives. Yet, ultimately, their agreement is necessary if the unimpeded flow of data over borders is to occur. The strength of the American position is also its weakness. As long as its dominance continues, other nations will attempt to retain some local control.

A general lack of appreciation by Americans of the nature and scope of social movements elsewhere in the world increases the danger of technology destabilizing international relations, Schiller notes. Not all countries adopt consumerist policies toward information. Schiller sees the exercise of choice in buying goods and services in the U.S. being represented as a form of democracy. He describes the supermarket as a sort of democratic citadel, where everyone is free to exercise democratic choices.

Consumers have their range of choice limited by how much money they can spend and if that same approach is taken toward information there is only an illusory democracy being created. Market forces are the antithesis of any democracy not built on individual capacity to pay.

Because public understanding of information technology has largely been defined by the accounts of it presented by advertisers and the media, wide appreciation of these issues is unlikely, Schiller believes. He shares with English writer and social critic Raymond Williams the belief that it may be people within the computer industry itself who begin to develop critical perspectives. Only they have the close contact with the technology needed to understand its use and potential.

Some of the most effective critics—of whom MIT's Joseph Weizenbaum is the clearest example—have come from within the high-technology culture that Schiller's book examines. But scrutiny from the outside has seldom matched the rigor of this critique. Ablex Publishing Corp., Norwood, N.J. (1984, 152 pp., $22.50).

—Ian Reinecke

BOOK BRIEFS

LEGAL LINGO

A number of writings on the legal aspects of computing have come our way recently. There seems to be an increasing emphasis on software protection, a topic which has probably been debated since the computer was first sold as a product. The new books include:

COMPUTER LAW FOR COMPUTER PROFESSIONALS
by Thomas R. Mylott III

An attorney delves into such subjects as software protection, regulation of data, computer evidence, computer crime, writing contracts for personnel and products, and the "computer professional as an expert witness." Mylott says his analysis is aimed at "computer professionals," not other lawyers, and therefore serves as a starting place for further research. He notes, too, that as computer law is changing so quickly, many court decisions become obsolete just months after being written, and therefore his text is not burdened by small print legalese. Prentice-Hall, Englewood Cliffs , N.J. (1984, 242 pp., $19.95 hardbound, $13.95 paper).

HOW TO COPYRIGHT SOFTWARE
by M.J. Salone, with Stephen Elias

As the title says, this oversized trade paperback is about protecting your hard-wrought software, with an emphasis on copyright law. It is written by an attorney and is not intended for professionals but for motivated laypeople (both computing and legal issues are discussed from that point of view) who want to "do it" for themselves.

Among the topics covered are copyright notices, registration of computer games, protection of training films and other documentation, and special cases such as compilers, drivers, and operating systems. Many filled-out sample forms are included.

Nolo, by the way, offers an appealing trade-in plan for its many do-it-yourself legal books that enables a buyer to save 33% on its latest editions; it also publishes a quarterly newsletter with additional updates and articles. Power to the people! Nolo Press, Berkeley, Calif. (1984, 256 pp., $21.95).

THE LEGAL GUIDE TO COMPUTER SOFTWARE PROTECTION: A PRACTICAL HANDBOOK
by Thorne D. Harris III

Harris, a New Orleans attorney who writes the "Legal Bits" column in *Nibble* magazine, has put together a book to help "computer users, programmers, software publishers, businesspeople, and nonspecialist attorneys" get a handle on protecting software. Tips are provided for choosing a computer lawyer, protecting visual displays, and protecting various forms of intellectual property. A number of sample forms and contracts are provided. Prentice-Hall (1985, 221 pp., $24.95 hardbound, $19.95 paper).

COMPUTER LAW
by David Bender

These volumes, originally published in 1978 as *Computer Law: Evidence and Procedure*, are written for practicing computer lawyers. One volume deals with computer-related evidence and discovery; the other is devoted to software protection. These are in-depth reviews of the legal literature designed primarily to help lawyers during discovery and litigation. Of the books mentioned here, this is certainly the most thorough, for it delves into the nitty-gritty details of computer law. It cites many legal precedents, references to other books, and relevant articles; also included are several sample depositions. Bender is a Dobbs Ferry, N.Y.-based lawyer. Matthew Bender, New York (1977, two looseleaf binders, $160).

REPORTS & REFERENCES

EXPERTS ON EXPORTING

A reference guide designed to help American telecommunications firms sell their products and services overseas has been published by the North American Telecommunications Association (NATA). *The Telecommunications Export Guide* features profiles of 134 foreign markets, and includes basic telecommunications data: number of telephones, number of telephone lines, switching characteristics, electrical current characteristics, and the nature of network operations.

Listings of contacts within foreign government procurement offices and standards organizations, Department of Commerce officers, and U.S. embassy commercial officers overseas are also included. Another section contains resources found in the United States, including DOC district offices, state international trade offices, U.S. port authorities, Small Business Administration field offices, and U.S. foreign trade zones.

The Telecommunications Export Guide is available to NATA members for $85 and nonmembers for $115 from NATA Publications, 2000 M Street NW, Suite 550, Washington, DC 20036.

WHAT'S UP DOC?

Using virtually only a screwdriver, a multimeter, and your fingers, you can learn to take care of and fix your IBM PC. Chilton has published the first in a series of computer repair manuals entitled *How to Repair and Maintain Your IBM PC.* Covering most of the systems and components of the IBM PC, including system boards, disks and disk drives, keyboards, printers, and monitors, author Gene B. Williams explains how the average user can become familiar with the workings of the IBM PC.

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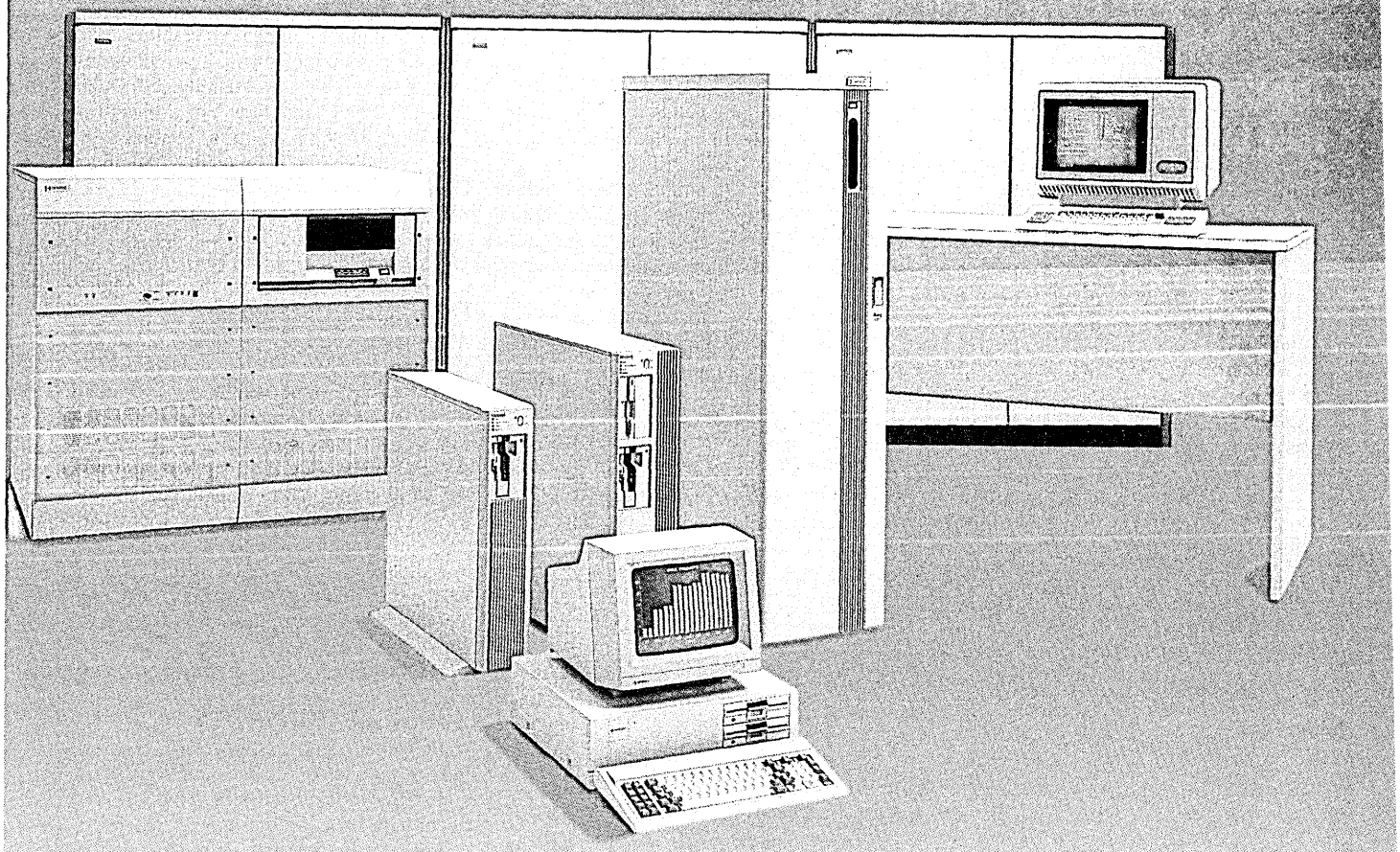

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you avoid costly delays and high repair costs; it also contains instructions for installing add-ons and hooking up peripherals. A section on troubleshooting provides a reference chart listing common symptoms of malfunctions and their likely causes. The author highlights simple safety precautions to eliminate any possibility of damage to you or your computer. *How to Repair and Maintain Your IBM PC* is available in bookstores for $12.95, or it may be ordered from Chilton Book Co., Radnor, PA 19089.

PERIODICALS

CRIME ALERT

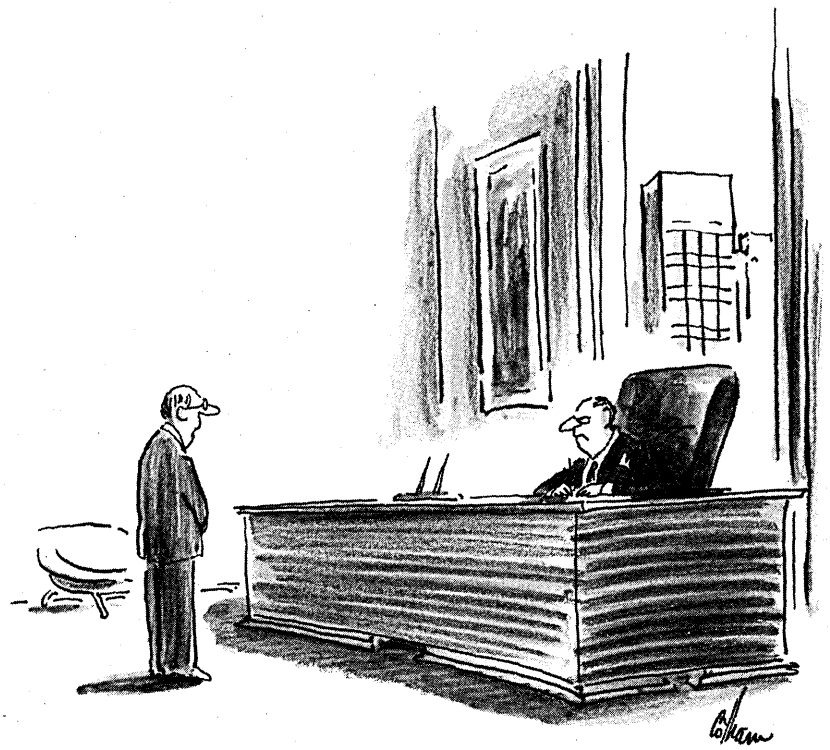
A newsletter focusing on how users can minimize the risks of criminal activity in their dp shops is now available from Technology Impact Research Inc. *Computer Crime Prevention* concentrates on personnel issues more than on purely technical solutions to security problems. Published 10 times a year, it describes how readers can detect crimes, identify their perpetrators, and discover the techniques involved, as well as analyze major developments in the computer security field.

Each issue will be dedicated to a particular theme and be designed to serve as a permanent reference. Technical editor is Dr. Abbe Mowshowitz, author of *The Conquest of Will*, a 1976 book on computing's impact on society (Addison-Wesley, Reading, Mass.); the general editor is Thomas H. Friedman, editor of science and engineering publications at Rensselaer Polytechnic Institute, Troy, N.Y. Subscriptions are $120 a year and can be ordered from Technology Impact at 212 Hessian Hills Rd., Croton-on-Hudson, NY 10520.

SEMINARS

CSI ON SNA

If you're wondering whether SNA is a practical solution to your company's data communications needs, this seminar may help you decide. Communications Solutions Inc. is sponsoring seminars on IBM's SNA and its implementation. Each seminar will begin with an SNA overview and will then examine the various layers of SNA, data link control, error recovery, and multiple-host SNA networks. Seminars will be held at the following locations: San Francisco, July 23-25; Boston, Aug. 13-15; St. Louis, Sept. 17-19; Los Angeles, Sept. 24-26; Hartford, Conn., Oct. 1-3; and Cherry Hill, N.J., Nov. 4-6. For more information, contact CSI, 992 South Saratoga-Sunnyvale Rd., San Jose, CA 95129, or call (408) 725-1568.



"If I may be so bold, sir, who are you calling timid?"

CARTOON BY FRANK COTHAM

COMPUTER LEGALESE CONTINUED

Dp managers, marketing executives, legal professionals, and hardware computer vendors will appreciate this seminar on "Legal Issues in Acquiring and Using Computers." This two-day seminar conducted by New York University will focus on protection and contracting for computer software, legal issues associated with computer software development, contracting for the acquisition and leasing of computers, and the resolution of computer-related disputes. The $595 seminar will be held in Washington, D.C., Sept. 30-Oct. 1, and New York, Nov. 18-19. For further information, contact DELTEL, New York University Seminar Center, 575 Madison Ave., New York, NY 10022, or call (212) 580-5200.

VENDOR LITERATURE

PRO-LOG PUBLISHES

A combination design engineer's manual and listing of integrated STD products, the "STD Bus Technical Manual and Product Catalog" contains standards and parameters common to Pro-Log's Series 7000 STD Bus microprocessor cards. The product catalog includes a full range of modular microprocessor system elements, including memory and I/O cards, motherboards, card racks and utility cards, PROM programmer systems, prototyping aids, and power supplies. PRO-LOG CORP., Monterey, Calif.

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SUBSCRIPTION INDEX

Management Information Corp. is offering an index of product evaluations of all eight subscription services. This 24-page document lists evaluations by category, product evaluated, date, and subscription service. MIC's eight services include *Small Business Computer News, Packaged Software Reports, Data Base Product Reports, Officemation Product Reports, Officemation Management, Data Entry Awareness Report, Datacomm & Distributed Processing Report,* and *Communications Product Reports.* MIC, Cherry Hill, N.J.

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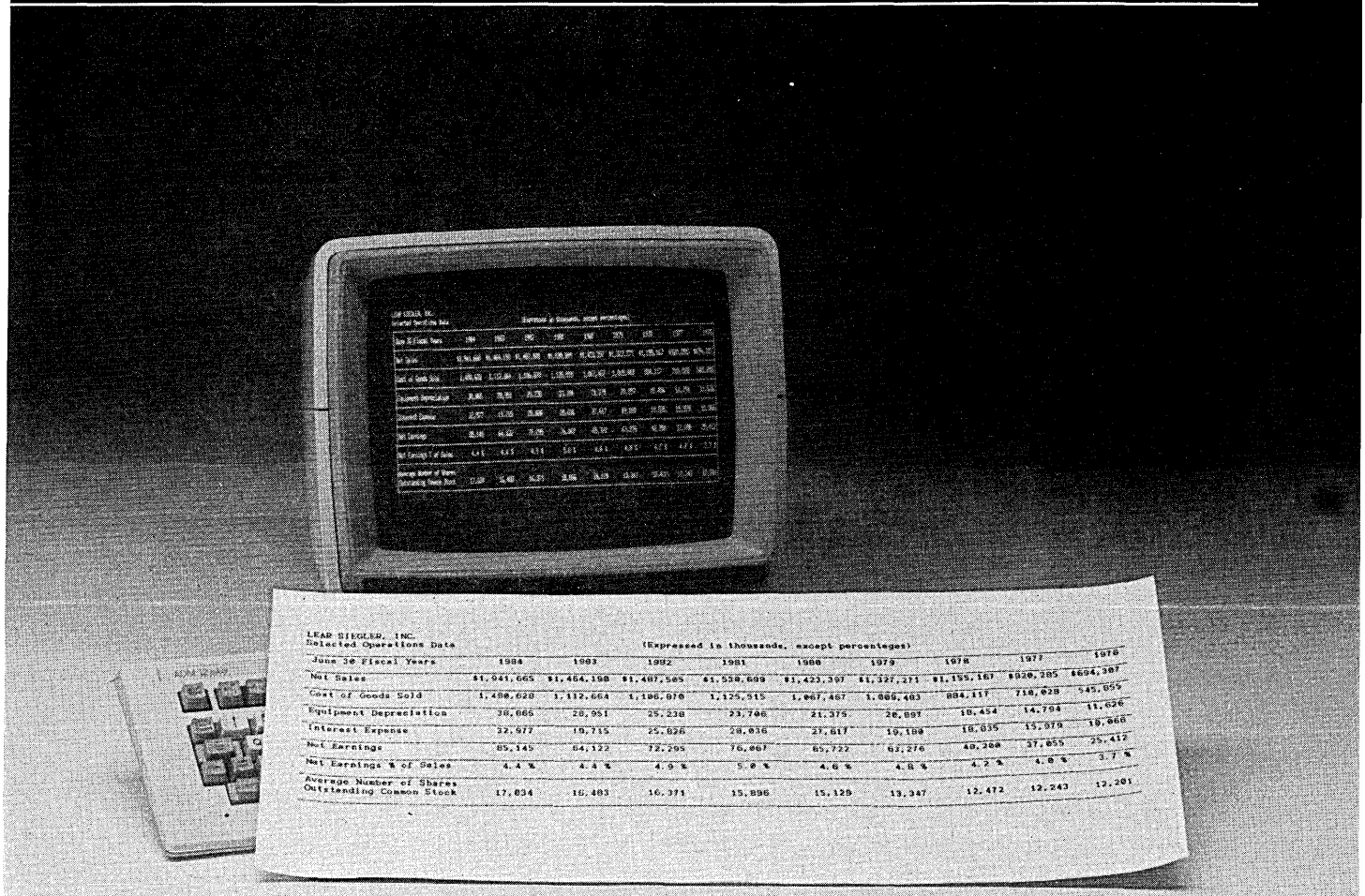

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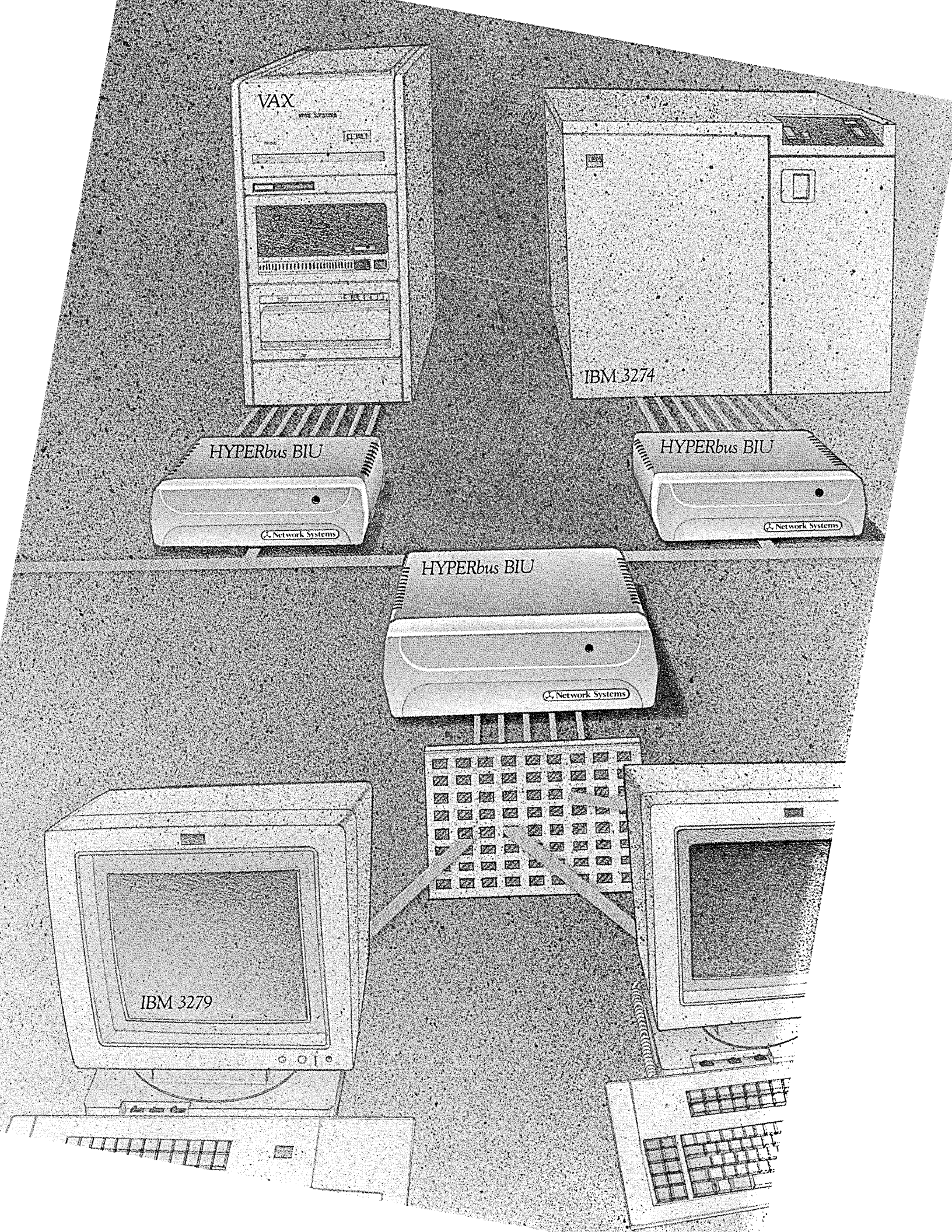
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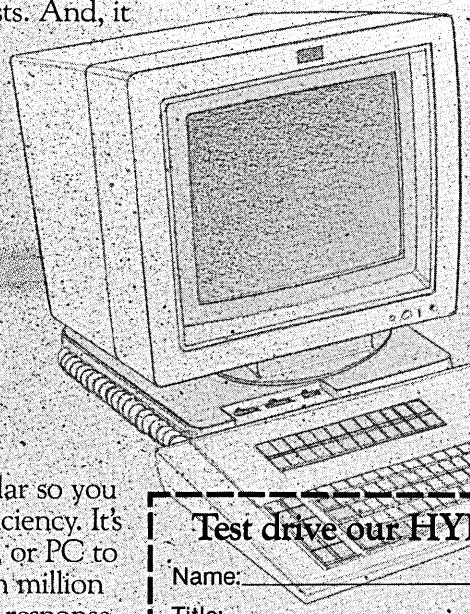

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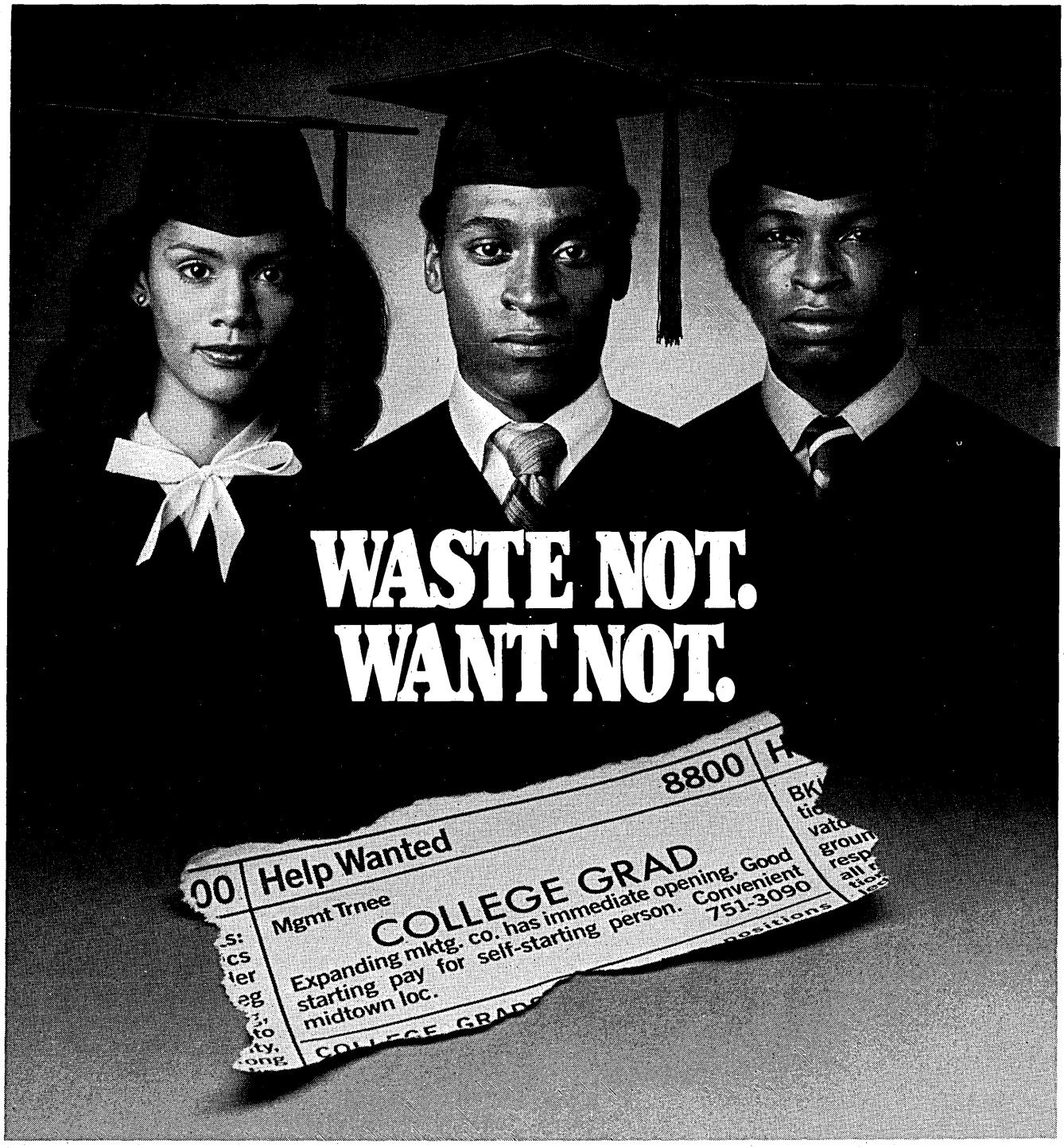

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READERS' FORUM

MATRIX MINDSETS

In a July 1, 1984 DATAMATION article ("The Battle for the Desktop"), Michael Hammer introduced a graph as "the inevitable matrix." Deep in my heart, the phrase struck a resonant and sympathetic vibration. How many times, in the course of an otherwise lucid exposition, has an article on our profession turned, nay leaped, to the seductive embrace of the "illustrative" matrix? And how many times have I, naive soul, pored over this cruel mistress, seeking enlightenment, only to discover that beneath the sophisticated finery lay threadbare platitudes?

Hammer had apparently unmasked this Jezebel already, since his article made generous, tongue-in-cheek reference to the matrix's poor cousin, the line chart—to wit, "Hammer's Generic Graph" and "Hammer's Other Generic Graph." Hammer, sly devil, was onto something important: why is the dp professional such a sucker for charts, graphs, flowcharts, tables, arrays, and matrices? Surely such a sobersided, logical creature ought to know better than to seek answers to Big Questions in little pigeonholes. Or is there a bit of self-deception here, the willing suspension of disbelief in one's own brillance, enticed by the Matrix's outward garb of Deep Thought and Yet Profounder Insight?

Every profession, of course, takes itself too seriously, often confusing a useful method for obtaining a practical result with a universal way to solve all problems. Every profession conditions its members to see the world in a certain light, inculcates values while teaching skills and principles, and reshapes the practitioner's outlook in accordance with the dominant value system. Not surprisingly, we learn to view not only our work but ourselves and our situations in life by the professional values we imbibe. In this regard, a programmer who lays out grocery lists in the form of an array is no different than the attorney who fights with his spouse by defining precedent cases and admissible arguments, or the therapist who effaces personal feeling in favor of "objectivity" when he talks to his kids. To the dedicated programmer, a bad relationship is a faulty algorithm, an unreturned message, an I/O error.

More than most, however, the dp professional sees problems as demanding translation and restatement into a particular form. Put simply, to a programmer the whole world is a matrix. Nor is the reason far to seek. Reversing the direction of thought that has driven technical developments from the bronze age until the recent present, the programmer sees himself as an extension of the tool, rather than the reverse. And if the computer can be thought of as a device that repeatedly and mindlessly executes a certain cycle of activities, albeit at incomprehensible speed, it can also be thought of as a collection of arrays—an array of arrays, or a table of tables, but you get the picture.

People in the profession deny their compulsive reductionism, their need to find the row and column headings so that each element can be loaded. They will say that words cannot convey many of the constructions they work with, or that tables and matrices convey information much more concisely than words or documents. Programmers reach for a matrix to explain themselves because they have come to think of themselves as stored programs, and their life experiences as gobs of data waiting to be processed. Like the machine whose servicing butters their bread, they arrange the world into rows and columns, load data elements, and process their thoughts by means of FOR-TO-loops subscripted to their array addresses.

Three questions immediately suggest themselves. One, am I correct in this characterization? Two, are they then utterly mad, on the model of Swift's mathematicians in the land of Luggnagg? And three, so what?

Questions one and two are easy. Yes, I am correct and yes, they are mad: mad in the same way that Gulliver is also mad at the end of his travels, when he begins to see the world in purely rational terms, like his beloved Houyhynhnms. The pervasiveness of the matrix as example, illustration, or even as the graphic equivalent of an enthymeme is demonstrated by simply opening a copy of a trade journal or textbook.

But the interesting question is number three: so what? Lawyers, for example, were mad in much the same way before Justinian codified Roman jurisprudence, yet except for hating lawyers as a class (an entirely unrelated matter) the public has not taken much notice. Poking around in the origins of the word matrix affords a starting point, albeit an oblique one. The *Oxford English Dictionary* traces the word from the Latin matrix, meaning womb (older Latin, pregnant animal or female animal used for breeding), apparently derived from mater (mother) by giving the stem the suffix of feminine agent nouns.

The first recorded English usage occurred in 1526, in a biblical passage referring to the womb of a sheep. Subsequently, the word acquired extensions of the root meaning: a place or medium in which something is bred or developed; an embedding or enclosing mass; a mold in which something is cast or shaped. The modern mathematical sense of "a rectangular array of elements, arranged in rows and columns, that may be manipulated

according to rules of matrix algebra" (Jerry M. Rosenberg, *A Dictionary of Mathematics*), first appeared in Arthur Cayley's mid-nineteenth century work on matrix algebra (see *Collected Mathematical Papers*, 1889). Essentially, the modern meaning of the term, which has completely replaced the older meaning, is a little over 100 years old.

But again, so what? Plenty. The shift from the root to the modern meaning is a categorical shift along several lines: from qualitative to quantitative, from concrete to abstract, from natural to artificial. What happened to the meaning of matrix parallels what has been happening to our intellectual life since the late seventeenth century: a systematic epistemology drives out a nonsystematic, as Christianity drove out paganism, but with less fanfare and, on the whole, with destructive results.

A little closer to home, the same movement to replace nonsystematic perceptions exploded upon the business world through the writings and practices of Frederick Taylor. Bookkeeping had been around for centuries, of course, but the notion of "Scientific (read systematic) Management" that grew out of Taylor's work was something new. As in the modern world generally, systematic perceptions and methods drove out nonsystematic perceptions and methods.

I am, of course, oversimplifying some involved matters, but bear with me: an example will clarify. When one enters the data processing field, one is taught to see the world in a particular way. First, experience is divided in Manichaean fashion into problems and nonproblems. Problems, in turn are split into those capable of algorithmic solution, such as describing an invoice system for the purchase of paintings, and those (poor unfortunates) not capable of algorithmic solution, such as deciding whether a painting is beautiful.

Next, all experiences, actions, actors, and things are shaken from their drowsy slumber of simple being and dragooned into conceptual systems with jawbreaking names: dataflow diagrams, data-structure diagrams, and databases, the last being the most intricate, a domain unto itself wherein an object is rigorously interrogated, herded into hierarchies, chained in networks, or dissolved in the ontological soup of a Relational Database Scheme. It is as if dp set out to resurrect Locke's *Essay on Human Understanding*, and were again conceptualizing matter as composed of primary and secondary qualities.

As one progresses through the arcana of dp, the representation first of information (programming), then of experience, of people and things (systems analysis) takes on methodological rigor. The more one is trained to perform logical analysis and to develop logical solutions, the more the world acquires a logical cast. Whatever doesn't lend itself to logical analysis is politely ignored, like users. Confronted with nonlogical situations, the new adept may well exclaim with the philosophes, "ecrasez l'infame!" which can be loosely translated as "I choose not to deal with this ugliness."

And this brings me to the heart of our collective darkness. Perceiving the world in systematic fashion, as if that were the only or the best way to look at it, may be called the Matrix Mindset. It is a powerful outlook, and enjoys, with justification, great prestige. It is not limited to data processing, as I have hinted above, but in the business world, data processing is probably the locus classicus. The problem with the Matrix Mindset is its rigidity, its attitude of contempt for anything that doesn't conform to binary notation and the Von Neuman cycle. It cannot admit that the world might be other than orderly. Worse yet, it cannot understand that great chunks of the world are better understood differently, nonsystematically.

When one translates people, activities, and things into data elements and data structures, much is gained from the perspective of logical description. Alas, much is also lost, to wit, a sense of gestalt; a sense of particular context, nuance, feel, and local color; a sense of intuition. These are major losses. Of course, the situation works the other way too. To focus perception on qualitative reality, on textures, feelings, and gestalts is to lose the concision and power of formal logic.

At the other extreme from the Matrix Mindset is a nonsystematic way of perceiving the world which I shall call the Narrative Mindset. People who hold this view are the vast majority in any society. Many are only superficially literate, some are hyperliterate. These are the people that Sherry Turkle characterized as "soft" programmers (I'll let you guess who the "hard" programmers are) in her recent book, *Computers: the Second Self*. From the narrative perspective, the world is a story. That may sound silly, but to my mind it makes as much sense as seeing the world as a matrix.

The Narrative Mindset is nonsystematic, but possesses a strong sense of order. The sense of order, however, is derived not from logical abstractions but from stories themselves. All stories must have a beginning, a middle, and an end, as Aristotle wisely pointed out some time ago, and most include situations, plots, and characters. Don't tell me about modernism and postmodernism. I'm talking about all of us, the great unwashed, not about Joyce, Bartheleme, Gass, Borges, Marquez, and so on.

Most people who view the world as narrative make themselves the leading characters, thus imposing a point of view. They do not think of themselves as consciously creating stories. Rather, the narrative mode of perception occurs naturally, without reflection or, for that matter, apparent learning. We seem to absorb it with our first nursery rhyme or television cartoon, below the level of consciousness.

Michel Foucault, recently a major force in French intellectual life, has characterized (in *The Order of Things*) this kind of unseen shaping of perception and thought patterns as a culture's episteme. Foucault has argued that a particular episteme will define an epoch yet will be itself unseen, very much like

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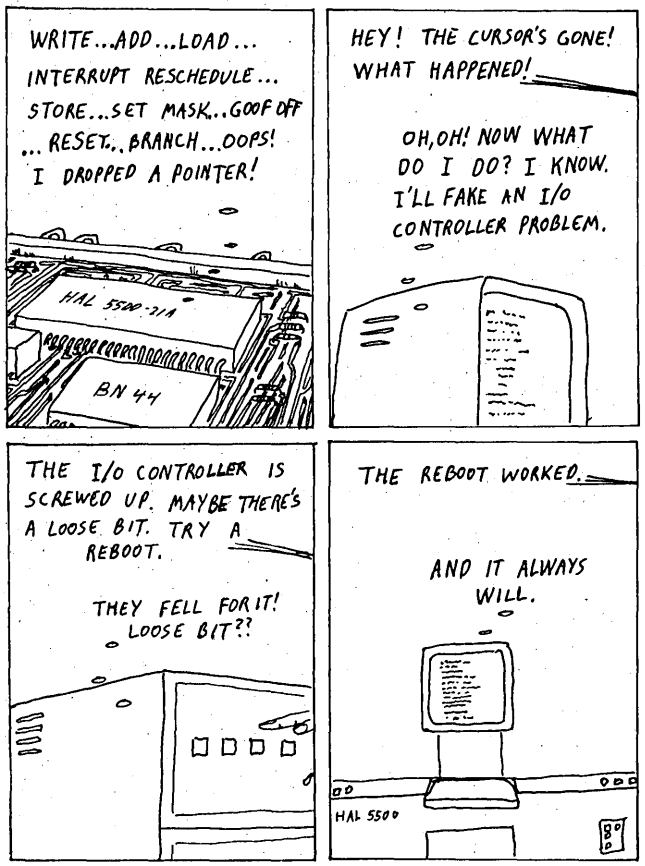

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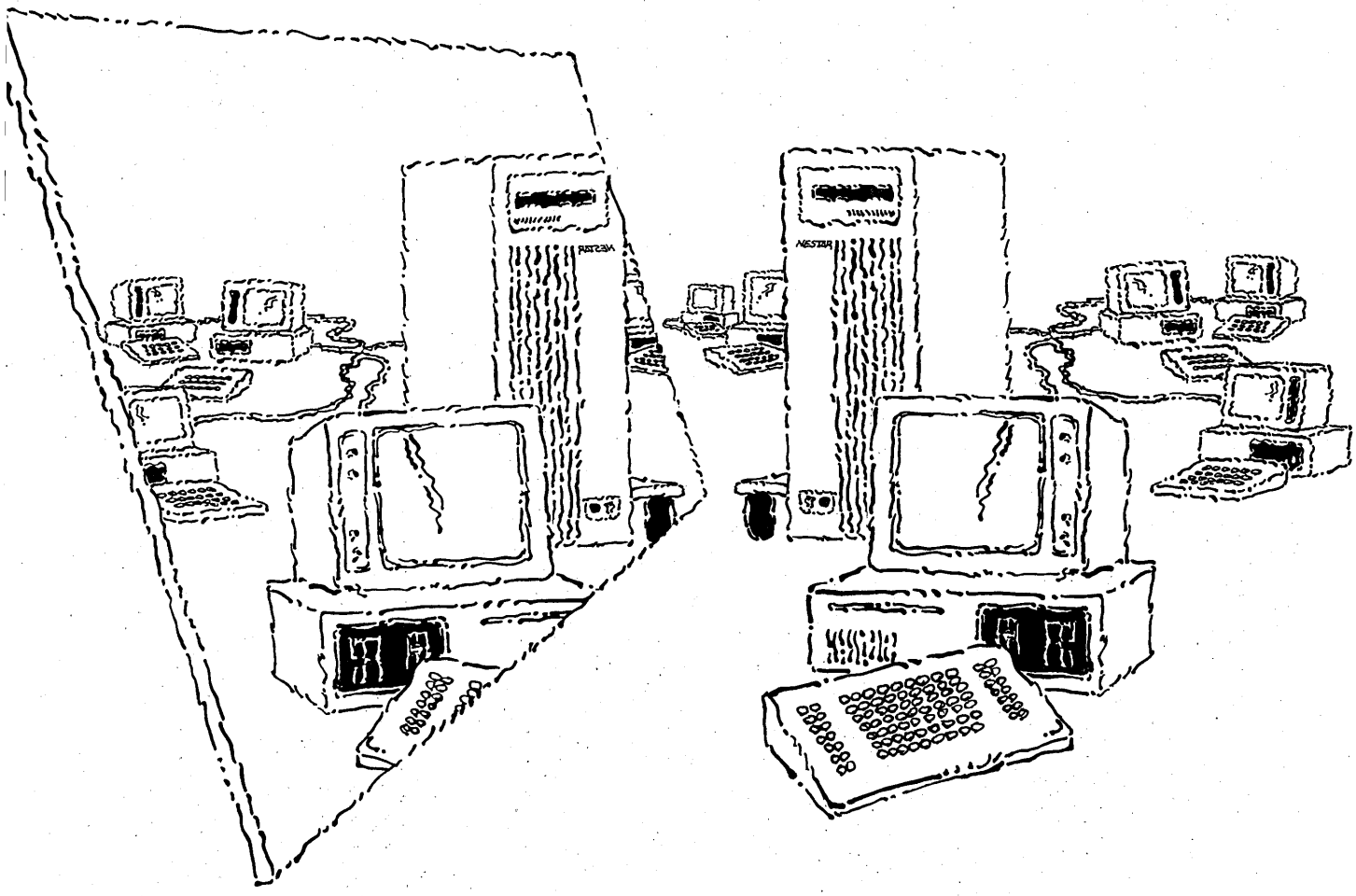

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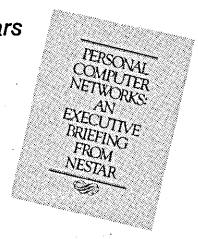

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Thomas Kuhn's notion of a scientific paradigm. In other words, the episteme is, as we say in dp, transparent to the user, but also (as we don't say in dp) determinative of what the user subsequently sees.

If there is this split between a narrative and a matrix view of the world, why characterize it in terms of an episteme? Aren't we really talking about the psychological differences between left and right brain? Between analytical and holistic, hard and soft, and so on? My answer is no, most emphatically not: I deliberately choose not to use the left/right brain hypothesis because it implicitly reinforces the determinism that the Matrix Mindset lusts after in its deepest soul of souls. Foucault's episteme is a much softer kind of determinism. It is historical, not biological; that is, it is a human construction, not a construction that we have arbitrarily denominated human.

Putting aside the left brain/right brain canard, the differences between the matrix and the narrative can be examined in more detail. Grammatically speaking, the Matrix Mindset is always in the nominative mood. It is static; its typical syntactic pattern is noun, linking verb, complement. The matrix person sees the world as things needing to be put in boxes and classified. He is a prescriptive grammarian, frowning on the disorder inherent in life's dangling participles, split infinitives, or terminal prepositions.

The Narrative Mindset prefers active to passive verbs, transitive to intransitive. Its typical syntactic pattern is subject, verb, object. It defines things by bouncing other things off them, by making things do things. Most narrative people want to know what happens next. They are not interested in seeing how things relate to all other things, but in knowing what consequences will follow from some action. They do not see the world as boxes awaiting classification, but as processes that happen to things, or as actions that actors perpetrate on other actors.

The Matrix Mindset hates the semantic aspect of things. It prefers syntax, devoid of the irrationality of meaning, purified into abstract form or pattern. It is parsimonious, disliking repetition because repetition, by definition, is inefficient. By contrast, the Narrative Mindset loves meaning. It delights in semantics, in puns and word play and wit. The content, texture, and sound of language possess its soul. It leaves formal matters to literary critics, whom it does not much care for. Repetition is its hallelujah grace note, its communion wine and wafer, con- and transubstantiation alike.

Fundamentally, the Matrix Mindset abhors words because it finds them inadequate and inexpressive, ambiguous and slippery. It mistrusts having to share the meaning of words with strangers, and hence makes up its own legions of abbreviations and acronyms so vile that the Almighty, had He forseen dp dialects as the ultimate consequence of smashing the tower of Babel, might have relented His Wrath and let the impious structure stand.

The matrix person constructs words by subtracting their vowels, secretly desirous of a purely consonantal language, believing, with Rimbaud, that vowels have colors as well as other irrational associations that must be excised, as a sheepherder castrates bumptious rams. Out with the damn things! Hence dp language resembles Slavic tongues like Polish or Serbo-Croatian, full of unpronounceable consonant strings—PL1, JCL, RPG—or hideously misshapened ur-words, prototypes foolishly rushed into production: SASS, FORTRAN, COBOL, DISOSS, SNA, PROLOG, ASCII, and—almost beyond belief, let alone pronunciation—EBCDIC.

The Matrix Mindset wants to reduce words to quantities, so that they can stand for something exact, by God, and be manipulated like numbers, or algebraic variables. This attitude underlies such otherwise innocuous ideas as "pseudocode" and "structured English." For a thoughtful discussion, see Norman Meyer's "On Formalism in Specification," lest you think I exaggerate (IEEE *Software,* January 1985).

The Narrative Mindset believes with Augustine that in the beginning was the Word, and sees in an ASCII code only a dry husk and the rattle of Swiftian winds from a nether throat. Narrative people have not advanced much beyond Homer with regard to the word. They love words for their own sakes, for the way they fall or fly from the tongue, resonate or die, and most dearly for the way that they half-create the world they can never fully capture. To the narrative person, words are symbols, hence abstract; yet they are abstractions with a concrete history, be it Latinate, Germanic, French, native American, or some other. Words have, as we saw with the word matrix itself, a peculiar, sometimes amusing, often irrational history that they drag along with themselves, heavy but necessary baggage.

The squelching of paganism by militant Christianity, alluded to earlier, may serve to bring this discussion to a close. No doubt, the alert reader has discerned that I am of the narrative persuasion, and hence could be described as biased against the matrix. Nothing could be further from the truth. Like a pagan of the third century, I can accept the new matrix faith with equanimity, if not enthusiasm, for while I see its rigidity and compulsion to reorder the world into symbolic logic as sapping its creative force, I nevertheless see it as an instrument of great power.

The Matrix Mindset may, as Gibbon said of Christianity itself, have erected its triumphant cross on the ruins of the Capital. Gibbon knew better, however, because the old beliefs did not die away, but instead assumed a new garb. Put another way, the Matrix Mindset is an episteme that has not and perhaps cannot fully triumph over the narrative episteme. Neither perspective can fully describe the world; each has its proper and improper uses—which cannot, incidentally, be looked up in a matrix.

The Narrative Mindset first discovered its limitations when Rome was a dirty market town and the Greek enlightenment was at its brightest. Plato, having learned the seductive power of word and story from Homer, turned away from rhetoric to dialectic, and banished poets from his Republic. *Sic transit gloria.* Our contemporary programmer, flush with the power derived from a new and subtle technology, believes that he will remake the world again as a universal and perfect matrix in the image of his electronic god. Let him heed the fate of Homer at the hands of Plato, study humility, and learn to love a well-told tale.

—Curt Hartog
St. Louis, Missouri

DP: YESTERDAY AND TODAY

In any revolution, power and authority tend to shift. The pervasiveness of the micro revolution makes it impossible to deal with all the power and authority shifts taking place without becoming encyclopedic. But one of the most important shifts is taking place in the dp manager's office. Boiled down to its very essence, the revolution is true distributed data processing.

The fight is not microcomputers against mini- or mainframe computers, but computer applications vs. noncomputer applications. The new computer applications will not replace or drive out the old ones. Old computer applications will be modified and will change functions, but will not be driven out. Dp managers have been dealing with these kinds of changes for years. Definitions, configurations, and uses always change; this did not start with micros.

For example, at many universities, microcomputers are being installed for use in introductory programming courses.

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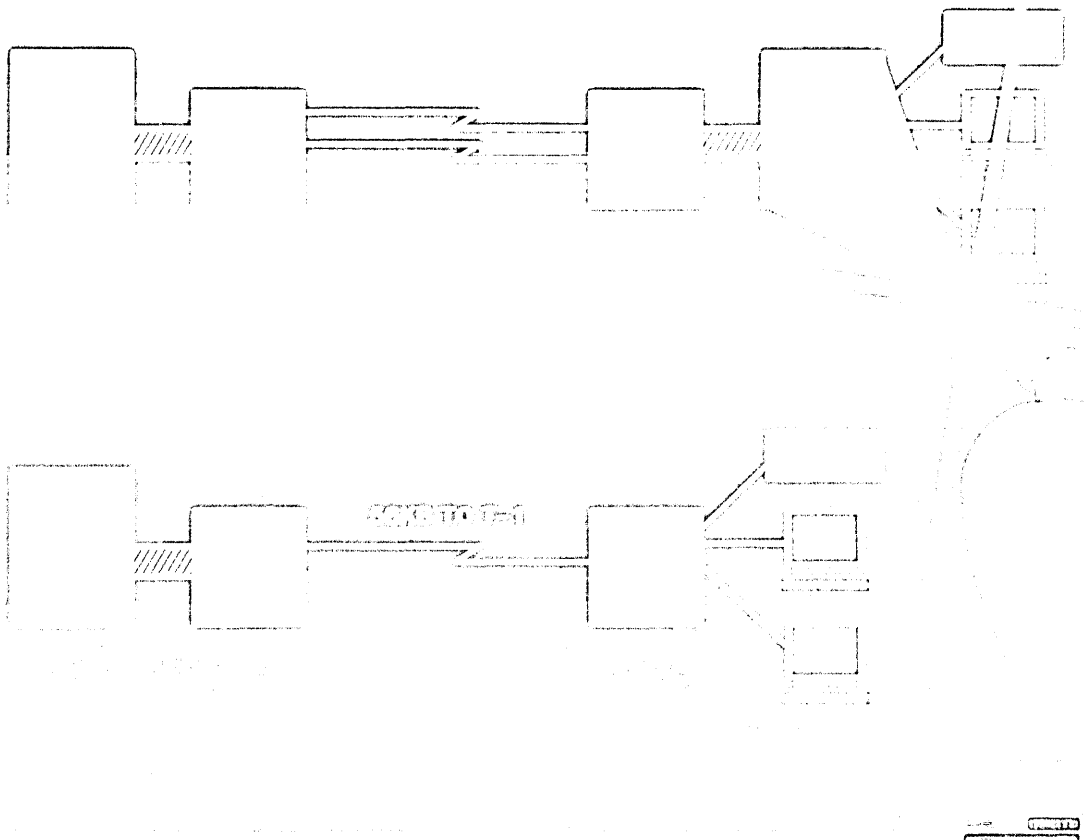

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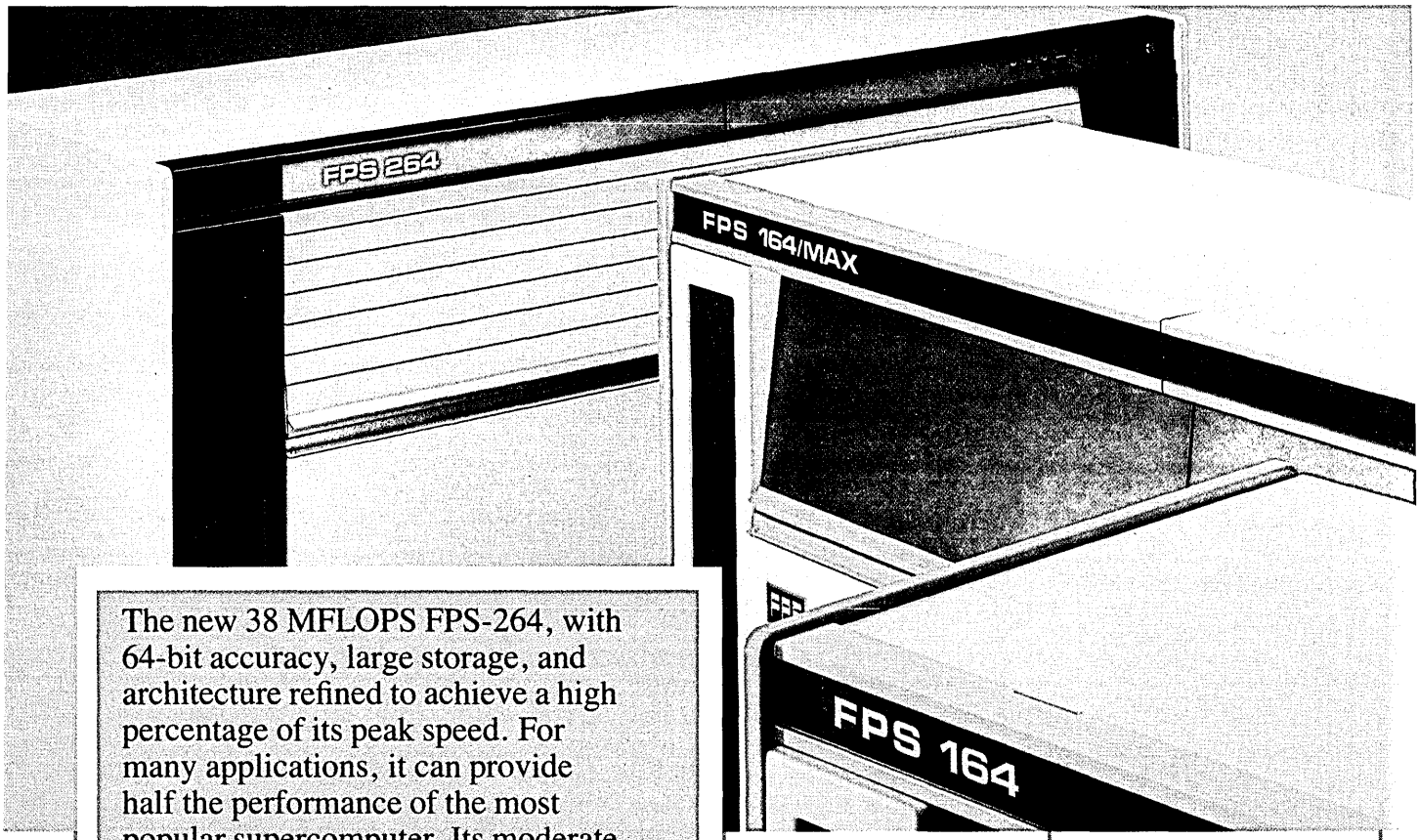


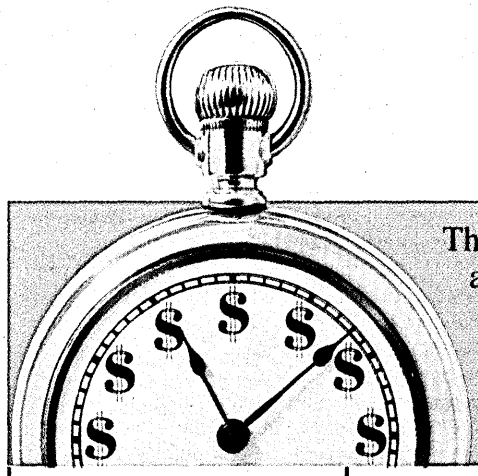
The new 38 MFLOPS FPS-264, with 64-bit accuracy, large storage, and architecture refined to achieve a high percentage of its peak speed. For many applications, it can provide half the performance of the most popular supercomputer. Its moderate price and exceptional support liberates supercomputing from the realm of major corporate investment and puts it within practical reach of departments and teams.

How fast can you get a supercomputer up and running is as important as how fast it runs. When you look beyond peak computing speeds to the practical realities of compute-intensive analysis and simulation, odds are that nothing else can take your job from start to finish as fast as the FPS 64-bit supercomputer family. Here's why:

1. FPS protects and utilizes your existing software resources. FPS offers you an exceptional, proven software tool set. If your investment in FORTRAN is typical, the FPS Compiler will alone be a compelling advantage.

2. More applications software than for any other comparable computer. Compare quantity and quality of compatible third party software packages—for structural analysis, circuit design, reservoir simulation, fluid flow analysis, chemistry and much more—and the FPS advantage widens.

3. The FPS 64-bit family makes supercomputing speeds affordable at the department level. Even teams with remote access to Crays® and Cybers™ are



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likely to find that the advantage of immediate, local access is well worth the sacrifice of standing in line for the "fastest" machines.

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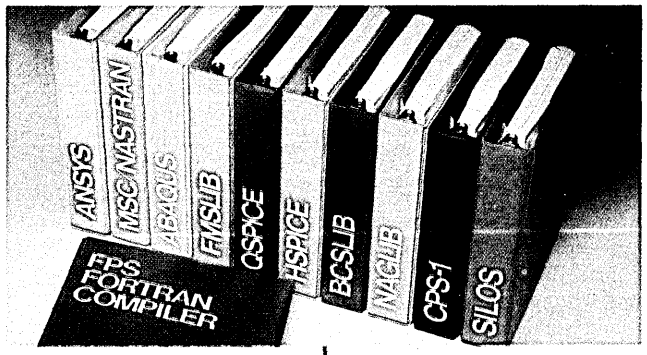

Family Specifications

	FPS-264	FPS-164/MAX	FPS-164
Peak speed, MFLOPS	38	33-341	11
Dynamic range	2.8×10^{-309} to $9.0 \times 10^{+307}$	2.8×10^{-309} to $9.0 \times 10^{+307}$	2.8×10^{-309} to $9.0 \times 10^{+307}$
Word size	64 bits	64 bits	64 bits
Main memory capacity	4.5 MWords	15 MWords	7.25 MWords
Maximum disk storage capacity	16 Gbytes	3 Gbytes	3 Gbytes
Precision	15 decimal digits	15 decimal digits	15 decimal digits
Vector registers	4 x 2K	124 x 2K (max.)	4 x 2K
Scalar registers	64	184 (max.)	64
Host interfaces	IBM, DEC	IBM, DEC, Sperry, Apollo	
Program Development Software	FORTRAN Compiler, Overlay Linker, Assembler, Object Librarian, Interactive Debugger.		

Family Performance Measures

	FPS-264	FPS-164/MAX		FPS-164
		15 accelerators	1 accelerator	
Peak MFLOPS	38	341	33	11
Peak MOPS	190	1705	165	55
Peak MIPS (Instructions are multi-parcel)	19	5.5	5.5	5.5
Typical MFLOPS, LINPACK Benchmark	9.9	20.0	6.0	2.6
Whetstones, KWIPS (64-bit)	19,000	5440	5440	5440
1000x1000 matrix multiply, seconds	53	10	66	189
$K/MFLOPS (system price/peak speed)	$17K	$2.5K	$12K	$27K

4. The FPS family is expandable. Proven dependable. Well-supported. In other words, a safe, farsighted investment. You can upgrade your existing FPS computer, or evolve from one level of performance to another, with minimal disruption. And you can bank on a record of reliability that begins with exhaustive manufacturing testing and extends to our 30 field office service facilities worldwide.

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Students in these courses tend to use a great deal of connect time and relatively little compute time. Since this is an inefficient use of a mainframe, shifting those students to micros allows the mainframe to be used for more appropriate applications.

Another university example is the increasing use of dial-up service for mainframes. Students and faculty are discovering that a little inexpensive hardware and software can convert their micros into remote terminals. This relieves some of the pressure on the campus computer center, but increases the pressure to either provide or expand the dial-up services. So the pressure in this case is not for the dp manager to give up functions, but to reallocate resources to better serve the users. The difference from the past, however, is that the change from demand for hard-wired terminals to demand for dial-up service can take place without the dp manager having any say in its planning (which probably did not exist) or its execution.

Recently, this point about adding more computer functions rather than replacing old functions was made very clear to me. Ten years ago, about the time the IBM 5100 came out (keep this one in mind if you are a micro user who thinks IBM never stops supporting a product line; dp managers know better), I heard a talk by an IBM representative. He was very enthusiastic about the new machine and said it would relegate Hollerith code punch cards to the Smithsonian. Since I seldom used cards, I nodded my head in agreement.

But, two years ago I was working on a research project with a visiting Polish professor at the university where I work. We were trying to extend some research he had done in Poland, but his data were still in Poland. He called home, found someone willing to pick up the data cards from his old office, and found someone else who was about to come to the U.S. He walked into my office one day with a tattered box full of cards. I took the cards down to the computer center, punched up five control cards, and fed the cards into the card reader. They went in without a hitch. The total elapsed time was 10 minutes. I knew nothing about the original Polish hardware or software, and I had no need to know since the cards were standard 80-column Hollerith code.

I discovered that day that the Hollerith coded punch card is the true international standard for data interchange. So, despite the fact that the Hollerith punch card is about 100 years old, it is not about to go away because of microcomputers or for any other reason.

The problem with the revolution as perceived by data processing managers is a before and after situation. Before the revolution all data processing power was concentrated in the computer center. The operators controlled everything. Even in timesharing or remote batch situations, the terminals or remote stations were wired into the central computer. Any control by the users was strictly at the discretion and pleasure of the dp manager. Since the revolution, we have computers and computing power springing up everywhere. Computing power is being selected, bought, and used without the consent, control, and even sometimes without the knowledge of the dp manager. People are putting micros on their desks, carrying them around, and taking them home at night. No one ever took an IBM 360 home with him.

The critical question from the dp manager's point of view is, how does one control this process? There are different strategies you can use to control it, depending on the organizational objectives. Typical objectives might be security of hardware, software, or data; flexibility in configuration; ability to communicate; or minimum cost for such factors as initial investment in hardware, software, maintenance, and support.

One must be careful to distinguish objectives from the means of achieving them. For example, a typical desire of dp managers (but one which is not a true objective) is to insure that all micros in the organization are identical. That is a means to an end, not an objective.

Whatever the objectives of the dp manager, let us look at some of the strategies for achieving them. One way is to let everyone get whatever he wants. This sounds like chaos, but does not necessarily have to be. First of all, it is still possible for a group of different micros to communicate with each other. One way is through networking. Another is through using the mainframe as a mail-drop. This requires the micros to have a standard interface such as RS232 plus a modem and software, and the mainframe to have interface capability. But this can usually be done easily within the confines of the present system. Second, if everyone chooses his own micro, the selection process becomes the responsibility of the users instead of the computer center. A third advantage of this approach is that if everyone selects wisely, then flexibility in use is maximized.

The disadvantages of such an uncontrolled approach are obvious and include the difficulty in controlling the entire process and the shift in authority from the computer center to the users. Chaos results when the users do not choose wisely and turn to the computer center to bail them out when nothing works. If this is the strategy one chooses (and, in fact, choosing no strategy will result in this situation), the computer center personnel must take on a heavy educational role to train users in analyzing uses and in selecting hardware and software.

A second strategy is to impose a standard system. Anyone in the organization who wishes to procure a micro must do so through the computer center, and may only procure the standard model specified by the computer center. This strategy generally sounds very good to the dp manager. It results in apparent total control over the revolution. The initial purchase can usually be done under a blanket contract with a lower price. Maintenance is easier and more conveniently arranged, and common software may be purchased. This also improves communications, because with common software it is easier for someone's analysis to be verified. Finally, it is easier to share or move around peripherals such as printers and plotters if all the basic machines are identical.

The disadvantages of such a strategy relate to reconciling the needs of the various users. Flexibility is minimized. Marketing and finance may have very different needs, and a common machine is unlikely to serve either very well.

Another strategy that often appeals to the dp manager is to allow the user full freedom in choosing a system, but to require that he obtain prior approval of the system from the dp department. For example, users may be required to select a system that uses a particular operating system, runs a certain type of software, or has an RS232 interface. The company still ends up with a menagerie of micros, however, and dp will be faced with the task of trying to support all the different users.

One may, of course, choose a mixed strategy, such as requiring each office or division to standardize on one particular machine—picking one that has a large number of options extends their possibilities.

After the dp manager has selected and implemented a strategy for controlling the acquisition of micros in the company, there still won't be time to rest. The next task at hand is to gain control of the micros and their use. While the selection process for micros can be painful and time-consuming for dp people and users, failure to control the use of the micros can result in disaster for the company.

If we were to use a single word to describe the task of controlling use, it would be security. No longer are machines kept in a separate room and restricted only to trained operators. No longer are all data and software kept in a central location and managed and maintained by experienced programmers.

Let's look at some of the hardware and software security problems the dp manager now faces. Theft is one aspect of physical security. Micros are very tempting to thieves, much more so

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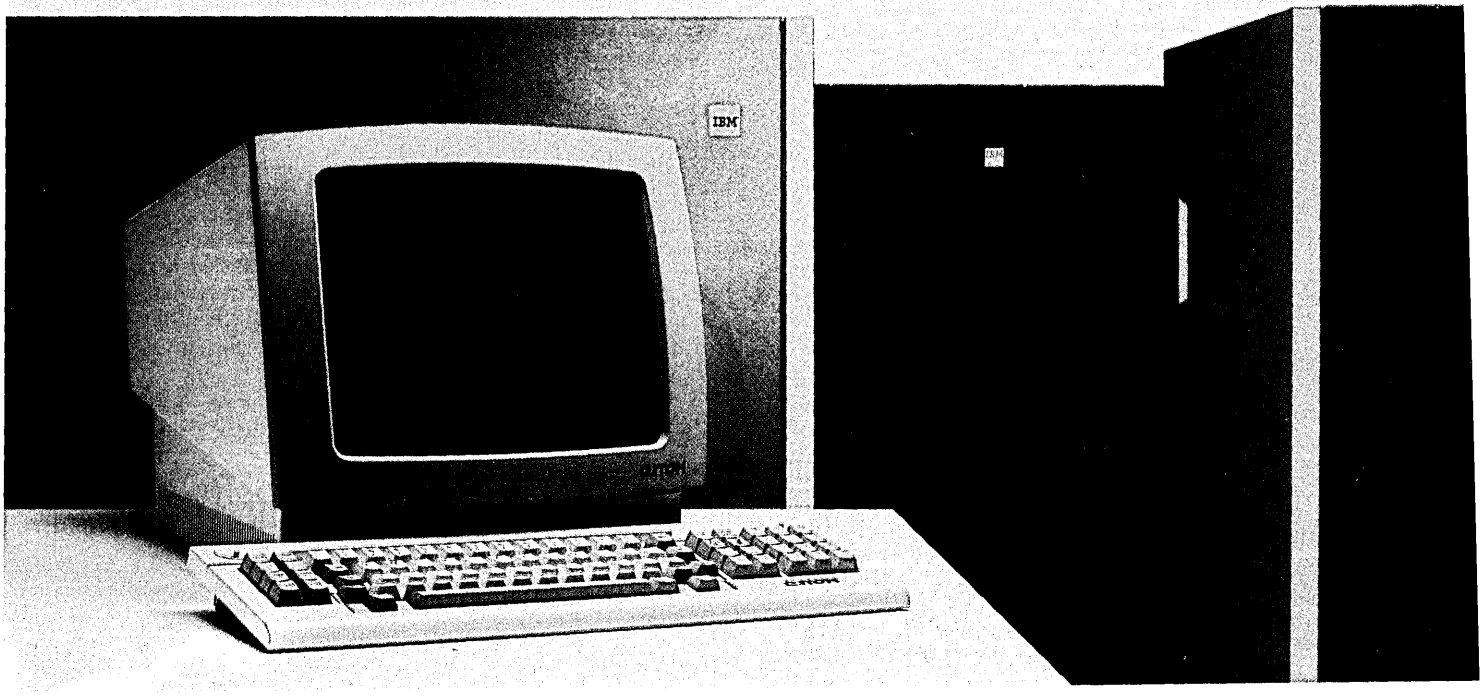


than terminals and other equipment dependent upon the mainframe. What hacker wouldn't love to get hold of your $5,000 system for $200? In other words, a stolen micro is a self-contained, useful unit and is easy to fence. Portables are especially vulnerable because they are supposed to be carried around, and so someone carrying one would not necessarily look suspicious.

Separate keyboards present an interesting problem and opportunity. Once stolen, the remaining cpu and display are singularly useless without the keyboard. On the other hand, if the keyboard is locked up securely, the same cpu and display are just as useless to the thief. The bookkeeping machines that used to be in offices were unattractive to thieves because of their narrow applications. The micros that replace them are general purpose machines and are thus quite attractive.

In other words, organizations must now provide security for machines scattered throughout offices that previously only required minimal security. And most micro users are not sensitive to the need for security. It often becomes the task of the dp manager to educate and oversee the security of micros.

Physical security goes beyond theft, however. All of the hard lessons learned by dp about caring for the machine must now be learned by people untrained in the nuances of computers. For example, micro users often ignore the physical environment. Last winter, a pipe in the ceiling of a micro lab on campus froze, burst, and flooded half the micros in the lab. The dp manager would not have tolerated such a potential risk in his computer center, but the micro users were not sensitive to the dangers of putting computers under water pipes. Micros are placed in rooms with shag rugs, plugged into outlets using adapters so they are not grounded, placed over hot air vents where not only heat but dust and dirt are sucked into the machine, and left uncovered or with the disk drives open and exposed to all manner of environmental hazards. How often has one seen a micro user smoking and blowing the smoke directly into the disk drive? How long would the dp manager tolerate that in the computer room?

Beyond the environment, most micro users do not know the most elementary procedures taken for granted by trained dp people. Storage media are mishandled. Disks are left lying around on desktops out of their envelopes, or stored lying flat, or placed near heat or telephones (which generate a magnetic field when they ring), or leaned against the side of the computer near the power supply. Backup systems such as son-father-grandfather are foreign to the typical micro user. If you mention off-site storage, micro users think you are crazy. Tasks like formatting and sysgening a disk can be formidable to the untrained micro user. The job of training people in all these procedures will fall, of course, to the dp department.

Finally, most dp managers get very uneasy at the thought of employees taking their computers home with them at night or on weekends. One solution is to give employees the opportunity to buy their own machines at the company price, or even at subsidized prices. That way the company machines stay put and employees may end up doing more work at home than they ever did before.

Data and software security is often more of a problem than physical security. If the mainframe has an interface for communications purposes, it opens the mainframe databases to enterprising hackers. If the interface is dial-up, hackers outside the company may feel invited or challenged to inquire. Even with a strictly internal system, users can download data into the micro for perusal or manipulation. If the mainframe is isolated from the micros, one advantage of having a standard micro is that the computer center can issue data via diskette. In this way, dp can control at least the first user of the data.

Unfortunately, unless the system places inordinate demands on the computer center personnel, there is no way to prevent the copying and passing around of the data. Even program integrity is difficult to control. For example, the computer center could issue a diskette with a spreadsheet-type program with a template for a particular type of analysis. This should insure that the results of any analysis using the diskette could be replicated by someone else using the same diskette and data. It is, however, very difficult to prevent changes to the template (without repackaging the disks). In any case, it is virtually impossible to prevent temporary changes. Even if the problem of data and program security is solved by the organization, the solution usually means the dp department must take on a tremendous workload. Instead of there being one program on a mini or mainframe to be managed, hundreds of diskettes that have to be maintained and managed are now floating around. The dp manager may quite rightly ask why the company chose to use micros when proper control requires twice as much effort on their parts.

Finally, after all the changes wrought by the micro revolution have taken place, and the dp system and managers have accommodated the new machines, who's going to control and be responsible for them? Dp or the end user? Who will budget for the purchase of micros or software? Who will be responsible for training new users? Who will maintain the hardware and software? Who will buy the supplies? If dp wants control over the micro system, is it willing to have all the micros and peripherals scattered throughout the organization? How will software be handled? At the university where I work, the university inventory manager came around with a standard metal inventory sticker looking for SuperCalc!

I once knew a music professor who said that organ players should not be held in awe for playing music with their hands and feet simultaneously. After all, that's what they get paid to do. The same will soon be true about dp workers. More and more users will realize that dp managers have no mysterious powers or knowledge; they are only doing what they are paid to do. Dp should try to control and use the micro revolution; we cannot afford to let it run out of control. On the other hand, trying to stop the micro revolution is trying to stop the inevitable.

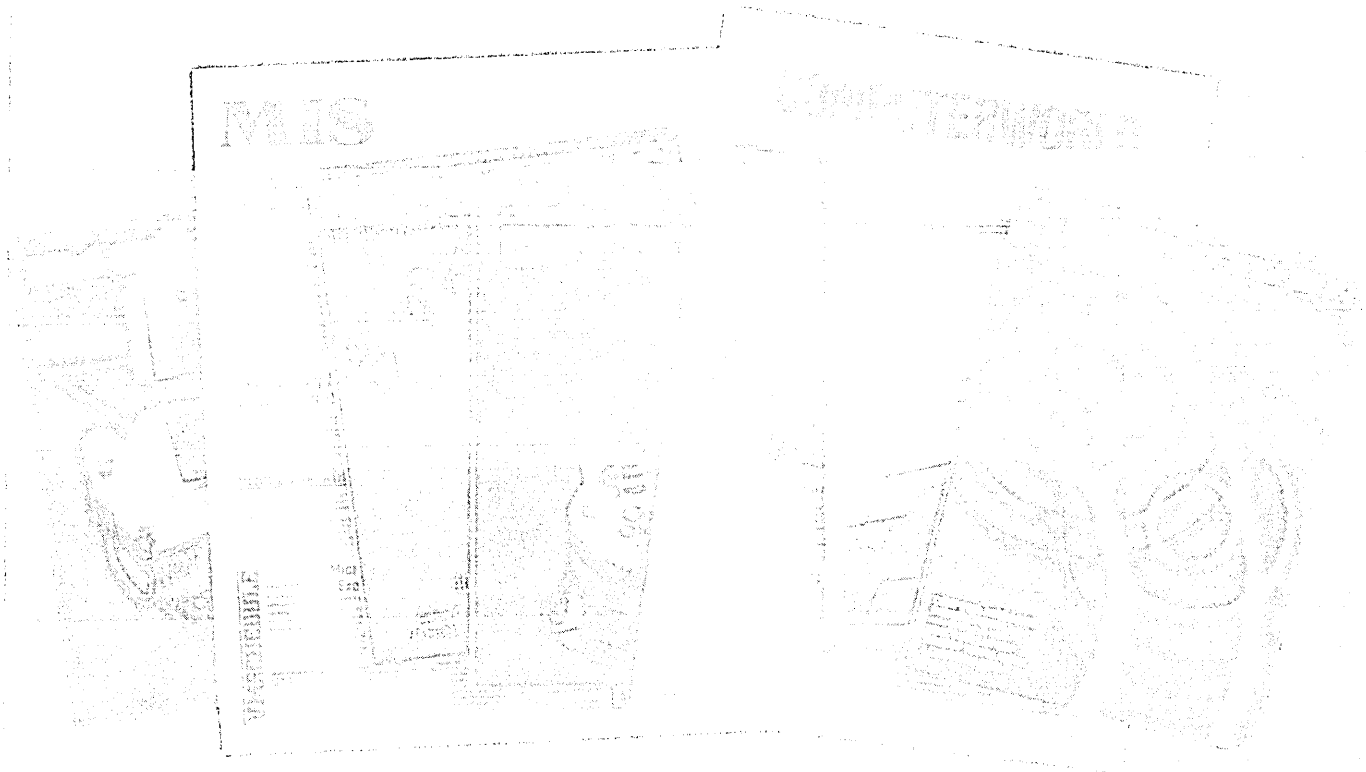
—James A. Pope
Norfolk, Virginia

Goldilocks and the three beers

CARTOON BY HENRY MARTIN

If you'd like to share your opinions, gripes, or experiences with other readers, send them to the Forum Editor, DATAMATION, 875 Third Ave., New York, NY 10022. We welcome essays, poems, humorous pieces, or short stories.

They all say they're the Fortune 500.



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✓ 132. National Intergroup
✓ 133. Burlington Industries
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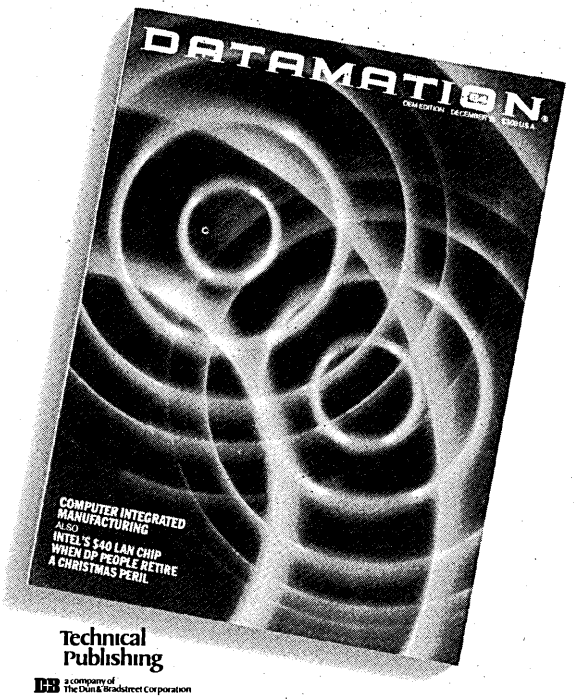

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NIP - News In Perspective
OEM - Oem/Systems House Edition
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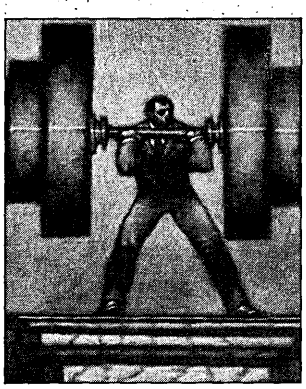

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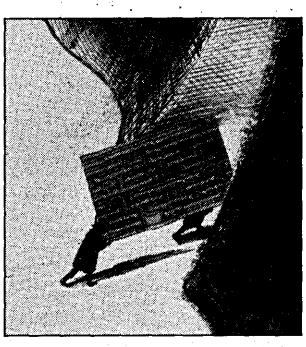

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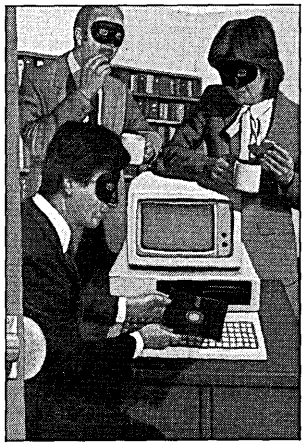

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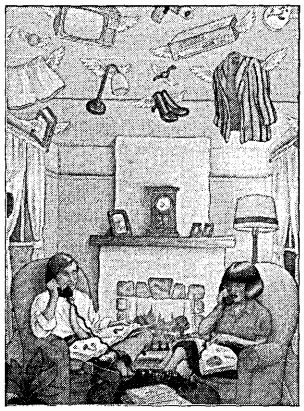

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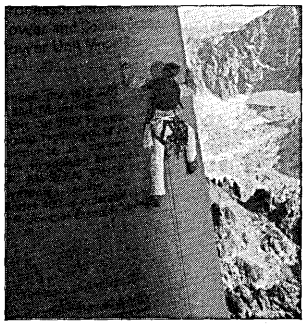

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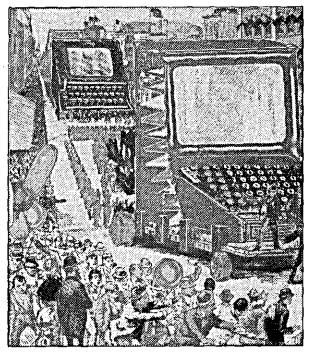

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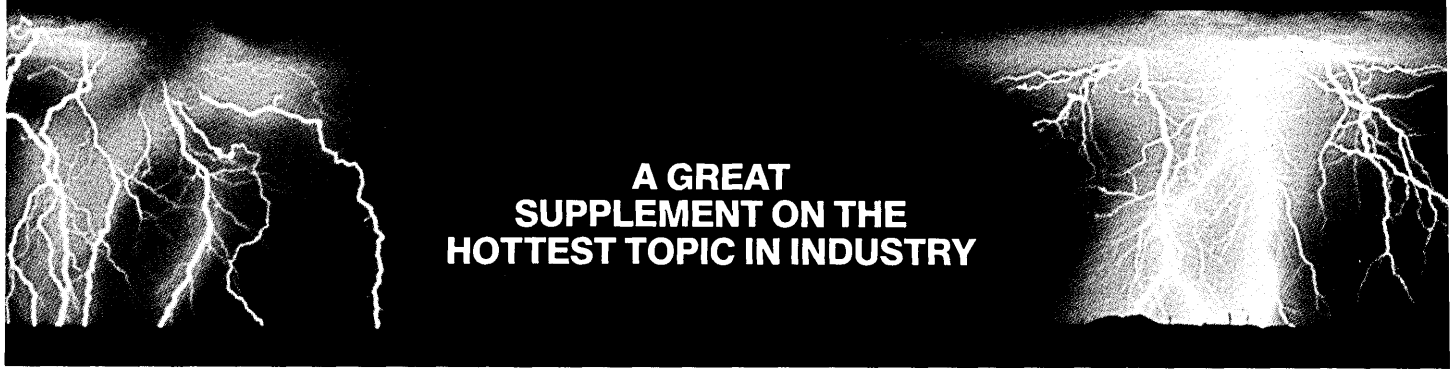

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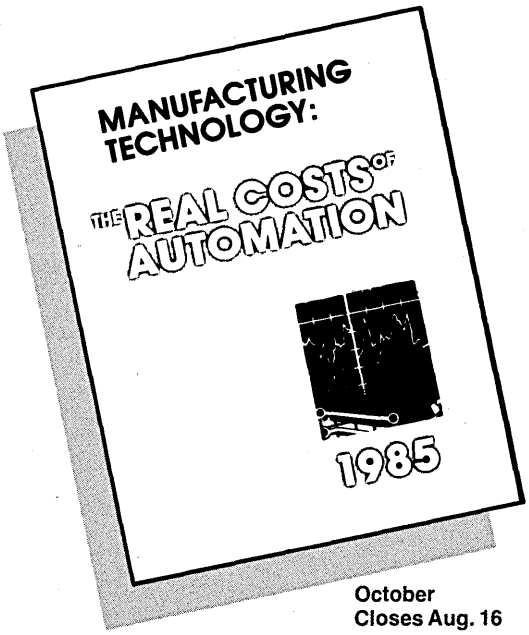

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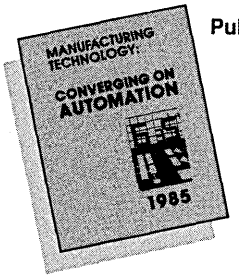

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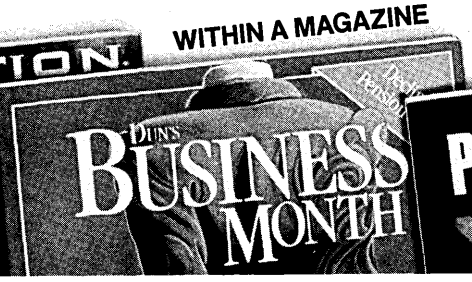

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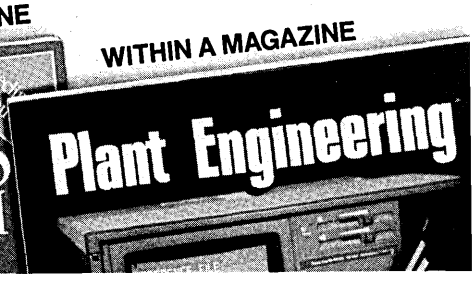

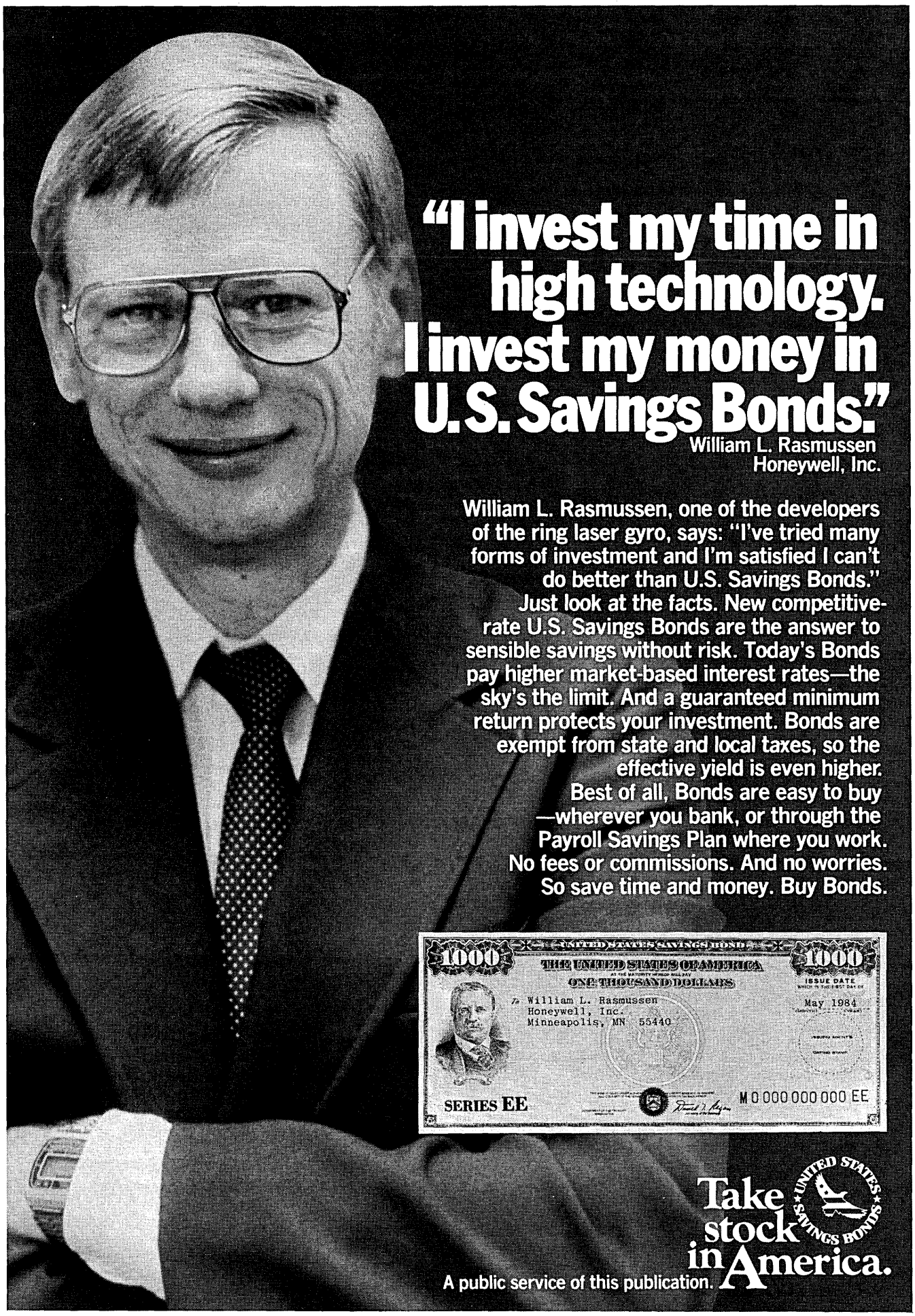
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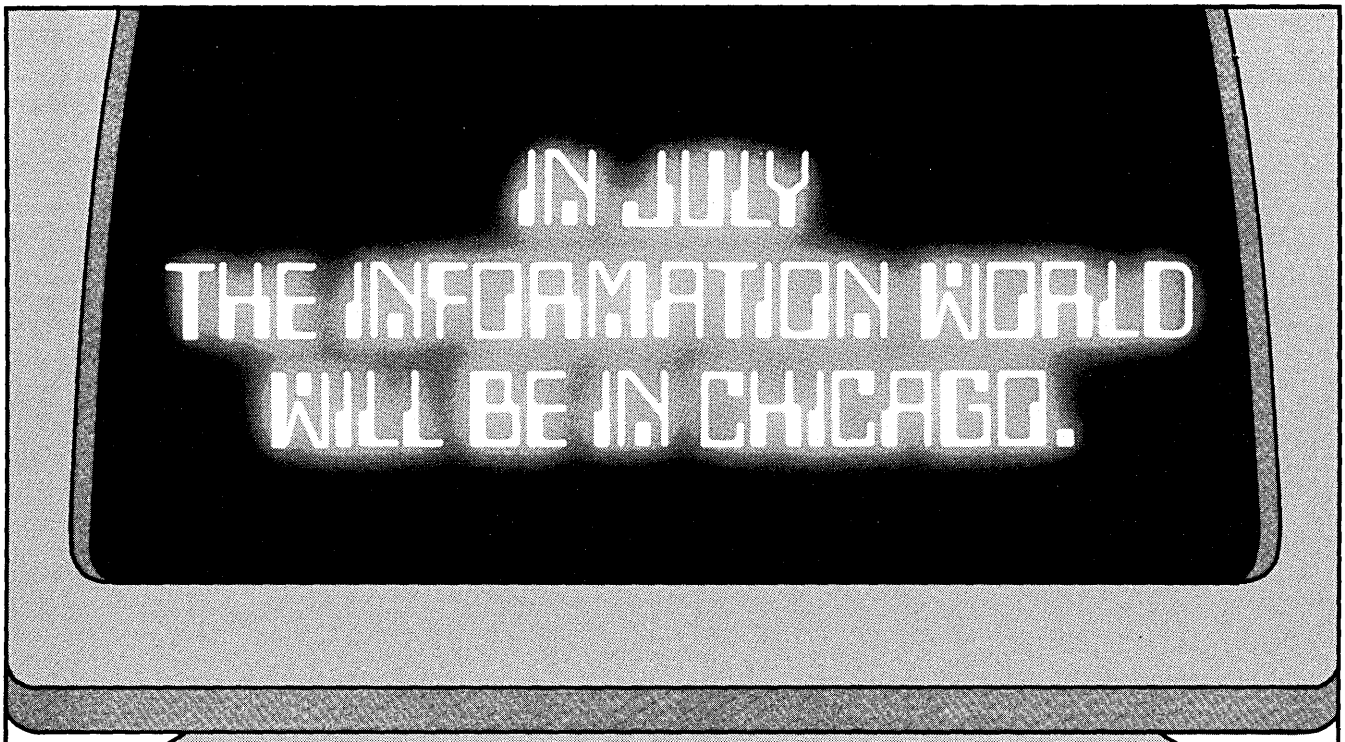

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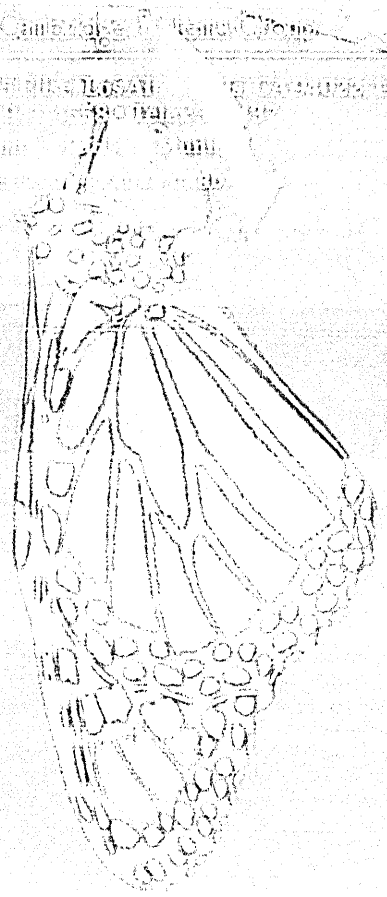

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1970. The original Spectron* data line monitor, the D-2000. First on the market.

1972. Communication Switch Units; various EIA switches.

1973. EIA Interface Patch Units.

1974. D-601, the original Spectron DATASCOPE.* First in a series of CRT line monitors.
Telephone Line Patch, TLP-8.
Modem Eliminators.

1975. High Speed Recorder.
Alarm Panel.

1976. Programmable Monitor with Data Trap, D-501.
Enhanced high-speed Data Recorder, T-511.
DPU-24XX. Industry's first Digital Patch Units to use printed circuit cards.

1977. Industry's first programmable monitor, D-502; allows emulation.
DSP-24XX. Digital Switch Patch series. Industry's first to integrate switching and patching.
DSU-24XX. Digital Switch Unit series.

1978. Line Recorder Printer, D-201.
Digital Tape Unit for DATASCOPEs, T-96.
Large Electronic Buffer, D-301.
Analog Patch Units, APU-829.
Modem Interface Splitter, MIS-3400.

1979. Modem Eliminator Repeater.
The D-580 family of Spectron DATASCOPEs.
D-901 DATASCOPE. Industry's most powerful diagnostic tool.

1980. RASP. Remote Access Switch/Patch. Introduced the concept of centralized control of a data network.

1982. DPU-24. Economical Digital Patch Unit.
D-101. Economical, truly portable DATASCOPE with high performance.

1983. D-101x. Added bit level protocol to D-101.
NMS. Industry's first comprehensive Network Management System.

1984. D-105. Enhanced portable Spectron DATASCOPE with SNA decode capability.
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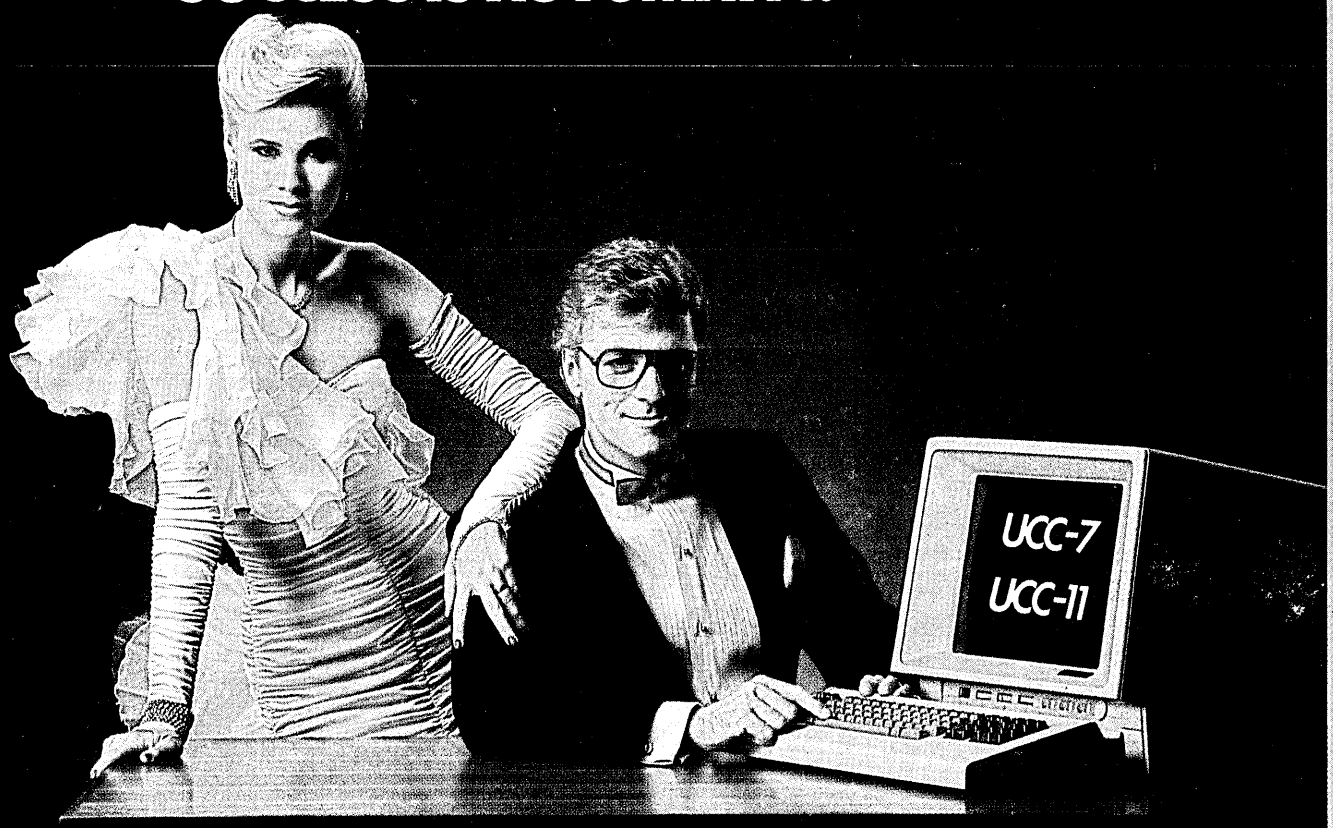

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