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REACHING

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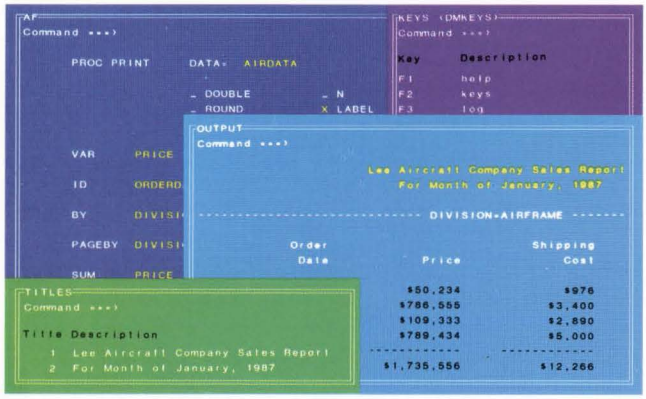

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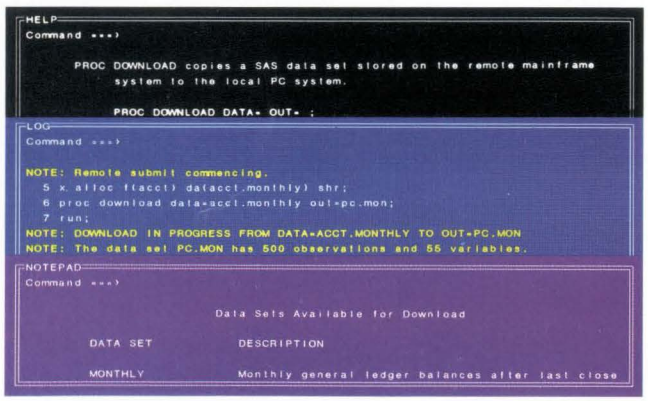

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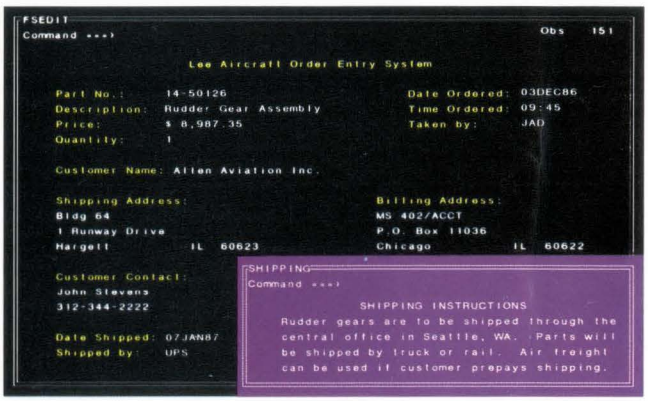

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Circle 4 on Reader Card

DATAMATION

THIRTIETH ANNIVERSARY ISSUE

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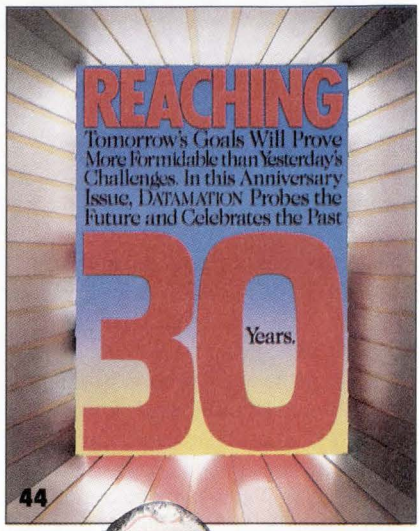

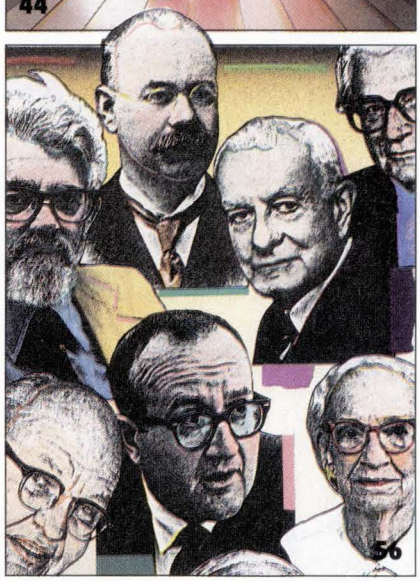

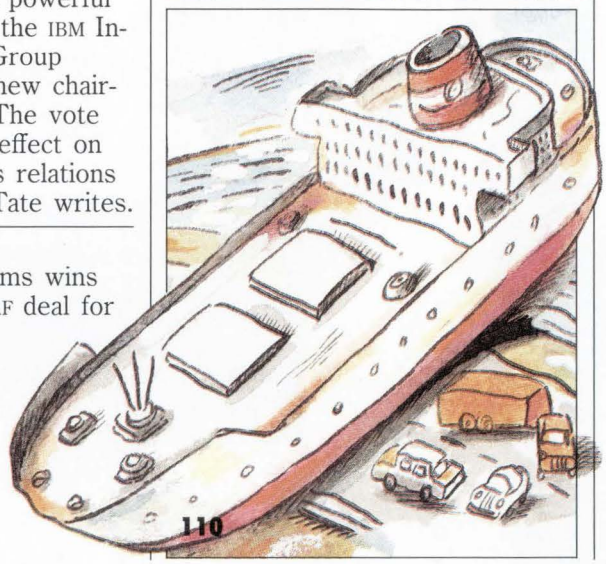

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Cover Photograph by Walter Wick
Typography by James Montalbano

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Unix: What Users Are Saying
The Long Shadow of DB2
The Golden Rules of Global Networking

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1987 JESSE H. NEAL AWARD

Editorial

Taking a Technology Trip

Back in 1957, an industry was born. So was a magazine. DATAMATION was the first to provide in-depth coverage of a technology destined to change the world.

During those 30 years, we've tracked the companies, machines, people, and programs that have helped shape society and the information processing profession. At the same time, DATAMATION has played an instrumental role in helping to shape and define the realm of information technology.

That legacy lives on.

When I began here 11 years ago, I felt a real sense of awe at the respect DATAMATION commanded in the U.S. and abroad. Harking back to my college sorority days, I felt I'd successfully "rushed" DATAMATION and that I was now going to be initiated into the lofty ranks of the most prestigious publication in the computer field. "Congratulate your daughter," I told my mother. "I'm pledging DATAMATION!"

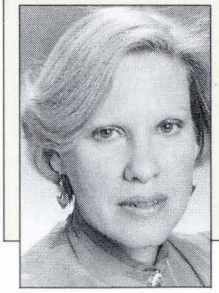
Last January, I made another pledge—to top the editorial package I put together for the magazine's 25th anniversary issue. After much brainstorming, the DATAMATION editors charted an itinerary, a travelogue of articles to take you on a journey through the dramatic changes and trends that have shaped the industry, the technology, and the careers of IS practitioners.

To launch our voyage, we inaugurated the DATAMATION Hall of Fame. After six months of research, we selected a roster of 30 distinguished pioneers of information processing (p. 56).

We held roundtable talks, at which IS pros put their careers and computing in context. Complementing our discussion with veteran IS execs (p. 48) is our panel with tomorrow's technology chiefs (p. 126).

No trip through a number-crunching industry would be complete without numbers, so we've given you a graphic look at the changes that have occurred in the IS arena over the last 30 years (p. 77). We tracked the changes in attitudes toward automation by carefully culling the cartoons in DATAMATION that best characterize the humor of the times (p. 90).

To illustrate just how deeply entrenched technology has become in everyone's professional and personal lives, we took a long day's journey into a world where all the computers go on the fritz (p. 110). Our most ambitious technology tour takes you to the future—to the year 2017, the network age where MIPS factories and AI create a new corporate structure and working environment, a world changed anew (p. 142).



Linda Runyan

LINDA RUNYAN
SENIOR EDITOR

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ABP ABC VBPA

Letters

Pioneers

I am forced to take serious exception to the wording of the first item in Look Ahead (July 15, p. 9). I find your description of a 17-year-old company as a "pioneer" in scientific computing to be, at best, inappropriate, and, more properly, ludicrous. Given the facts that the modern age of computing started during the era of World War II, some 45 or more years ago, and that all of the computations of that era were scientific, longevity of at least 40 years should be associated with any individual or company for which status as a "pioneer" can be claimed.

Let the nonbelievers ponder the fact that FORTRAN, the major scientific language of today, is older than COBOL, its business counterpart.

JULIUS A. ARCHIBALD JR.
Professor of Computer Science
SUNY at Plattsburgh
Plattsburgh, New York

CASE Study

"CASE: Cranking Out Productivity" (July 1, p. 55) featured a supplier listing that did not include McDonnell Douglas.

McDonnell Douglas is one of the pioneers in the development of CASE tools and also one of the top five suppliers of such tools in the country—we have sold over 2,400 copies of our CASE tools so far. McDonnell Douglas has a number of educational courses available for CASE tool users to help them hone their expertise with these products. Add to these our consulting capabilities and you can see that McDonnell Douglas does have a full-cycle offering to take companies from strategic planning to implementation to maintenance, while offering virtually every potential interface along the way.

We developed and sold the industry's first CASE offering—STRADIS/DRAW—in 1982. Our latest introduction—ProKit*WORKBENCH—is a shining example of our commitment to providing the best current practice tools available.

RICHARD A. CALVERT
President
Integrated Business Systems Division
McDonnell Douglas
St. Louis

Comparability

"The TPS Race Gets Hotter" (Look Ahead, July 1, p. 9) repeats IBM's claim of performing 1,012 credit transactions per second and 885 debit tps on a 3090 model 400. This much is credible.

What does not stand close scrutiny is the notion that this simulation was "comparable" to the standard ET-1 benchmark. The transaction profile that IBM used differed substantially from ET-1 as described in your publication (see "A Measure of Transaction Processing Power," April 1, 1985, p. 112). According to the June 15, 1987, issue of the newsletter *FT Systems*, 99% of the transactions were against data resident in main memory. The balance were against index-less, hierarchical, nondistributed databases.

Conspicuously absent from IBM's disclosure on this matter was any reference to response time. Tandem's NonStop SQL benchmark was done using response times of two seconds or better for 90% of the transactions. What did IBM do?

Kimball Brown of Dataquest commented: "The IBM benchmark is not equivalent to ET-1. They weren't even aiming at Tandem." Another major consulting firm has suggested that it was designed to show what IMS could do if it were freed of memory limitations and I/O constraints.

Perhaps your opening line should be changed from "Look out, Tandem" to "Look out, IBM users."

RALPH CHIARELLA
Tandem Computers
Cupertino, California

Not Quite Right

I have just finished reading "Integrated Software: Tools for Today" (July 1, p. 48) by Don Leavitt.

The correct spelling of my name is Baur and I am employed by Horizon Financial FA, not NA. We are presently using several products of Hogan, of which FIS is the general ledger module. The article makes it sound as though FIS is the entire Hogan package. We made the decision to go to Hogan in 1983, long before the IBM agreement. The IBM agreement did strengthen that decision.

We are not merging two data centers, since we have only one center in Pittsburgh and conversion to the system has been from both internal systems and external servicers. The Hogan software is already installed on the 4381 and has been for two years; again, FIS is only a part of the package.

E.J. BAUR JR.
Senior Vice President
Horizon Financial FA
Pittsburgh

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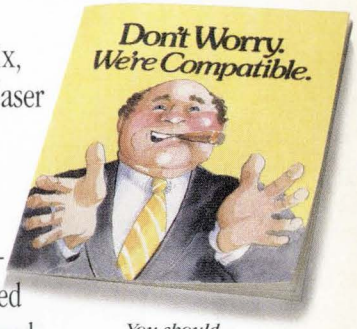

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Look Ahead

U.S. SAID TO PROBE STARTUP

PALO ALTO -- Over at Synthesized Computer Systems, things have taken a few interesting turns recently. Several well-placed sources report that the startup developer of IBM-compatible midrange systems has recently come under investigation by the U.S. Commerce Department, which suspects the company of having exported advanced technology to South Africa in violation of U.S. law. SCS allegedly decided to transfer technology to an unnamed South African company in exchange for a much-needed infusion of capital--reportedly between $1 million and $2 million. An SCS official declined to comment on the reported DOC investigation or the company's relations with South African interests. SCS referred inquiries on those matters to its lawyer, who did not return calls. U.S. law prohibits the export of advanced technology to companies or agencies involved in enforcing South Africa's apartheid policies. In response to queries about the reported investigation of SCS, a DOC special agent in San Jose replied, "I can't comment on that at this time." Meanwhile, minus some of its top engineering talent (see next item), SCS has pushed back by three months the target date for beta shipment of its first system. The company official acknowledges that SCS is trying to solve channel problems and plans to ship its beta machine in October.

GENE FORMS ANOTHER FIRM

PALO ALTO -- Outraged over the situation at Synthesized Computer Systems (see above item), two of the company's top engineers have quit and joined forces with plug-compatible mainframe pioneer and early SCS investor Gene Amdahl, who recently resigned from the SCS board of directors and is demanding that his investment be returned. Dr. Amdahl and the former SCS engineers call their new company Andor Systems Inc. They are developing a high-performance commercial processor, but will not say much more until their business plan is completed.

NEGOTIATING PRICE

TOKYO -- In the face of the huge rise in the value of the yen, the Japanese IS market is not entirely invulnerable to pressure to lower hardware prices, as shown by the recent experience of IBM user C. Itoh & Co. Although most of IBM Japan's products are manufactured in Japan, the Japanese trading house proposed that its next big purchase be of a mainframe made in the U.S. and imported at cheaper dollar prices. IBM Japan didn't go for the idea, but C. Itoh reports it was able for the first time to get a "5% to 7% discount" on a made-in-Japan machine.

Look Ahead

NEW FRONT END FROM AMDAHL

SUNNYVALE, CALIF. -- Amdahl Corp. this week is expected to answer IBM's four-year-old 3725 front-end communications processor with its own new model--jointly developed with Fujitsu--to be called the 4725. The box, to be built around a 30nsec central processor, runs IBM's Network Control Program and adds features such as remote and local console control, satellite support, and support for extended network architecture. The 4725 also is said to make extensive use of microcode, a feature that should help Amdahl avoid some of the compatibility issues faced by its first generation 4705 front end.

NO SUPPORT FOR HP'S TRANSLATOR

CUPERTINO, CALIF.-- Hewlett-Packard 3000 users waiting for a promised software translator to help them migrate their SPL programs to C so they can run on HP's new Spectrum systems in faster native mode shouldn't hold their breath. HP is now telling HP 3000 users with SPL code that its SPL-to-C translator, though completed, won't be an HP-supported product. The reason is that SPL and C are so different in structure that it was not possible to develop a useful translator tool. Instead, HP is recommending that SPL users either run Spectrum in slower compatibility mode, use an object code translator that will provide some SPL performance improvements, rewrite in C or Pascal, or wait for an SPL compiler for Spectrum that is now under development by a third party, Software Research Northwest Inc., Seattle. That product, called Splash, is due out early next year, when HP is to start shipping its 930 and 950 Spectrum machines in volume.

ADR TO DETAIL NEW PRODUCTS

PRINCETON, N.J. -- Watch for Applied Data Research Inc. to move into a number of new areas when it makes its annual product announcements at the Cadre user conference later this month in Las Vegas. In addition to a new version of its Ideal fourth generation language that supports both DB2 and Datacom/DB, ADR also will announce an expert system performance monitor program, a CASE tool, and speech synthesis for its eMail electronic mail program. Mindover MVS is a IBM PC-based expert system for performance management. ADR plans to apply the inference engine it built for this product to Datacom/DB, but did not specify a release date. The company will also roll out Depictor, a computer aided software engineering tool that automates the design and analysis of databases and applications. This is ADR's first foray into CASE. ADR used voice technology developed by Mountain View, Calif.-

(continued on p. 12)

CA and UCCEL: A View of the Future.

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based Speech Plus Inc., partly owned by Ameritech, to develop eMail-CallText Voice Gateway. The product digitizes text to speech, which can be accessed by terminal, pc, or telephone from eMail software.

DOING IT FROM HOME

TOKYO -- Japanese securities firms are scrambling over each other to set up trading systems through which customers can buy and sell securities from their homes using personal computers with modems. The latest wrinkle in the trend are networks that can use the "Famicon," a cheap home game computer manufactured by Nintendo Co. Ltd of Kyoto. An estimated 10 million Famicons are being used throughout Japan.

RIDGE READIES NEW HIGH END

SANTA CLARA -- Ridge Computers is expected to announce this month a new high-end general purpose RISC system, the 5100, priced in the $100,000 to $150,000 range. Additionally, Ridge, which supplies RISC hardware to partial owner Groupe Bull, Paris, says the two are working on a common version of Unix System V release 3 to replace their currently separate European and American System V.2 releases. Most likely, Bull will draw on such Ridge/American Unix features as Berkeley enhancements and support for NFS and TCP/IP. In a separate matter, Ridge has embarked on talks with Honeywell Bull about a possible oem deal.

FPS EXPECTS DEC CONTRACT RENEWAL

PORTLAND, Ore. -- Digital Equipment Corp. has indicated it plans to renew its November 1986 agreement with Floating Point Systems to market FPS minisupercomputers, according to FPS president George O'Leary. O'Leary says it's a sign that DEC is not close to releasing its own high-performance product to compete with minisupercomputers.

RUMORS AND RAW RANDOM DATA

Hewlett-Packard will announce some new networking products at a seminar on its networking strategy to be held the first week in October in Rye Brook, N.Y. . . . Look for Ungermann-Bass Inc. this month to announce enhanced network management software for its Net/One network offerings. Among the expected additions are improved capability to track traffic and isolate the source of problems. . . . From the 16th to the 21st of September, Milan's Fiera exhibition center will host the 24th annual edition of SMAU, Italy's largest computer show. Over 1,300 furnishers will be exhibiting their products in 94,000 square meters devoted to the show. Among international exhibitors, there will be 231 U.S. companies, 149 West German companies, and 74 Japanese companies.

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	Montgomery	Oct 15
AR	Little Rock	Sep 16, Nov 10
AZ	Phoenix	Sep 22, Oct 22, Nov 19
	Tucson	Oct 21
CA	Lafayette	Sep 24, Nov 12
	Los Angeles	Sep 8, Sep 30, Oct 15, Oct 29, Nov 12
	Newport Beach	Sep 17, Oct 6
	Sacramento	Oct 15
	San Diego	Sep 10, Oct 8
	San Francisco	Sep 15, Oct 20, Nov 17
	San Jose	Sep 2, Oct 7, Nov 5
CO	Colorado Springs	Sep 17
	Denver	Sep 15, Oct 15, Nov 12
CT	Hartford (Farm.)	Oct 28
	New Haven	Oct 14, Nov 12
DE	Wilmington	Sep 1, Oct 1, Nov 5
FL	Ft. Lauderdale	Nov 5
	Jacksonville	Sep 9
	Orlando	Nov 4
	Tampa	Sep 10
GA	Atlanta	Sep 16, Nov 11
HI	Honolulu	Sep 17
IA	Des Moines	Sep 17, Nov 17
ID	Boise	Nov 19
IL	Chicago	Sep 15, Oct 15, Nov 18
	Springfield	Nov 19
IN	Indianapolis	Sep 24, Oct 20, Nov 24
KS	Wichita	Oct 6
KY	Louisville	Sep 10
LA	Baton Rouge	Oct 22
	New Orleans	Oct 23
MA	Boston	Sep 10, Oct 20, Nov 10
	Burlington	Sep 30
	Springfield	Sep 16, Nov 17
	Worchester	Nov 5
MD	Baltimore	Sep 3, Oct 8
	Bethesda	Sep 8, Oct 6, Oct 27, Nov 24
ME	Portland	Oct 8
MI	Detroit	Sep-15, Oct 13, Nov 10
	Grand Rapids	Nov 4
	Traverse City	Oct 28
MN	Minneapolis	Sep 29, Oct 29, Nov 18
MO	Kansas City	Sep 22, Nov 10
	St. Louis	Sep 16, Oct 13, Nov 10
NC	Charlotte	Sep 23
	Raleigh	Sep 16
	Winston-Salem	Oct 7
NH	Manchester	Oct 21
NJ	Cherry Hill	Sep 9, Oct 29
	Iselin	Sep 16, Sep 29, Oct 8, Oct 22, Nov 5, Nov 17
	Princeton	Sep 22, Oct 14, Nov 12
NM	Albuquerque	Sep 22, Nov 5
NV	Las Vegas	Sep 9, Oct 27
NY	Albany	Oct 6, Nov 4
	Buffalo	Sep 29
	Long Island	Sep 15, Oct 15, Nov 12
	New York City	Sep 9, Sep 17, Sep 23, Oct 7, Oct 21, Oct 28, Nov 4, Nov 18
	Rochester	Sep 22, Oct 22, Nov 18
	Syracuse	Oct 15
OH	Cincinnati	Oct 1
	Cleveland	Sep 17, Oct 15, Nov 12
	Columbus	Sep 30
	Dayton	Sep 22, Oct 20, Nov 17
OK	Oklahoma City	Sep 15, Nov 17
	Tulsa	Oct 20
OR	Portland	Oct 6
PA	Harrisburg	Sep 15, Oct 22, Nov 12
	King of Prussia	Sep 17, Oct 29
	Philadel.	Sep 10, Oct 8, Nov 5
	Pittsburgh	Sep 8, Nov 4
SC	Greenville	Oct 14
TN	Knoxville	Nov 4
	Memphis	Oct 14
	Nashville	Oct 21
TX	Amarillo	Oct 13
	Austin	Oct 9
	Dallas	Sep 9, Oct 6, Nov 4
	Houston	Sep 18, Oct 16, Nov 18
	San Antonio	Oct 8
UT	Salt Lake City	Sep 29, Oct 29
VA	Norfolk	Oct 20
	Richmond	Sep 8, Nov 17
	Virginia Beach	Oct 15
VT	Burlington	Sep 2
WA	Seattle	Sep 3, Oct 15, Nov 10
WI	Madison	Nov 12
	Milwaukee	Sep 3, Oct 14

CANADIAN SEMINARS

Calgary	Sep 9, Nov 18
Hamilton	Oct 20
London	Sep 15, Nov 17
Ottawa	Sep 3, Oct 1, Nov 5
Regina	Oct 27
Saskatoon	Nov 3
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† *Digital News*, December 1, 1986. ‡ Gartner Group currently available research.

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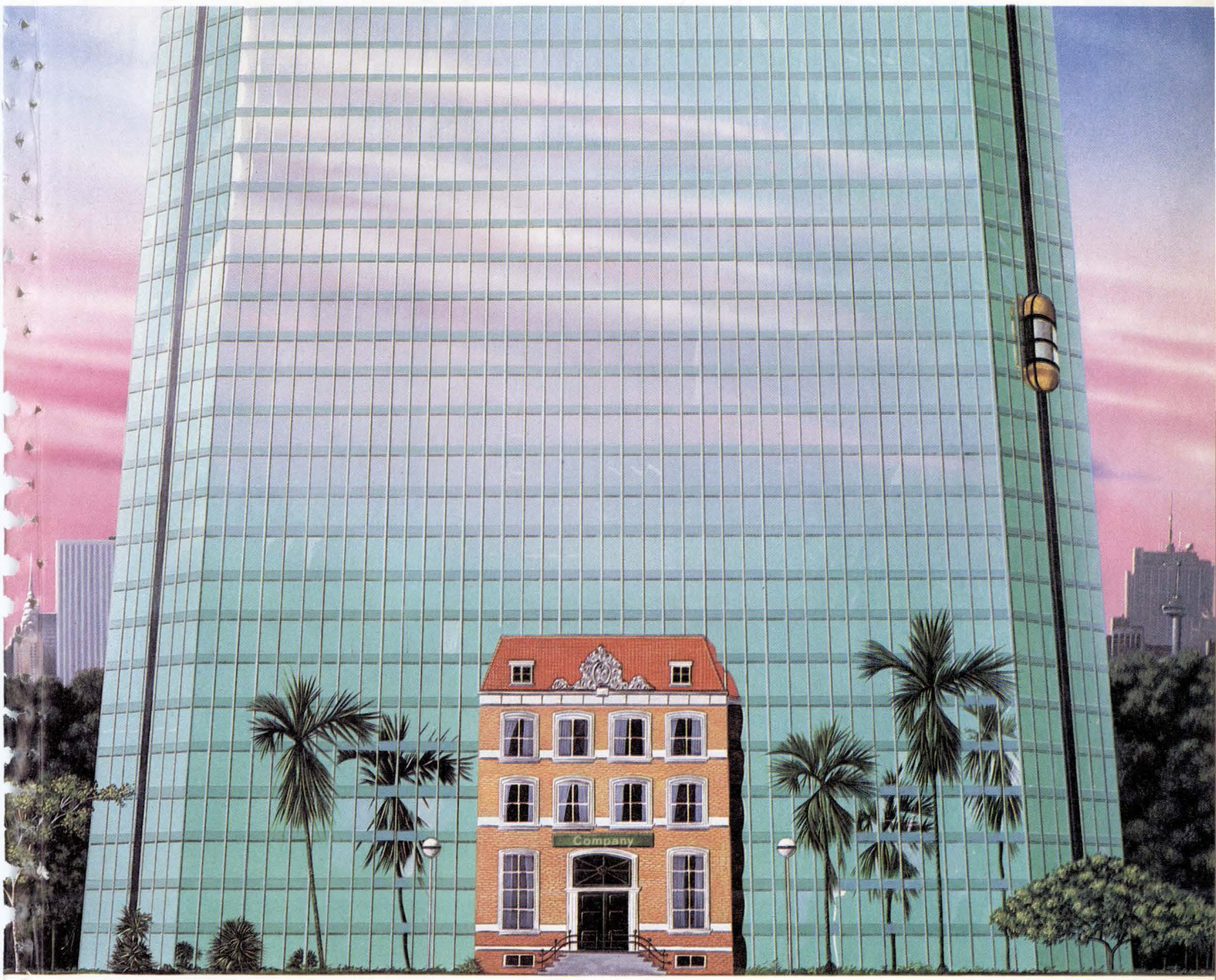
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PRICING

Supercomputer Dumping Alleged at U.S. Universities

Honeywell NEC officials deny that the company is attempting to give away the big machines.

BY WILLIE SCHATZ

Even as U.S. and Japanese trade officials were putting their pens to the supercomputer trade agreement papers (see "Accord Excludes Pricing Dispute"), Honeywell NEC Supercomputers Inc. (HNS) was reportedly making offers it thought couldn't be refused.

According to university and government officials, many of whom requested anonymity, HNS, which is 50% owned by Tokyo-based NEC Corp., was offering its Japanese-made SX 2 supercomputers to potential university customers at prices that amounted to giveaways. What we're really talking here is dumping, which government computer experts say has continued unabated for the last year.

"NEC has engaged in a persistent pattern of substantial price discounting," says an official at a government agency.

HNS officials deny the discounting charges. Says HNS chairman and chief executive officer Jim Berrett, "I've heard all the talk, and we're no closer than anyone else to signing a deal," in response to charges that his company was ready to practically give away a supercomputer worth as much as $22 million to the Massachusetts Institute of Technology, Cambridge, Mass. Sources say that Burlington, Mass.-based HNS also has approached Brigham Young University (BYU), Provo, Utah, and the University of Illinois, Champaign, with similar deals.

Illustration by Doris Ettinger

There's a lot at stake for HNS in getting a supercomputer into a U.S. university—particularly MIT. HNS wants to establish a presence in the U.S. supercomputer market. It needs a customer base that will build applications for its machine and train computer scientists and engineers on its architecture. Universities, where the desire for supercomputers is high and the amount of available dollars is low, are a good place to start.

MIT is an especially big fish for HNS to hook. It is the most prestigious member of the Princeton Consortium for Scientific Computing (CSC), one of five supercomputer centers funded by the National Science Foundation.

U.S. Probes First NEC Sale

Selling a Japanese-made supercomputer hasn't been easy, given the high-tech trade tensions between the U.S. and Japan. NEC has just one machine installed in the U.S., located at the Houston Area Research Consortium (HARC). NEC's lease agreement with HARC included $12 million off the $22 million list price of the machine. That led to an International Trade Commission investigation of possible dumping violations. The investigation was later dropped, but the HARC deal never has been completely forgotten (see "Planting the Flag," May 1, 1986, p. 24).

HNS had been pursuing MIT since last fall and came to it with a proposal this spring. According to several sources, MIT was to receive an SX 2 for the yearly maintenance cost of $500,000. The quid pro quo was allowing HNS to use the machine for software development and as a demonstration of the SX 2's prowess.

Berrett denies this, saying HNS offered to sell MIT cycle time on its supercomputer installed at HARC and at one to be installed at its engineering facility in Burlington, Mass., this fall. MIT decided against buying cycle time and told HNS that it needed time to assess its needs.

"HNS came to us in the spring with a proposal," says Jim Bruce, MIT's vice president of information systems. The $500,000 offer "never came up in any conversation I was in. I wasn't in on every discussion about our supercomputer, but I know substantively what went on. . . . Other vendors came to the table too. We weren't even sure at that point that we needed a supercomputer on campus. So we asked them to let us talk about it.

"After doing that, we decided we did need one. So the next step was to see how much money we could raise. It's considerably less than the price of a machine."

No lie. In its request for proposal, MIT says it has about $1.5 million a year available now and will have $2 million available at the end of five years. The proposal calls for peak theoretical capability of 1.2GFLOPS and principal memory of at least 32 megawords. The procurement could be a sale, lease, or grant.

All of the vendors from whom MIT has solicited proposals—Amdahl, Cray Research, ETA Systems, HNS, IBM, and Thinking Machines—can deliver machines with such performance, but not, it seems, at the dollars MIT is talking. The vendors had until Aug. 28 to submit a proposal.

"They [MIT] are looking at going at or below cost," says a source at one of the potential competing companies. "We can't do that. We try to treat all our customers the same. If we make an exception for one, then everybody's going to want the same deal. But when you're trying to gain entry into the market [like HNS], who cares?"

Some observers say that the stipulations of MIT's pro-

posal being what they are, it is tailored to HNS, since it is the only company willing to play ball for such a price. Another advantage the company has, others hint, is that NEC is a large corporate contributor to MIT.

"There's no way this proposal precludes any other company," says Berrett of HNS. "Each vendor has a benchmark with MIT's code. They're looking for a high-performance machine and it's certainly not tailored to us."

Other Universities Approached

MIT hasn't been the only recipient of HNS's affections. Sources told DATAMATION that HNS recently approached the NSF's National Center for Supercomputing Applications (NCSA) at the University of Illinois. In its talks with NCSA, sources say, HNS proposed giving the center a free SX 2 and the staff to run it in the same building as NCSA's Cray X-MP/48. When that proved unpalatable, HNS then mentioned building a separate facility. NCSA hasn't said yea or nay, but the parties are still talking.

HNS denies having talked to NCSA."That doesn't even warrant a response," says Chuck Nies, HNS's executive vice president for sales and marketing. "There isn't one piece of one word that's true. We're not in the business of giving away supercomputers."

The BYU-HNS affair has been going on since late last year and is still hot and heavy. One of BYU's specialties is linguistics, and it wants a supercomputer to facilitate a technical translation institute.

"We've been offered tremendous discounts on supercomputer systems," says Ed Redd, BYU's information system officer and an associate professor of mechanical engineering. "But we're not interested in someone giving it away. If we buy the SX 2, it won't be a dump. We know that everybody's heavily discounting MIT's offers. But they're still talking about $1.5 million. That's a lot of money for a place like us.

"HNS's price offering was competitive with others. Cray's wasn't. They were 50% above everybody. They weren't interested in developing a relationship with BYU. HNS is. We know we're going to have to alleviate some political concerns with this deal. But it's not a dump. And it won't raise any eyebrows once it's done."

An official at Cray close to the BYU bid says, "I wouldn't be surprised if we were four times higher in price. We bid a very competitive price. But this isn't business as usual, where the vendor wants to price to maximum profit and still win the bid. This vendor doesn't care about maximizing profit."

HNS says the deal is still up in the air. In Berrett's estimation, "We're a hell of a long ways away from signing anything with BYU."

Meanwhile, MIT is well aware of how politically sensitive the issue of buying Japanese supercomputers is right now. The risks are obvious. "Will going with HNS have an effect on our government funding [of which MIT receives more than any other university]?" MIT's Bruce asks. "We'll see."

Donating computers to universities isn't exactly a new concept. In May, IBM in essence donated a 3090-400 mainframe worth $20 million to the NSF supercomputer center at Cornell University. The machine was upgraded in July to a 3090-600, with IBM retaining ownership. But when it's a Japanese company doing the donating, things get political.

"If HNS wants to continue playing this game, they may feel the U.S. government will do nothing," according to the government agency official. "But they'd better watch out if Congress gets its back up."

Well, Congress has. Or at least some hairs on Capitol Hill are standing on end. Sen. Max Baucus (D-Mont.) attached a few choice sentences to the Senate comprehensive trade bill to the effect that the government should give "the highest priority" to ending the "predatory pricing activities of Japanese companies in the U.S. . . ."

HNS is determined to weather the current storm. "The prominence of the issue regarding Japanese computers is more volatile than ever," according to Chuck Nies, HNS executive vice president for marketing and sales. "Supercomputers are a very convenient issue with which the U.S. government can hit Japan. There is a not unanticipated spillover into what we're doing. We don't welcome it, but we will prevail." ■

Associate news editor Karen Gullo assisted in the reporting of this story.

Accord Excludes Pricing Dispute

What exactly did the U.S. gain in its recent supercomputer accord with Japan, which promises to open the Japanese public sector market to U.S. companies? No one in Washington seems to be fooling themselves about the immediate yields.

"It's not perfect, but it gives U.S. firms a weapon," says Tim Miles, a senior industry specialist in the Department of Commerce's Office of Computers, about the U.S.-Japanese supercomputer accord reached last month. The Japanese agreed to require public institutions to announce their plans to buy a supercomputer and give supercomputer vendors about 90 days to prepare their bids. U.S. supercomputer companies had complained for almost a year that procurement practices in Japan excluded them from bidding on government contracts.

"We think we've made progress," continues Miles. "At least on its face it makes their procurement system open and transparent. But no one in government feels that all of a sudden the Japanese will buy a lot of U.S. systems."

U.S. supercomputer manufacturers are taking a wait-and-see attitude. "The agreement looks great on paper, but we'll have to see what happens when we get close to a deal," says an executive at Cray Research who requested anonymity. The world's supercomputer leader probably stands to benefit most from the opening of the public sector, since it's already sold eight machines to private companies in Japan.

One point the agreement does not address is pricing. U.S. companies have been complaining that the Japanese are holding fire sales for U.S. universities that are shopping for supercomputers. U.S. companies consider that a much more significant issue than Japanese public market access.

"The real issue's over here," the Cray source insists. "The Japanese are desperate to get into the supercomputer business. We get the government business because they're willing to evaluate quality. But if price is the only consideration, the technical requirement will be reduced to the lowest common denominator."

The International Trade Commission is poised to take a closer look at pricing practices, and you can bet it is scrutinizing the moves of Honeywell NEC Supercomputers Inc.

Users, Developers Face Major Changes with PS/2 Graphics

New user and graphics interfaces will force users to decide whether or not to rewrite current applications to conform to the OS/2 Presentation Manager.

BY JEFF MOAD

No pain, no gain. That's what they say down at the local fitness emporium.

That axiom could just as well apply to personal computer users and software developers who are hoping to cash in on the widely touted advanced graphics capabilities promised for IBM's new PS/2 and its OS/2 operating system.

On the gain side, new display hardware and a new PS/2 graphics card, coupled with the Presentation Manager feature of OS/2, will constitute a major enhancement of the—at best—limited graphics of the earlier IBM PC generation. The new 12,750-gate video graphics array in the PS/2 Models 50, 60, and 80 and the new graphics displays will support higher resolutions of up to 256 on-screen colors at once. The Presentation Manager front end for OS/2, along with its windows-based graphic user interface, will provide a programming interface for graphics. This will give software developers a standard method to write applications that will interface automatically to a sophisticated new library of graphics functions and a wide range of graphics printers and other output devices.

On the pain side, however, users and developers are beginning to realize that in order to cash in on those new PS/2 graphics goodies, they are going to have to make some potentially major changes in their existing PC applications. That's because, in addition to promoting a new user interface, the Presentation Manager portion of OS/2 will incorporate a different graphics programming interface.

GSS'S CLARKSON: Users should wait and see which standard takes hold.

Photograph by Rick Browne

In fact, the programming interface is different from the interfaces used by most PC applications today—including those that were written to Microsoft Inc.'s Windows graphic environment specifications. As a result, PC software developers today are facing a decision that end users will be forced to deal with once OS/2 with Presentation Manager becomes available some time in 1988: whether and when to replace existing PC applications with versions that conform with Presentation Manager.

One user already wrestling with that question is Tom Mahon, an industrial engineering manager for the U.S. Army Corps of Engineers' construction engineering research lab in Champaign, Ill. Mahon, who oversees the development and use of graphics-based PC applications used by 50 Army installations, says that once Presentation Manager becomes available, he expects that it will take 18 months to adapt many of his applications to the new programming interface standard.

"We expect it's going to be a major job," says Mahon. "Right now, we're not going to make that kind of investment until we have a chance to evaluate some of the commercial products for Presentation Manager and determine the benefits."

Delivery Timetable Unclear

Until recently, IBM had given developers very few of Presentation Manager's technical details. Although IBM unveiled it in April, along with the PS/2, the company said Presentation Manager would not be available until the second version of OS/2 shipped. IBM also said it wouldn't be able to predict when that would be and that developers wouldn't get any help moving their applications to Presentation Manager until the fourth quarter of this year.

More recently, however, officials from Redmond, Wash.-based Microsoft and from IBM confirmed reports that, while Presentation Manager's user interface will be consistent with version 2.0 of Microsoft Windows, its graphics programming interface will not be compatible with Windows' GPI or with the proposed ANSI standard Computer Graphics Interface (CGI). It will, however, be compatible with the GPI for IBM's mainframe-based Graphical Data Display Manager (GDDM). According to an IBM spokesman, "The windowing will be similar to Microsoft Windows, and the graphical interface will be similar to GDDM."

IBM selected the GDDM interface over the Microsoft Windows interface because GDDM already had been designated as a key programming interface element of IBM's System Application Architecture, along with other programming interfaces, such as SQL and QMF for relational database systems. By pushing the same programming languages and interfaces up and down its product lines, IBM hopes that eventually it can promote the easy portability of applications across its different architectures.

Developers and users say that this a good idea, but in the short term it means dealing with a new programming interface. Alex Kask, a New York-based microcomputer manager for Ernst & Whinney Inc. and president of the Micro Managers Association, says, "It looks like anyone who uses graphics and wants to move that over to the PS/2 will be facing a hassle. I know many of us are grateful that we never implemented graphics to any great extent."

According to Microsoft, which will have the right to license both OS/2 and the Presentation Manager as part of its joint development deal with IBM, extensive rewriting won't be necessary for the 140 developers who wrote their applications to interface with the Windows environment. According to Microsoft product manager Manny Vellon, applications written to the Windows GPI will require only 10% of the original coding effort to be made to conform with Presentation Manager.

Nevertheless, he acknowledges that applications written for other Windowing systems such as Digital Research Inc.'s Graphics Environment Manager (GEM), may require more recoding. In addition, programs written to their own user and graphics interfaces will require extensive reworking.

Coding Effort Skepticism

Users such as the Army Corps' Mahon say they are skeptical of Microsoft's 10% estimate. "Maybe it will be 10% for applications dealing only in the DOS text environment. But for graphics-based applications it will be much more than that," he predicts. For one thing, says Mahon, Presentation Manager's library of graphics functions numbers in excess of 200, compared with Windows' 50. That means developers porting graphics applications to Presentation Manager will have more choices to make. "It'll be more complicated, and it will widen the gap between developers and users," says Mahon.

Presentation Manager's GDDM-based programming interface also complicates matters for vendors of PC software and their customers. Vendors and users must decide whether to continue to invest in programs that do not conform with Presentation Manager's new interface or to change direction and get behind the product.

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Some developers, such as Lotus Development Corp., Cambridge, Mass., can afford to do both. Lotus has said it plans to improve the performance, graphics, and other features of its current 1-2-3 spreadsheet product for MS/DOS and the initial version of OS/2, and, at the same time, to develop a version of 1-2-3 that conforms with Presentation Manager.

According to Lotus advanced products group marketing director Tom Smaldone, "We believe the Presentation Manager interface eventually will become the dominant interface, but we also think there are many users who will prefer to stay with the familiar, character-based interface. They have a significant investment in it, and they won't change until it can be shown that Presentation Manager offers a big improvement."

For other vendors it's not so easy. Belmont, Calif.-based Oracle Corp., for example, is currently in the middle of developing a graphics-based add-on for its PC relational database management system, which is based on proprietary and CGI interfaces. Oracle has told its users that it will go ahead with the product—called Easy SQL—even though it might have to be reworked later if users demand Presentation Manager compatibility. Oracle has said it will offer an upgrade path to OS/2, but it hasn't said when.

For now, at least, that seems to be acceptable to Oracle's PC users. At this point, they're more interested in getting their hands on graphics for Oracle than in making sure the software will be easy to port to Presentation Manager later on. TRW Corp., which is scheduled to be a beta site for Easy SQL for the PC, is anxious to get the product whether or not it's Presentation Manager compatible. "We are developing applications under Oracle on the PC and migrating them to minicomputers, and we're interested in using graphics," says TRW analyst Jane Kwon. "With Easy SQL, Oracle has a way we can do that now. We don't want to wait."

Trying to Fill the Void

IBM says its goal is to make the complete technical details of Presentation Manager available to developers by the time the initial version of the OS/2 standard edition ships in the first quarter of next year. A spokesman says IBM is on schedule to achieve that.

Some vendors, however, are betting it will be considerably later than that before most developers can get their hands on Presentation Manager and start writing applications for it. At least two firms—Digital Research Inc. of Monterey, Calif., and Graphic Software Systems Inc. (GSS) of Beaverton, Ore.—are trying to fill what they see as a void. GSS, which markets tool kits that allow developers to write their own CGI-compatible graphics, recently said it will sell a version of its product with which users can move existing DOS graphics to the protected mode version of OS/2. This, in effect, would bypass Presentation Manager.

According to GSS chairman Tom Clarkson, while some large companies such as Lotus can afford to hedge their bets, other developers and end users will want to stick with their current DOS interfaces and graphics until they see which standard takes over.

Brian Boyle, an analyst with Novon Research of Berkeley, Calif., says Presentation Manager's probable mid-1988 availability date does represent an opportunity for vendors that, like GSS, offer users and developers a short-term alternative. In the long run, however, Boyle says Presentation Manager and IBM's plan to push GDDM and other standard programming interfaces of its own chosing will probably win out—with help from Microsoft, which has little choice but to follow IBM's lead on Presentation Manager. Says Boyle, "With Presentation Manager, they lost one because IBM decided applications written for Windows wouldn't be completely compatible with OS/2."

Whether Presentation Manager brings more pain than gain to users remains to be seen. ■

Photograph by Andy Snow

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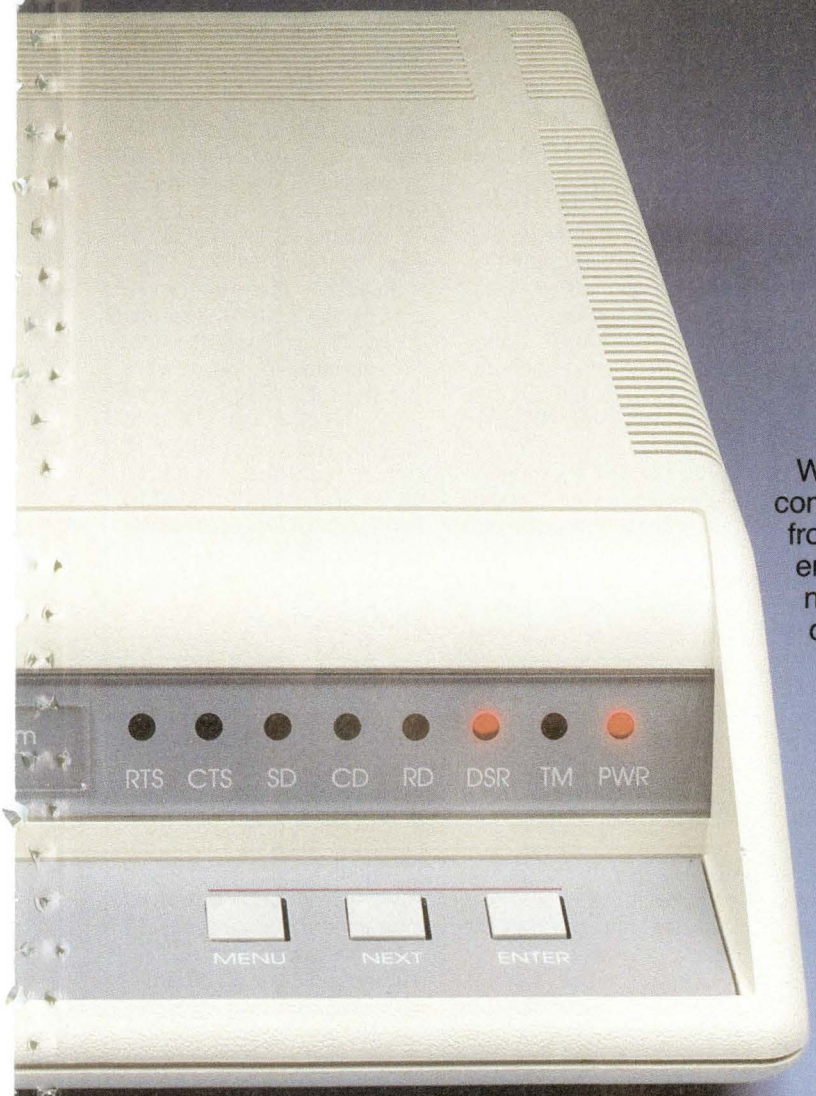

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MICROCOMPUTERS

PS/2 Flying High In Reservations Systems

The airlines are embracing the micro not only for next generation reservation networks, but also as the vehicle for moving into other communications offerings.

BY GARY McWILLIAMS

If there's a clear winner in the airline wars, it's the IBM Personal System/2.

Most of the major airlines have selected the IBM Personal System/2 family as the hardware platform for new enhancements to their computerized reservations systems (CRSs) and for subsequent new offerings in the areas of software, communications, and databases.

The airlines and their CRS subsidiaries—American Airlines' SABRE Information Services, United's Covia Inc. (its system is called Apollo), Texas Air's System One Inc., TWA and Northwest's PARS Travel Information Systems, and Delta Airlines' DATAS II—are under intense competitive pressures as a result of deregulation. All are looking for new sources of revenue, and the PS/2 appears to provide just such a vehicle in both travel and nontravel markets.

The airlines plan to replace their current terminals with the PS/2 over the next year as lease contracts expire. American, Delta, and United Airlines each will furnish services to their travel agency customers using the PS/2s and IBM's token ring local area network. Texas Air has shown a PS/2 Model 30 at industry trade shows; although no final selection has been reached, a decision is imminent. Even European airlines have caught the PS/2 fever, as a new CRS consortium has embraced the system for a network now under development overseas (see "European Airlines Embrace IBM").

Only TWA and Northwest have bucked the trend, choosing Altos Computer Systems' Altos 386 Series 2000, a Xenix System V multiuser system.

Some airlines are exploring the use of their CRS networks to sell communications or financial services to corporations. "The whole PS/2 environment just gives you a platform to build applications," declares Calvin Rader, assistant vice president for marketing automation at Delta Airlines, Atlanta. Those applications are where Rader sees future growth.

Both American and Texas Air say they expect growth for their subsidiaries in communications and nontravel services. Both say they plan to offer services that leverage their networks for private and public voice or data network ventures, financial, and other services.

"Our vision is clearly to move beyond the businesses we've been directly and closely aligned with and gradually enter others," states Edward Gehrlein, executive vice president and chief operating officer at Texas Air's System One Inc., Houston. "We have 20 very large mainframes and a very extensive communications network with 7,000 to 8,000 circuits. Within the next 18 months, we'll have it all integrated," says Gehrlein. "If we ever get to the Mecca where there are personal computers in every home and office, we'll be positioned to serve them."

While other airlines claim no present interest in nontravel businesses, all but Delta have spun off their computerized reservation systems. As separate operations, they make it easier to create businesses unrelated to the airlines.

Among those airlines that have ruled out expansion into communications or nontravel information services, officials say the decision isn't meant to be absolute. "I'm not saying we wouldn't ever do that. It's just not what we're doing now," explains Pat McAvoy, Chicago-based Covia's director of technology sales. In one possible exception, she says, Covia is investigating selling time on its network to travel agencies.

Meanwhile, travel agencies, the major users of CRSs, applaud the introduction of the new PS/2-based systems, saying they are long overdue. "The airlines are more aware that the technology we have now is archaic," says Wayne Berens, president of Revere Travel Inc., Trenton, N.J., and chairman of the National Automation Committee of the American Society of Travel Agents.

UNIGLOBE'S HARVEY: There's fear companies will bypass agencies.

Photograph by Bill Staley/Black Star

Efficiency Is Cited

The PS/2s promise to improve response times significantly while creating the potential for business applications such as accounting and word processing to be handled by each agent. To book an airline reservation on the 3270-like terminals that are now prevalent requires roughly 250 keystrokes. A reservation made on the pcs will require only 20 keystrokes, according to Berens.

Berens predicts the new systems will enable agents to provide corporate clients with timely data and analysis. "We will begin to see the more sophisticated companies with traffic managers dialing into an agency's database for the information they need," he says. Such services would more strongly link a travel agency and its clients, he believes.

But it's a relationship some airlines also covet for themselves. American Airlines recently introduced a travel and expense reporting package that it sells to businesses. The software, Capture, links to the five major

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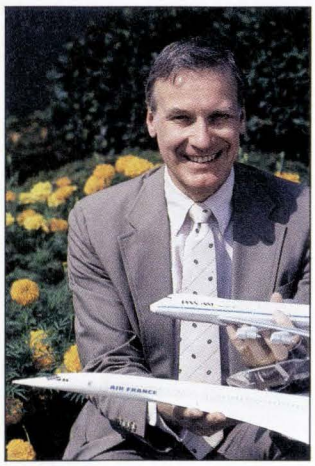

REVERE TRAVEL'S BERENS: "The technology we have is archaic."

CRSs for a corporation's travel data, creating a business relationship between airline and corporation that formerly was exclusive to the agency (see Updates, p. 169).

Travel Agents Are Worried

Such offerings have travel agents worried that the airlines will horn in on their corporate customers. Agencies survive on the 10% commissions they earn from airline bookings. "The big fear is the airlines will make their software so user friendly that businesses will bypass the travel agencies," declares Doug Harvey, vice president of Uniglobe Travel Information Services, Vancouver, B.C. "If they will is a subject of endless debate."

Executives at American and other airlines insist there are no plans to usurp the agents' role. "The travel agent remains our travel distribution system. We don't intend to do anything to change that," declares Terrell B. Jones, vice president of product development for American's SABRE Travel Information Network Co.

Indeed, some airlines say that when they expand their services, travel agents will be the first to benefit. For instance, Texas Air says its voice and data network will be offered first to System One affiliated travel agencies. "We've a vision of providing their telecommunications needs . . . as part of our client relationship," says System One's Gehrlein.

Some travel agents say the airlines' plans to expand their network offerings has a bright side. Stephen H. Baldi, director of finance at Crimson Travel Service Inc., Boston, says American Airlines, for example, is reducing the restrictions on what equipment travel agents may employ. "In some ways," he explains, "the airlines are moving away from being hardware vendors and toward supplying information needs. Eventually, you will see them move completely out of hardware. They'll give us the connection to the system."

Donald R. Sohn, president of Heritage Travel Inc., Cambridge, Mass., and of the Travel Agents Computer Society, says, "In the past, if we said we wanted to connect our own equipment to American's communications lines, the answer was 'No.' Now, the answer is 'We'll listen.' " More flexible terms and conditions for CRS equipment leases are also a result of the changes. "There are a fair amount of good deals out there," adds Berens.

Overcoming the Hurdles

As the airlines move into communications and/or database services, there are a number of problems that ensue. Prickly competition and ownership issues may deter some airlines from entering nontravel businesses. United Airlines' direction most likely will be shaped by its plans to take on a partner for Covia. To date, inquiries have been made by airlines as well as by computer and network companies, says a Covia spokesman. Competitive pressures within the travel business may well confine some to

European Airlines Embrace IBM

Two consortia of European airlines are planning, with the help of IBM, to bring order to chaos through the development of shared computerized reservations systems (CRSs). Both groups have chosen IBM systems.

Until now, Europe's major airlines each offered their own CRS. Travel agents lease one or more systems, and some have even bought a U.S.-supplied system—mostly United's Apollo or American Airline's SABRE system.

While the consortia were apparently formed in response to competition from U.S. suppliers, both groups have taken on CRS partners in the U.S. whose systems are based on IBM hardware and software. One consortium, led by British Airways (BA), brought United Airline's Apollo system into its fold, while the other group, led by Air France and christened Amadeus, signed a licensing agreement in July with Texas Air for its System One software. BA's other partners are Dutch KLM and Swissair. Amadeus members also include Lufthansa, SAS, and Iberia.

Winning the two contracts (Amadeus is said to be worth $300 million, the BA project $120 million) was a coup for IBM. Big Blue has not been a major player in the CRS market in Europe. That role had been filled by Unysis. But IBM's previous CRS experience in the U.S., and its ability to offer higher mainframe performance, nudged out Unisys in the end. "Unisys could not offer sufficiently powerful systems," says Claude Giafferri, marketing automation development manager at Air France. "IBM could, and already had such systems operational in the U.S. Unysis could only make promises and offer the personal guarantees of [ceo W. Michael] Blumenthal. But the system didn't exist."

Both consortia are setting up autonomous companies to operate their joint reservation systems. BA's approach is to gradually merge each partner's existing distribution system and eventually to link them to a central database. The Amadeus group, on the other hand, plans to develop a centralized system that will take over the distribution operations of each partner, while their existing systems will be utilized solely for in-house inventory control.

"Amadeus is a sophisticated and very ambitious system because it centralizes the whole distribution operation," maintains Air France's Giafferri. "Amadeus will take over the tariffication, as well as ancillary services such as hotel reservations and car rentals."

The BA consortium has fully embraced the PS/2. The group plans a three-stage integration of the four systems, with the aim of using the best that each has to offer. The first stage will get under way next year, and involves persuading travel agents to install PS/2s for connection to the new system. Then, later in 1988, the partners' existing systems and databases will be interconnected to enable travel agents to retrieve the best information available. Finally, in 1989, a new IBM-based central core system will come on-stream, providing a central source of information for all users.

BA is confident it can persuade travel agents to replace existing systems with PS/2s. Mike Thorn, BA's manager of distribution systems, contends, "With our enhancements, the PS/2 terminals will sell themselves."

BY JAMES ETHERIDGE

Photograph by Ronda Bishop

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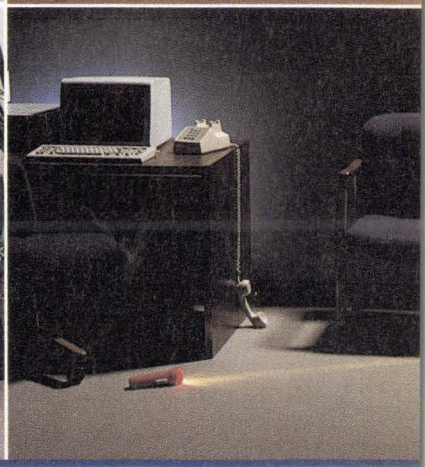

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travel, says John A. Corsiglia, a consultant at Chicago-based accounting firm Arthur Andersen & Co.

"It's clear they are looking at and have the superstructure for a number of opportunities such as financial services," says Corsiglia. "The downside is they have to support the bread-and-butter business. My experience with the airlines is they have in-house a huge backlog of systems and information needs that aren't being met."

In addition, the airlines face a lack of established pricing strategies or sales outlets beyond the travel agents. "If we sold pure information, such as a database of campgrounds, it might or might not lead to [separate fees]," comments SABRE's Jones. "We have to find appropriate ways of charging for that information."

"It's not clear whether [the airlines] will become an information provider like [McDonnell Douglas Co.'s] Tymnet or an information server," says Corsiglia. "They are probably going from one highly competitive to another highly competitive market."

For their part, many travel agents are wary of adding nontravel services. "Do I see a tremendous amount of other services being offered [by travel agents] through airline reservation services?" asks Uniglobe vice president Harvey. "I really don't." Harvey's company provides computer services to about 600 Uniglobe Travel Service agencies in North America.

Despite the assurances, there also is substantial concern about the airlines' eventual direction. "It's a double-edged sword," says Berens. "The airlines are trying to offer a broader product. . . [but] it's obvious that product will be available to any user who elects to subscribe to any [CRS] system." ■

COMMUNICATIONS

The Era of Twisted Pair Begins to Dawn on Ethernet

An expected rush of products to support 10Mbps Ethernet on unshielded telephone wire will put pressure on Starlan and IBM's Token Ring.

BY SUSAN KERR

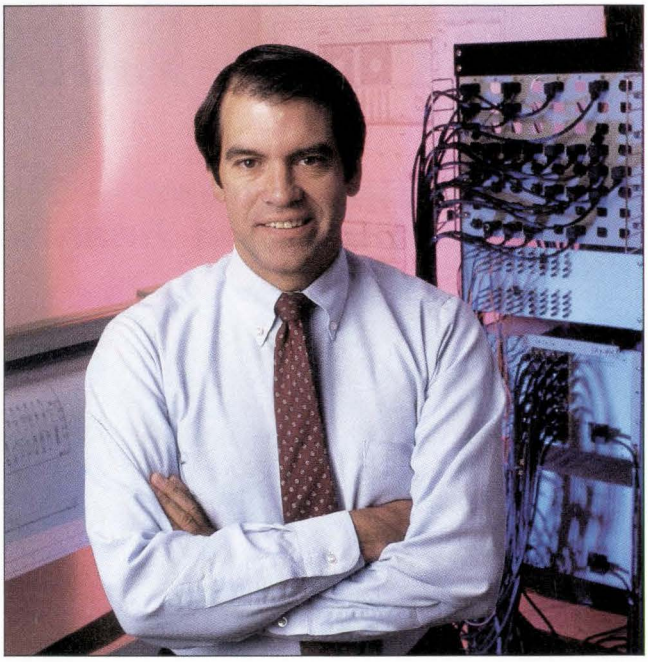
Ethernet local area networks are about to get a big shot in the arm.

Faced with a tough battle against two hard-nosed competing LANs prefaced by the names IBM and AT&T, Ethernet network vendors are about to overcome one of their biggest weaknesses: the user costs and headaches associated with installing the coax cable typically required for Ethernet.

The solution sounds simple and mundane, but isn't. Starting this month and continuing throughout the year, a number of vendors, big and small, will announce the availability of products to run 10Mbps Ethernet over unshielded twisted pair telephone wire.

These products, if successful in overcoming tough technical hurdles, will push headlong against current versions of AT&T's Starlan and IBM's Token Ring networks. Moreover, the technology is sure to get a big push if Digital Equipment Corp. does as is expected and announces support this month for 10Mbps DECnet over unshielded wire.

Up until now, unshielded wire has been best known in the networking world for supporting the 1Mbps Starlan, which is a theoretical—if not practical—subset of Ethernet. The two show signs of settling their differences and merging at the 10Mbps level. Hewlett-Packard Co., a big Starlan supporter, has presented a formal working proposal for a 10Mbps Starlan to the IEEE 802.3 Standards Committee. According to Maris Graube, the head of the 802 Committee, the group is looking to hammer out a single high-speed twisted pair proposal that would incorporate elements from both the Ethernet and Starlan sides.



SYNOPTICS'S LUDWICK: AT&T has put its know-how on the table.

Photograph by Rick Browne

"That would be wonderful if Starlan and Ethernet merged," says Gordon Sollars, vice president of Merrill Lynch's Distributed Financial Systems in New York. A big fan of Ethernet, Sollars is less enthusiastic about Starlan or Token Ring, although his company uses all three. One reason for Sollars' support is that "Ethernet is a much more known commodity." He laughingly adds, "With any luck, twisted pair Ethernet will be viable and we can take our Starlan cards and build a big bonfire."

The Impact of 32-Bit Machines

While that type of comment is hardly welcome to Starlan hawkers, they concede to Ethernet a valuable point. The emergence of a higher performance Starlan is being driven partially by a new wave of products: 32-bit personal computers and workstations. Admits Bernard Guidon, group marketing manager at HP's Information Networks Group, "One megabit would be a bottleneck with an 80386 pc."

While the present-day Starlan still has a place with small work groups, which Guidon believes won't

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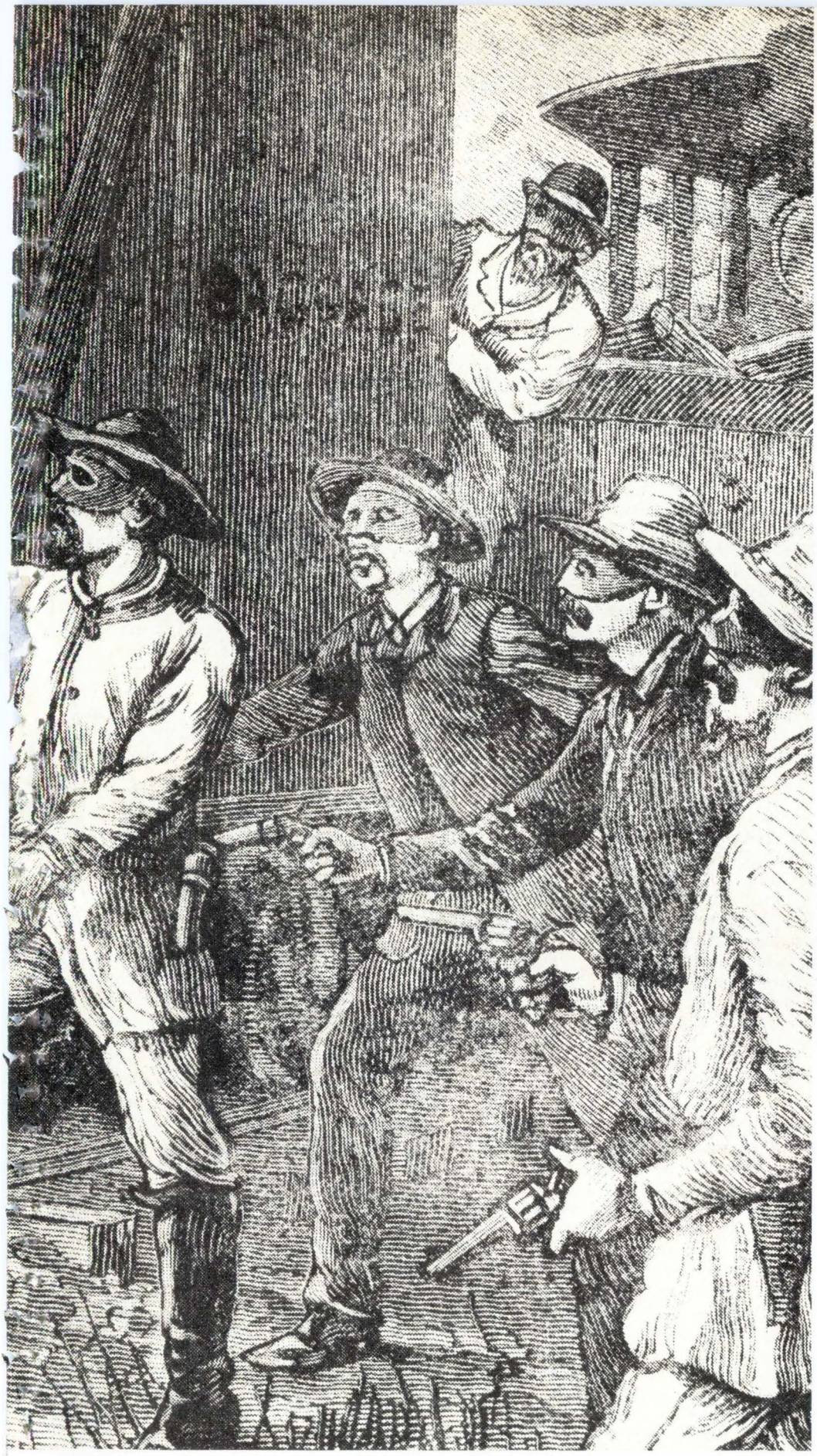

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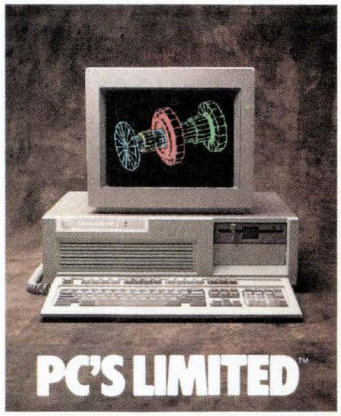

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change for quite some time, the 10Mbps version provides a much desired migration path. "The difference that was extremely well marked between coax Ethernet and unshielded twisted pair is diminishing," he adds.

That belief is being tested out in user sites. Merrill Lynch is thought to be a beta site for SynOptics Communications Inc.'s 10Mbps unshielded twisted pair Ethernet, but Sollars refuses to provide confirmation. However, the financial concern does use SynOptics' older product that allows Ethernet to run over the IBM shielded cabling system, a medium more typically used with the Token Ring.

For some institutions, the interest in the new media for Ethernet lies not so much in deep affection for this network as in economics.

Companies already have telephone wire in place and realize that "the more things that can run over wire, the more economical it is," says Bill Redman, program director of Gartner Group's local area communications service, Stamford, Conn. Thus, the potential of Ethernet over twisted pair is enormous, he says. "Wiring can be a large portion of the actual expense associated [with networks]. Certainly, with coax-based solutions, there's a lot of upfront expense, but even more so when you want to change [terminal locations]. A coax move can cost $500 to $1,000" for each terminal.

Ethernet's Advantages

"This will make Ethernet a real viable contender and take away one of the advantages Starlan and Token Ring enjoy," agrees Andy Verhalen, marketing director for 3Com Corp., Santa Clara, which is just beginning beta testing of its own Ethernet-over-unshielded-twisted-pair system. "I think it will be most important in buildings where there already is installed unshielded twisted pair and the cost of pulling additional cable is prohibitive."

Labor, in particular, can be the biggest expense associated with coax. Paul Beebe, director of academic computer services at the University of Wisconsin, Madison, found that adding an Ethernet station onto coax takes at least an hour. That was cut to five minutes when the university signed on as a beta site for unshielded twisted pair Ethernet. "Every time we tap with the old Ethernet, I'm more and more pleased with SynOptics," he says.

Two-year-old SynOptics is a Xerox Corp. spin-off. The Mountain View, Calif.-based firm claims to have installed more than 15,000 concentrator nodes of LattisNet, its Ethernet implementation that runs over either fiber optics or shielded wire. It has even higher hopes for its new unshielded version of LattisNet, which just became available for approximately $500 per node. (For purposes of rough comparison, HP's Starlan version, which includes some bundled software, currently is priced at $595.)

SynOptics has received some big-name help in its latest effort. AT&T has tested and certified that LattisNet runs over AT&T's popular Premises Distribution System (PDS) unshielded wiring scheme. But while that's the official agreement, SynOptics founder and chief executive Andrew Ludwick concedes that the ties go deeper and may one day include oem or reseller arrangements.

To date, though, the two have combined "our know-how [with Ethernet] and AT&T's know-how of wiring; for example, how to deal with a building with 1950s analog equipment," says Ludwick. "Since we're helping them position PDS, they help us understand specific issues of immunity and interference on telephone wire—and in the real world. This is proprietary know-how that AT&T has put on the table."

One reason AT&T may be so keen on SynOptics, despite the appearance of conflict of interest with its current version of Starlan, is that it helps push the AT&T wiring scheme. As to the future, an AT&T spokeswoman says the deal with SynOptics "is to jointly develop an interface between Ethernet and our Starlan," although she declines to provide many details. Tellingly, AT&T has even sent members of its Starlan force out to tour the University of Wisconsin's Ethernet setup.

Despite AT&T certification and apparent success at 10 beta sites, including Eastman Kodak, Rochester, N.Y., and Metaphor Computer Systems, Mountain View, Calif., it remains to be seen how well the SynOptics system works in everyday, heavy-duty environments. 3Com, which previously said it would release products this summer, is still in the midst of testing, indicating there may be difficulties involved in the project. The technical obstacles in running at speeds greater than 4Mbps over unshielded telephone wire are immense.

SIGNAL QUALITY IS STILL A BIG CONCERN.

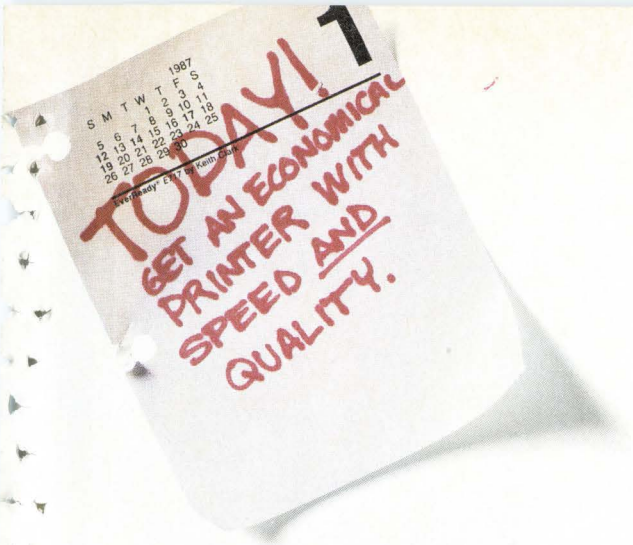
Two of the biggest obstacles are attenuation and emanation, which affect signal quality. Weakened signals become more likely the farther the distance from the telephone wiring closet. SynOptics and 3Com are shooting for distances in the range of 330 feet. Transceivers sit between the workstation and the phone jack while a concentrator is placed in the local wiring closet. Local concentrators are then connected by fiber-optic backbone cable to a central concentrator. In a small enough work group, concentrators may not be needed.

A Building-Dependent Analysis

The technology is affected by wiring quality and age. "This goes a lot further than standard Ethernet, where we specify cable and then we expect them [customers] to pull in that cable," according to 3Com's Verhalen. Then who shouldn't use 3Com's product? "It's going to be dependent on the building," he replies. "Some building layouts just aren't practical—for example, if each bundle goes from each individual office down a long shaft to the basement."

Although it's still early in the process, the potential of unshielded twisted pair for data networks seems sure to grow. On the shielded side of the wiring maze, that leaves IBM. While IBM is not in the cabling business per se, it provides specifications for the IBM Cabling System, which others sell. And, although the Token Ring can run on other media, including unshielded wiring, IBM's big push is toward shielded wire where speeds ostensibly reach 16Mbps.

As far as the wire war goes, this may be one of those rare cases where IBM concedes some points to the competition. "There are still a lot of customers who have AT&T as their carrier and a lot of customers who use them," says an IBM spokesman. Beyond that, he says, "We don't comment on competitive offerings." ■



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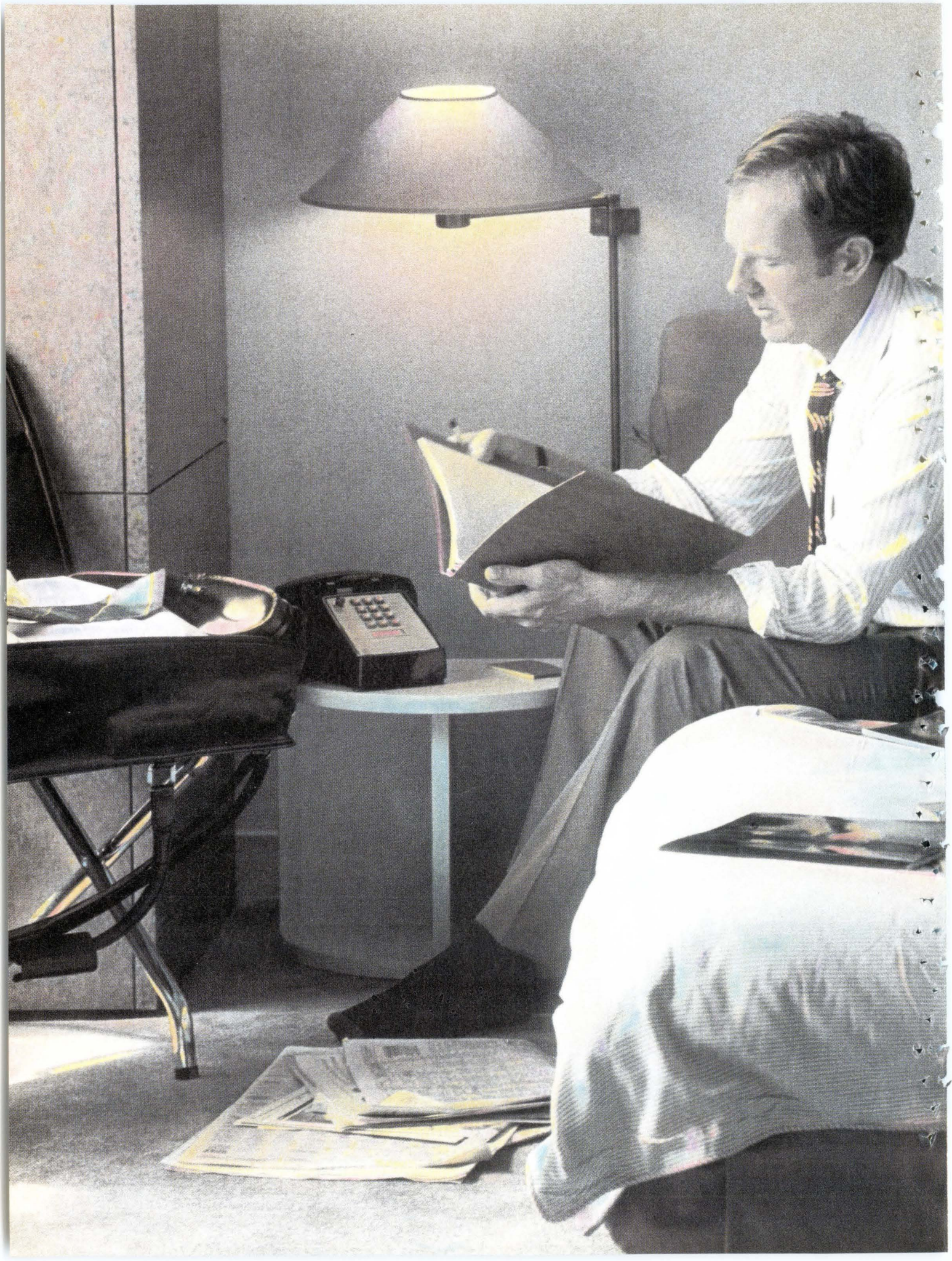

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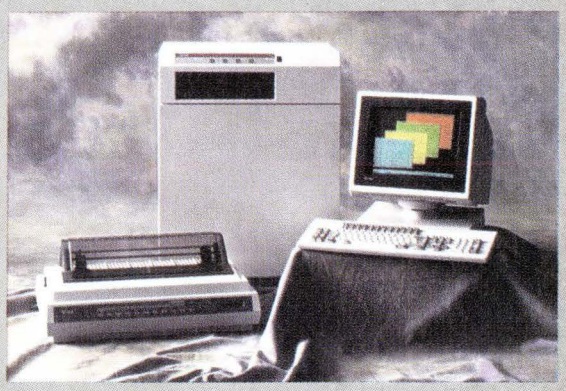

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ASSOCIATIONS

Council Unites Top IBM User Groups

The group, which represents IBM users all over the world, is attempting to strengthen and streamline the dialog between Big Blue and its customers.

BY PAUL TATE

The presidents of the six largest IBM user groups will meet in San Francisco later this month to elect a new chairman for the IBM International User Group Council (IUGC), one of the largest and most powerful user committees in the world.

The IUGC represents the interests of SHARE U.S., Europe's GUIDE, the SHARE European Association (SEAS), GUIDE International, Australasian SHARE/GUIDE (ASG), and GUIDE Latin America (see "IBM User Group Council Members"). Together, these groups account for about 10,000 member companies.

The imminent IUGC election is critical to the future of user relationships with IBM on many levels—strategic, technical, pricing, and support. Topping the list of issues that the council and its new chairman will address is the strengthening and promotion of a bid to update the "requirements process," whereby user groups formulate requests concerning products and/or strategies on their members' behalf and present those requests to IBM.

A Need for Coordination

Since its inception in June 1985, the IUGC has been working to change the way IBM users get the company to listen to their needs. The group is creating a formal, united front of worldwide IBM users to negotiate with Big Blue. "The council's main interest," explains current IUGC chairman Edward W. Murray, "is to get user groups to coordinate activities between themselves and with IBM."

Murray, who is the assistant general manager for Information Systems at the Friend's Provident Life insurance company in New South Wales, Australia, and also the president of ASG, will be a tough act to follow. Under his guidance, the IUGC has provided a world forum for major issues concerning IBM users, setting up international projects focusing on two of those issues—applications development and the future of CICS.

IBM hasn't taken IUGC lightly. It appointed corporate marketing executive Mitchell Watson as the group's own liaison officer in Armonk.

That suits both Murray and the other council members very nicely. "We see our role as working with IBM in a partnership," says Murray. "We're not in the business of creating conflicts with IBM."

Maybe not, but the IUGC doesn't approach IBM with kid gloves either, as SEAS president and council member Sverre Jarp of CERN, the European physics research center in Geneva, points out. "One of our major jobs," says Jarp, "is to force IBM to wake up and realize that it has so much in sales outside the U.S. that it must take our problems seriously. Maybe it's our job to suggest that IBM spread its development activities around the world, to underline the *I* in IBM."

As with Murray, the requirements process is one of Jarp's biggest concerns. He feels it is obsolete and ineffective. There are many thousands of user requests on the books at IBM, some dating back almost 20 years. Jarp feels that the user groups themselves are largely to blame for the great backlog of requests. In the past, no efforts were made to unite the various user groups or streamline the process. The council is determined to change all that.

Global Analysis Attempted

"The requirements process is wrong because it means we are bitching about something that's already happened," Jarp says. "It would be more sensible to work together with IBM in the product development stage—a sort of what-if dialogue. Then we can anticipate the problems as much as possible."

Murray says the group is attempting to do a global analysis of the requirements process. "We hope to develop a blueprint for a better system. This will probably result in a strategy document," he says, "but we are still looking at the options."

One of those options is to adopt a strategy that has proven useful in Europe. In 1985, SEAS identified a top priority list of major user concerns. Now included on the European list is IBM's source code policy, support for the Open Systems Interconnection (OSI) networking standard, and national character standards. When the list is reviewed this fall, SEAS president Jarp expects IBM's Systems Applications Architecture to be among the topics.

Creating a worldwide list will be more difficult because each of the international user groups have their own set of priorities, but there should be sufficient common ground for the IUGC, and its new chairman, to make a start. One thing that the user groups are certain of, however, is that it would be a list IBM couldn't ignore. ■

IBM User Group Council Members

Edward W. Murray
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Asst. General Manager, Information Systems
Friend's Provident Life
Milson's Point, New South Wales, Australia

Sverre Jarp
Pres., SHARE Eur. Assoc.
Head of IBM Systems, Data Handling Division
CERN
Geneva

John E. Nack
Pres., GUIDE Intl.
Manager, Processing Network Division
Caterpillar Tractor Co.
East Peoria, Ill.

Pierre Delesalle
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Gemeentekrediet Van Belgie
Brussels, Belgium

Paulo Moreira
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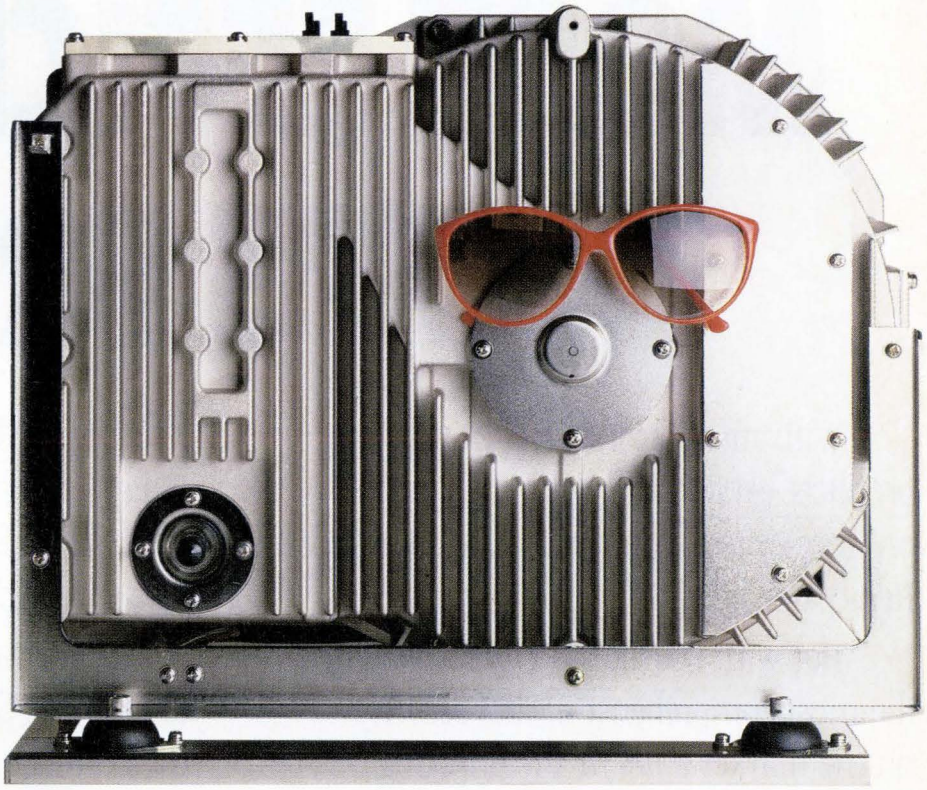

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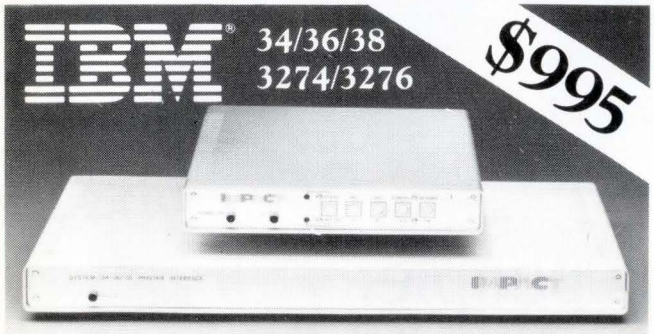

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News in Perspective

BENCHMARKS

Air Force Taps Zenith For Portables

Zenith Data Systems beat Toshiba, IBM, and Grid Systems for a $104 million Air Force contract for kneetop computers. Sanyo Corp. will build a quantity of the machines in Japan for Zenith. Trade sanctions against Japan, including a 100% duty on motherboards and complete microcomputers, won't affect the Zenith deal, say company spokespersons. The deal, which calls for up to 90,000 kneetops over the next three years, is the fourth large military contract Zenith has won over the last several years. The company has supplied microcomputers to the Air Force, Navy, and the Internal Revenue Service.

ETA Lands NASA Deal

ETA Systems, Control Data Corp.'s supercomputer subsidiary, has beaten Cray Research Inc. and Amdahl Corp. in the bid to install a supercomputer at the Mountain View, Calif., NASA Ames Research Center (see "Is ETA in Home Stretch at NASA?" Look Ahead, June 1, p. 10). The machine will be used by NASA's Numerical Aerodynamics Simulation Processing Network. The contract, which is slated to be signed in November, calls for St. Paul-based ETA to install a four-processor ETA-10 supercomputer in the first quarter of 1988, with an upgrade to an eight-processor system one year after delivery. The contract for both systems, which are being leased with an option to buy, is valued at $45 million. It is the four-year-old company's sixth order since introducing the ETA last summer.

Apple Responds to OS/2

Apple Computer Inc., hoping to strengthen its presence among corporate users, has added multitasking capabilities to its Macintosh OS and introduced an information management system for the Mac. The OS, called Multifinder, and the new software, called Hypercard, may help the Macintosh compete against IBM's PS/2 and OS/2, which IBM says will include built-in database management and communications capabilities.

Multiflow and Apollo Reach Agreement

Multiflow Computer Inc., Branford, Conn., has entered into a joint marketing agreement with Apollo Computer Inc., Chelmsford, Mass., whereby Multiflow's Trace supercomputers will be offered as servers for Apollo workstations. A joint selling, marketing, and sales training effort will be provided.

Apollo's Network Computing System, a series of products that distributes parts of mechanical design applications to the most appropriate computer resource, will distribute these modules to a network of Multiflow and Apollo systems. The initial offering is geared to the mechanical CAD market.

Microsoft Acquires Graphics Company

Microsoft Corp., Redmond, Wash., has agreed to acquire Forethought Inc., Sunnyvale, Calif., which developed and markets the PowerPoint presentation graphics product and is the exclusive distributor of FileMaker Plus, the database for Apple Macintosh systems. Under the agreement, the terms of which were not disclosed, Forethought becomes Microsoft's new Graphics Business Unit, a development and marketing facility for more graphics-based application software to be headed by Robert Gaskins, Forethought's vp of product development. Microsoft has also signed an agreement with U.S. West Advanced Technologies, Englewood, Colo., to develop jointly a multimedia application based on CD-ROM technology. ■

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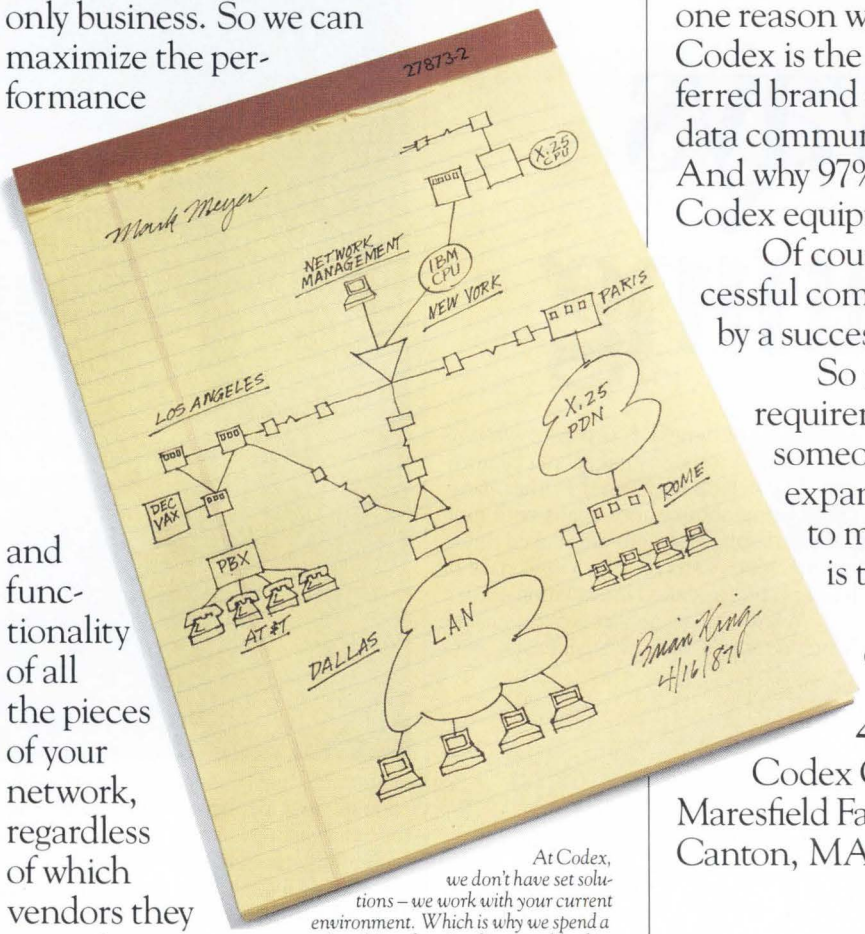

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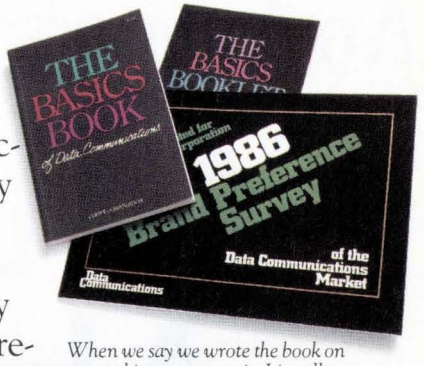

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An Anniversary Celebration

The Future Is Always Beginning

Technology and management, which 30 years ago stood nearly as far apart as Sun and Earth, are moving closer to each other under the forces of human intellect and global competition.

The process, accelerated by advances in computers and communications, may lead to a peaceful reordering of the information galaxy with individuals situated in networked corporate systems spanning nations, suppliers, and customers. The orbital shift, on the other hand, could bring about sheer chaos with individuals displaced by bio-chip based thinking machines and ruled by a new class of leaders, the so-called information elite.

What will it be—order or chaos? Much depends on how businesses, governments, and educational institutions choose—aspire, if you will—to manage the increasingly powerful information technology tools at their disposal.

Several signs detected by DATAMATION editors in preparing this 30th anniversary report point to order, man over machine:

• Conversations with 30-year-veterans of the information processing industry reveal a keen interest in trying to harness the latest technologies. "A technological development that probably isn't appreciated for its contribution to decision-making is graphic output on the pc," observes Jack Jones, executive vice president of administration for Norfolk Southern Corp. in Virginia. Jones broke

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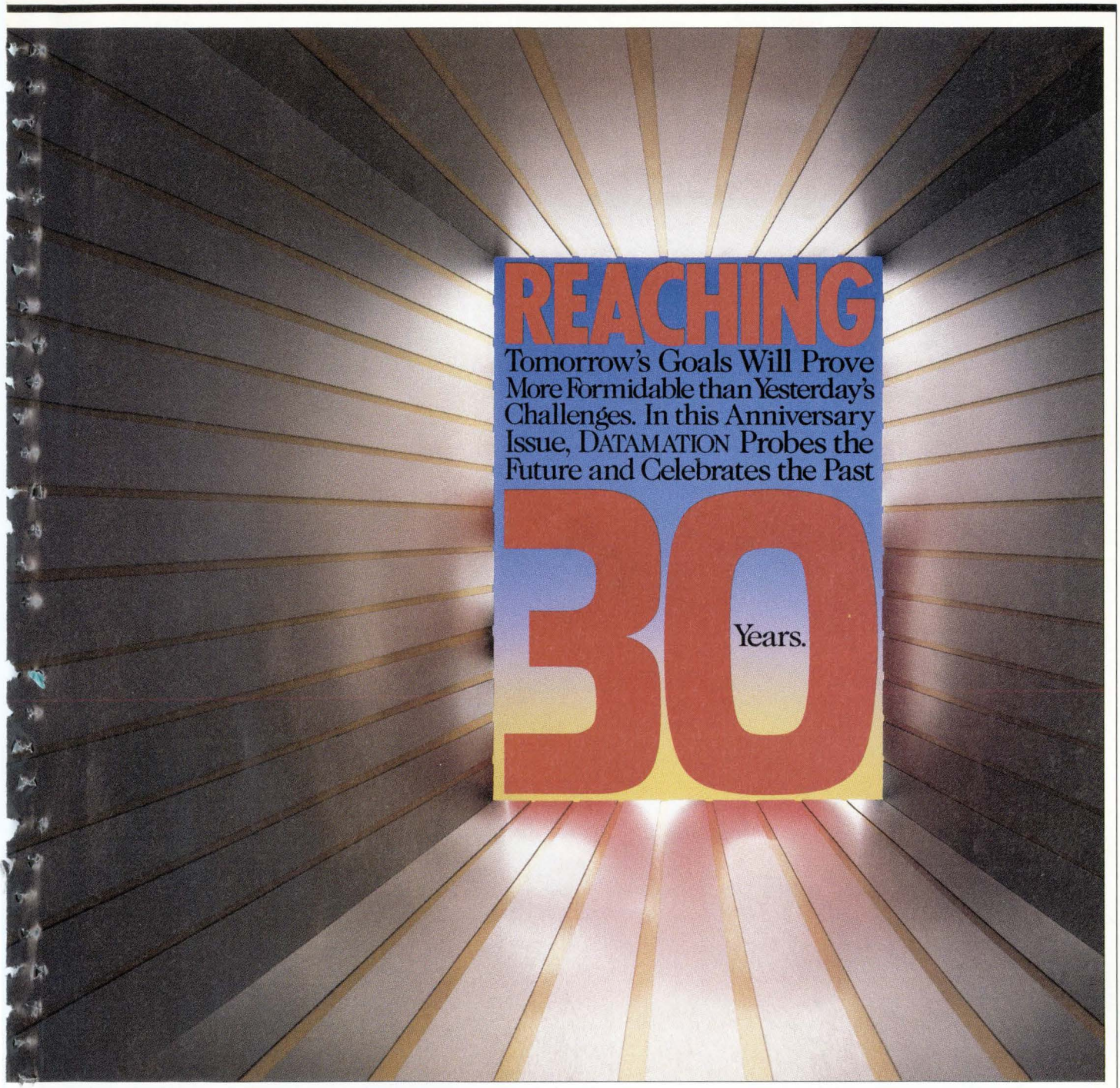


Photograph by Walter Wick

into the industry three decades ago on Univacs.

• Similar dialogue with 30-year-olds who are just entering the industry uncovers an equally fervent desire to learn the management skills that are required to make the best use of technology. "While programming and running computer systems is a challenge, an even greater challenge is managing the people who can run those systems," explains Fred Leichter, a user youthful enough to jump from being a senior systems manager at Merrill Lynch Inc. in New York to product manager for a fledgling software house in Cambridge, Mass. Leichter believes that "there's a new skill evolving that's somewhere in between management and technical."

• The candidates who merited consideration for our Hall of Fame—the men and women who have shaped this industry—have always tempered their enthusiasm for information technology with sober realizations about its limitations.

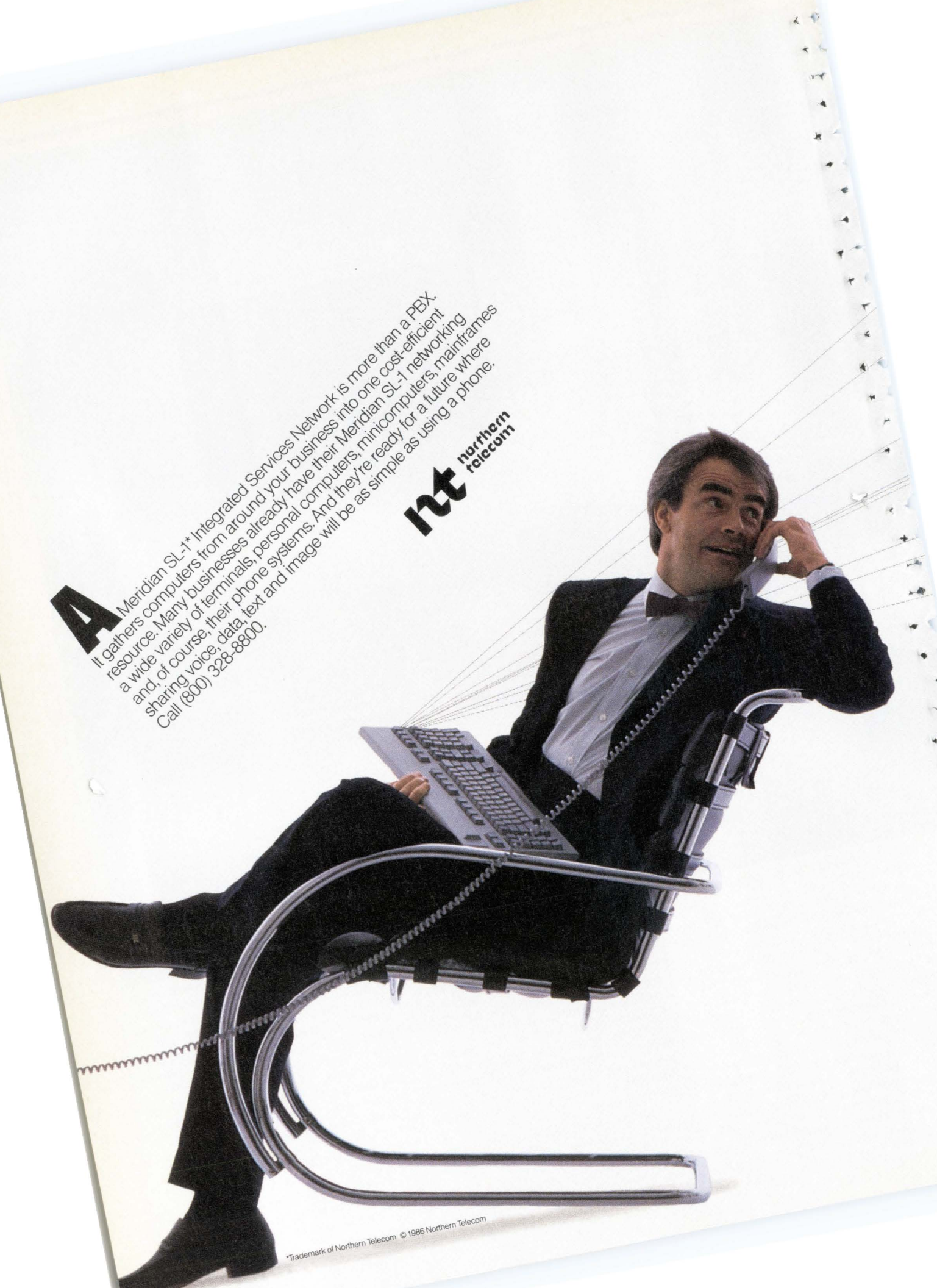
• The ability to laugh at the industry's shortfalls and at our own foibles helps us deal with them. A sense of humor has never been lacking, as evidenced by the 30 years of cartoons that have graced this magazine.

Lurking beneath this calm surface, however, are some indications of impending chaos:

• The influence of transnational corporations, which will rise on the strength of their information networks, is particularly disturbing. "These changes will seriously affect the ability of nation-states to control their own destinies and economies," declares William H. Melody, professor of communications at Simon Fraser University, Burnaby, B.C. Melody cautions, "We must ask ourselves whether it makes sense to make the maximum use of our networking capacity."

• Some futurists interviewed by senior writer Ralph Emmett Carlyle foresee massive job displacement in the 1990s as a result of automation.

Bear these thoughts in mind as we look back at our past travels together and look forward to the next leg of our journey. ■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NETWORKING

REACHING 30 YEARS

Today's View From the Top

Where were you in 1957? If you were reading DATAMATION, you must have been waging computer campaigns that gained new ground in information processing. If you are in the ranks of those respected vets, then you will probably remember some of these tales from the trenches. It was these processing pioneers who traveled with technology up the corporate chain of command, successfully taking computers from the back room to the boardroom. Now, as computers become powerful weapons in the corporate arsenal, these seasoned practitioners are feeling pressure on the management front. A prestigious panel of veteran information systems execs tells DATAMATION what the last 30 years have meant to their careers and to computing and what the next 30 years may be like.

The view from the command post of the computing center is a lot different these days from what it was three decades ago. Computer campaigns have moved onto higher ground where the stakes are also higher. The technology has traveled all the way up the corporate chain of command, moving out of the back office and into the boardroom. In the process, computing careers have been forged.

Thirty years ago, the information systems veterans who embarked upon their careers in the Eisenhower era remember the fun and the frustration of the glory days of data processing. Those were the days when they had to make heroic efforts just to keep machines at the ready. Those were the days when they made history with hardware and software breakthroughs.

These information processing veterans were there in the trenches as applications got more and more complex, moving out of the accounting arena and into the very core of the business operation.

That's where technology is today. And that's also the base of operations for today's information systems executive. After fighting countless computer battles, the IS chief has finally made it into the executive echelons in most companies. The power and pervasiveness of the computer in the corporation has put him there. His management skills will keep him there.

To get a better perspective on the past, present, and future of the information function, DATAMATION convened a special roundtable session to celebrate its 30-year anniversary.

The 30-year veterans participating in this discussion were James Collins, retired from Johnson & Johnson, Jack Jones of Norfolk Southern Corp., Carl Reynolds of Hughes Aircraft Co., Irwin Sitkin of Aetna Life & Casualty Co., and Frank Wagner, retired from Informatics Inc.

Q: What has changed the most dramatically in the information systems field over the last 30 years?

REYNOLDS: I think one of the things that's changed is the satisfaction level. When most of us got into the business 30 years ago, we worked on the whole problem. We built the system, fixed it, programmed it, and ran it. The satisfaction in doing that is essentially missing in today's dp department. Nobody gets to play with the whole system. That's part of the attraction and fun of the pc.

COLLINS: The pc has given us individual computing again. We started out that way, then went to central computing. Now we've got both. Those that thought that micros would kill the big stuff—make them dinosaurs—are wrong.

One thing that has changed dramatically in 30 years is the equipment, which used to be very expensive and didn't run all the time. It used to be 90% of the budget. Now you don't have to worry about the equipment anymore because it works so well and it's so relatively inexpensive. It's down to about 10% to 20% of the budget. But today you've got to manage the people and get your money's worth out of those rising costs.

JONES: I think MIS management has realized that we don't have to invent everything ourselves to have productive applications. Most of us assume, or at least hope, that if we need a new application or a function, we can find a package.

SITKIN: I wouldn't say we don't have to worry about equipment. The computer has become pervasive in our businesses, and we have an increasing dependence on their availability to perform.

COLLINS: You can manage that. You have backup, you have duplicate files. You're not as driven by computer failures.

SITKIN: For me, a big change and potential problem area is the growth in the

Photograph by Billy Kelly

number of dp people and the specialization of those people. At Aetna, we have over 4,500 employees earning a living from information systems, and many are still COBOL and big-iron oriented.

The problem is that if the only tool you have is a hammer, everything looks like a nail. We have a big retraining job to do. Our people have to understand other tools and techniques and recognize that their role is changing from one of trying to understand a customer's problem and converting that to a solution, to consulting with the customer on the best technologies to use. I think we are coming full circle. We've spent the last 30 years converting our customer problems into computer solutions. By the end of the century, the people who know and understand their problems will use the computer themselves to solve them.

REYNOLDS: We are successfully driving the computer out to the ultimate users, putting it on their desks. We are adding to capital investment where we've never had it before. We are now finally enhancing, augmenting, and mechanically extending the effectiveness of our service and administrative people.

WAGNER: We're recognizing that work is done by people, not by machines, and that people's output greatly depends on their mental attitude. And one thing that makes people unproductive is frustration that comes from not having control over their work environment.

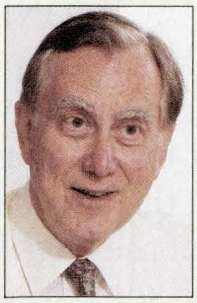
Today, a person has a machine on his desk and software in that machine that enables him to do his job. He has no one to complain to except himself. So, if that machine and software works, he has no frustrations.

SITKIN: We are pushing the technology further and further out from the center of the company—not only to end users, but also out into the distribution and supply channels.

The issue involved here is information resource management. To achieve it, you must get those standard definitions down pat so that you can communicate within the enterprise and with the people out in those channels. Companies like GM are telling their suppliers, "If you can't communicate with us, we won't do business with you."

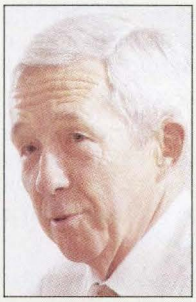
WAGNER: That illustrates how we have evolved in computer applications. In 1957, perhaps as much as 99% of our business dp applications were accounting. Then you had business executives like the ceo at Southern Railway who

Panel Participants



James Collins was vp of corporate staff when he retired in 1985 from Johnson & Johnson, New Brunswick, N.J. Collins held many jobs in his 38 years at J&J, but the job that moved him highest up the management ladder was vp of corporate IS, engineering facilities, and planning and construction. "What I left J&J with," says Collins, "was a worldwide IS organization serving 155 companies at 250 locations in 95 countries."

Jack Jones is executive vp, administration, for Norfolk Southern Corp. in Virginia. Jones, who's been working on the railroad 24 years, heads up personnel, labor relations, medical departments, freight claims, a charitable foundation, and IS, which includes 495 people and a $37 million budget. A dp pioneer, Jones has been chairman of both the Codasyl Committee, which developed COBOL, and the Codasyl Executive Committee.



Carl Reynolds, a longtime DATAMATION advisory board member, is staff vice president at Hughes Aircraft Co. in Long Beach, Calif. In his IS operation, Reynolds oversees a staff of 1,000 and a budget of $100 million. Before joining Hughes in 1970, Reynolds worked for IBM. "I supervised OS 360, and the most exciting part," Reynolds recalls, "was telling Mr. Watson that it was going to be late."

Irwin Sitkin, vp of corporate administration at Aetna Life & Casualty Co., Hartford, Conn., heads up facility management, corporate audit, administrative services, and IS, which has a $252 million budget and a staff of 2,600. "A senior IS guy" for many of his 33 years with Aetna, Sitkin has seen many changes in IS. He remembers when it was a "miracle" that an application on the "new" IBM 650 worked.

Frank Wagner was chief operating officer at Informatics Inc., Los Angeles, when he retired in 1981. He helped build the firm, now part of Sterling Software, from a three-man operation into a $250 million company of 2,000 people. Before joining the vendor in 1962, Wagner worked at North American Aviation, where he plowed new ground in aerospace computing. Wagner also helped found IBM user group SHARE.

NORFOLK SOUTHERN CORP.'S JACK JONES: "Something . . . that hasn't changed too much is the difficulty of bringing up new applications. While we're a lot smarter in designing, debugging, and testing applications, the application complexity and the complexity of the bugs have increased at least as rapidly as the sophistication level of our development people."

came to Jack Jones and said, "Why don't we use the computer to run the railroad?"

So we gradually programmed new applications like factory scheduling and inventory control, although at first they were put at the bottom of the list and were assigned the poorest programmers. Now, the heart of the business—the airline reservations, the freight control operations—is on the computer.

Q: Has anything stayed the same in the information systems realm over the last three decades?

JONES: One of the things that certainly hasn't changed is the constant hunger for hardware. Even after you've put in new hardware, it's not enough.

Something else that hasn't changed too much is the difficulty of bringing up new applications. While we're a lot smarter in designing, debugging, and testing applications, the application complexity and the complexity of the bugs have increased at least as rapidly as the sophistication level of our development people.

REYNOLDS: Programming productivity has changed, but we still haven't won a thing there. We have all kinds of tools and devices, and programmer output has increased only about five times in the last 30 years. Meanwhile, the equipment output has increased 100 million times. So programmer output simply hasn't kept pace.

COLLINS: I think the thing that has not changed is the management problem of allocating inadequate resources. The dp resources are always inadequate. Depending on your definition of a computer, there are roughly six or more computers to every programmer. You can't have a $30,000 programmer for every $10,000 machine, and your users can't do everything for themselves.

So you buy packages and you have data dictionaries and standards for software development and machine selection. But the overall management problems are still the same now as they were then.

Q: What kinds of changes have you observed taking place in information systems management?

SITKIN: One major change is the higher level of the information systems executive. I've been a senior IS guy for a long time, but I've moved from being a technology manager to being a people manager and a business manager. I don't manage computer projects any more. I sit on the corporate management committee actively participating in how we implement technology in our business.

JONES: Many of us have stopped thinking that no one else can understand our business systems and then implement them. Now, most of us assume, or at least hope, there are some packages out there that can do the trick. I think there's been a great attitudinal change on the part of MIS people in that regard.

COLLINS: Today, the biggest MIS expense is people and, to a lesser extent, the cost of purchased programs. As a result, you've got to manage your people more effectively than ever before.

JONES: The pervasiveness of the computer has put more pressure on IS management. It used to be that if your machine was down, the chairman didn't call unless the payroll was due out. Now, if one of our major railroad switching yards is out for two hours, the chief operating officer will probably call me speaking unkind words.

WAGNER: I think that problem will be solved in the next 20 years by having one machine per application.

REYNOLDS: Except those machines will be tied into a gigantic piece of iron, and if that goes down, then everybody is down. Reliability has actually improved tremendously over the last 10 years. We have an [IBM] 3090 processor that goes 2,000 to 4,000 hours between failures.

SITKIN: One problem that has increased enormously throughout this decade is keeping on top of all the technology and products. IBM alone is announcing something new every month and competition is responding. Compounding this technology overload is the change in importance of the communications network. The network has become vital to our organizations. Maintaining security and backup in an open-system, friendly environment is a problem we deal with daily.

Q: What are the major technological advances of the last three decades?

COLLINS: One of the most important is the development of low-cost, high-output, and high-performance microcomputers that can be given to everyone and connected to the network.

JONES: Of all the great advances, one of the most startling to me was the Apple Macintosh. I remember the first time I saw it. I almost couldn't imagine the things you could do with ease on that machine.

WAGNER: Seeing a personal computer in action is comparable to the first time I saw a binary deck assembly program put into the IBM 701 back in the '50s. We pushed the start button and immediately the stop light came on. We said, "Oh my God, we have an error in the first or second instruction." Then we found out that 2,000 instructions had been executed before that stop light came on.

JONES: The same thing happened to me the first time I put a binary deck into the 704. I'd been used to stepping through one instruction at a time with Univac I, and suddenly we were doing thousands. It boggled the mind.

REYNOLDS: The first spreadsheet program I saw boggled my mind. All I could think of was, what if we had put it through the same development methodology we used at IBM when we were developing OS 360 back in the '60s? It would have taken several million bytes and it wouldn't have worked.

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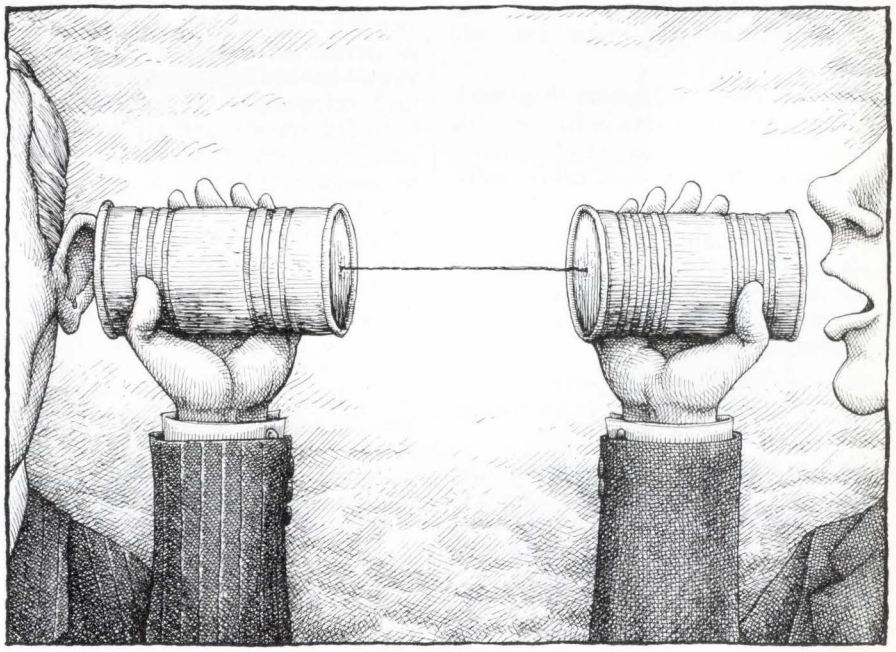

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AETNA LIFE & CASUALTY CO.'S IRWIN SITKIN: "We have a big retraining job to do. Our people have to understand their role is changing. I think we are coming full circle. We have spent the last 30 years converting our customer problems into computer solutions. By the end of the century, the people who know and understand their problems will use the computer themselves to solve them."

JONES: A technological development that probably isn't appreciated for its contribution to decision-making is graphic output on the personal computer. That has given a person the ability to understand his business by looking at graphs that can be produced instantly—rather than having to plow through columns of figures to see trends.

REYNOLDS: That graphics capability has to be easily and completely integrated with text. That will happen in the next few years, and it will significantly change the applications of manufacturing organizations.

Another development that will dramatically affect applications is standards. Once we get transparency so that we can easily network pcs, applications will mushroom.

WAGNER: The development of parallelism in supercomputers is having a big impact in nuclear design, weather prediction, and other large scientific applications.

SITKIN: We think supercomputers and parallel processors have implications for our business. We are studying them for use in the process control aspects of our back-office work.

WAGNER: That's a job for Codasyl, a standard development language for parallel processors to do business work.

SITKIN: I'd like to reemphasize the changes related to the network. We consider computers and other technology as nodes on the network serving peoples' needs. Enhancing them with expert systems, image and voice processing, and mass storage capabilities will provide our people with very valuable tools to help them get their work done.

Knowledge engineering and expert systems activity will enable us to do more in our businesses without having to depend on more and more people. Optical storage devices and fiber-optic cables are major tools enabling us to start thinking about moving images around in a work-in-process environment, controlled or managed by parallel processors/supercomputers.

Q: Has technology actually enabled American business to make better decisions?

COLLINS: Organizations that have top quality in their field couldn't exist without computerized evaluation.

SITKIN: American businesses have been modestly successful at best in using technology to help them develop a better vision of the future and how to deal with it. At Aetna, our business—financial services—has had an accounting and statistical orientation, so we pore over historical reports and try to develop plans from them. That's driving the boat by looking at the wake.

At General Foods, for example, Ed Scheffer is a vice president of information systems and market research. I think he's trying to exploit the power of the computer to help identify opportunities for his company, analyzing performance relative to competition, and determining what the market really looks like. They had a major breakthrough in the retail business when they started capturing data through optical checkout stations and quickly comparing sales to projections.

Q: That's certainly a strategic use of information systems. Are U.S. companies zeroing in on these "strategic" applications?

WAGNER: Tactical is what we're all interested in—keeping the company running and supporting the real business that our company happens to be in. Strategic is planning for the future and what you're going to do five years from now.

REYNOLDS: If you go back 30 years in the aerospace industry, what bigger impact could you have had than the fact that postwar airplanes could not have been built without computing? You would be hard-pressed today to say that an aerospace company's or electronics company's critical success factor was to be some presently unknown computer application.

What's making companies talk so much about strategic uses today is that the business environment in the United States is dramatically different. There are severe problems in many industries. Some companies are looking at using computers to solve those problems.

SITKIN: One of the reasons business is changing is that new tools and techniques exist to use in business today. Back in 1965, we conceptualized Aetna's Safari system as a way to improve not only our back-office processing, but also the quality of our product for the customer—the physical policy. We knew 20% of the policies we delivered had a detectable error that was created by the person rating, coding, or calculating the premium with a manual calculator or by someone's typing up the policy. Safari changed all that.

That's the way a company like mine, one that is in the financial services industry, differentiates the product or service it provides to the customer. Once the company reaped the benefits created by Safari, we enhanced it to do even more and better things. To go back to our discussion of strategic systems, just putting wheels on what you are already doing does not give you a competitive advantage.

You have to rethink your business in terms of what you ought to be doing, which requires some knowledge and understanding of what the technology might enable you to do. That's why you need that paradigm, the coming together of the person who understands the technology and the one who understands the business.

That's what we're trying to do today, and that's one of the biggest challenges facing all of us in information systems. ■

Coordinating and moderating this roundtable discussion was DATAMATION *advisory board member Angeline Pantages.*

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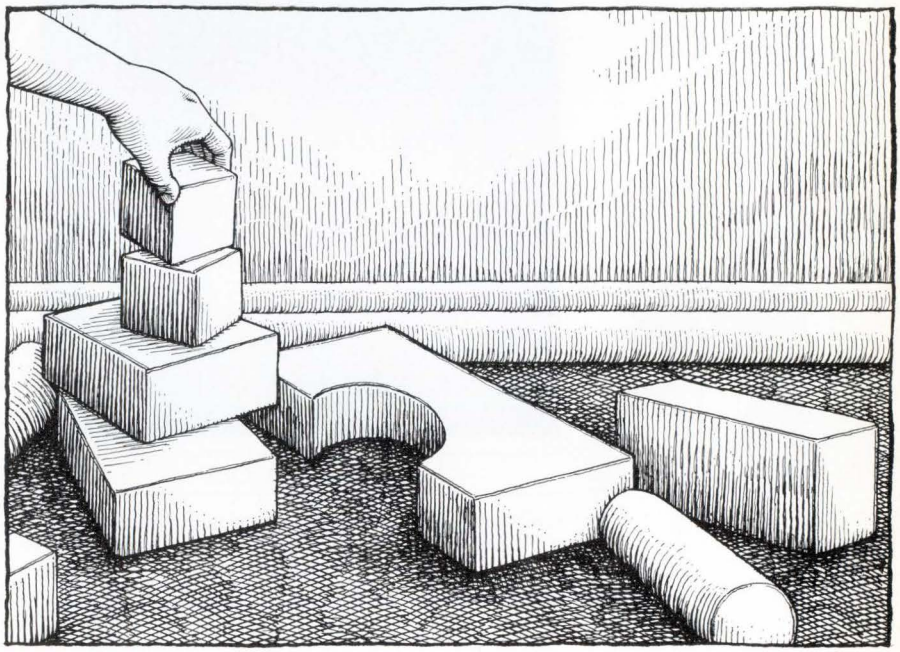

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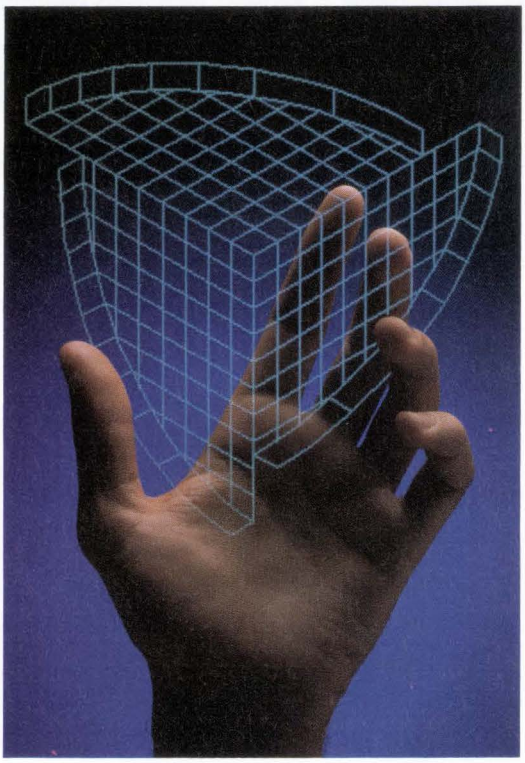

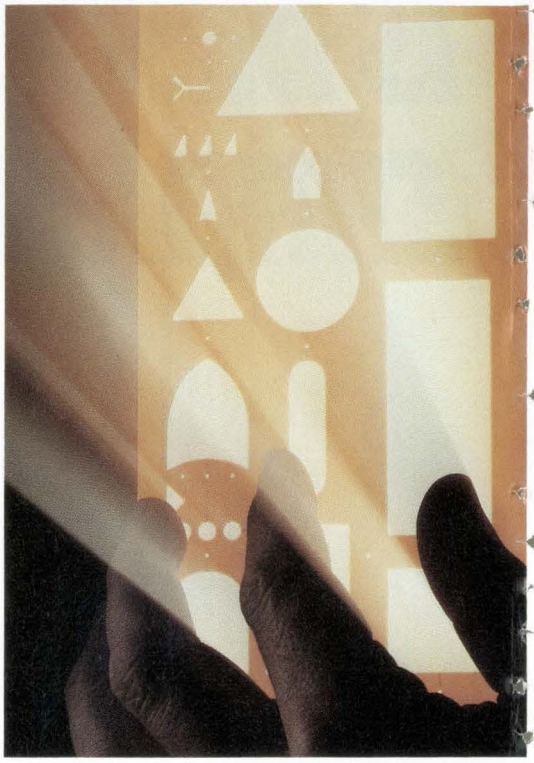

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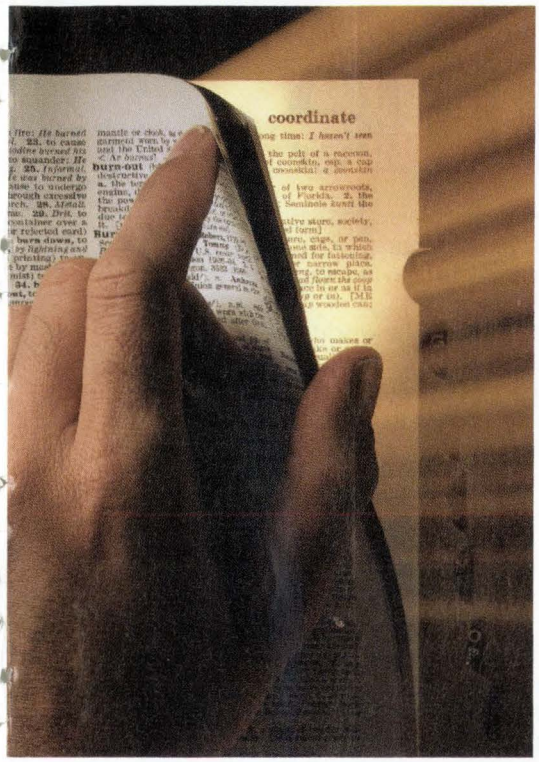

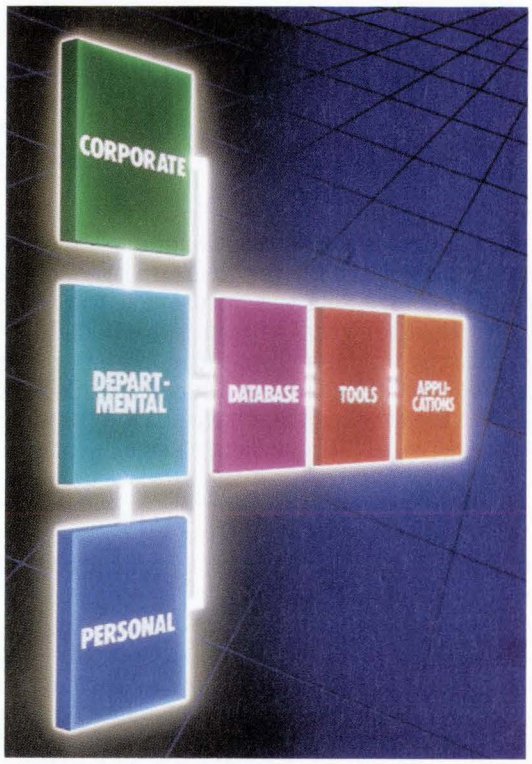

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REACHING 30 YEARS

The DATAMATION Hall of Fame

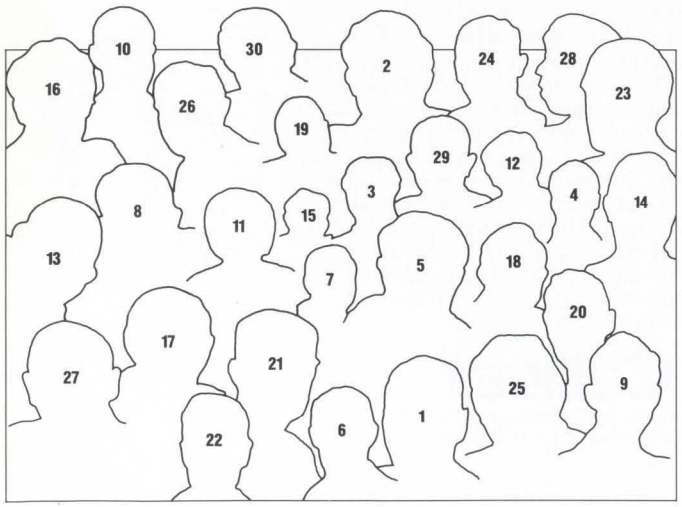
Seventeenth century French philosopher and mathematician Blaise Pascal has been quoted as saying that things are always better in the beginning. In the beginning, computing was done on a large scale at large costs, and as large as the room-filling ENIAC was, its promise was writ even larger.

More than 150 years separates the 1822 Difference Engine, the world's first calculating machine, from the modern-day microcomputer. The technological breakthroughs have been staggering. So has the pace of change. Keeping up with the advances that have shaped the information processing world has been DATAMATION's challenge since its founding 30 years ago.

To commemorate those 30 years, we decided to celebrate the pathfinders who have made all this progress possible. After careful consideration, DATAMATION has selected 30 outstanding individuals to induct into its 1987 Hall of Fame. This special award, which will be bestowed every year in September to coincide with our anniversary, honors those people throughout the world who have made major contributions to information processing.

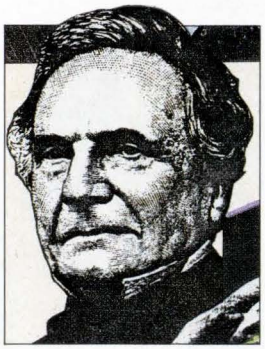
This year's award winners span a prolific period that runs from Great Britain's Babbage to Silicon Valley's Wozniak. Unlike Steve Wozniak, of course, Charles Babbage never got much recognition for his accomplishments. Only in the last few decades has the British engineering genius received the acclaim that is so rightly his due.

Almost one third of the people in DATAMATION's 1987 Hall of Fame were born outside the U.S. Charles Babbage, William Shockley, Alan Turing, and Maurice Wilkes all hail from Britain; John von Neumann and John Kemeny were both born in Hungary; Konrad Zuse comes from Germany; An Wang is a native of China; and Hideo Yamashita was born in Japan. Many of the American award winners have roots in the Midwest, the prairie state of Nebraska being a popular birthplace for a surprising number of these informa-



1. Howard Aiken
2. Gene M. Amdahl
3. Charles Babbage
4. John Backus
5. C. Gordon Bell
6. Seymour Cray
7. J. Presper Eckert
8. Bob O. Evans
9. Jay W. Forrester
10. Herman Hollerith
11. Grace M. Hopper
12. John G. Kemeny
13. Jack Kilby
14. Donald Knuth
15. John V. Mauchly
16. John McCarthy
17. William F. Norris
18. Robert Noyce
19. Kenneth H. Olsen
20. Claude E. Shannon
21. William Shockley
22. George R. Stibitz
23. Alan M. Turing
24. John von Neumann
25. An Wang
26. Thomas J. Watson Sr.
27. Maurice V. Wilkes
28. Steve Wozniak
29. Hideo Yamashita
30. Konrad Zuse

WESLEY

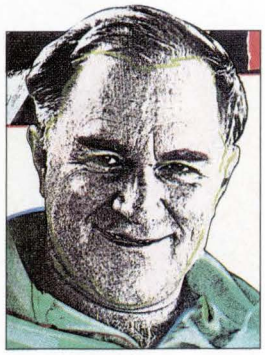


Charles Babbage

Charles Babbage was the inventive genius who, in the nineteenth century, saw the future. A sage of the computer age, Babbage, the son of a wealthy British banker, designed in 1822 his Difference Engine, considered to be the first automatic calculating machine. Years later, the mathematical wizard began work on his ambitious Analytical Engine, the pioneering precursor to the programmable computer. As towering as these achievements seem today, they were largely unrecognized in Babbage's time. A perfectionist, the inventor saw his projects realized only on paper. After almost two decades of tinkering and pleading for funds, Babbage abandoned his dream for a Difference Engine in 1842. Eleven years later, the Swedish father and son team of Pehr Georg and Edvard Scheutz created the Tabulating Machine, a scaled-down version of the device. Several years after the Scheutzes' success, Babbage was back at the drawing board, working on his Analytical Engine, a primitive hybrid calculator-computer that performed mathematical calculations. Its external program came from punched cards—an idea Babbage borrowed from Frenchman Joseph-Marie Jacquard, who invented a loom controlled by punched cards. These ideas were some 70 years ahead of their time, ideas devised by the uncommon mind of a truly brilliant man.

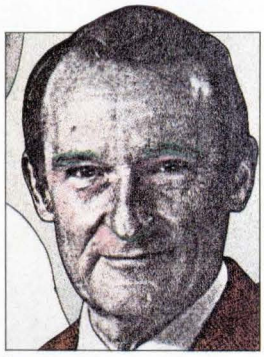
John Backus

John Backus is a high-level thinker who pioneered the high-level Formula Translation system, or FORTRAN. It was the first machine-independent language, and it gave the computing world a quicker, cheaper, and more reliable method of programming. After 30 years, it's still going strong. Backus headed up the research team at IBM that developed the famous language. When the first FORTRAN compiler for the IBM 704 was finished in April 1957, it boasted 25,000 lines of machine code. It was a big language that would prove to be a big help to Big Blue in selling its systems. Backus, who is now 64 years old, joined the company in 1950, right after he earned his master's degree in applied mathematics from Columbia University. Hired into a programmer post, Backus quickly rose through the research ranks at IBM. After FORTRAN, Backus became involved in the design of ALGOL 58 and 60. In 1959, along with Peter Naur, he invented the now well-established Backus-Naur Form (BNF), a syntax description tool. Backus was named an IBM fellow four years later. In 1970, the consummate researcher began his ongoing investigation into function-level languages, which promise a new era in user friendliness. Backus was awarded the National Medal of Science in 1975 for his influential work on FORTRAN, which today stands as the dominant high-level language in supercomputing and the practical standard throughout the scientific and engineering realm.



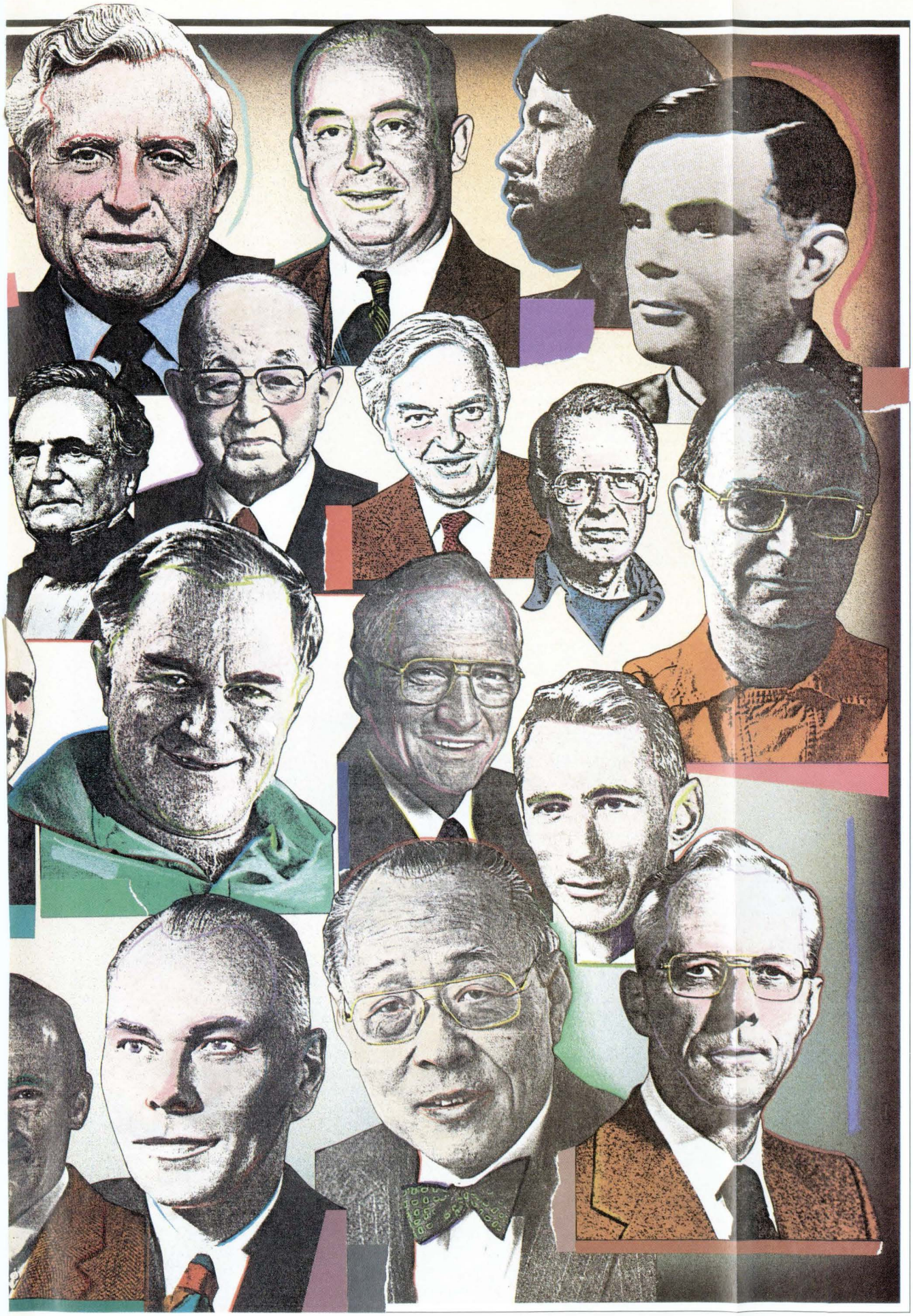
C. Gordon Bell

Gordon Bell is the Frank Lloyd Wright of minicomputer designers. "I tend to think first of computers in user terms and then how to build them," says Bell in a voice that crackles with enthusiasm. From designing small computers at Digital Equipment Corp. to working on multiprocessor prototypes, the 53-year-old Bell has left his distinctive mark on systems design. His technical contributions include the open bus structure and general registers for memory addressing. Joining Digital in 1960, Bell conceptualized and designed many of DEC's Program Data Processors (PDPs). It was the 1965 release of Digital's PDP-8, a Bell design still in use, that helped coin the term minicomputer. His influence was so pervasive that even the chief engineer on the PDP-11 was a student of his. The PDP-11 enabled Digital to regain its front-runner position in the mini race. Bell was vice president of engineering when Digital created the 32-bit virtual memory VAX-11 series. After 23 productive years, Bell left Digital in 1983 to set up his own ventures and to advise startups. He founded Encore Computing, designing its Multimax system. In June 1986, the National Science Foundation asked him to direct funding for U.S. computer science efforts, a project close to his heart. "My goal has always been to make a difference," he says. "As long as I can do that, I'll keep on."



Seymour Cray

Nobody does it faster than 61-year-old Seymour Cray, the man who put the speed and the "super" into the computer. Without his systems, what now takes seconds to solve would have required months, maybe even years. Cray began in the computer business working for Engineering Research Associates and its successors, Remington Rand and Sperry Rand. After being the main man on the Univac 1103 project, Cray, along with William Norris and seven others, said good-bye to Sperry Rand and founded Control Data Corp. in 1957. The machines spewed forth quickly. The 1604 hit the street in 1964. The 6600 followed five years later. But it wasn't until the 1969 introduction of the CDC 7600, considered by many to be the first supercomputer, that Cray found his computing niche. Next, he developed the 8600, which Control Data decided not to market. So Cray, who had already gone far from the madding crowd, left CDC in 1972 to set up Cray Research Inc. with $500,000 in seed money from CDC. His vector processing Cray-1 made its debut in 1976 at Los Alamos National Laboratories. In 1982, the X-MP series appeared. The 9.5nsec machines were the first supercomputers not to bear Seymour Cray's design stamp. The MOS memory Cray-2, which hit the streets in 1985, was a Seymour system. The 8-billion byte Cray-3 will also be his creation. The powerful processor, slated to be from five to 10 times faster than its predecessor, should arrive next year.



tion processing pioneers.

Much of that ground-breaking work took place on college campuses. Harvard University was the site of some of the earliest American activities in the computer field. Spearheading those efforts on the program-controlled Mark machines was Howard Aiken, assisted by the inimitable Grace Hopper, who discovered software bugs in the process. In the early '40s, the University of Pennsylvania was home to the enormous ENIAC computer, created by the famous designing duo of John Mauchly and J. Presper Eckert.

But the real hotbed of invention was the Massachusetts Institute of Technology. In 1936, one year before Claude Shannon published his master's thesis on relay and switching circuits, Yamashita, the father of Japan's computer industry, was at MIT as a visiting associate professor of electrical engineering. Several years later, MIT hosted the historic Whirlwind project, headed up by Jay Forrester, who created the magnetic core memory for the fastest machine of the early '50s. A few years later, Forrester led the MIT and IBM team that developed the SAGE air defense system. Also part of the Whirlwind group at MIT was Digital Equipment Corp. founder Kenneth Olsen, who built a special computer to test magnetic memory.

John McCarthy, conceived of the idea of timesharing while he was at MIT in the '60s. Ironically, he was at Dartmouth College when he created Lisp. In 1964, Dartmouth became the birthplace of BASIC and timesharing. The founding fathers who shared credit for this dual accomplishment were John Kemeny and Thomas Kurtz.

Kemeny, like many other mathematical masters in the Hall of Fame, received degrees from Princeton University, a major hub of advanced computational activity. While at Princeton, Kemeny served as Albert Einstein's research assistant. Next to Einstein, one of the most brilliant mathematicians of all time was John von Neumann, who devised the concept of the stored program computer while at Princeton. Von Neumann unsuccessfully tried to recruit another towering talent, Alan Turing, who designed the first operational electronic digital computers several years after he left Princeton in 1938.

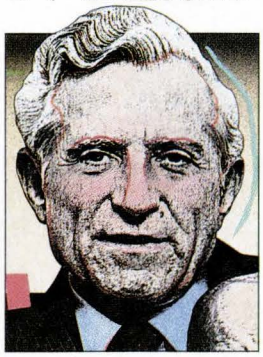
All of the individuals in DATAMATION's Hall of Fame have had a major impact on the world of computing, as the following profiles, researched and written by DATAMATION's editorial staff, show.

BY LINDA RUNYAN

The DATAMATION Hall of Fame

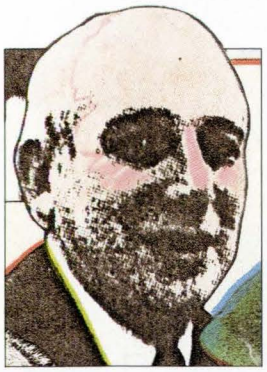
Howard Aiken

Howard H. Aiken conceived of the design of the Automatic Sequence Controlled Calculator, known as the Mark I, while he was a professor of applied mathematics at Harvard. It was while Aiken was working on his doctorate at Harvard that he first thought of developing the large-scale calculator. Unveiled in May 1944, the first program-controlled computer was a massive two-ton machine that took nearly six years to build. Helping to build that hardware hulk was IBM's Thomas J. Watson Sr., who provided Big Blue know-how and two-thirds of the cash for the pioneering project. The credit for the early computer, however, clearly went to Aiken and Harvard, much to Watson's chagrin. With the forceful Aiken at the computing helm, Harvard became an early training ground for computer science students. During his 22-year tenure at the Ivy League school, Aiken served as a director of its fledgling Computation Laboratory, which probed such fields as automatic language translation, switching theory, and mathematical linguistics. He left Harvard in 1961 for the University of Miami, where he became a distinguished professor of information technology. At a testimonial dinner that same year, Aiken voiced his concerns about his creation: "I hope to God this will be used for the benefit of mankind and not for its detriment." When he died in 1973 at the age of 73, the man and his machine had certainly left a mark on the world.



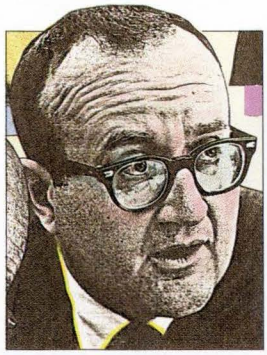
Gene M. Amdahl

By the reckoning of some analysts, prices on IBM mainframes fell about four times faster between 1975 and 1981 than they had during the previous five years. This roughly coincides with the time that Amdahl Corp., led by its founder Gene M. Amdahl, began to ship the industry's first plug-compatible mainframe. The price/performance ratio has steadily improved ever since—a trend for which many credit Amdahl. The soft-spoken native of Flandreau, S.Dak., made two tours of duty with IBM, as the chief planner of the floating point 704 computer in 1952 and as the principal architect of the landmark System/360 in 1960. Disappointed at IBM's refusal to use LSI logic circuits to improve high-end mainframe performance, Amdahl left to form his own company in 1970. Five years and $40 million later, Amdahl shipped the 470 V/6, which was much faster and cheaper than the 370/168. Amdahl then answered IBM's 3033 with the 470 V/7, which was even faster. The race accelerated, as did the price/performance margins on mainframes. Amdahl, after losing control of his company to early investor Fujitsu, went on to form Trilogy Ltd. in 1980, an unsuccessful attempt to advance mainframe logic technology through wafer-scale integration. In 1985, Trilogy acquired superminicomputer maker Elxsi Corp. The 65-year-old Amdahl, an investor in several startup companies, continues to be the chairman of Trilogy.



J. Presper Eckert

On J. Presper Eckert Jr.'s 24th birthday the Army okayed a project that was destined to change his career and the computing world. On that fateful day in 1943, the Army put its stamp of approval on the Electronic Numerical Integrator and Computer (ENIAC) officially introduced to the masses in 1946. Eckert's partner on the portentous project was John Mauchly, a fellow student 12 years his senior at the University of Pennsylvania's Moore School of Electrical Engineering. Together, they became the driving development force behind the Electronic Discrete Variable Automatic Computer (EDVAC) and the Binary Automation Computer (Binac), the first stored program machine, which they built at the firm they formed in 1946, Electronic Control Corp. The duo then moved on to the Universal Automatic Computer (Univac), the first commercial general purpose computer, which was rolled out the door at Remington Rand in 1951. Unable to meet their financial obligations, Eckert and Mauchly were bailed out by Remington Rand, which then persuaded the twosome to stay on board. After almost two decades of working together, the team split up in 1959 and Eckert went on to become the director of the Univac Division. In 1955, he was named vp and director of research at Univac. Eight years later, Eckert was appointed vp and technical advisor for computer systems at Sperry (now Unisys). In 1969, Eckert was awarded the National Science Foundation's National Medal of Science.

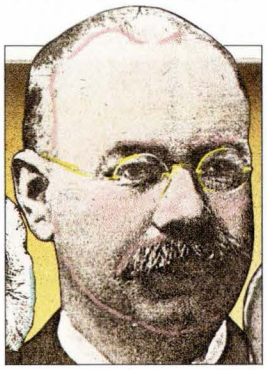


Bob O. Evans

Bob Overton Evans joined IBM in 1951 to work on the firm's first production computer, the 701. It took IBM approximately three years to bring the first 701 to market. Delivered in 1953, this vintage system had a machine cycle time of 12msec and included a 9KB Williams Tube memory. Evans would go on to become the company's most durable and influential engineer. As leader of the computer giant's Systems Programming, Research, Engineering, and Development (SPREAD) committee in the 1960s, Evans was instrumental in the creation of the 360 series, the computer range that both he and IBM had bet their futures on. After many traumas, the industry's first family of compatible processors was born. The 360 became the cornerstone of modern commercial computing and the basis for IBM's subsequent colossal growth. During his 1965 to 1969 stint as president of IBM's Federal Systems Division, Evans became convinced that a virtual memory architecture was needed to keep those growth rates skyrocketing. The result was the System 370, which Evans developed while he was president of IBM's Systems Development Division from 1970 to 1974. The 370 architecture has since been cloned and copied by a burgeoning subindustry of IBM plug-compatible vendors. Evans, a native of Grand Island, Neb., remained active in IBM engineering circles until 1984, when he left the company at the age of 57 to become a venture capitalist with Hambrecht & Quist Inc., San Francisco. A year later he received the National Medal of Technology from President Reagan.

Jay W. Forrester

Innovative electrical engineer Jay W. Forrester left an indelible mark on the early history of computing through his invention of the magnetic core memory. The small, doughnut-shaped cores were devised by Forrester for use on MIT's Whirlwind computer, the quickest machine of the early '50s. Faster than the ENIAC and Mark I, the general purpose Whirlwind was nevertheless plagued by the problem all these early machines shared: the high cost and low reliability of vacuum tubes. Forrester's core memory approach, which solved this problem, was adopted by the whole industry in the early '60s and the new storage medium developed by this native of Climax, Neb., helped pave the way for low-cost, mass-produced computers. Whirlwind was just one product of the long and fruitful association Forrester had with MIT, beginning with his graduate studies in 1939. After Whirlwind, he went on to tackle the Semi-Automatic Ground Environment (SAGE), the sophisticated U.S. air defense system. In operation from 1958 until 1983, SAGE was built under Forrester's leadership, with some help from IBM and from Whirlwind, which became the prototype for SAGE. During the '60s and '70s, while working at MIT's Sloan School of Management, Forrester used computers to model and analyze human social systems, creating a discipline now known as system dynamics. The 69-year-old Forrester currently heads up the system dynamics program at MIT.



Herman Hollerith

In Bern, Switzerland, in 1885, Herman Hollerith wrote these prophetic words to his wife about his invention: "The machine, as it exists now, will appear crude and inefficient; still, it is the genesis." Hollerith's punch card tabulating machines were indeed the genesis of the data processing era. In 1879, the son of German immigrants was hired as a special agent to the U.S. Census office, where he began to devise better ways to tabulate and analyze the mountains of hand-gathered and hand-calculated data. A year later, when he was at MIT, Hollerith built his first tabulating system using punched tape. He soon redesigned the machine, switching to the more reliable and quicker punch cards. The inventor developed a special puncher and card reader for his tabulator, which was powered by batteries that could be recharged courtesy of the local utility company. The machine proved to be a big hit with the federal census takers, who took 56 of Hollerith's machines to help them with the 1890 head count. By the early 1890s, Hollerith's system was in demand by companies all over the world. Business was booming at his Tabulating Machine Co. when, in 1911, it merged with three other firms to form the Computer-Tabulating-Recording Co. The company would later come to be known as IBM. When Hollerith died in 1929 at the age of 69, he was recognized as the father of the first data processing devices. He must have foreseen that legacy back in Bern when he wrote his wife that his "machine or the principle will be potent factors in statistical science long after after I am gone."

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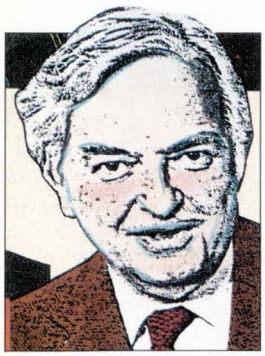
Grace M. Hopper

If diminutive Grace Murray Hopper were running a political campaign, her candidate would be a lock. There has never been a more enthusiastic booster of the computer industry. In fact, the mathematician was there at the start, working with Howard Aiken's Mark I at Harvard on the Navy's Computation Project in 1944. Although she declines to take credit for it, Hopper is said to have coined the term "bug" after a moth stopped the Mark II she was working on dead in its tracks. In 1949, she was hired by the designing duo of J. Presper Eckert and John Mauchly to work on the Binac and the first commercial computer, the Univac. She stayed on board with their company even after it was absorbed by Remington Rand, which later merged into Sperry Corp. It was while she was working at Sperry that she created the first operational analytical differentiator in 1954. Hopper, with the help of Charles Phillips, also begat the Common Business-Oriented Language (COBOL), based on Hopper's Flowmatic, the first English language dp compiler. Throughout her business life, Hopper has been affectionately anchored to the Navy. She chose to retire in 1966, but the Navy called her back to active duty a year later, when she was 60. She finally left the fleet with the rank of rear admiral in 1986 at the age of 79. Within the month, the indefatigable Hopper undertook a new job as a roving speaker for Digital Equipment Corp. They don't call her Amazing Grace for nothing.

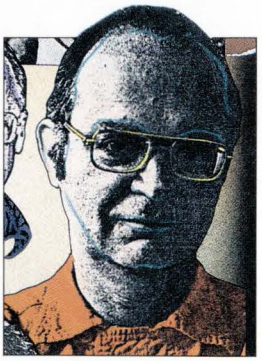


John G. Kemeny

At 4 a.m. on May 1, 1964, the first BASIC program ran on a timesharing system. Two Dartmouth University mathematics professors, John Kemeny and Thomas Kurtz, were responsible for this major event in computing history. The timesharing concept, pioneered by Fernando Corbato and John McCarthy at MIT, would enable a new breed of users to have better access to, and quicker turnaround time on, the computers of the day. The Dartmouth Time-Sharing System (DTSS) scored big points with students who became computer literate almost overnight. What those novice users needed next was a user-friendly language to make real use of that newfound literacy. Even before the DTSS went live, Kemeny began work on a compiler that would solve this problem. The result was the Beginner's All-Purpose Symbolic Instruction Code, developed by both Kemeny and Kurtz. BASIC, which eased the process of debugging and changing programs, soon became the bible for beginners in computing. Kemeny had his own beginnings in Budapest, Hungary, where he was born in 1926. After emigrating to the U.S., he enrolled at Princeton University, and earned a BA and a PhD in math. While working on his doctorate at Princeton in 1948, Kemeny was Albert Einstein's research assistant at the Institute for Advanced Study. In the early 1950s, Kemeny joined the Dartmouth faculty. There, he has held various positions, including that of college president from 1970 to 1981. In 1985, Kemeny and Kurtz developed True BASIC, a more powerful version of their legendary language.

Jack Kilby

Jack St. Clair Kilby, the co-inventor of the integrated circuit (IC), is the first to admit that this designation was gained by default. The 63-year-old Kilby was indeed the first to conceive of integrating transistors, resistors, and capacitors on a single chip of germanium while at Texas Instruments in 1958, but he didn't get around to developing a chip on which the devices could be interconnected, except by hand. In 1961, the U.S. Patent Office ended up granting the patent to Robert Noyce of Fairchild Semiconductor, Cupertino, Calif., whose description for interconnection was ruled to be adequate. Noyce ultimately won the 10-year patent battle, and the two companies decided that both men would be credited as co-inventors of the IC. Kilby later went on to adapt the integrated circuit for the Pocketronic, the first pocket calculator. Introduced by TI in 1971, the successful product weighed 2½ pounds and cost a hefty $250 back then. The soft-spoken inventor held various IC development positions at TI until he left in 1970. A year earlier, Kilby had been honored with the National Medal of Science. In 1978, he became a distinguished professor of electrical engineering at Texas A&M University, College Station. Three years earlier, the inventor had begun work on a unique solar energy project. TI acquired the rights to the technique but never marketed it. In 1981, Kilby was inducted into the National Inventors Hall of Fame.



Donald Knuth

At 49, Donald Knuth is already a world-re-nowned computer scientist, writer, musician, and typography expert. The multitalented professor of computer science at Stanford University has been called the foremost computer scholar in the world. The Milwaukee-born Knuth, often credited with having done more than anyone else to build computer science into an independent discipline, is the author of the definitive work in the field, *The Art of Computer Programming*. He has finished three volumes in the seven-volume series, which won't be wrapped up for another two decades. Dubbed the "bible of computer science," Knuth's major work has been translated into Chinese, Rumanian, Japanese, Spanish, and Russian. In 1974, it earned him the Association for Computing Machinery's A.M. Turing Award, and in 1979, he was the recipient of the National Medal of Science. A Renaissance man in real time, Knuth is also a fiction writer, a composer of music, and an inventor of two major computer typography systems. Frustrated by the messy appearance of his own book galleys, Knuth put his methodical mind to work devising TeX, the first standard language for computer typography, and Metafont, a system that applies mathematics to the design of alphabets. Knuth turned his designing talents into building an eight-foot-high pipe organ that stands in the living room of his Stanford campus home. After finishing off the last books in his preeminent programming series, Knuth plans to turn his considerable talents to the composition of music.

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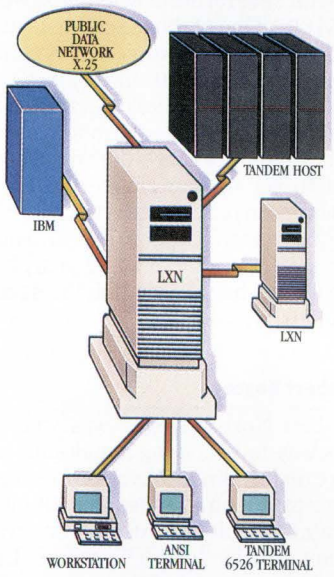
GOOD CONNECTIONS.

The LXN system integrates easily into the Tandem transaction processing network. You can access



both Tandem host applications and UNIX applications, as well as other hosts through SNA or X.25. You can connect PCs to LXN through Ethernet LANs, then LXN to other systems. A MS-DOS file server provides availability benefits of LXN to PC users.

HIGH AVAILABILITY.

Tandem is the first to bring OLTP features to UNIX in this price range. The system can support two mirrored disks. If one fails, the other takes over. In case of power failure, an uninterruptible power supply will run the entire system for up to five minutes. It will also send everything in memory to disk. When power is restored, auto restart resumes where you left off, maintaining data integrity.

APPLICATION POWER AND PORTABILITY.

Now you can run your UNIX applications and access the Tandem OLTP network—all from any workstation. The power comes from a 32-bit microprocessor. It's backed by a 1.6 megabyte floppy disk drive, 80 or 170-megabyte hard disk storage and a 60-megabyte streaming cartridge tape drive.

EASY TO EXPAND.

As you add users, add processor and memory boards. In a fully configured system, memory can expand to 16 megabytes, with 510 more megabytes of hard disk storage. LXN can support up to 32 users and take a huge workload off your mini or mainframe.

EASY TO SERVICE.

A menu-run test allows office workers to check out the entire system. All key components are field replaceable. Diagnostics can be run locally or remotely from a Tandem service center.

EXTEND YOUR TANDEM NETWORK. OR START ONE.

Now it's easily affordable. Whenever there's a need for constantly current information, efficient expandability and unbeatable price performance, Tandem technology proves consistently superior. Compare us to any other OLTP system. You'll see why companies in every major industry choose Tandem.

For information, write: Tandem Computers Incorporated, 19191 Vallco Parkway, Loc. 4-31, Cupertino, CA 95014. Or call 800-482-6336.

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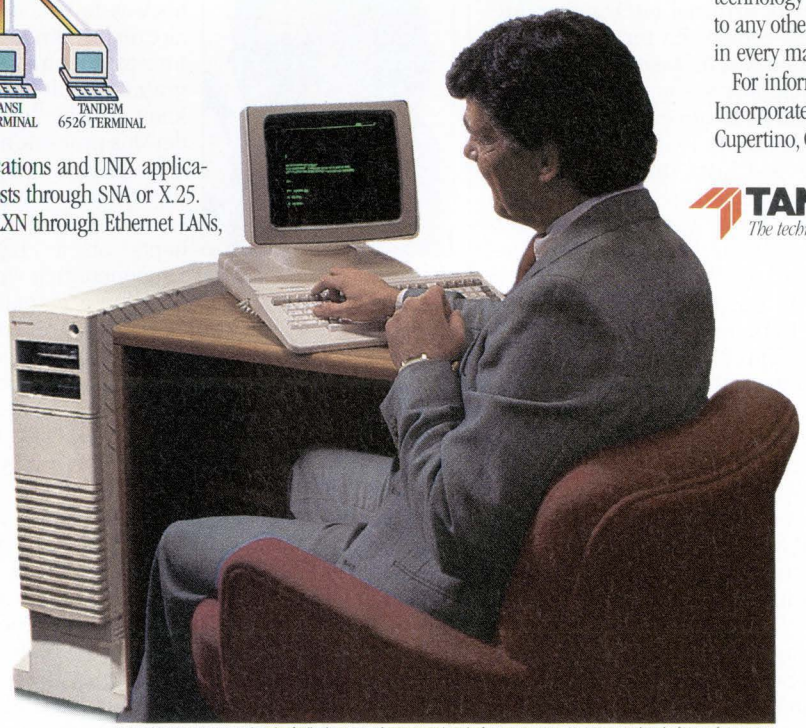

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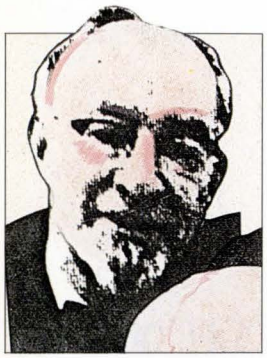
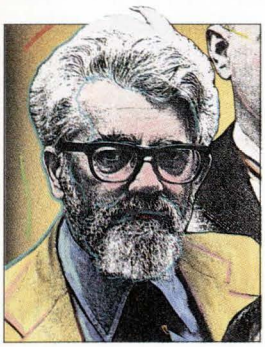


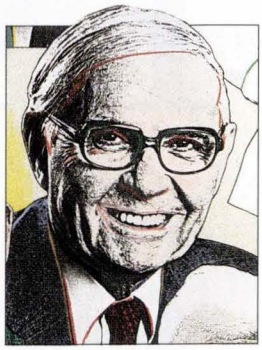
John V. Mauchly

John V. Mauchly had a dream—a dream shared by J. Presper Eckert Jr. These two electrical engineering geniuses realized that dream in February 1946 when their invention, the Electronic Numerical Integrator and Computer (ENIAC), was unveiled. The 30-ton ENIAC was a speed demon, performing mathematical computations 1,000 times faster than any device of its day. After ENIAC, the dynamic developers from the University of Pennsylvania went to work on the Electronic Discrete Variable Automatic Computer (EDVAC). Snubbing offers from IBM, Mauchly and Eckert founded their own firm, Electronic Control Corp., where for Northrop Corp. they built the Binary Automation Computer (Binac), the first stored-program computer. Binac, finally completed in August 1949, was almost $200,000 over budget. Eckert and Mauchly picked up the tab and went to work on a far more significant project, the Universal Automatic Computer (Univac). The first commercial general purpose processor, Univac was completed under Remington Rand's auspices in 1951. Eight years later, Mauchly left the renamed Sperry Rand and his partner of 18 years to form Mauchly Associates. While working in his own company, Mauchly developed the critical path method (CPM) for job and resource scheduling. In 1968, he set up Dynatrend, which specialized in forecasting weather and stock market trends. When he died in 1980 at the age of 73, Mauchly left a technological legacy few could rival.



John McCarthy

John McCarthy has been called the father of artificial intelligence. McCarthy coined the term AI in 1955 when he was an assistant professor of computer science at Dartmouth College in Hanover, N.H. It was at Dartmouth in 1958 that McCarthy developed Lisp, the first programming language for symbolic computation. Some say that Lisp was created by accident. McCarthy vehemently denies this, saying that Lisp "is a representation of common sense knowledge." The Boston-born McCarthy received his BS degree in math in 1948 from the California Institute of Technology in Pasadena. Three years later, Princeton University awarded him a PhD in mathematics. In the early 1960s, when he was at the Massachusetts Institute of Technology, McCarthy began developing the concept of timesharing. In 1971, he was honored with the Association of Computing Machinery's A.M. Turing Award. McCarthy, a professor of computer science at Stanford University since 1962, has been director of the school's Artificial Intelligence Laboratory since 1966. Often described as an eccentric, enigmatic personality, McCarthy is currently working on nonmonotonic methods that are aimed at helping computers "reason" more like humans. He has continued to be active in the field of artificial intelligence, teaching courses at both Stanford and MIT. He believes the level of interest in artificial intelligence is increasing all the time. But will the technology ever be universally used? "Sure," declares the 60-year-old computer scientist, "within five to 500 years."



William F. Norris

William F. Norris, founder and former chairman of Control Data Corp., has taken on some very big and controversial projects during his more than 40 years in the computer business. Founding a multimillion-dollar corporation, winning an out-of-court settlement against IBM, and spawning the supercomputer industry are just a few of the many achievements of this Red Cloud, Neb., native. Norris was graduated from the University of Nebraska in Lincoln with a degree in electrical engineering in 1932. In 1946, he launched Engineering Research Associates, which was bought by Remington Rand six years later. After Remington Rand and Sperry merged in 1955, Norris became vp and general manager of Univac operations. Along with several other scientists, Norris left Sperry in 1957 to found CDC. One of those scientists was Seymour Cray, who was given a free rein by Norris to develop a supercomputer line. This included the 6600, in its time the most powerful machine ever built. Other CDCers objected when Norris wanted to move the company into the peripherals and computer services sectors, nor did they share the social concerns that prompted Norris to set up the pioneering Plato educational project and various urban renewal efforts. The criticism escalated in 1986 after CDC reported losses of $567.5 million. The 76-year-old Norris, who retired that same year, has held fast to the ideas and ideals that have made him the social conscience of the computer industry.

Robert Noyce

Robert Norton Noyce was well on his way to becoming a multimillionaire on July 30, 1959, the day he filed for a patent on a semiconductor integrated circuit that used what was known as the "planar" process. Under this process, a flat plane of oxide was spread over silicon to facilitate the wireless connection of two transistors and other circuit components on a chip. The resulting microchip was the crucial component that would fuel the ensuing electronics era. It also fueled a patent dispute between Noyce and IC co-inventor Jack Kilby of Texas Instruments. Noyce, who won the case, designed his integrated circuit while he was general manager of Fairchild Semiconductor, Cupertino, Calif., which was just down the street from his former employer Shockley Laboratories. Leaving Fairchild in 1968, Noyce and Gordon Moore, another Shockley defector, supplemented their own funds with $30,000 in capital from Arthur Rock to form Intel Corp. in nearby Santa Clara. Intel, which initially concentrated on memory devices, switched over several years later to microprocessors, which were invented by Ted Hoff. The company's stock soared, its 1978 sales of $66 million three times what they'd been in 1972. Noyce became chairman of the Semiconductor Industry Association in the late '70s. Several years earlier, in 1974, he had turned the day-to-day management of Intel over to Moore and Andrew Grove. The 59-year-old Noyce received the National Medal of Science in 1980 and the National Medal of Technology this past summer.

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The newest member of the Tandem NonStop family can run a fully distributed network. You can start with a single-processor system ideal for small applications. You can expand to two, four and six-processor systems, with over 10 gigabytes of memory, enough for hundreds of users at each node in your network.

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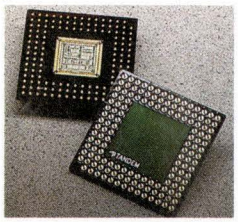


So does everything else. Our single-processor system operates with only two boards. The processor board consolidates over 1,000 integrated circuits in a six-chip set and comes with four megabytes of memory. A single integrated controller board supports disk, tape, communications and remote maintenance.

EASY MAINTENANCE, REMOTE DIAGNOSTICS.

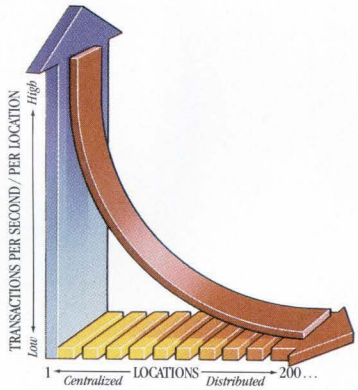
Special software does all the work, so you can maintain it yourself, let us do it, or we can do it cooperatively. All critical components can be replaced without tools by any office worker. They can be easily replaced without interrupting the application. That means fewer service calls that take less time. Other software allows remote diagnostics from Tandem service centers.

ONE SOFTWARE FITS ALL.

Tandem's unique, parallel architecture turns all systems into one system. This top-to-bottom compatibility means you can change the size of the system without changing the application software.

INTRODUCING NonStop SQL™ DATABASE TECHNOLOGY.

Tandem has now combined SQL productivity and high-performance OLTP in the same relational database management system. Users can read, write and update data anywhere in the Tandem network with total data integrity. They also have local database autonomy so that local processing continues when other parts of the database in the network are unavailable.



High performance at any level. Only Tandem is equally productive whether you're processing transactions in high volume from a central site or many distributed sites.

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Circle 35 on Reader Card

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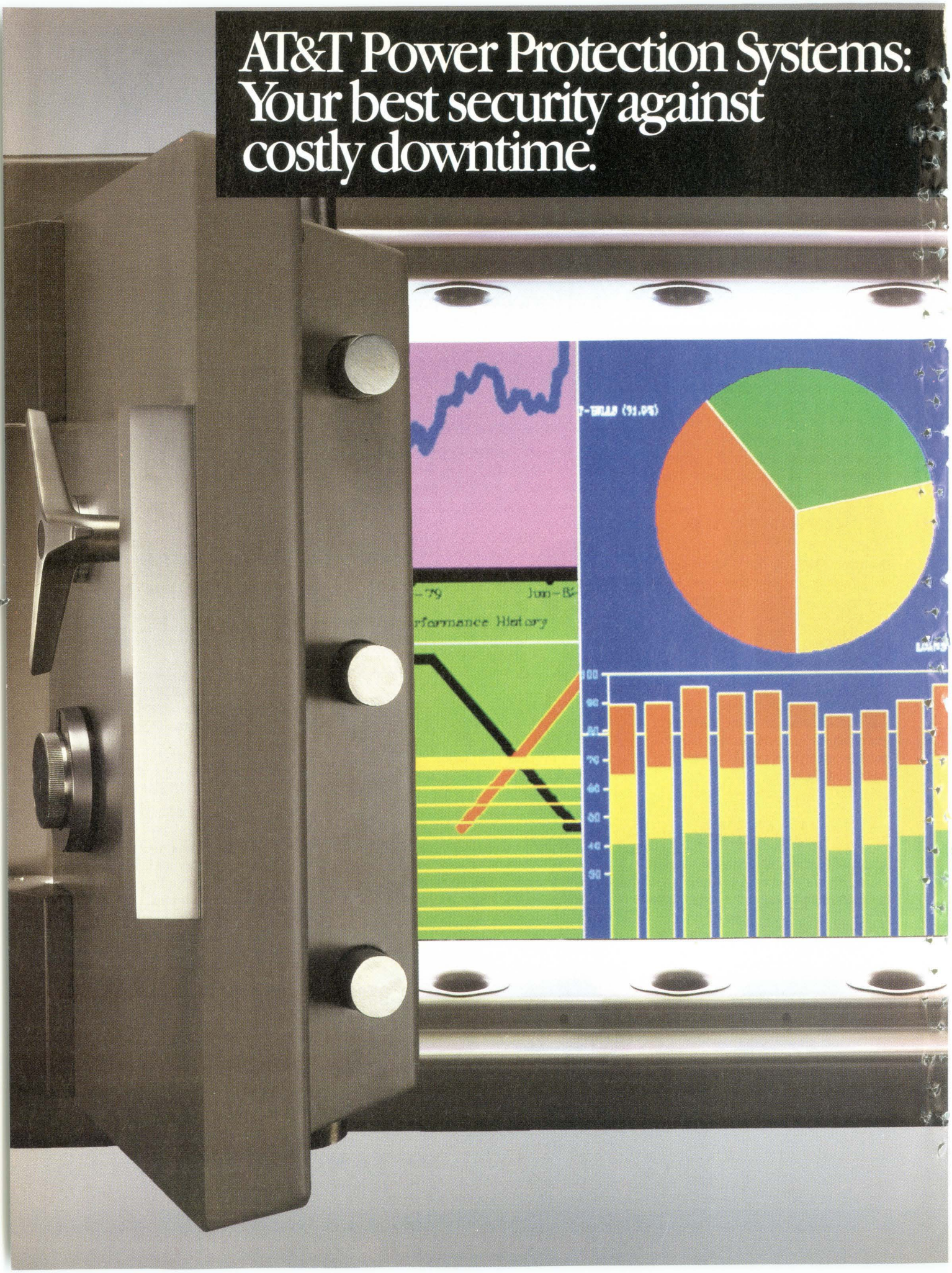

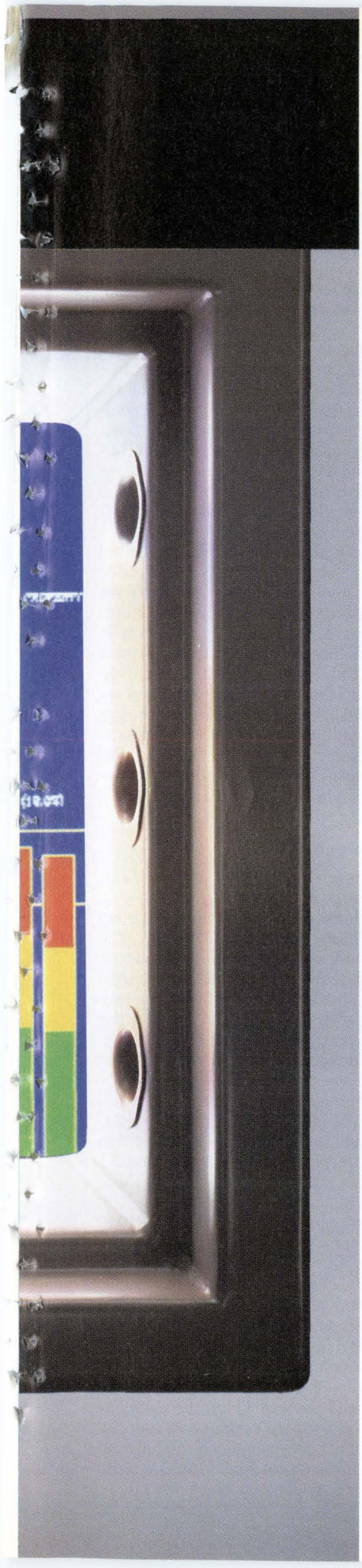

Eliminate the cause of up to 50% of your computer downtime: power disturbances.

Power disturbances, brief and imperceptible, cause very visible data loss, data errors, and equipment damage, all resulting in costly downtime.

According to AT&T Bell Laboratories and IBM research, a typical computer site experiences as many as 135 commercial power disturbances a year, accounting for up to 50% of all computer downtime.

The protection solution.

AT&T offers two product lines to combat these disturbances: the Uninterruptible Power System (UPS) and the Power Line Conditioner (PLC). Each effectively eliminates power fluctuations, including noise, transients, peaks, brownouts, and distortions. The difference being that the UPS includes a built-in battery reserve for protection against blackouts. The UPS is available in 1, 3, 5 and 10 KVA power ranges. The PLC is available in 3, 5 and 10 KVA models.

A 50-year advantage.

Why specify AT&T's power protection equipment over that of other manufacturers? Because AT&T has an unmatched 50 years of experience in manufacturing power equipment. And, because AT&T also designs and manufactures computers, we have a unique understanding of what should go into a superior power protection product.

For instance, our parallel processing architecture offers reliability few others can provide. It also maximizes cost-efficiency: less power is needed to run our systems, and heat loss is substantially reduced.

Easy does it.

AT&T UPS and PLC power protection systems are easy to install, need no operator, and require no scheduled maintenance.

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Fast delivery.

AT&T is ready to ship from stock. Once our Dallas facility has your order in-hand, we'll have your system speeding on its way to your site.

So for maximum security against power disturbances, along with low-cost, trouble-free performance, call AT&T at **1 800 372-2447** or mail the coupon below. Let us show you how to turn expensive downtime into productive uptime.

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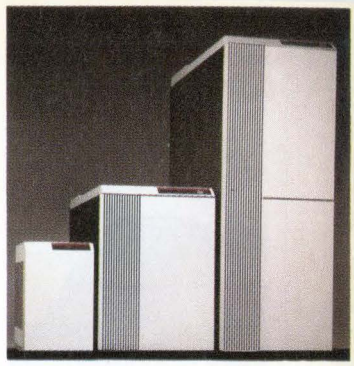

AT&T's UPS is available in 1, 3, 5 and 10 KVA models.

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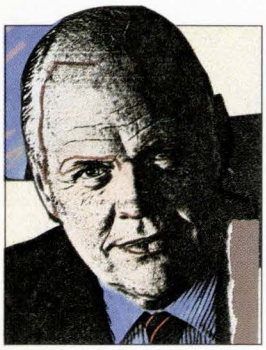


Kenneth H. Olsen

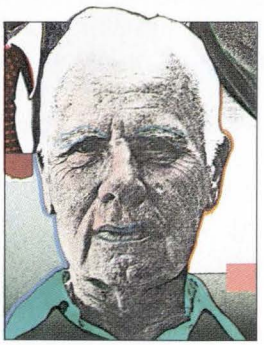
Kenneth H. Olsen has come to personify the word tenacious. As the founder, in 1957, of Digital Equipment Corp., Olsen struggled to create a computer company that few thought would ever challenge the high and mighty IBM. But Digital did just that. With the power of the minicomputer and the perseverance of its leader, the firm grew into a booming $9.3 billion business. Olsen received his technical training at MIT, where he earned a BS and an MS in electrical engineering during the 1950s. When he was a graduate student at MIT, he built a special computer to test the magnetic core memory invented by Jay W. Forrester for the Whirlwind machine, the fastest computer of its time. Olsen's test runs proved that the core's magnetic properties were permanent and reliable. Core memory was then moved to the Whirlwind in the summer of 1953. To this day, Olsen has maintained his allegiance to engineering ideals, and has been a fierce guardian of those ideals at Digital. A large man with modest tastes, the 61-year-old entrepreneur is, in his own words, a champion of discipline and foresight. Olsen fostered that same discipline and drive in his top-notch engineering team, led by C. Gordon Bell. The group came up with the products—from the PDP minis to the VAX superminis—that proved there was a market for midrange systems that could service a host of applications, especially distributed processing. Olsen, who has been president since Digital's founding, has had that vision all along.

Claude E. Shannon

The 71-year-old applied mathematician Claude Elwood Shannon is one of the few men of science to be immortalized within his own lifetime. A "shannon," or measure of information content, was adopted by the International Standards Organization in 1975 in honor of this communications pioneer. Shannon was also a pioneer in computing, publishing in 1937 his MIT master's thesis on "A Symbolic Analysis of Relay and Switching Circuits," a paper that set the stage for the development of digital computers. Eleven years later, Shannon wrote "A Mathematical Theory of Communication," which is generally recognized as the foundation of information theory. Produced in 1948 while he was at Bell Labs, this landmark work is a remarkable document that has stood the test of time. A monograph from that same fruitful year entitled "Programming a Computer for Playing Chess," greatly influenced the design of computer games in subsequent years. Throughout his long career, Shannon has wed his algebraic theories to switching circuit technology to influence such diverse fields as computers, genetics, and cryptography. He refers to the interplay between mathematics and electrical engineering as the "story of my life." Shannon, who joined the faculty of MIT in 1958, became one of the founding fathers of the AI movement. In 1966, he received the National Medal of Science, 12 years before he retired from MIT as a Donner professor of science. The 20 years the mathematician put in at MIT was a productive period for Shannon and the information processing field that he was instrumental in advancing.

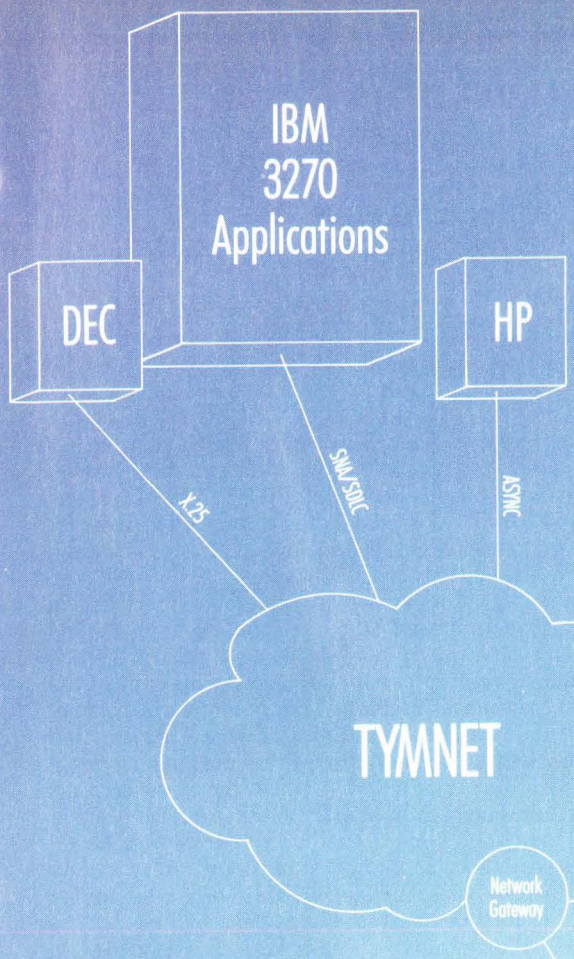
William Shockley

William Bradford Shockley led the Bell Telephone Laboratories' team that was awarded the 1956 Nobel Prize for physics for its work on the transistor, one of the twentieth century's most important inventions. Since its creation in 1947, the powerful little point-contact transistor has been used in one form or another to shrink the size and cost of computers. Using concepts developed during World War II, Shockley and fellow physicists John Bardeen and Walter Brattain found a way to combine "solid-state rectifiers" that could both detect and amplify radio waves. The result was a device that did everything a radio tube could do. It was called a transistor because it transferred current across a resistor. Shockley was born in 1910 in London, was graduated from the California Institute of Technology in 1932, obtained his PhD from MIT in 1936, and joined Bell Labs in 1937. He set up his own company in 1955, Shockley Semiconductor Laboratory, which ultimately spawned the "big eight" engineers who founded Fairchild Semiconductor. Shockley sold his firm in 1960 and headed for Stanford University, where he became the first Alexander M. Poniatoff professor of engineering and applied science. From 1965 to 1975, he was an executive consultant to Bell Labs. Shockley, who holds over 90 U.S. patents, was named to the National Inventors Hall of Fame in '74. Recently, he has been propagating his controversial theory of dysgenics, which posits intelligence to be a genetic trait of races.



George R. Stibitz

When DATAMATION wrote about George R. Stibitz 10 years ago, he had just received the first Emanuel R. Piore award from the IEEE. The award, sponsored by IBM, honored Stibitz for his outstanding achievement in the field of information processing. A decade later, the 83-year-old mathematician is fittingly inducted into DATAMATION's Hall of Fame for developing the Complex Calculator, the earliest form of the digital computer in the U.S. Stibitz earned his PhD in physics in 1930 from Cornell University. Seven years later, he joined Bell Laboratories and went to work on the Complex Calculator, later known as the Model 1 relay computer. The machine, the first to use excess-three code and binary components, began as a weekend hobby. The hobby produced an actual functioning piece of hardware in 1940 when various Teletype machines were attached as input devices—a sort of early timesharing system. At Dartmouth College, Hanover, N.H., the capital of timesharing, the first public demonstration of remote computer operation was staged in September 1940 using the Complex Calculator. Over the next few years, Stibitz made several proposals to Bell Labs to extend the design of the relay computer into new areas—requests that the company rejected. After building four more models of his computer for Bell Labs, Stibitz left the company to be an independent consultant in snowy Vermont. In 1966, he joined the Dartmouth Medical School to apply computers and mathematics to complex biomedical problems. Stibitz continues to do research at Dartmouth and he is writing a book.



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MCDONNELL DOUGLAS

Alan M. Turing

Alan M. Turing, the British mathematican who designed the world's first operational electronic digital computer during the '40s, is also recognized as the father of artificial intelligence for his early theoretical work on "thinking" machines. In 1937, Turing, who was educated at King's College, Cambridge, published his famous paper, "On Computable Numbers with an Application to the Entscheidungsproblem." In that paper he envisioned the Turing machine, which could be fed instructions from punched paper tape. Two years after being graduated from King's College, Turing was invited to Princeton University, where he earned his doctorate in 1938—the same year he rejected an offer to work with John von Neumann. Back in Britain, Turing was hired in 1939 by the U.K. government to try to crack the German Enigma code. He succeeded, eventually automating the process in 1943 with his first electronic digital machine, the Colossus. Two years later, he joined the U.K.'s National Physical Laboratory, working on the design of the Automatic Computing Engine, a scaled-down version of which was finally produced in 1950. After that, came Turing's seminal paper on AI called, "Computing Machinery and Intelligence," in which he proposed a definition of intelligence and thinking. In 1954, when Turing took his life at the age of 41 under mysterious circumstances, the world lost a genius whose work remains relevant even in today's world of advanced research.

John von Neumann

John von Neumann, the genius behind the stored program computer, was a generalist among contemporary scientists. He made important contributions to the foundations of mathematics, logic, quantum physics, computers, and game theory. A paper entitled "A Preliminary Discussion of the Logical Design of an Electronic Computing Instrument," which he coauthored in 1946 at Princeton University's Institute for Advanced Study (IAS), became the definitive paper in the computer field. The work delineated the design of a stored program computer, and von Neumann anticipated problems by proposing ingenious solutions. "He is the man who invented the computer," declares author Fred Greunberger who edited the von Neumann paper 17 years later for publication in DATAMATION. That paper led to the development in 1951 of the IAS or von Neumann machine, a digital, all-purpose electronic calculating device intended for scientific research. His work on game theory from 1928 until publication of his 1944 book, *The Theory of Games and Economic Behavior* (coauthored with Oskar Morgenstern), led to the application of game theory to business and war strategy. Born in Hungary in 1903, von Neumann emigrated to the U.S. in 1930 as a visiting lecturer at Princeton University, where he became a full professor in 1931. A consultant on the atomic bomb project in 1943, von Neumann was appointed in March 1955 to the Atomic Energy Commission, which awarded him the Enrico Fermi Award. An influential advisor on nuclear matters, von Neumann died of bone cancer on February 8, 1957.

An Wang

It may be said that An Wang, a native of Shanghai, China, got shanghaied in his first deal with IBM. The inventor of core memory stringing sold his patent for this key process to IBM for the bargain basement price of $500,000. This early brush with Big Blue taught Wang a valuable lesson he didn't forget: never relinquish control. His formal lessons were learned at Harvard University, where he earned his MS and PhD in applied physics and engineering in the late 1940s. Just a few years later, in 1951, he founded Wang Laboratories Inc. and, remembering his lesson of yesteryear, he did indeed keep control of the company he created. As a result, the 67-year-old Wang is one of the few computer industry entrepreneurs who can say his company is his in more than name. Majority voting control is held by Wang—now the company chairman—his wife Lorraine, and their children. One of those children, Frederick, is now president of the $3 billion firm. Frederick, who is the eldest son, has set out to put the company back in the black, a goal applauded by the founding father. While the father's control has been absolute, it has never been autocratic. Wang is still affectionately called "the Doctor" by his employees. While some consider his paternalism his greatest misstep as president, others see it as instrumental to the company's success. Wang has been the catalyst in each of the company's several transitions, personally involved on both the engineering and managerial sides.

Thomas J. Watson Sr.

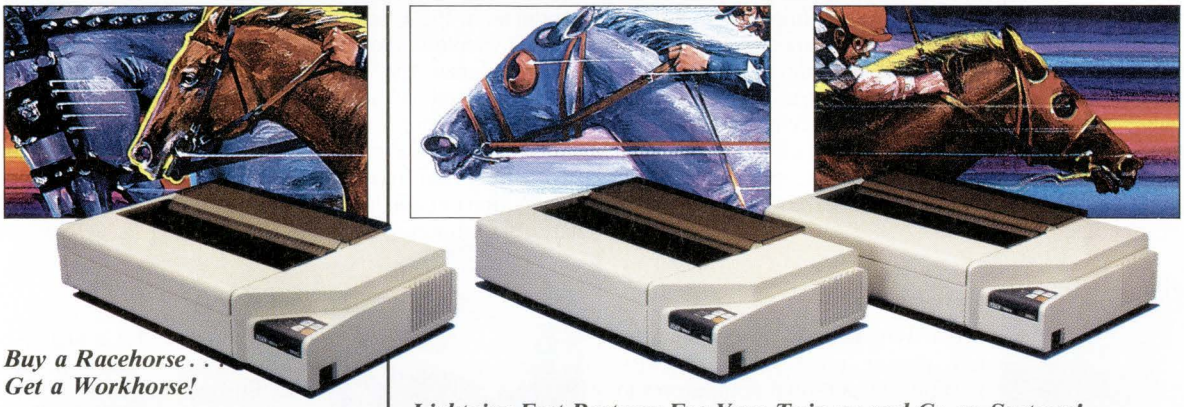
Thomas John Watson's most enduring contribution to computing was, of course, IBM, the company that has influenced our modern information processing era like no other. Watson, a former traveling salesman, liked to say that there is no invention, only discovery. What he discovered in the ailing Computing-Tabulating-Recording Co., which he renamed International Business Machines in 1924, was to many merely worthless clay, but in Watson's hands it became the stuff of legends. Through a combination of his own moral fervor, family spirit, and the carrot-and-stick techniques learned from NCR's legendary salesman John H. Patterson, Watson created a corporate culture, an esprit de corps that is the envy of the business world to this day. The Watson way was also admired by President Franklin D. Roosevelt, who offered two prestigious posts to the patriotic IBM founder during World War II: Secretary of Commerce and Ambassador to Great Britain, a job that Joseph Kennedy Sr. subsequently snapped up. It was largely through Watson's efforts and funding that the first programmable computer in the U.S., Howard Aiken's Mark I, was built. Watson's son, Thomas J. Watson Jr., became president of IBM in 1952. Two years later, the company, playing catchup with the Univac, came out with the popular 650 computer. Watson lived long enough to see the introduction of the 700 family, IBM's first production computers. When he died of a heart attack in 1956 at the age of 82, he still held the title of chairman of the company he had painstakingly created in his own image.

Printer Racing News

OTC Volume I, Issue #1

Announcing OTC's Triple Crown of American Thoroughbreds!

The 800 Series of* New *Dot Matrix Printers from OTC . . . On the Track and Ready to Run at 850 CPS!



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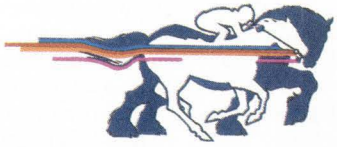

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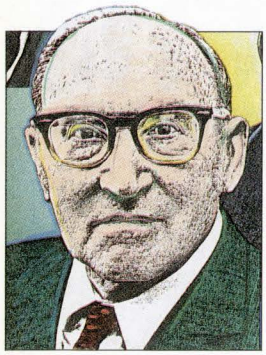
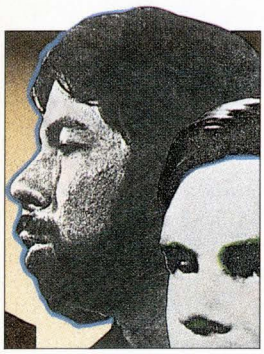


Maurice V. Wilkes

Although 74-year-old British computer pioneer Maurice Wilkes did not create the first stored-program machine, it was his design that led to the development of the world's first business computer. Educated at St. John's College, University of Cambridge, Wilkes became director of the Mathematics Laboratory at Cambridge after World War II. Four years later, his computer technology development team had come up with the Electronic Delayed Storage Automatic Computer (EDSAC), which stored 512 words of 34 bits each. The EDSAC, which boasted 3,000 electronic valves, could add two numbers in 70 microseconds, multiplying them in 8.5 milliseconds. But where the mighty machine really scored was in its storage—both programs and data could be contained in the same store, which allowed greater flexibility in programming. Working with engineers from the London bakery firm of J. Lyons & Co., the Wilkes team helped to build another machine, the Lyons Electronic Office (LEO) in 1951. Similar in design to the EDSAC, LEO was destined to become the first computer to be used purely for commercial data handling—the first business computer. Six years later, in 1957, Wilkes went on to become the first president of the British Computer Society. He then moved on to work for Digital Equipment Corp. in Britain. An internationally respected lecturer, Wilkes is currently a member of the research board of Italian computer manufacturer, Olivetti.

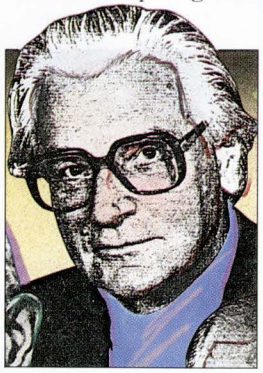


Steve Wozniak

Steve Wozniak, 37, is perhaps the one person most responsible for putting the personal computer and his home turf of Silicon Valley on the industry map. The brilliant and quirky computer whiz, affectionately known as Woz, designed both the Apple I and Apple II microcomputers that launched the home computer industry. It all began over a decade ago when Wozniak was at Hewlett-Packard, where he and Steven Jobs belonged to the company's Homebrew Computer Club. His tinkering bore big fruit—the Apple 1. The first to gobble that fruit was a Byte Shop, which placed an order for 50 machines. Wozniak teamed up with Jobs in 1976 to form Apple Computer Inc., which has taken an incredible journey from garage shop to multibillion-dollar concern in only a few years. Wozniak, however, hasn't always been along for the ride. More interested in engineering than management, he took hiatuses from Apple to pursue other things, such as earning a computer science degree under a fake name from the University of California, Berkeley, in the early '80s. A few years later, in February 1985, Wozniak left Apple to design a remote control home video device for his own company, CL-9 (Cloud 9). Critical of Apple management's seeming preference for the Macintosh over the popular Apple II, Wozniak vented his frustration and his desire to abandon the computer biz for good. "I really am through with computers," he vowed at the time. "There's a freedom in getting away." While Wozniak got away, he'll probably always retain that strong computer tie as the man behind the micro.

Hideo Yamashita

Hideo Yamashita, now 88 years old, designed and built calculation and von Neumann-type machines, which laid the foundation for the commercial computer industry in Japan. Without Yamashita's pioneering work, Japanese giants like Fujitsu, Hitachi, and NEC would have been unable to get their first computer wares to market as early as they did. Trained as an electrical engineer, Yamashita spent a year at MIT as a visiting associate professor back in 1936—one year before Claude Shannon, the famous applied mathematician, published his landmark master's thesis that set the stage for the development of the digital computer. Four years later, Yamashita was working on his own all-electrical statistical calculation machine, which used binary logic and relay circuits. Machines modeled on his invention were used by Japan's Bureau of Statistics for census taking in the late '40s and by Fujitsu a decade later in its early computing products. In 1950, Yamashita and a team from Tokyo University used vacuum tubes to create the first large electronic computer in Japan, the Tokyo Automatic Calculator (TAC). The memory-based TAC became the basis for the country's first all-transistor computers. Yamashita, the oldest inductee to DATAMATION's Hall of Fame, received his nation's highest honor in 1954: the award from the Japan Academy. He has also earned recognition outside Japan, serving as staff director of the International Computing Center in Rome.



Konrad Zuse

It wasn't until the mid-1960s that computer researchers in the U.S. and Europe discovered that the credit for developing the first automatic, programmable, digital computer should probably go to Konrad Zuse. In 1935, three years after he'd been graduated from the Berlin Institute of Technology with a degree in civil engineering, Zuse built his first machine, the mechanical V1, in his parents' living room. Drafted into the German army in 1939, Zuse worked on designing airplanes for the Luftwaffe. In his spare time, he created the electromechanical V2. Another version, the V3, completed in 1941, was the first fully functional, program-controlled, general purpose digital computer in the world. The V stood for versuchsmodell, which means experimental model. Zuse later renamed his first three computers the Z1, Z2, and Z3 in order to avoid confusion with the German rockets of the same name. Next came the more sophisticated Z4, which was the only Zuse Z machine to survive the war. After the war, Zuse developed Plankalkul, probably the first programming language. Zuse believed that the prototype language could be used for more than mathematical problems. A year later, in 1946, he tried to interest IBM in his work. But neither IBM nor anyone else expressed any interest until 1949, when Remington Rand Switzerland offered him support. By that time, however, Zuse had set up his own company, Zuse KG, where he continued to work full time until 1966. Today, the 77-year-old computer pioneer, who now lives in Hunfeld, a small village outside Frankfurt, devotes much of his time to painting.

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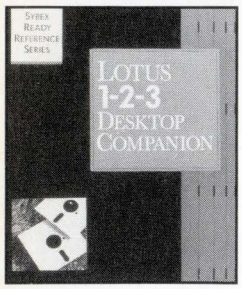

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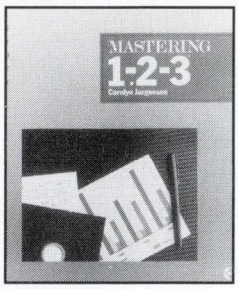

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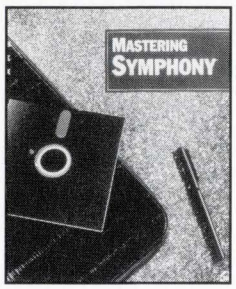

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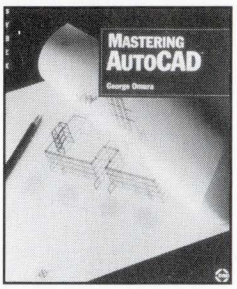

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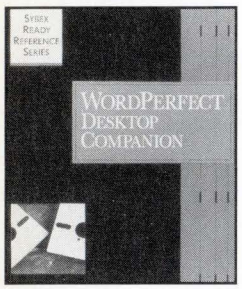

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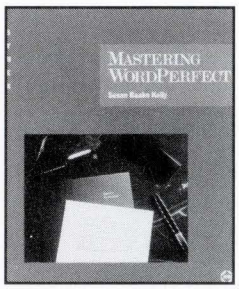

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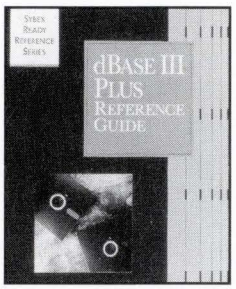

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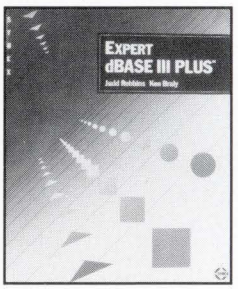

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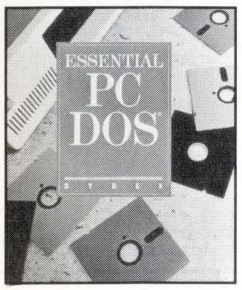

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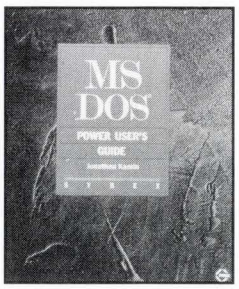

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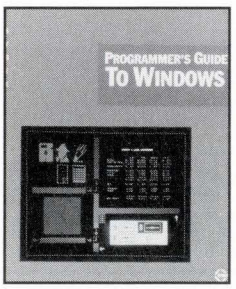

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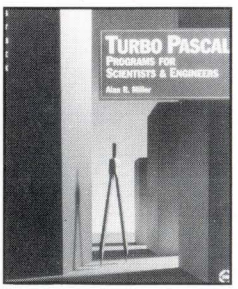

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Three Decades By the Numbers

BY PARKER HODGES

In an industry where numbers do much of the talking, it makes sense to let numbers describe some of the changes that have taken place since DATAMATION and this industry began growing up together. In 1957, there were only a few computers shipped, 700 or so. Still, that was a huge jump from the year before, when, according to industry veteran Frederic G. Withington, there were only 500 computers—total—in the U.S. But 1957 was a year holding extraordinary potential for this industry: the transistor was just about to enter the commercial mainstream, transforming all electronics and creating a platform upon which today's information industry would be built.

The industry's explosive growth did not take place in a vacuum, however. The world was changing even as computers changed the world. Figure 1 makes one trend very clear: for three decades, the United States and Western Europe steadily have been losing dominion over the world's gross production. Perhaps most surprising is that the largest percentage decline in the U.S.'s "market share" came during the boom years of the 1960s. Figure 2, describing a 15-year core within recent history,

FIGURE 1 Share of World GNP, By Percent

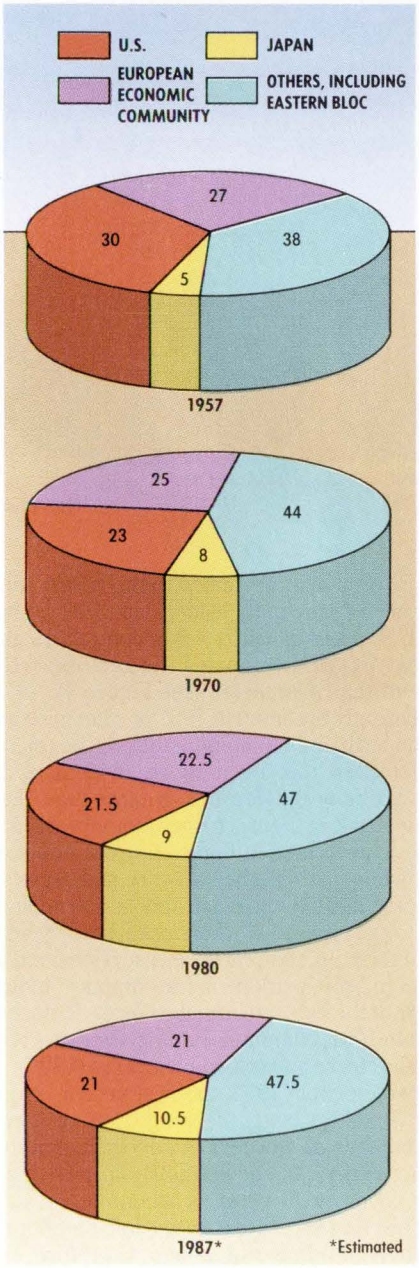


FIGURE 2 U.S. Share of Selected Technology Exports

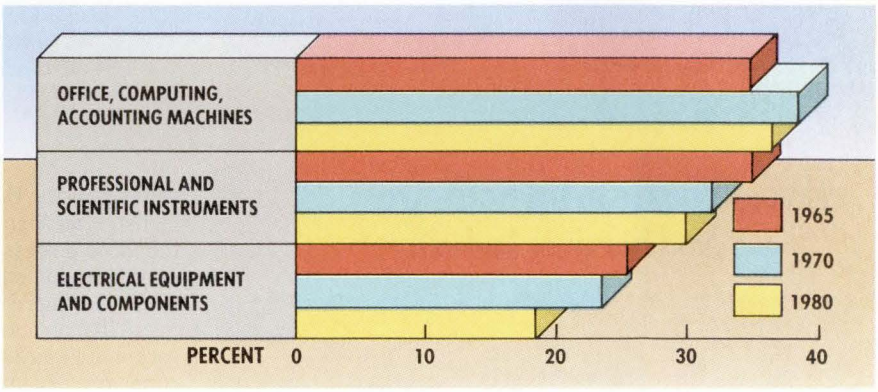
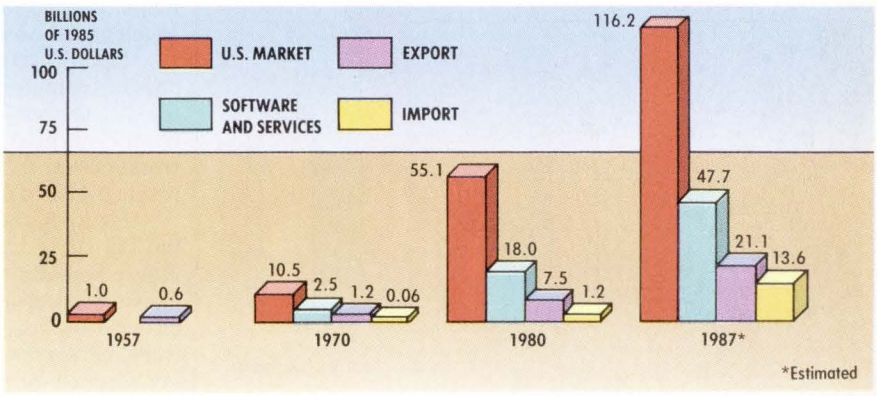


FIGURE 3 U.S. Computer Market—Exports and Imports



Charts by Hayes Cohen

FIGURE 4 U.S. Consumption of Micros, Minis, and Mainframes

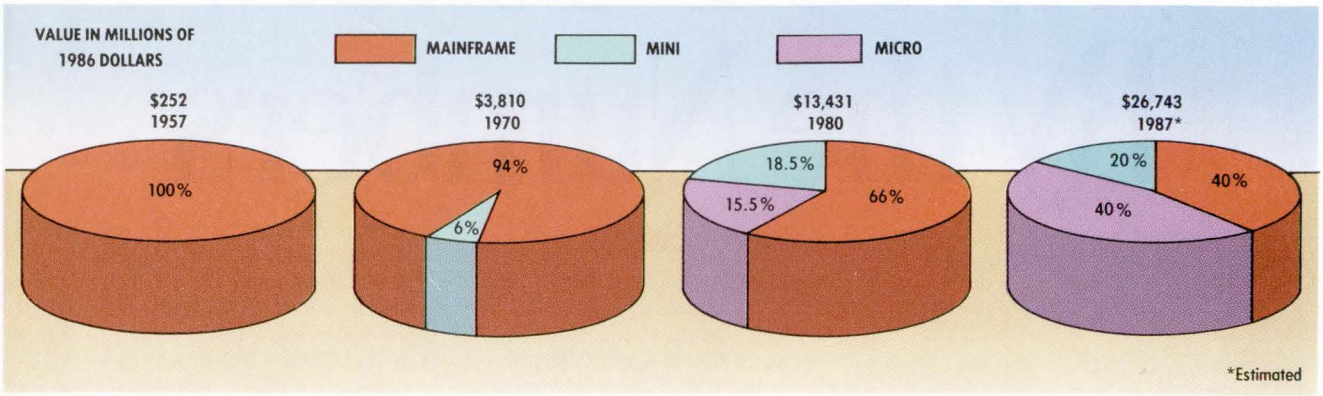


FIGURE 5 Shipments of Micros, Minis, and Mainframes

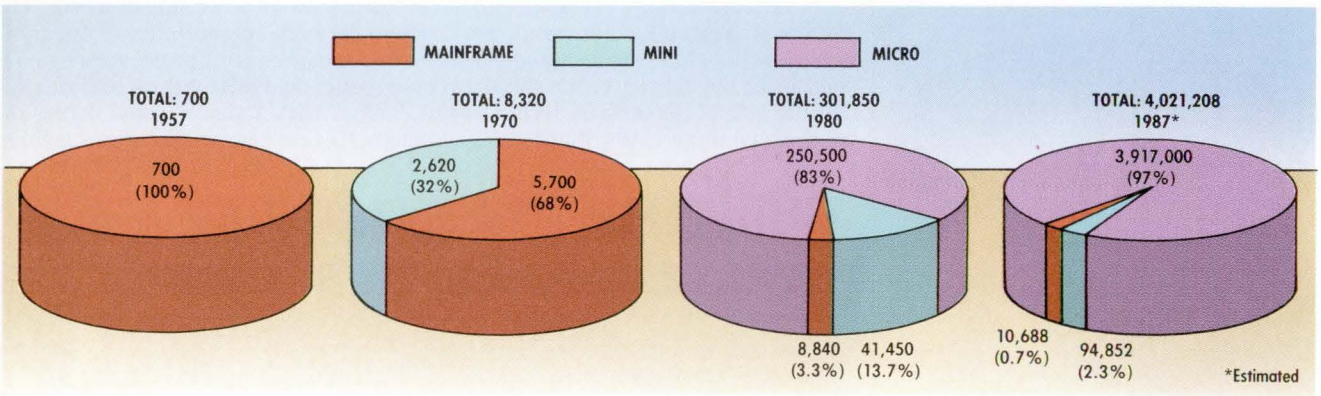
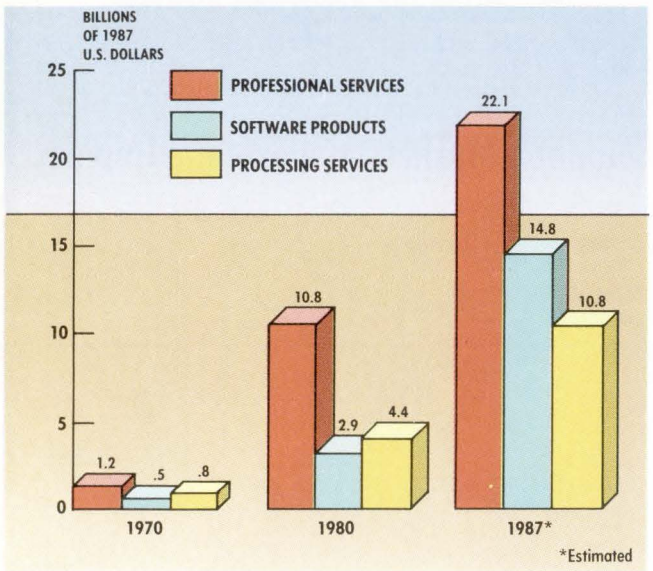


FIGURE 6 The Growing Software And Services Industry



shows how the U.S., in three markets linked to the information industry, has experienced decay in its leadership. Still, so far, the much discussed U.S. trade deficit is *not* in computers and related equipment: DATAMATION estimates the U.S. exported $7.5 billion more in 1987 than it imported (see Figure 3).

What no one apparently dreamed in 1957 is what is so apparent in Figure 4: the birth and blooming youth of the microcomputer. Figure 5 makes this even more evident: U.S. computer shipments are now 5,745 times greater than they were in 1957, and almost half of them are microcomputers. Another booming sector is described in Figure 6: from nonexistent in 1957 to $2.5 million in 1970, the software and services segment of the business this year will reach almost $50 million.

Figure 7 shows the number of workers employed by vendors of computer and telecom equipment and services and in the civilian labor force. In 1960, workers in the computer industry made up just 0.14% of the U.S. civilian labor force. Telecom workers were 0.11%. In 1987, computer industry workers represent 0.41% of the labor force and telecom workers 0.89%.

Figure 8's numbers begin in 1972, the first year in which the Bureau of Labor Statistics began keeping track of them. Figure 8 shows the number of workers in several computer industry occupations. Figure 9 shows how salaries have changed for those employed by the vendors of computers, software, and services. The chart shows the actual dollar amounts, not adjusted for inflation; in purchasing power, therefore, the

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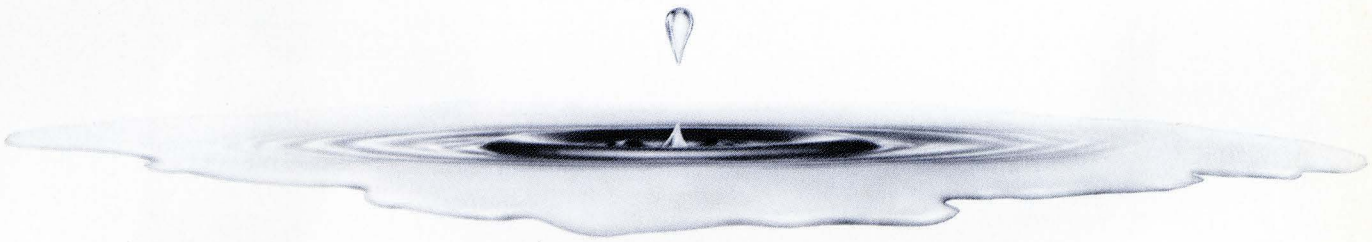

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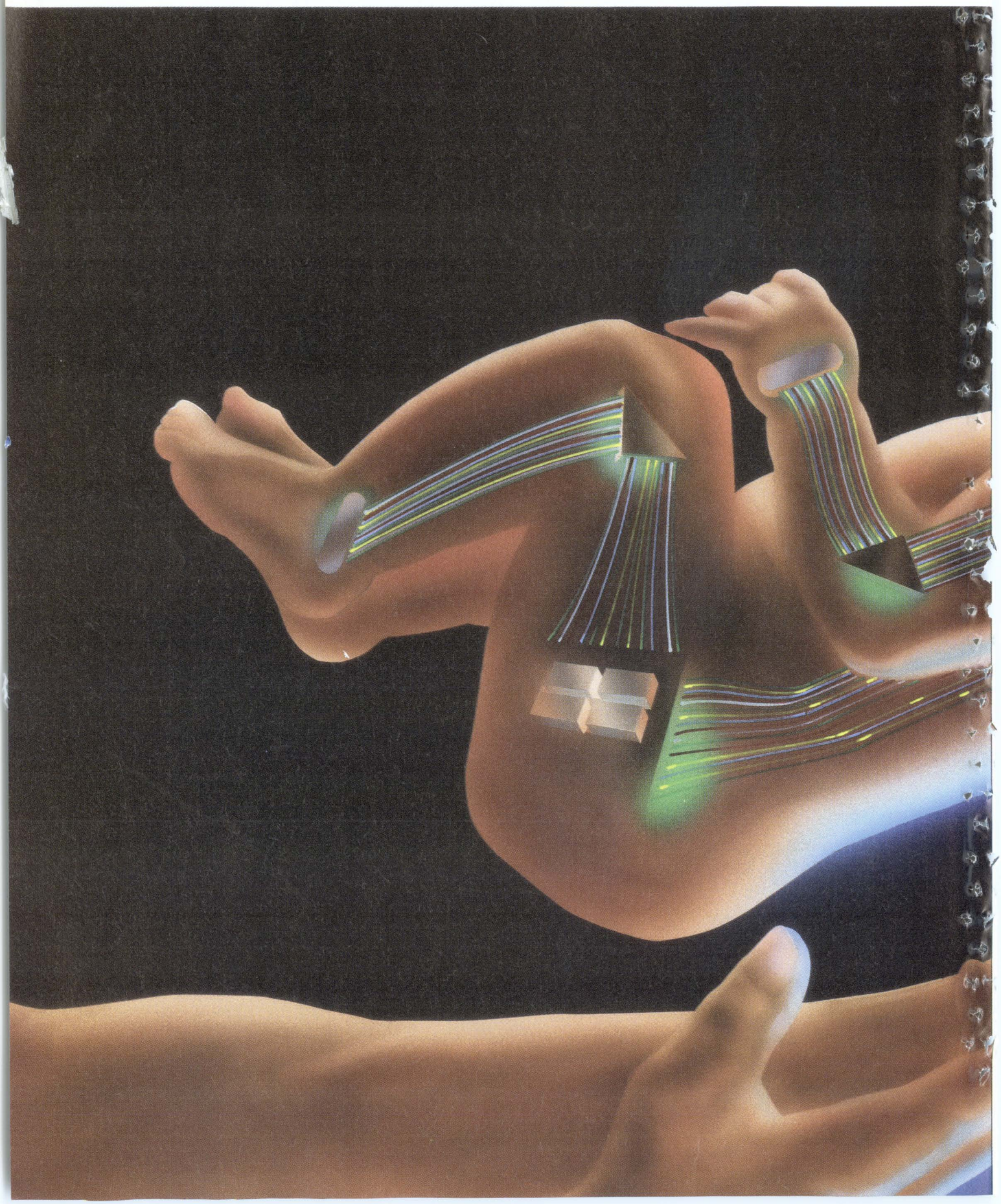

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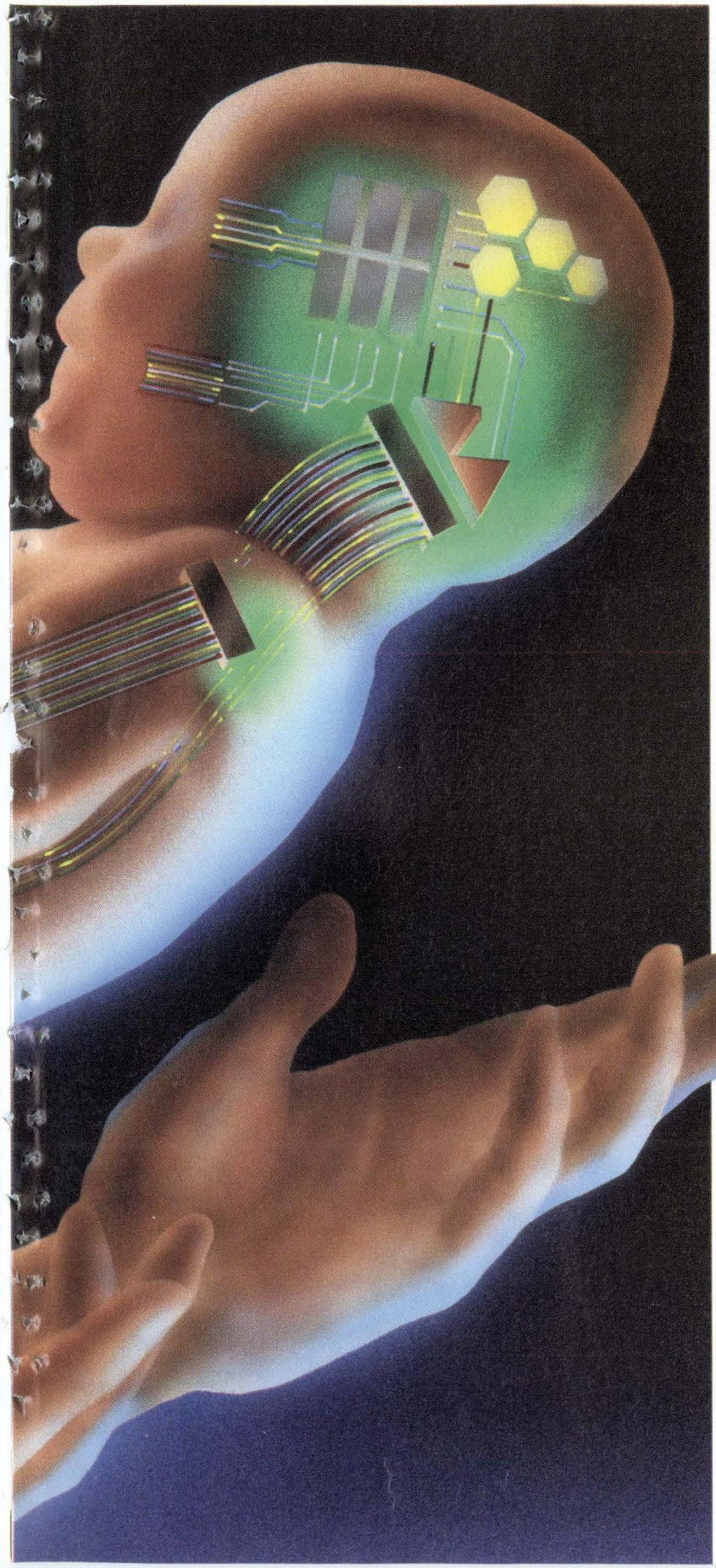

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FIGURE 7 Computer and Telecom Manufacturing Jobs

(AVERAGE ANNUAL EMPLOYMENT IN THOUSANDS)

	1960	1970	1980	1985	1987*
COMPUTER INDUSTRY	101	191	354	445	501
TELECOM INDUSTRY	820	1,106	1,236	1,058	1,079
CIVILIAN LABOR FORCE	69,628	82,771	106,940	115,461	120,126

*Estimated

employees. While these workers are on the front line of computer occupations, their productivity supports millions of other information workers. Clifford Nass of Stanford University, who has published widely on the sociology of work, told DATAMATION that in 1987 more than 43% of all civilian labor done in the U.S. can be classified as information work. Marcel Porat, in *The Information Economy: Definition and Measurement*, puts the percentage even higher. He suggests that in 1960 information workers made up 46% to 47% of the U.S. workforce. By 1980, almost 54% were information workers, and the percentage has remained relatively flat since then.

The basis for all this activity has been research and development. Figure 10 depicts the way in which U.S. investment in these vital activities has changed over the past three decades. Figure 11 shows how the U.S.'s most powerful trading rival is financing its own R&D activities, specifically how large a piece of Japan's basic information systems work is financed by its powerful PTT. In 1957, when the U.S. was already investing almost $700 million annually on computers, Japan was yet to begin

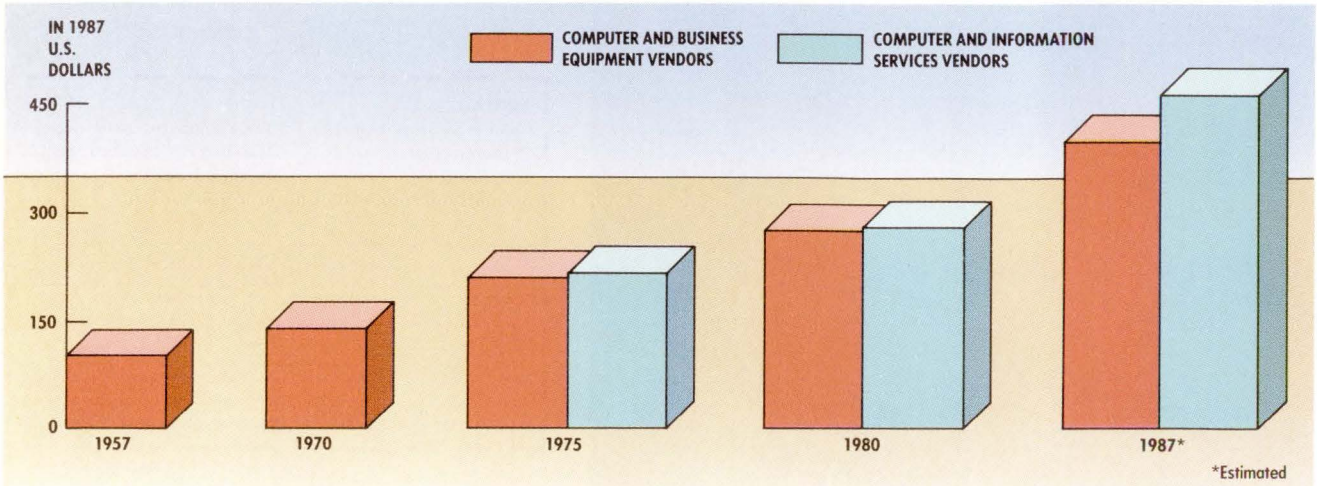
FIGURE 8 Employment in Some Computer Occupations

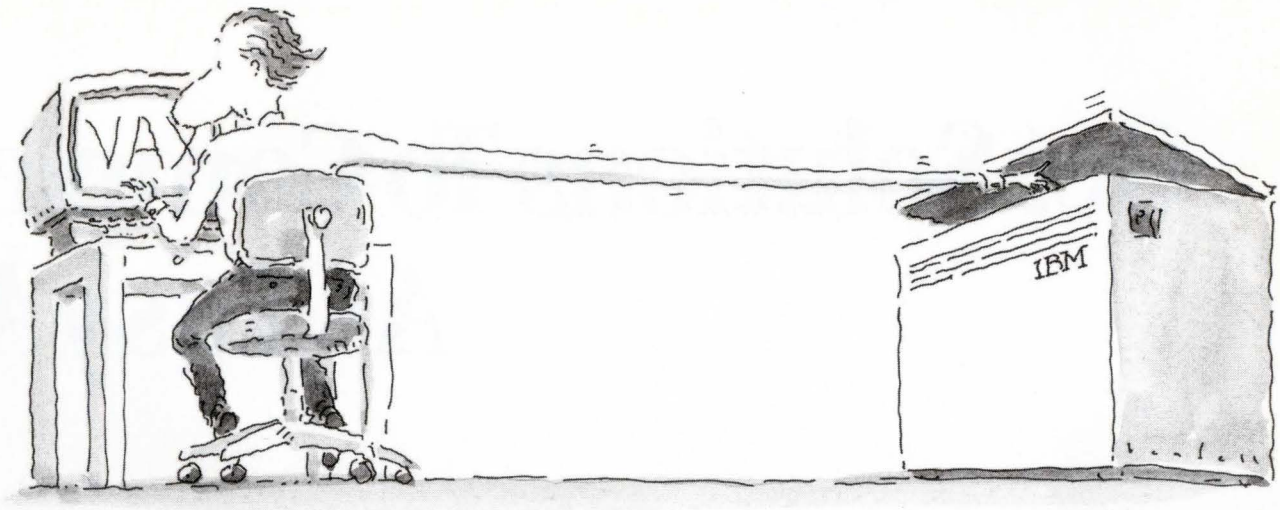
(IN THOUSANDS)

YEAR	TOTAL	SYSTEMS ANALYSTS	PROGRAMMERS	COMPUTER & PERIPHERAL EQUIPMENT OPERATORS	COMPUTER & KEYPUNCH EQUIPMENT OPERATORS*	COMPUTER SERVICE TECHNICIANS
1972+	792	75	188	199	284	46
1973	808	87	190	220	255	48
1974	855	99	203	251	251	51
1975	966	124	228	302	253	59
1976	1,000	139	235	295	279	52
1977	1,007	132	228	311	284	52
1978	1,155	155	255	403	277	65
1979	1,349	181	330	465	279	94
1980	1,448	205	351	535	271	86
1981	1,492	213	367	564	248	100
1982	1,712	242	434	588	364	84
1983	1,733	276	443	605	311	98
1984	1,815	300	455	630	320	110
1985	1,940	335	485	690	315	115
1987*	2,244	408	563	813	329	131

*Estimated +First year these statistics were compiled

FIGURE 9 Weekly Earnings by Industry Sector





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One report can draw on any number of dissimilar databases (see table).

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Databases

FOCUS can access any of these in a mainframe:

DB2	ADABAS	ISAM
IMS	MODEL 204	TOTAL
VSAM	QSAM	Teradata
SQL/DS	SYSTEM 2000	Britton Lee
IDMS	DATACOM/DB	FOCUS

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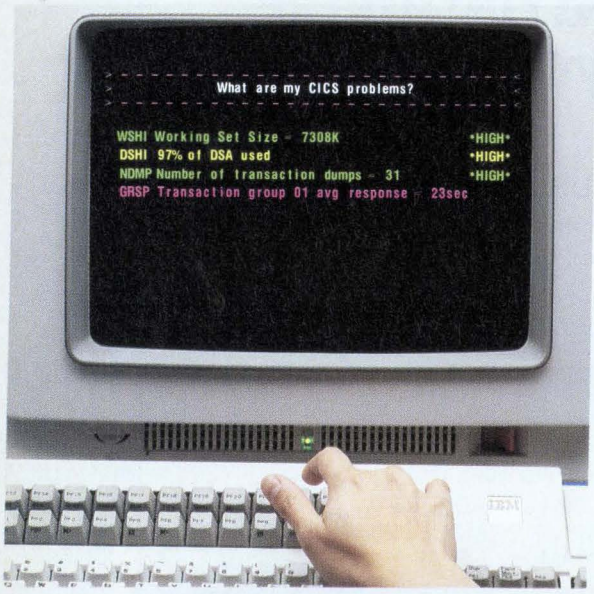
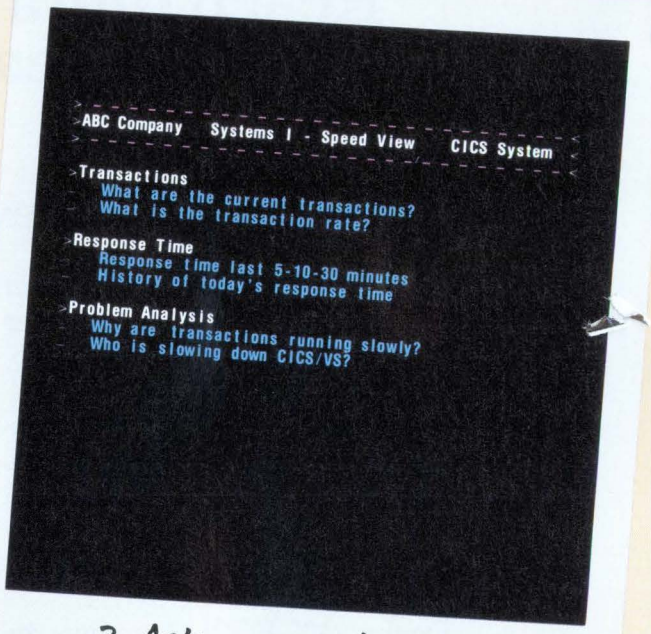


1. Identify a potential problem with Exception Analysis.



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If only there were a fast way to get solutions to potential problems before they lead to customer complaints.

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Speed View Menus

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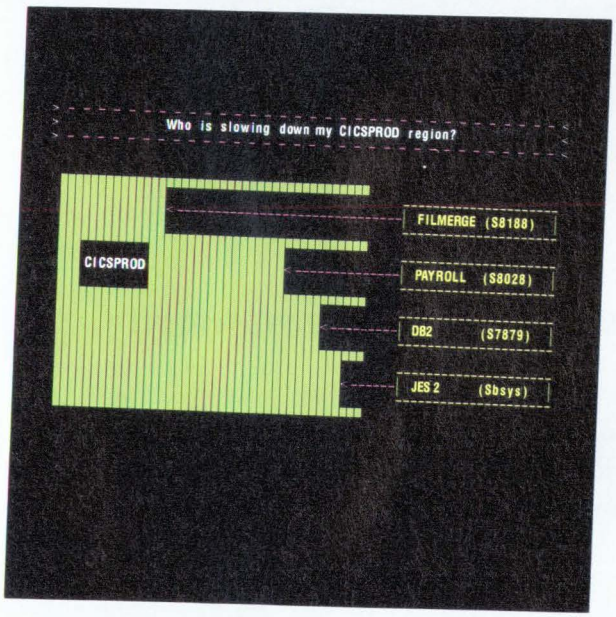
CICS Performance Problems 1, 2, 3.



3. Pinpoint the source of the problem with Impact Profiles.

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FIGURE 10 U.S. Computer R&D Spending

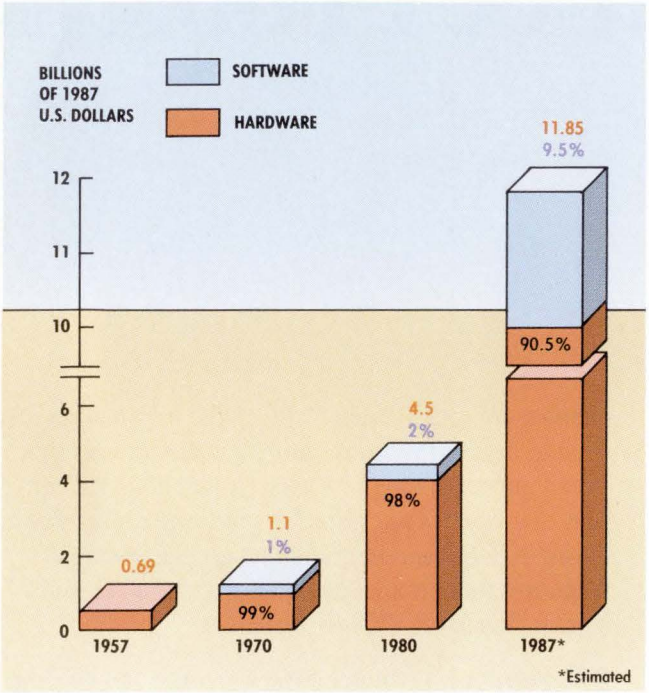
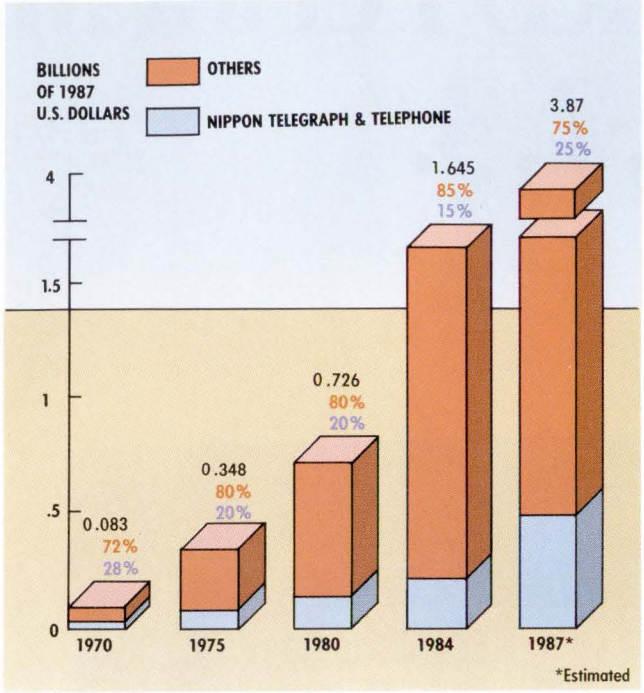


FIGURE 11 Japan's Info Technology R&D



$700 million annually on computers, Japan was yet to begin spending. By 1987, Japanese R&D investment still amounted to less than a third that of the U.S. Figure 12 shows the growth of the industry, the improved efficiency of computing, and the growth in programmers' productivity over three decades.

The last four charts all continue the story of the astonishing change in the cost of computing since the birth of the industry. Figure 13 shows that—while almost everything else was getting more expensive—the average yearly decline of the cost of various system elements over the past three decades ranged between 11% and 27%. As Figure 14 shows, however, inflation in the late 1970s played havoc with prices: for almost a decade, prices rose instead of fell. Still, as can be seen in Figure 15, the cost of a general purpose cpu now is about a third of what it was when DATAMATION began publication (using 1986 dollars and 1957 dollars, respectively). It seems fitting to close, in an issue that focuses on memories, on the cost of computer memory: as Figure 16 clearly shows, nowadays it costs a whole lot less to remember things than it did three decades ago. ■

These charts were assembled by Svein Borgersen of the International Ratio Group, Princeton, N.J. For some of the data in the charts, we are grateful to the following. Figures 1, 3: The U.S. Department of Commerce, International Trade Administration. Figure 2: U.S. Competitiveness in the World Economy, *Bruce Scott and George C. Lodge, Harvard Business School, 1985. Figures 3, 4, 5, 6, 7, 8, and 10: CBEMA Industry Marketing Statistics. Figures 6, 7, 8, and 9: The Bureau of Labor Statistics. Figures 11, 13, 14, 15, and 16:* Targeting the Computer, *Kenneth Flamm, The Brookings Institution, 1987. Figure 12:* Information Processing in the United States: A Quantitative Summary, *edited by Leslie Albin and Kathleen M. Gagne, AFIPS, 1985. Figures 13, 14, and 15:* Data Processing Technology and Economics, *Montgomery Phister Jr., Santa Monica Publishers, 1979.*

FIGURE 12 Indicators of Improvement

INDICATOR	1955	1965	1975	1985
INDUSTRY GROWTH	1	20	80	320
PRICE/PERFORMANCE	1	10^2	10^4	10^6
PROGRAMMER PRODUCTIVITY	1	2	2.7	3.6

FIGURE 13 Decline in Real Cost of Computer Hardware

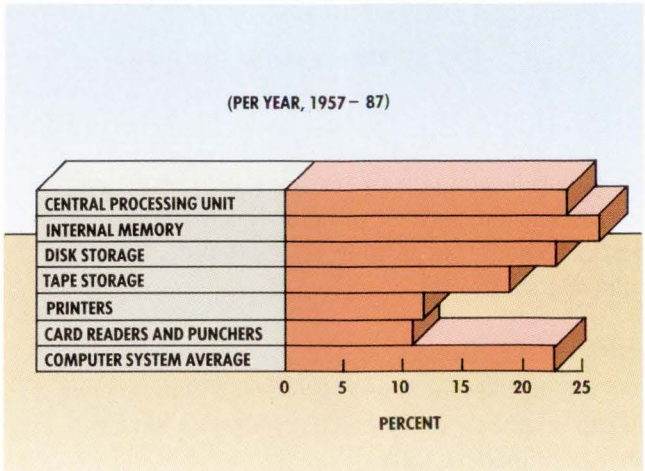


FIGURE 14 Cost Changes for an Average System Without Terminals (PER YEAR, 1957–86)

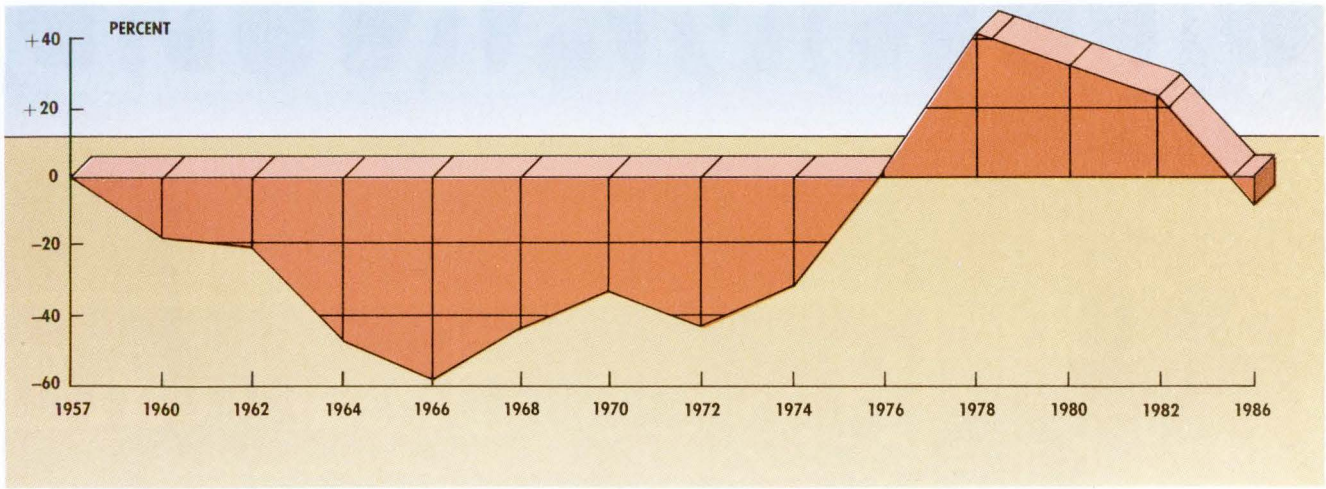
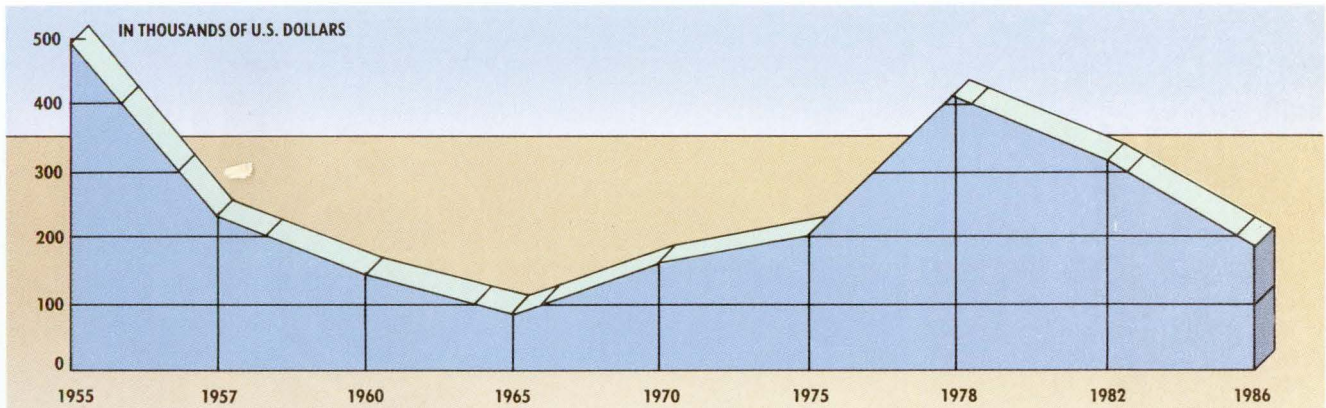
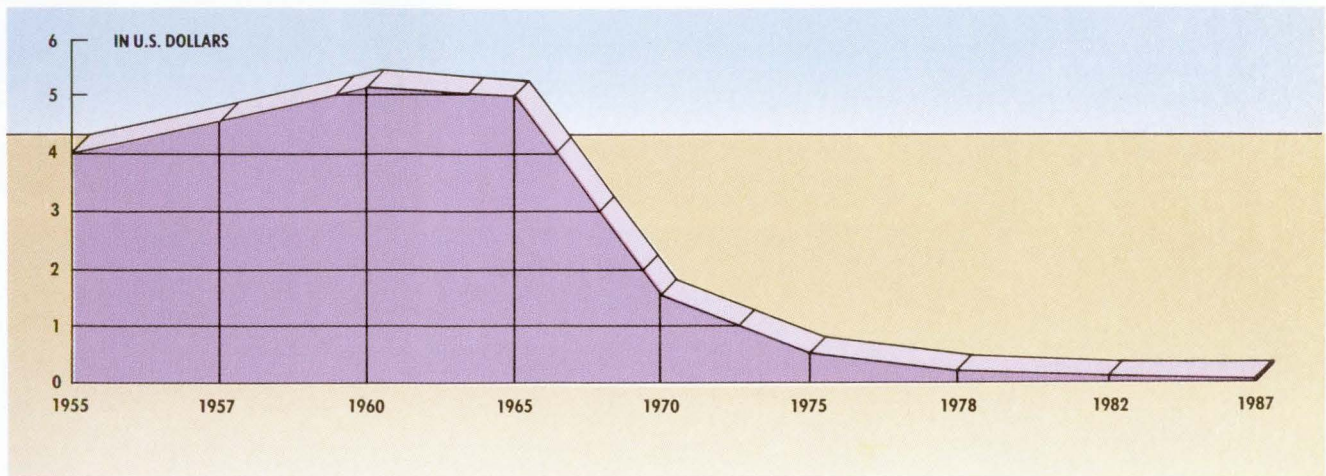


FIGURE 15 Average Price of Cpu*

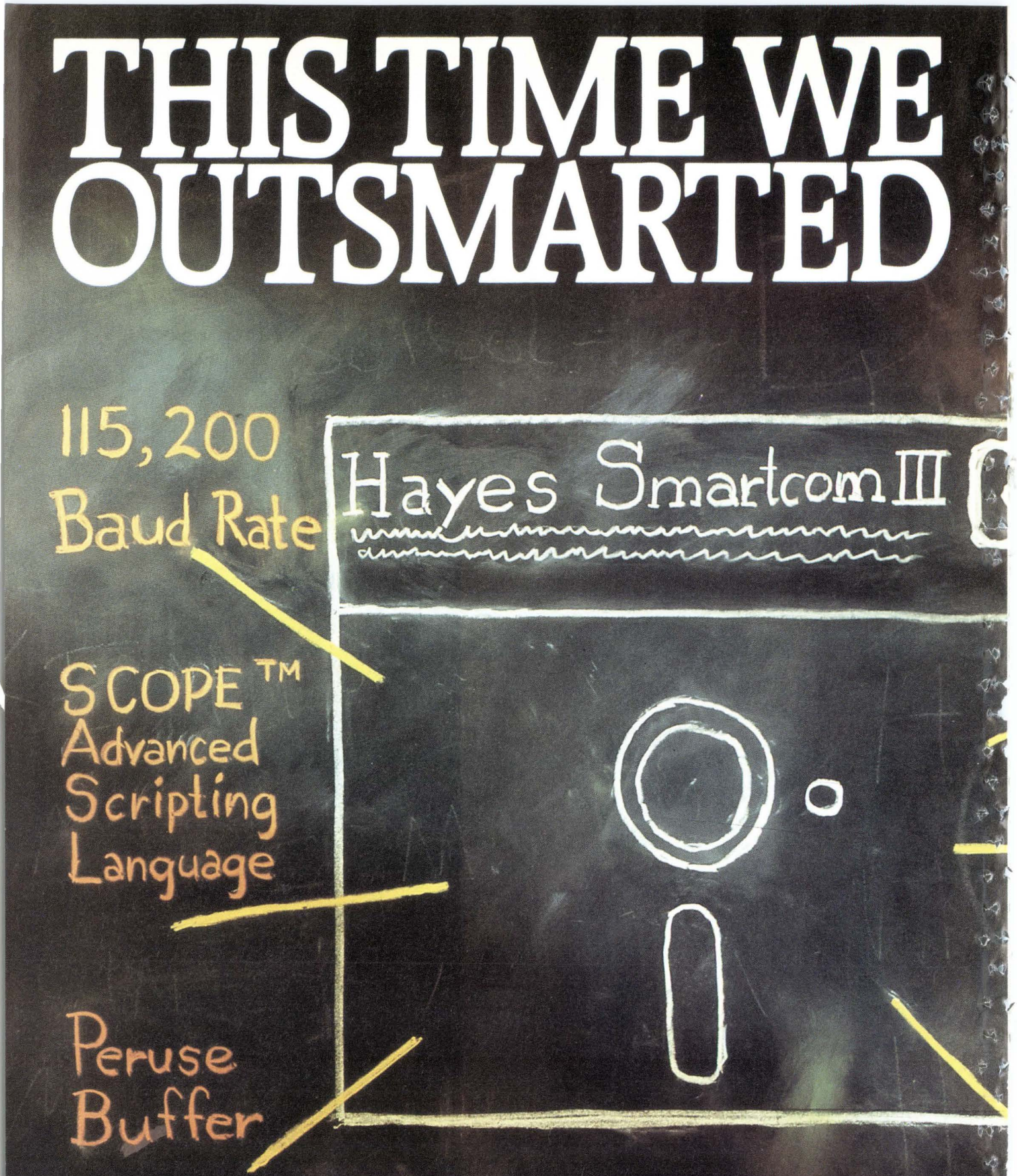


*General purpose computer, excludes minis and other small computers

FIGURE 16 Average Price of Main Memory Per Byte



THIS TIME WE OUTSMARTED



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"Don't get too smart alecky, wise guy! Just remember we made you! . . . and we can break you!"

The first DATAMATION cartoon (January 1958).

Three Decades of DATAMATION Cartoons

While the 1957 look of DATAMATION has gone the way of the tail fin, one graphic feature of the magazine looks basically the same—the DATAMATION cartoon, which has reflected not only the technology but also the tempo of the times.

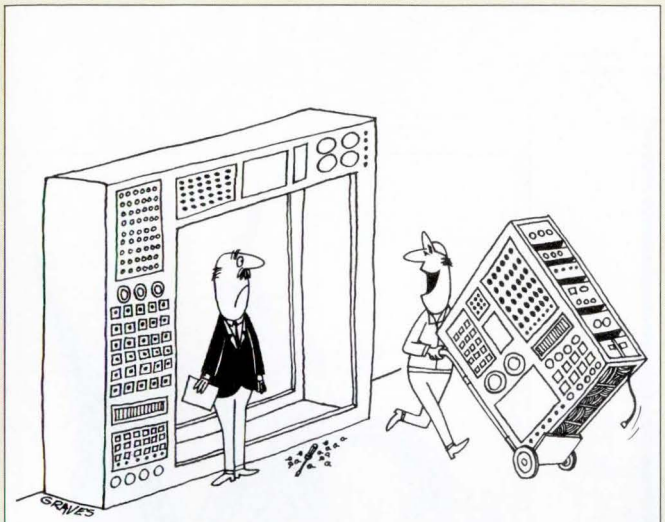
The humor in the first decade of cartoons paints a picture of the computer as a mechanized Ming the Merciless, wreaking havoc in one form or another on its hapless and eccentric operator.

The '70s seemed to end the era of mistrust. Computers had moved into the mainstream of society, and the cartoons reflected this move. Depictions of massive mainframes were out, while the Japanese, corporate giants, and invasion of privacy were all subjects for cartoon humor.

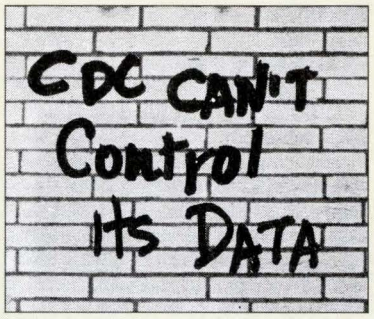
It wasn't until the '80s, when computers permeated society, that the computer operator misfit image became a dinosaur and women were no longer relegated to the stereotypical secretarial role. All topics became fair game for DATAMATION cartoons. The following, culled from DATAMATION's pages, give you a 30-year glimpse into the humor behind the hardware.

BY STEVEN KORN

DATAMATION Cartoons: The '60s



"... BETTER BRUSH UP ON THE OL' MULTIPLICATION TABLES FOR AWHILE."



"Sad case there . . . brilliant computer man—took a six weeks vacation and fell too far behind in his field."

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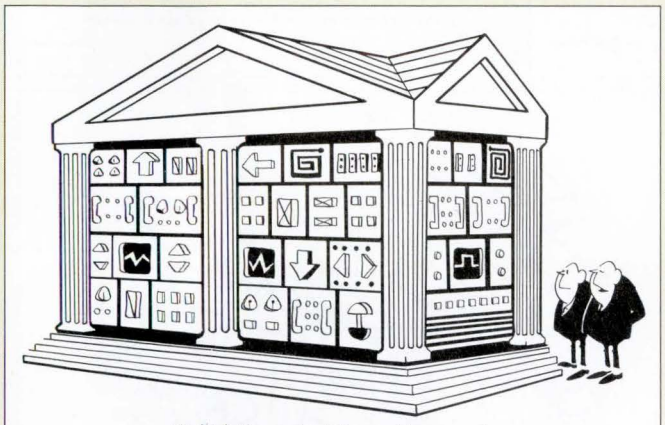

"I think I've spotted the problem . . . the architecture doesn't match the hardware."

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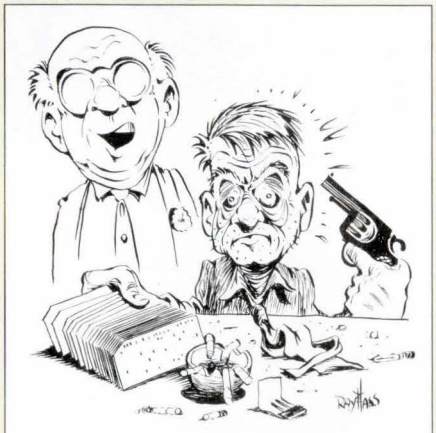
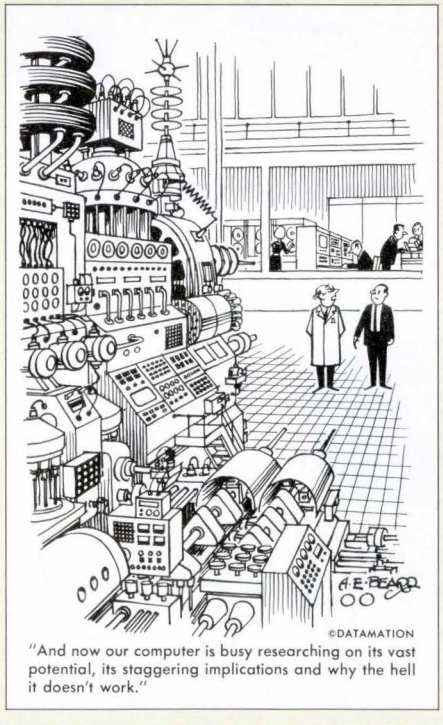


Good morning, George—How did your program test go last night?



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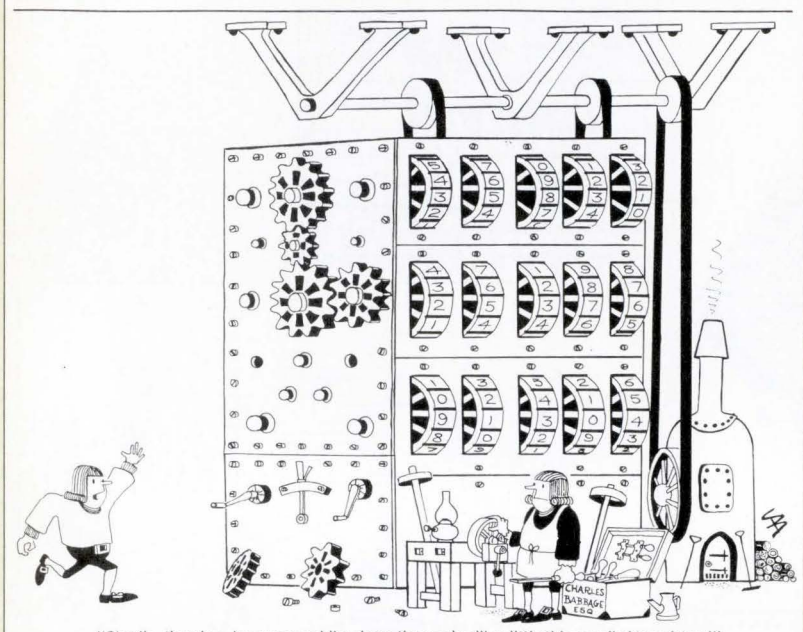
"And now our computer is busy researching on its vast potential, its staggering implications and why the hell it doesn't work."

DATAMATION Cartoons: The '70s



"Charlie, there's a Japanese peddler down the road selling little things called transistors!"

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"I'm stirring up a little trouble for AT&T. Care to add anything?"

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"... Any other reason why you'd like to work in data processing other than the fact that you like air conditioning?"

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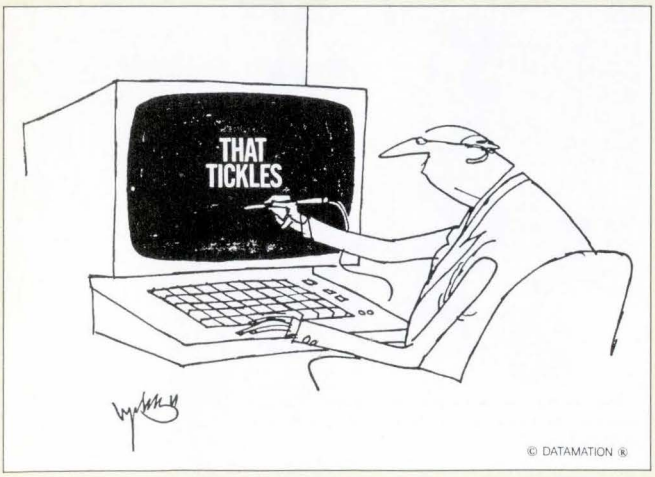
"This is not going to look too good on your record: complaining about invasion of privacy."



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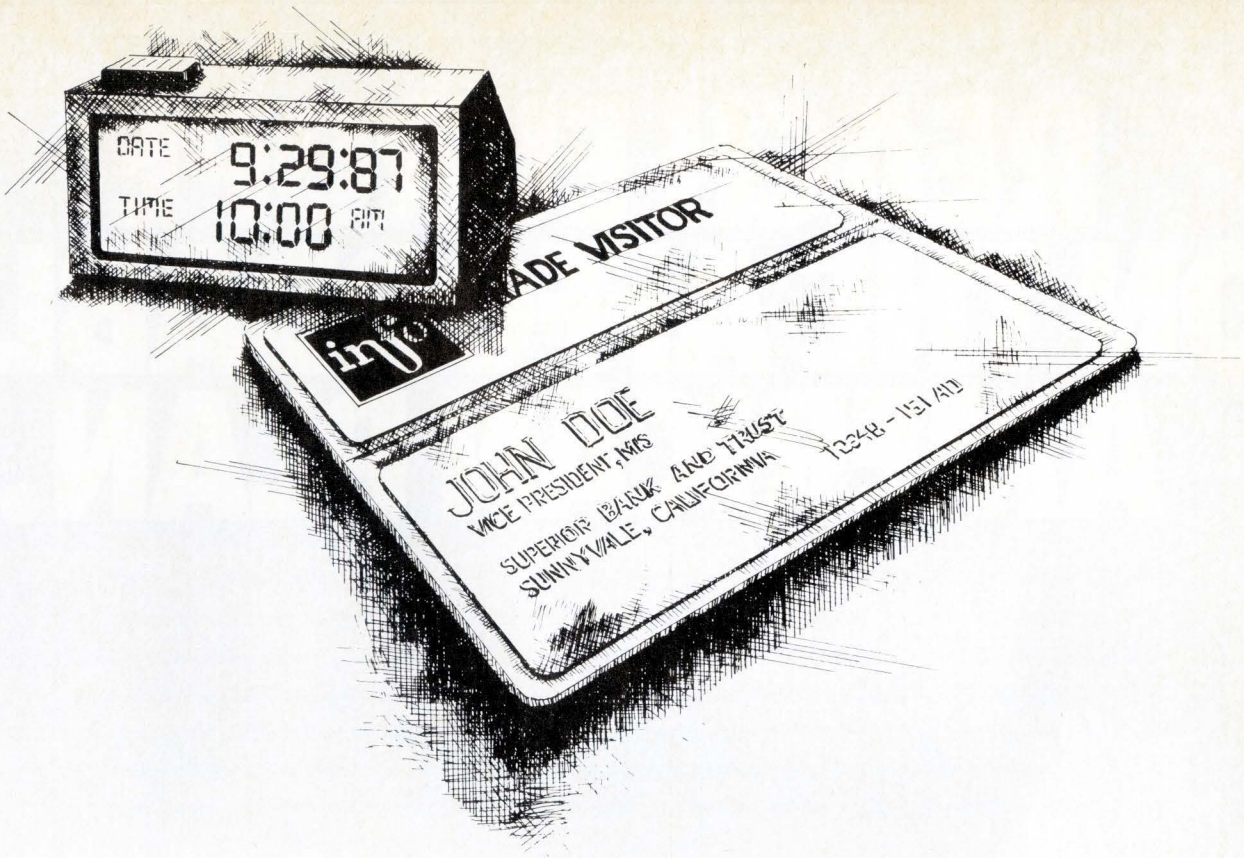

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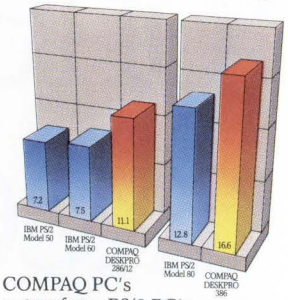

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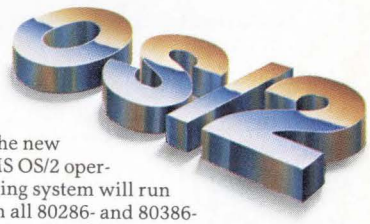

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DATAMATION Cartoons: The '80s

"You understand, of course, this position is only temporary."

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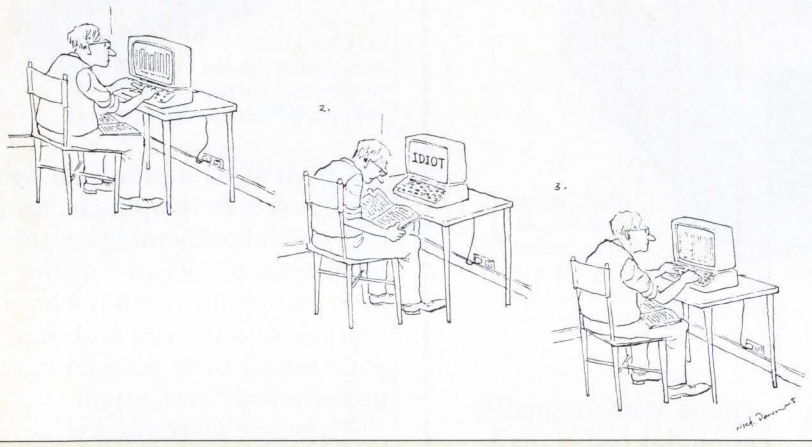

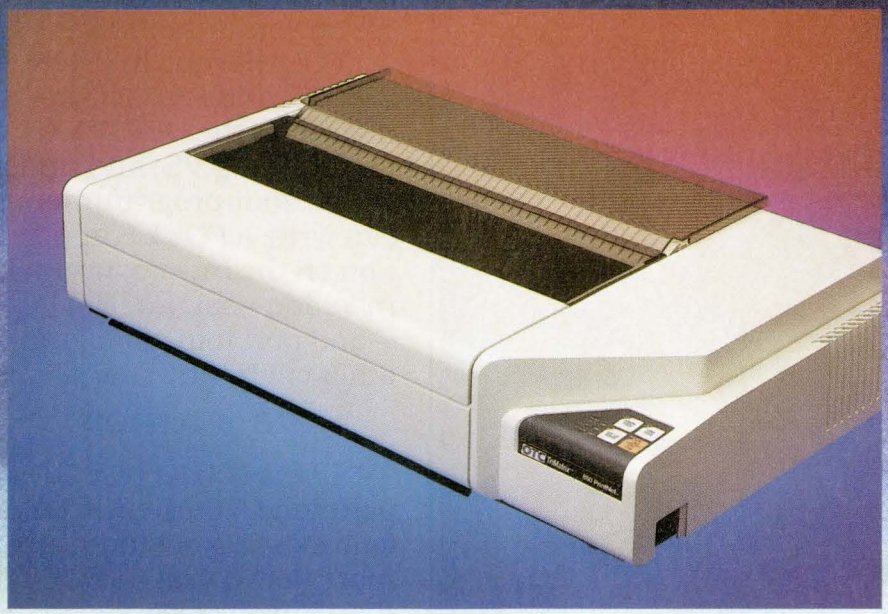

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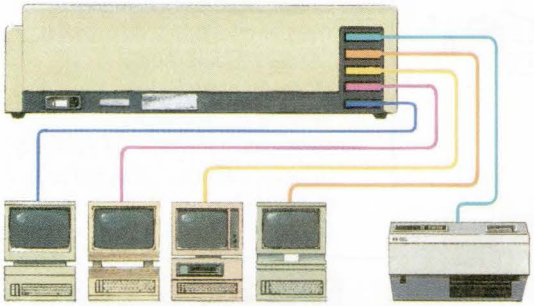

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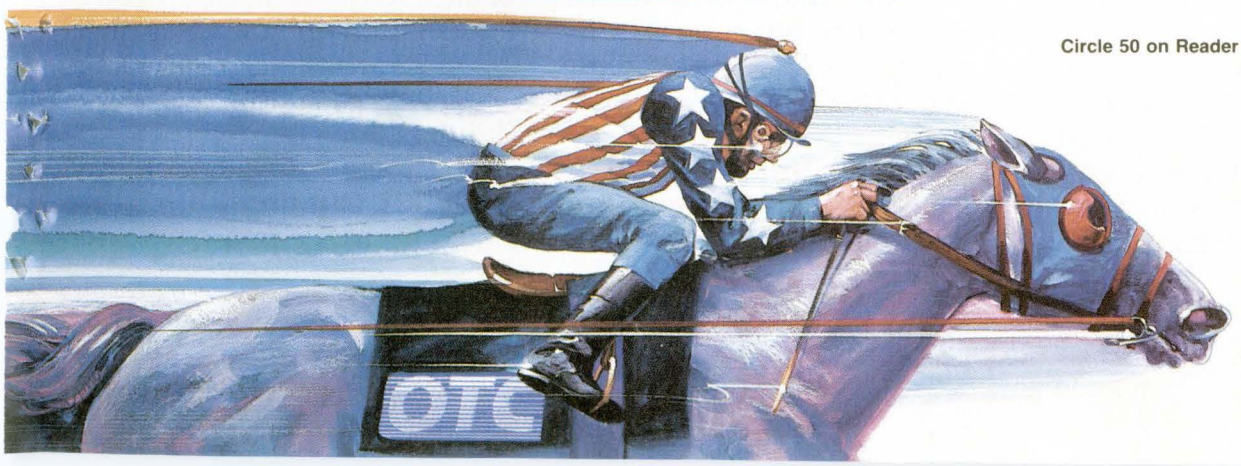

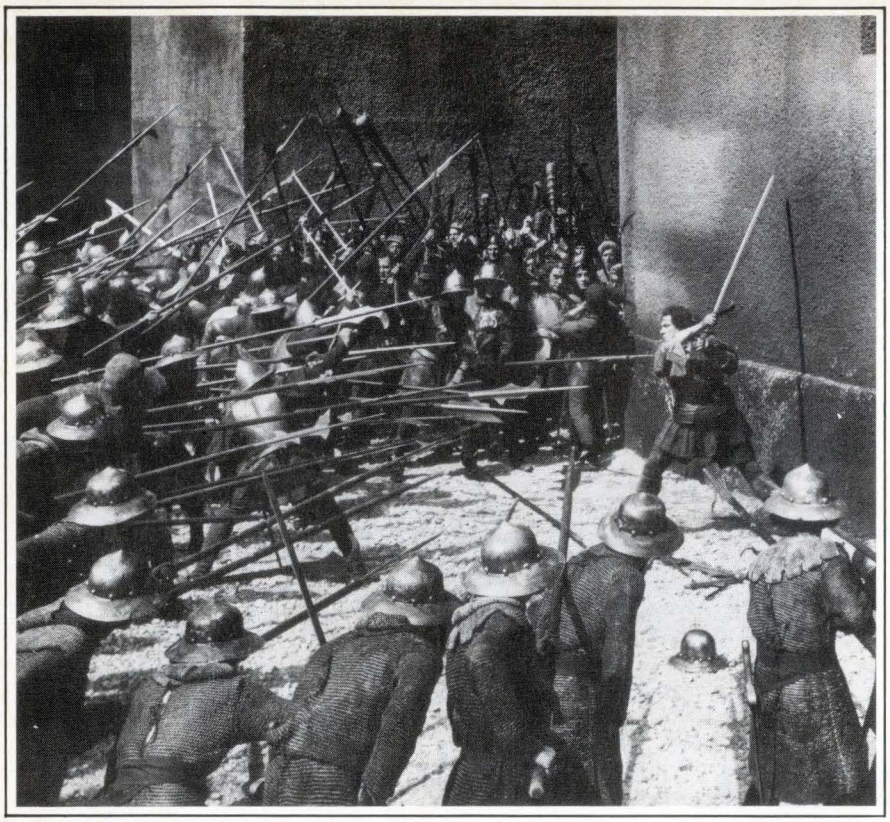

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REACHING 30 YEARS

A Day in Your Life

BY ERIC BRAND

What would happen if every computer, every microprocessor, went on the blink for a day? That's the question asked of IS chiefs in manufacturing, retail, scientific research, government, and financial services. Their answers have been incorporated into a whimsical story that illustrates how pervasive computers are in both business and our daily lives. Phones would go dead, stocks could not be traded, and oh, those Lotto riots!

"What a wild idea," I said to the senior editor. She'd just suggested I do a story about what would happen if every computer—every microprocessor, every mainframe—suddenly stopped working. She wanted to know what effect it would have on our readers and their companies and how the world would fare without the little marvels. And she wanted me to write as though it had actually happened.

"You realize that limits me to the New York area," I said, my visions of long trips charged on the company credit card fading away.

"Why?" she asked.

"Because trains and airplanes wouldn't be running and no car built in the last 10 years would work. Any interviews would have to take place within walking distance." She let loose one of those shrieks of laughter we've come to love her for and sent me on my way.

A number of computing professionals I called on panicked at the suggestion that their computers might seize up. In banking, on the stock exchange, at the local store, and elsewhere, we interact with a technology so efficient and so pervasive that we now take it for granted, they said. A loss of that technology was unthinkable. But five computing pros—in the areas of retail, government, scientific research, financial services, and manufacturing—were intrigued by the idea, and graciously agreed to have their musings placed in a fictionalized setting.

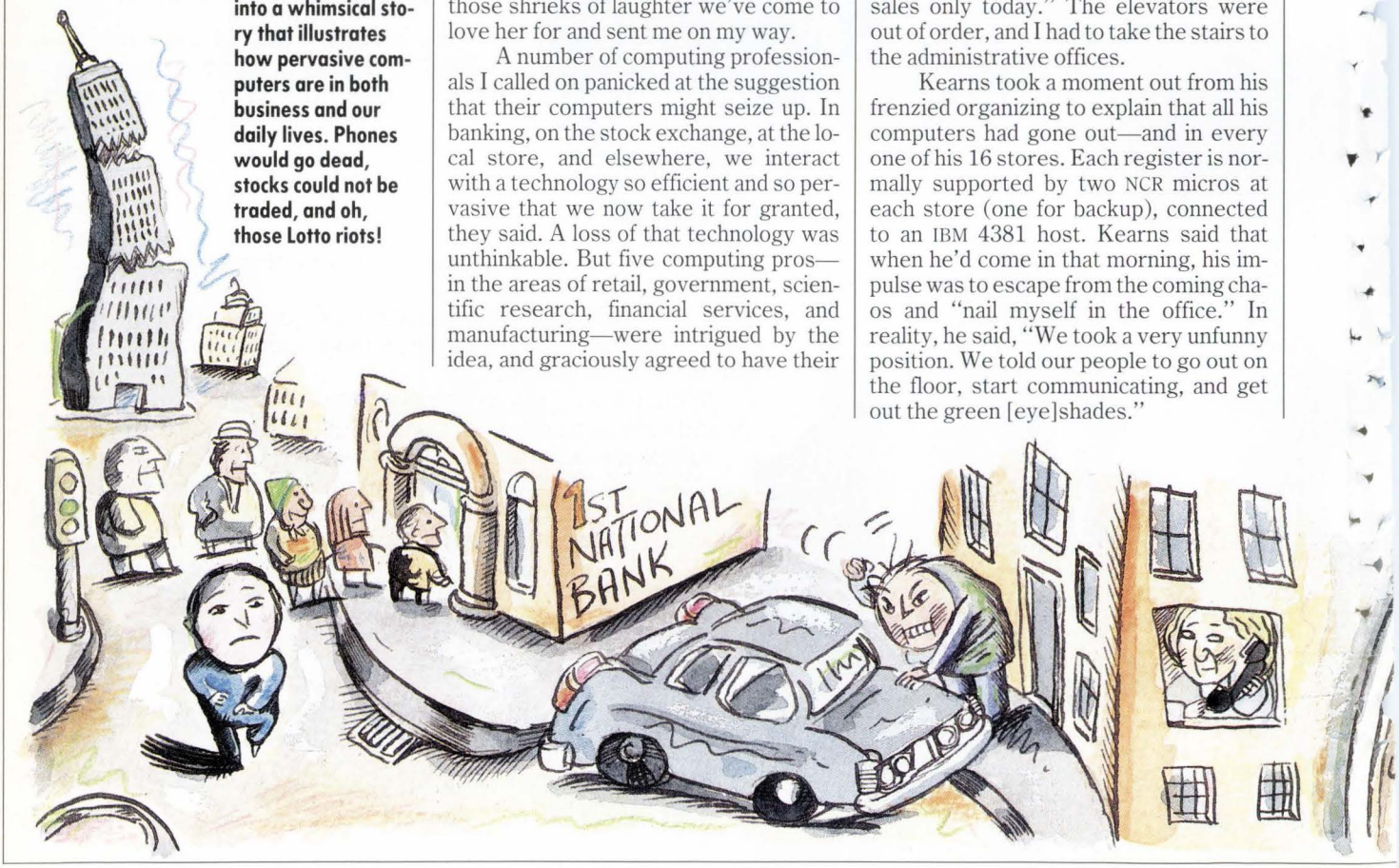
What follows, then, is a fanciful account of a day that never happened, a 24-hour worldwide downtime, what the tabloid *New York Post* would likely have called, "The Big Brain Drain, Day One."

Retailing the Old-Fashioned Way

That morning, I was supposed to stop off at the Abraham & Straus near my apartment in Brooklyn to speak with Brian Kearns, vp of operations for the big New York department store chain. I was running late because my alarm clock hadn't gone off—in fact, it wasn't working at all.

The selling floor of A&S was bustling with customers as usual, but the lines at the cash registers seemed unusually long. I was surprised to see the salespeople writing out receipts by hand. On each register was a hastily drawn sign: "Cash sales only today." The elevators were out of order, and I had to take the stairs to the administrative offices.

Kearns took a moment out from his frenzied organizing to explain that all his computers had gone out—and in every one of his 16 stores. Each register is normally supported by two NCR micros at each store (one for backup), connected to an IBM 4381 host. Kearns said that when he'd come in that morning, his impulse was to escape from the coming chaos and "nail myself in the office." In reality, he said, "We took a very unfunny position. We told our people to go out on the floor, start communicating, and get out the green [eye]shades."



Illustrations by Robert Neubecker

Without Computers

The A&S data center is located in Brooklyn, which was fortunate for the day's sales. "So many people are dependent on the crt," said Kearns, "that the only thing they could do was assist the people on the floor who are facing the crunch." It seemed to be working, so far. But Kearns pointed out, "It probably would be absolutely impossible during the Christmas season."

I asked why he didn't seem upset by this calamity. He said that what he'd seen so far that morning had borne out a theory of his about computers. "People allow the machine to communicate for them. This [loss] has opened up a lot of person-to-person communication. . . . The machinery is so rushed, it does so much for you. But no matter how rushed we get," he concluded, "the human behind the machine is the cornerstone of any progress."

I thanked him for his time and observations and left, annoyed at my tape recorder and SLR camera for not working during the interview.

Outside, I headed for the subway to lower Manhattan, where I was scheduled to meet with Helen Mosley, director of the computing unit for the mayor's office. At the subway entrance, a line spilled out onto the sidewalk. Someone muttered something about signal trouble, so I figured I'd hoof it. I tried to call ahead, to tell Mosley I'd be late, but the public phone didn't work. Nor did the one next to it. In fact, no phones were working. (Though a vp at Nynex assured me we could still reach out and touch someone if all the computers were to go down, experts I spoke with said that the phone system's electronic switching system is now computer based and therefore vulnerable to a total loss of processors.)

Not being a morning person, I hadn't yet seen the connection between these inconveniences. So, along with what must have been hundreds of other people, I walked toward the Brooklyn Bridge. It seemed that the only cars on the road were big-finned monsters. Crossing the East River, I saw a tanker collide with a pier.

The bizarre occurrences of the day began to pique my curiosity, but none of my fellow travelers had a newspaper; those with Walkmans said they couldn't pick up any radio stations. With a mind influenced by too many science fiction stories, I suddenly conjured up a vision of a world without computers, a world where communications and transportation were thrown back decades, and where, for the day at least, they were stymied almost completely.

Pcs and Politics

The scene around City Hall was chaotic—but it had always seemed that way, so it didn't faze me. I found Mosley in her office, giving instructions to a messenger. She told me what I already had guessed: the computers were down and the phones were dead. "I'm lining up typewriters," she explained. She was sending messengers to office equipment rental agencies, "trying to corner the market before anyone else does."

The typewriters and temporary help would have to take the place of the office automation that Mosley had implemented at the mayor's office in the last few years—word processing, correspondence tracking, personnel and employment databases, and the Mayor's Action Center complaint division. Three IBM System/36s handle interoffice mail, backup, and file transfer, while 220 IBM XTs, ATs, and clones are either remote or tied into local area networks.

"We just hope everyone has a hard-copy of whatever they were working on," Mosley sighed. So far, the mayor's staff was being cooperative. "They're less fussy about phraseology, and that extends right up to the mayor," she said. "He's very kind with people on a lower level. Not so much with people on a higher level, but definitely those on a lower level."

Scientific Computing Collapses

I wondered how Hizzoner would react to the developing news media blackout as I made my way to Greenwich Village for my next interview. I was due at the Courant Institute of Mathematical Sciences at New York University to

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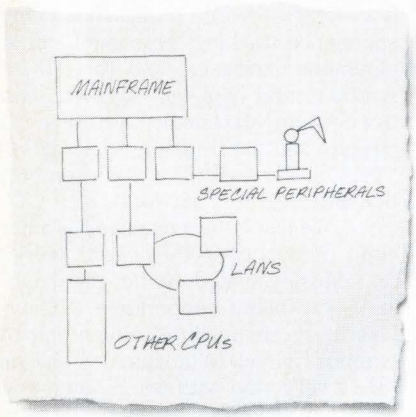

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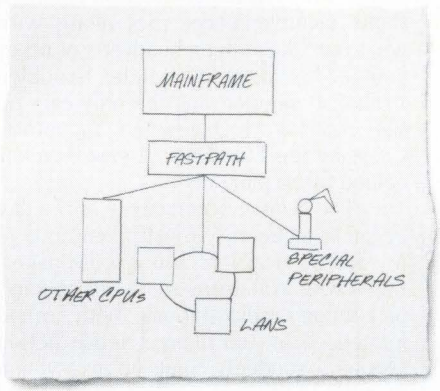

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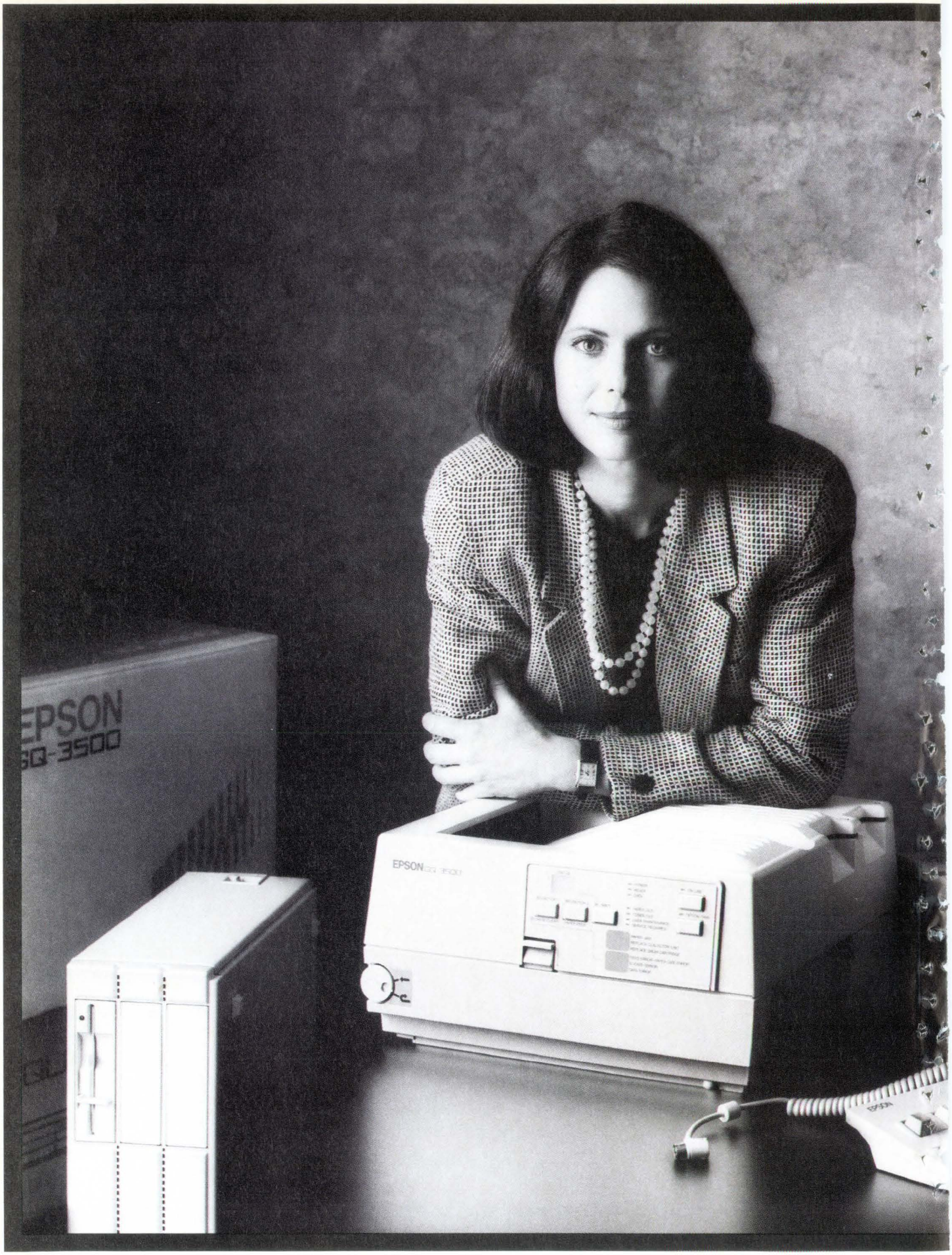

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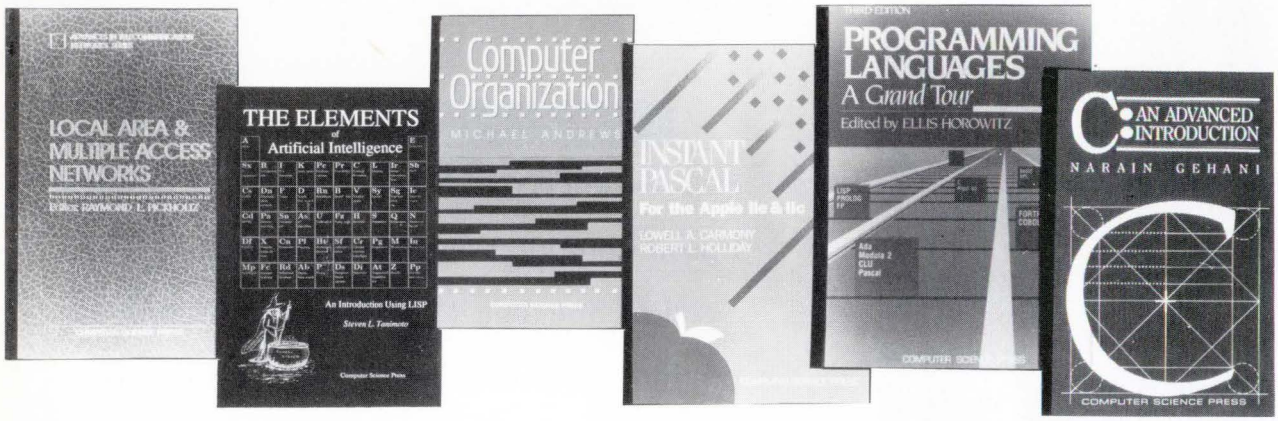

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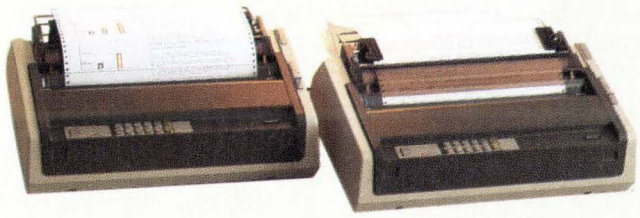

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A Day Without Computers

meet with Herbert J. Bernstein, senior research scientist. On the third floor of Weaver Hall, Prof. Bernstein had his feet on his desk and a smile on his face. "Quite frankly," he said, "a 24-hour loss of computer access is not a disaster." He'd figured out what was going on and sent his students to the library. "It'll do them a lot of good. It'll improve their scholarship," he said.

The institute uses Digital Equipment Corp. VAX minicomputers, Sun workstations, Convex minisupercomputers, and IBM 4381 and 4361 minis for its research into Eigen values and Eigen vectors and numerical linear algebra. For the Department of Energy, the institute conducts research into parallel computation, network design, and modeling of reactor plumes. Bernstein said that for the plume modeling, the computer loss was a problem. "Most of it is [computer] modeling," he said. "One shouldn't wait. But," he shrugged his shoulders, "there is very little one can do."

The loss of access to NYSERNet (the New York State Educational Research Network) was also a real problem, Bernstein said. Communication by electronic mail had come to a screeching halt.

Taking his feet off his desk, Bernstein said he planned to go to the library to do fundamental research. Then he remembered that without the computer-based library catalog system, he'd have to use the card catalogs. But these were no longer updated and hence were incomplete, so he would be forced to search the shelves.

And anyway, he said, a proposal was pending. "The normal way we do them is on computer," he explained, "printing them out on a laser printer. And the fact of life is you do them right up to the last minute." Now, he said, it was "back to kindergarten. I have to get everyone in one room, because there's no phones. I have to get a pot of rubber cement, a scissors, a typewriter, and start chopping up the previous version of the proposal and add the new insertions. We can't use the best mass-producing copiers because they all use microprocessors.

"Then we have to find a way to get this thing to Washington." Someone told him the airlines weren't running and the trains were going 10 miles per hour. "This is going to be a disaster," he admitted.

I left him looking for carbon paper and started uptown for my next appointment, with a senior information executive at Citicorp. Later, I found out from a Boeing Co. spokesman that almost all commercial airplanes can fly without computers (as evidenced by the day's incredibly few crashes), but that no airport would dispatch one that wasn't already off the ground. Tracking systems, of course, were out. Railroads were running, but at a much slower rate, as switching went manual and communications were impaired.

The Citi Sometimes Sleeps

All this walking had made me hungry. With only a subway token and some change on me, I stopped at a cash machine and put my card in the slot. Of course, nothing. I would have laughed if it hadn't been so annoying.

I was still 30 blocks from the Citicorp building on East 53rd Street, but the walk was not boring. I narrowly missed being squashed by a satellite that had fallen when it ceased receiving telemetry to adjust its orbit.

I trudged up about 30 flights of stairs. Inside, the offices were hot and stuffy—the heating, ventilation, and air conditioning system was on the fritz. The executive, who requested anonymity, greeted me with a wry smile. I asked him how his day was going.

"I couldn't make my morning shake in my blender," he said. "My BSR remote control system didn't work, so I had to switch the plugs on my lights. . . . The office door didn't work. My pc is gone." So what did he do? "I whipped out my favorite pulp magazine," he laughed.

And Citicorp? "We have contingency plans with very strict standards," he said. "We opened up the branches—did a manual fallback. We have last night's batch run on microfilm." The bank's NCR Towers and IBM minis running TPF were out. The Motorola 68020s at the heart of Citibank's automatic teller machine system weren't functioning. "People will go see real-life human beings. Manual banking services will go on. We're just stacking up the transactions." But, he points out, "We have a lot of middle managers with nothing to do."

Electronic funds transfer would be done by airborne courier, he said—if he could find the planes. "We'll lose float," he observed, "but only a few hundred bucks a day on a few million dollars."

Citicorp's investment banking arm, which relies on the telephone, was stymied. The institutional banking was likewise at a loss. "I'm sure the bicycle and sneaker business has increased," said the executive.

The company's brokering activities—which rely on a network of Stratus, Tandem, Motorola, and IBM minicomputers and Unix-based systems, and which use the Quotron system—were almost completely curtailed. "Volumes have slowed way down," he reported. "The small-order execution systems that match buys and sells don't work. The tickers don't work. There's no programmed trading." I asked him if he knew what was going on at the stock exchange. "There's probably a panic down there. The traders are probably going bonkers."

He glanced at his watch, which I enviously observed was an old-fashioned analog model—my nifty new Japanese timepiece was frozen. "By now," he said, "I imagine a trader would be drumming his fingers wondering how he's supposed to place an order. The traders are

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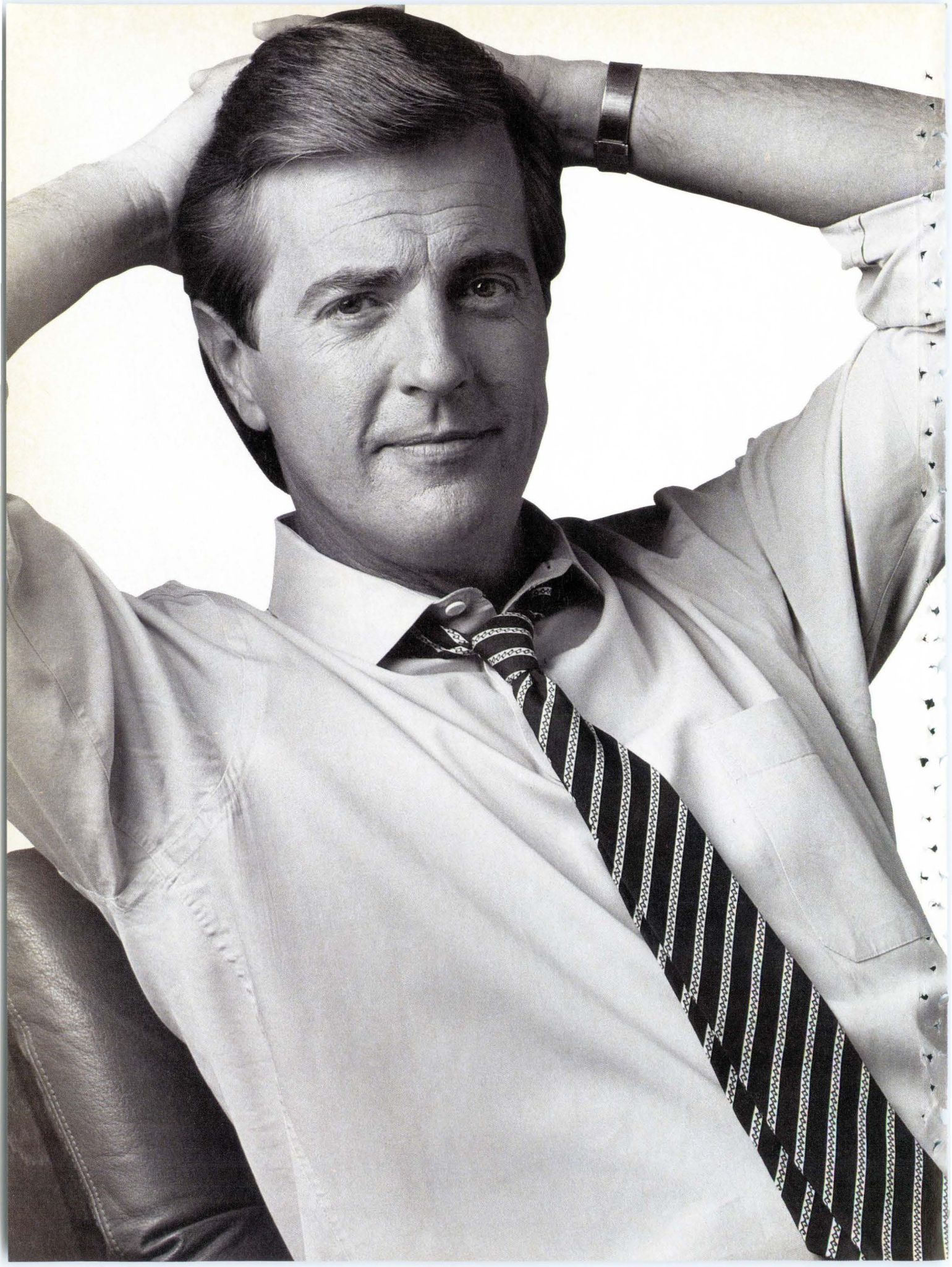

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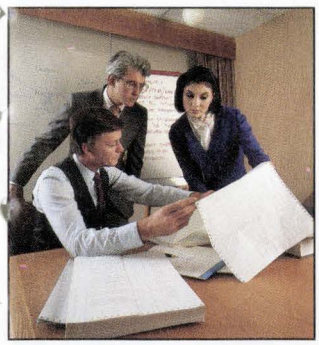

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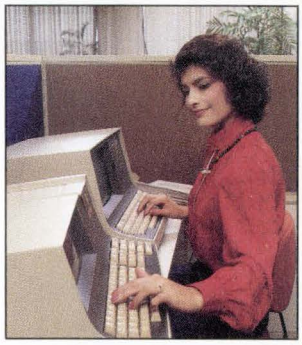

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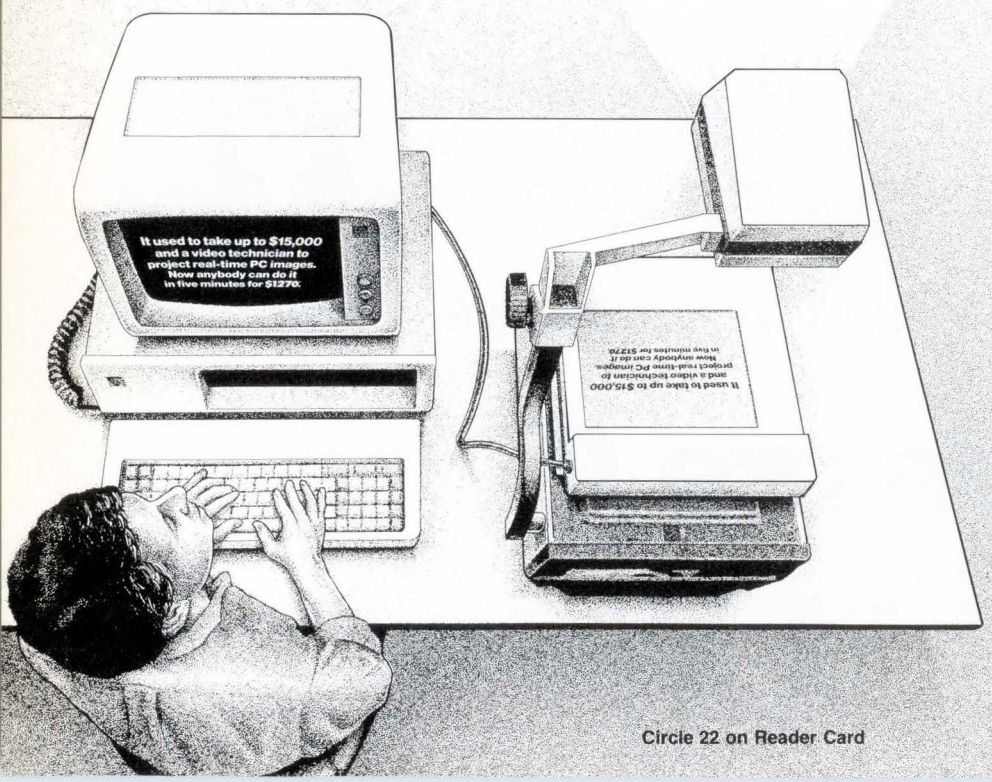

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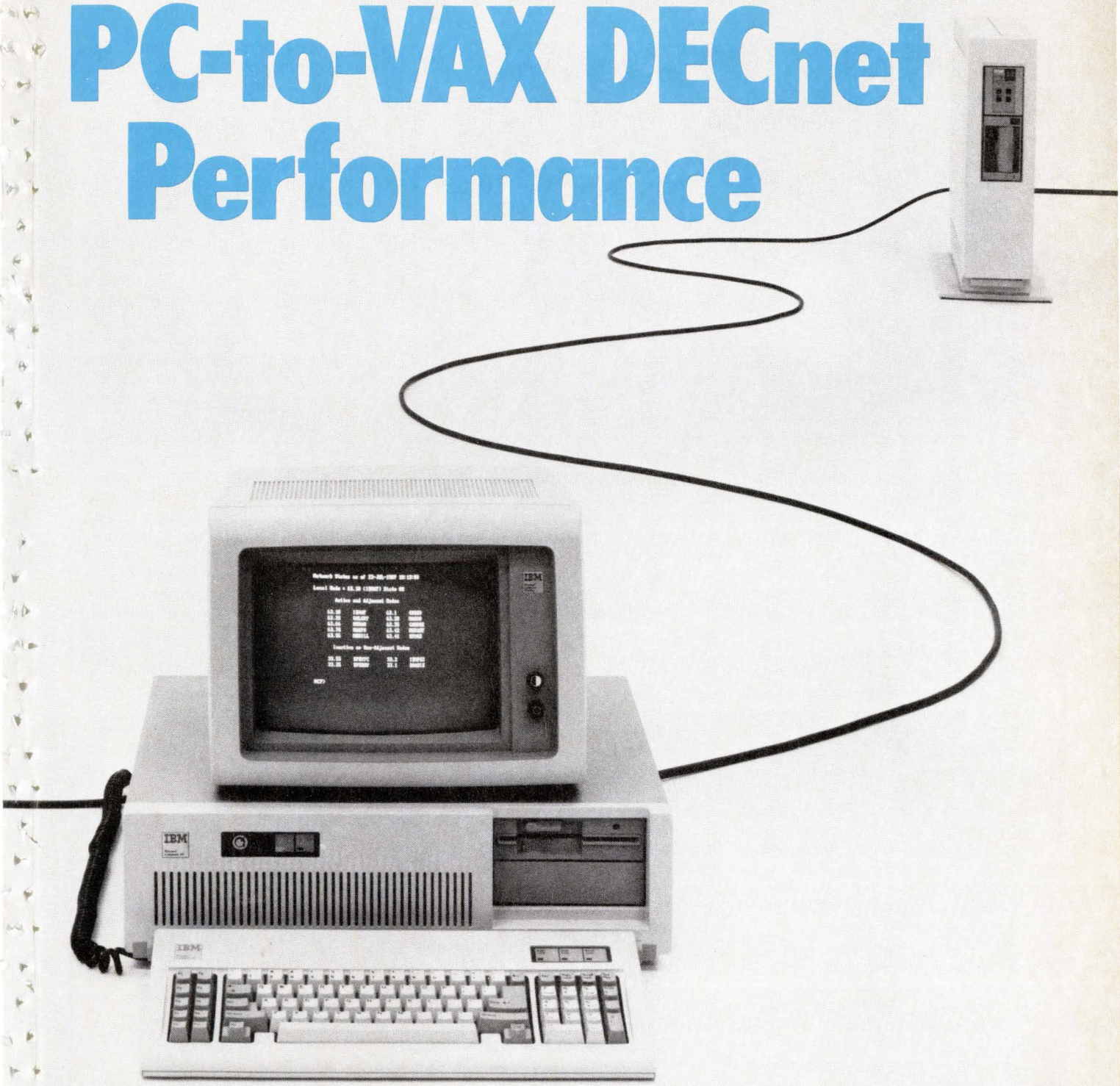

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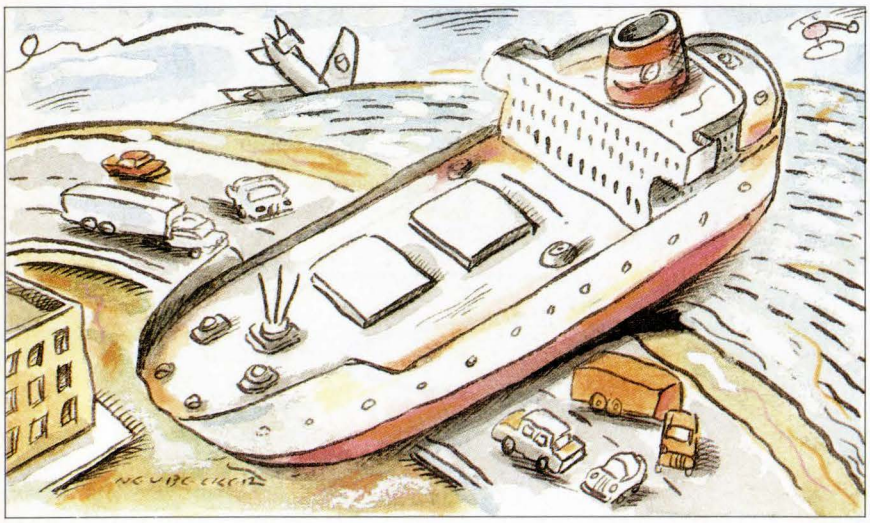
A Day Without Computers



probably trading among themselves or playing cards."

Suddenly, a man with a whistle around his neck and anxiety in his eyes stuck his head through the doorway to deliver a warning. It seemed that an intricate balancing system to keep the building from swaying was controlled by computer and, to prevent occupants from getting motion sickness, we had to evacuate the premises.

It was getting late, and I was grateful that it appeared there would be no blackout. A Con Edison spokeswoman later explained to me that although the utility did have four IBM 3081s, a 3083, and a 3090 Model 200 for switching, routing, and monitoring, it "all could be done manually."

As I walked along, I began to notice crowds gathering around cigar shops and stationery stores. I asked someone what was going on and he told me it was Super Wednesday, the last day on which entries could be submitted for the state's record $50 million lottery jackpot. Lotto's IBM 4341 was down, and as the realization rippled through the crowd that they would not get a crack at the money, they turned ugly. My father always taught me to run away from mob scenes, and over my shoulder I saw magazines flying, windows shattered, and a computer terminal smashed.

It was the first of the now-famous Lotto riots.

CAD/CAM Loses Wham

I stopped running when I neared the home of a friend who owns an old Dodge Polara. I planned to borrow it to get to my next interview, with Vincent Vento, the vp for robotic systems at SSMC Inc. in Edison, N.J. The car was running fine, but we had to unscrew the automatic garage door opener to get at it. Driving to New Jersey was an adventure: the traffic signals weren't working. Joyriders in old Mustangs and Firebirds sped along the highways, not mourning their radar detectors because there was no radar to detect. I pushed the Polara to its limit and made it to SSMC in time to catch Vento.

The company, a spin-off of the Singer Co. with annual sales of $600 million, makes robot systems for the sewn products industry, as well as sewing machines, furniture, and other products. Computer aided design is supported by Computervision boxes and software; IBM PCs are used for integration, control, and diagnostics. General Motors uses SSMC's gantry robot system for sewing car seat upholstery.

Vento's biggest headache that day had been in the drafting department. "We found a few drafting boards to keep a few people going," he said. "But most of our drawings are on tape. It shut down our integration and testing activity, though we can still carry on assembly work and wiring."

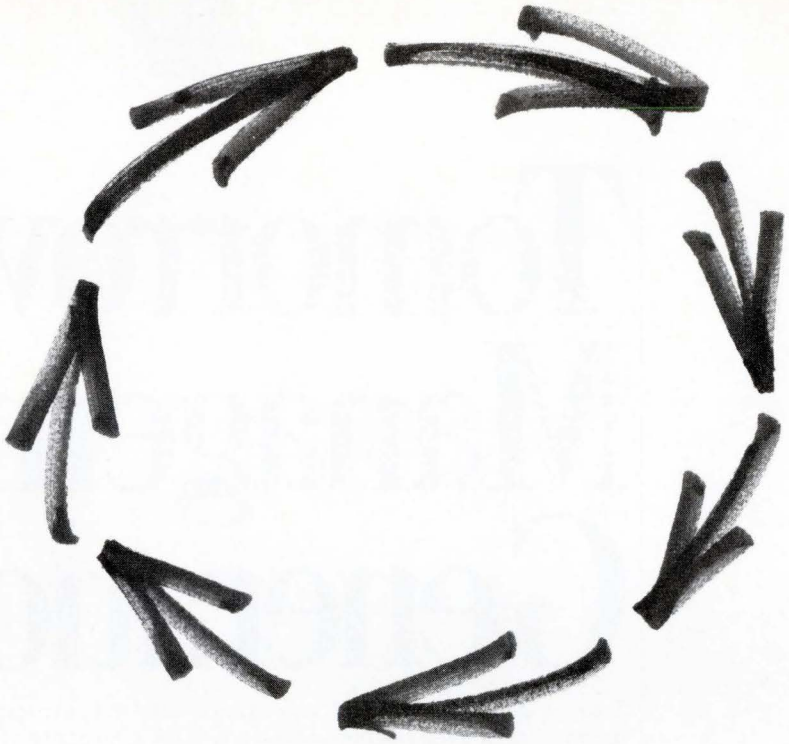
Vento told me that when his engineers had discovered their calculators weren't working, they went looking for slide rules. "Of course, some of them are too young to have learned how to use one," he laughed.

For the most part, though, everyone looked busy. "We're catching up on reports and other things we were putting off," said Vento. "We didn't send anyone home. Twenty-four hours is not the end of the world." I said I hoped he was right, and drove back to Brooklyn on the shoulder of the highway.

That night, my fiancée Jill told me that things at the hospital where she works were bewildering. Patient monitoring systems, operating-room surgical equipment tracking systems, nurse station and patient admissions systems—all blinked out. We tried to calculate how many people the Big Brain Drain had affected (most in the developed nations, a minority in the third world, we figured). We realized gratefully that for as long as the computers were out, missile guidance systems would not work and there was no threat of nuclear annihilation. We also realized that without sophisticated military defense systems, there was an outside risk of conventional war.

We looked forward to an evening of reading and perhaps some Scrabble, but we did not look forward to missing *The Honeymooners* on tv or remaining ignorant about the next day's weather.

What kept coming back to me as I thought about the day were identical comments made by Kearns and Vento on the loss of the telephones—that more work would get done without them. There was a common thread of almost perverse pleasure expressed by the computing professionals I had talked to at the prospect of losing their computers. It had less to do with resentment of their work than with their expert understanding of the limitations of their technology. All thought that the world depended on computers but had also needed a day without them to engender an appreciation of this powerful technology and a better understanding of its benefits and its hazards. ■



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REACHING 30 YEARS

Tomorrow's Management Generation

The Pepsi generation has grown up and wants to go into management. Not to buy a BMW, but to learn more about the mainline business. DATAMATION learned what's on the mind of the new, management-minded IS professional when it hosted a lively and revealing roundtable discussion with five promising IS professionals. All of them agreed that it will take a new set of skills to make that move up the corporate ladder. Most of those skills will come from the management, not the technical, side. A special blend of technical knowledge and management skills will enable them to become evaluators and translators of technology out in the field and up and down the corporate chain of command. Striving to be a major link in that chain, these aspiring IS execs want to raise the credibility and consciousness of corporate computing.

Take a good look around you. That preppy, bright-eyed systems analyst you hired two short years ago just may turn out to be tomorrow's top information systems executive. On a fast technological track, today's young IS professional wants to move away from back-office computing and up the corporate ladder.

To make that ambitious climb, the next generation of IS chiefs will need a new mix of skills, a touch of the technical with a big measure of management. Those aspiring for the top spot on tomorrow's corporate IS roster want to know more about management, not about machines. They know the leadership laurels will go to those who can effectively evaluate and translate technology to the bottom line and to end-user departments.

In fact, it's out in the functional fields where many of these would-be execs may end up. But whether they're in or out of the actual computer organization, the next generation clearly wants the "M" in MIS.

To learn more about what's on the mind of this new management-minded dper, DATAMATION hosted a roundtable. The panel members, all of whom were closing in on age 30, helped DATAMATION understand tomorrow's best and brightest.

Participating in the discussion were Joe Bilich of Chevron Corp., Sondra Burnett of the Coca-Cola Co., Kevin Fleischood of American Airlines, Fred Leichter of Merrill Lynch & Co. Inc., and Barbara Ristway of the Securities & Exchange Commission.

Q: What is your educational background and how did you first get involved in the computer field?

BILICH: I have engineering degrees from the University of Michigan and the University of Pittsburgh. I wasn't able to get an engineering job in the summer after my freshman year in college, but I was able to transfer the data processing skills I'd been taught into a meaningful summer job within the computer industry. Then, after college, I interviewed at the Mellon Bank in Pittsburgh for a dp position. I wanted to keep a business perspective and I thought that data processing might allow me to keep that perspective better than engineering.

RISTWAY: My first experience with computing was in college. I have a degree in economics and accounting from Frostburg State University in Maryland. I filled out my elective credits with computer courses, just because I enjoyed them. My first position was as a technical support representative for Display Data Corp. in Baltimore. After a while, I decided that technical support was not really what I liked doing.

LEICHTER: My first exposure to computers was in my freshman year at Swarthmore, punching cards for a physics assignment. I stayed away from computers unless I had to do assignments with them. I studied math and philosophy and was more theoretically oriented than technically oriented. When I finished college, I was recruited by Merrill Lynch for their Business Applications Programmer Training Class. During the next three years, I worked on various internal COBOL programming assignments and some on-line CICS work. It wasn't the cutting edge of technology but it was the meat and potatoes of the data processing business at Merrill Lynch.

Photograph by Bill Kelly

BURNETT: I also came from a liberal arts background. I have an undergraduate degree from Spelman College in political science. After graduating, I took a marketing job at IBM, where I reported to a systems engineering manager. After about three months, I decided I'd feel more comfortable if I really understood the equipment and the applications before I got out there to sell. So I went into systems engineering for four-and-a-half years before I left to work on my MBA at Atlanta University.

FLEISCHOOD: It wasn't until my senior year in college at the University of Pittsburgh that I was introduced to computers. During the first term of my senior year as a psychology major I took courses in FORTRAN and information science. The information science course got me interested in the grad program in information science, which had an interdisciplinary approach. When I finished my master's degree, I got a job with Champlin Petroleum as a programmer trainee for two-and-a-half years.

Q: What are your responsibilities in your current job?

BILICH: I'm a computer planning analyst with Chevron Information Technology Co. My responsibilities entail the assessment of new technology for both technical and economic advantages to Chevron.

RISTWAY: In my job as a computer specialist with the SEC, I am part of a team that's developing an office automation system. I was selected to work on the project because of my strong background in microcomputers.

LEICHTER: As a senior systems manager in New York and Princeton, I am responsible for managing the development of new financial systems and the implementation of new financial and accounting packages at Merrill Lynch.

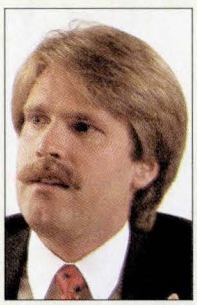
BURNETT: In my current position as systems project leader in Corporate Information Services at the Coca-Cola Co., I have the opportunity to manage people and projects. I work in both the development and support arenas.

FLEISCHOOD: At American Airlines, I soon found that in order to prosper, you had to work on projects no one else wanted. I was immediately placed in one of those positions—put in charge of the maintenance side of the schedule analysis system for the airline planning department. Working on maintenance got me

Panel Participants

Joe Bilich is a computer planning analyst at Chevron Information Technology Co., San Ramon, Calif., a division of the San Francisco-based oil company, Chevron Corp. Bilich's primary responsibility is to determine how technology fits, both technically and economically, into Chevron's computing environment. Bilich studied engineering at the University of Michigan and at the University of Pittsburgh.

Sondra Burnett is a systems project leader for Corporate Information Services at the Coca-Cola Co. in Atlanta. In this role, Burnett functions in both the development and support areas at the multinational beverage company. Before joining Coca-Cola, Burnett worked for IBM in both marketing and systems engineering and cofounded a consulting business. She received an MBA from Atlanta University.



Kevin Fleischood is a project leader at American Airlines in Dallas. Fleischood works on a schedule analysis system for the airline's planning department. Fleischood holds a BA in psychology and a master's degree in information science, both from the University of Pittsburgh. Before coming to American Airlines, Fleischood worked for Champlin Petroleum in Fort Worth and for the Haeger Corp. in Dallas.

Fred Leichter was a senior systems manager for Merrill Lynch, the financial services firm in New York, at the time of this roundtable. Operating between New York and Princeton, N.J., Leichter managed the development of new financial systems. Leichter is now a product manager for Saddlebrook Corp., a Cambridge, Mass., software development house specializing in banking applications.

Barbara Ristway is a computer specialist with the U.S. Securities & Exchange Commission in Washington, D.C. After receiving her BA from Frostburg State University in Maryland, she worked for Display Data Corp., Baltimore. Ristway first joined the federal government as an economist. She is currently putting her expertise in micros to work on an SEC project, developing an agencywide office automation system.

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COMPUTERWORLD

INSIDE

In Depth — Sizing up IBM's manufacturing empire. **Page 69.**

An Wang approved a decision to ship Wang Laborat ries products to South Af in 1986 through a conduit spite his own claim to ha terminated all business that nation. Page 2.

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SYSTEMS & PERIPHERALS

Users say DPS 7 top system

Survey shows Honeywell boosts overall satisfaction; Amdahl posts gains

BY JAMES CONNOLLY
CW STAFF

DELRAN, N.J. — Once the lowest ranking ven- dor in user satisfaction, Honeywell Bull, Inc. continued a climb to the top, where it joined Amdahl Corp. at the head of the list, in the 1987 Datapro Research Corp. report on main- frame user satisfaction.

Honeywell Bull's gains came from the strength of its DPS 7 small main- frame and took place four years after the com- pany sat at the bottom in overall satisfaction in 1983.

Five of the six ven- dors rated by users re- ceived higher overall satisfaction scores than they did in the 1986 sur- vey. The only company that saw its score slip was Unisys Corp., which scored better as roughs Corp. in 1986 as the combination urroughs and Sperry this year. How- Unisys had the dis- of posting some est scores and the worst re- ticularly with nentioned in

faction score of at least 3.2 on a four-point scale, at least 20 user re- sponses and no ratings lower than 2.8.

Datapro, a market re- search firm, said users rated 1,281 mainframes on questionnaires as part of the 14th annual Datapro user-satis- faction survey.

A five-year average of overall satisfaction scores showed Unisys on top at 3.239, followed by National Advanced Systems Corp. (NAS) at 3.205, Amdahl at 3.202, IBM at 3.169, Honey- well Bull at 3.14 and NCR Corp. at 3.077.

Datapro analyst Mari- lyn Courtney noted that the Honeywell Bull DPS7 scored better this year than it had in the past, climbing from a 3.3 overall satisfaction rating to 3.59 rating for the highest overall score among systems men- tioned by 20 or more users. The DPS 7 also scored well in ease of operation (3.59), re- liability of the mainframe (3.72) and operat

areas suchs as ease of operation (3.62), re- liability of the mainframe (3.72) and services such as maintenance, techni- cal support, education and documentation. Amdahl also led the field in user recommen- dations; 97% of its users said they would re- commend Amdahl sys- tems to other users. NAS finished second in that category and scored well in other areas but fell short of the 20- response minimum for special mention and finished last in overall satisfaction at 3.13.

Unisys systems and the corporation as a whole posted the high- est scores or tied for the highest in 17 catego- ries, with the high-end A 15 mainframe, used by eight respondents, lead- ing 10 of those catego- ries. On the negative side, Unisys had the lowest scores in 21 areas, with the nine users of the 1100/60 and

of the company's older systems: the 8500, 8600 and 8800. The NCR 9800, introduced last year, was not mentioned by users.

The poorly rated Unisys 1100/60 was the oldest single system, with an average life of 58 months.

Trend in buying pattern

Datapro detected as trend in the pattern of system acquisition; only 52% of the respondents said they own their com- puters, compared with 54% in 1986 and 56% in 1985. The number of users leasing systems from the manufacturer inched upward from 14% to 15%, while 32% of the users said they lease systems from third parties.

Courtney also re- ported that main mem- ories continued to increase in the frame

53% of the systems sup- porting more than 60 local terminals and 46% supporting more than 60 remote terminals. Last year, 50% sup- ported 60 local termi- nals, and 45% supported 60 remote users.

Datapro also noted that users continued an alternating pattern in connection with their expansion plans for this year. Expansion to current hardware con- figurations, indicated by 63% of users, surpassed expansion of data com- munications facilities, named by 62%, to head the list for 1987 acquisitions.

Software growth stunted

Communications ex- pansion had moved ahead of hardw growth last

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Not second highest, or third highest.

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And users gave our DPS 7 mid-range computer high marks for its ease of operation and reliability. They also praised its operating system, GCOS 7, that allows it to perform a wide range of functions, such as high-volume transaction processing, office applications, sophisticated networking and communications, and program development. In short, they rated the DPS 7 the best system available.

Again, not second best or third best. *The* best.

For months now, we've been telling you that, to Honeywell Bull, customers are more important than computers. That means we don't develop technology for technology's sake. We develop reliable systems that solve problems. And we don't give lip service from 9 to 5. We give prompt service 24 hours a day, anywhere in the world.

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Honeywell Bull

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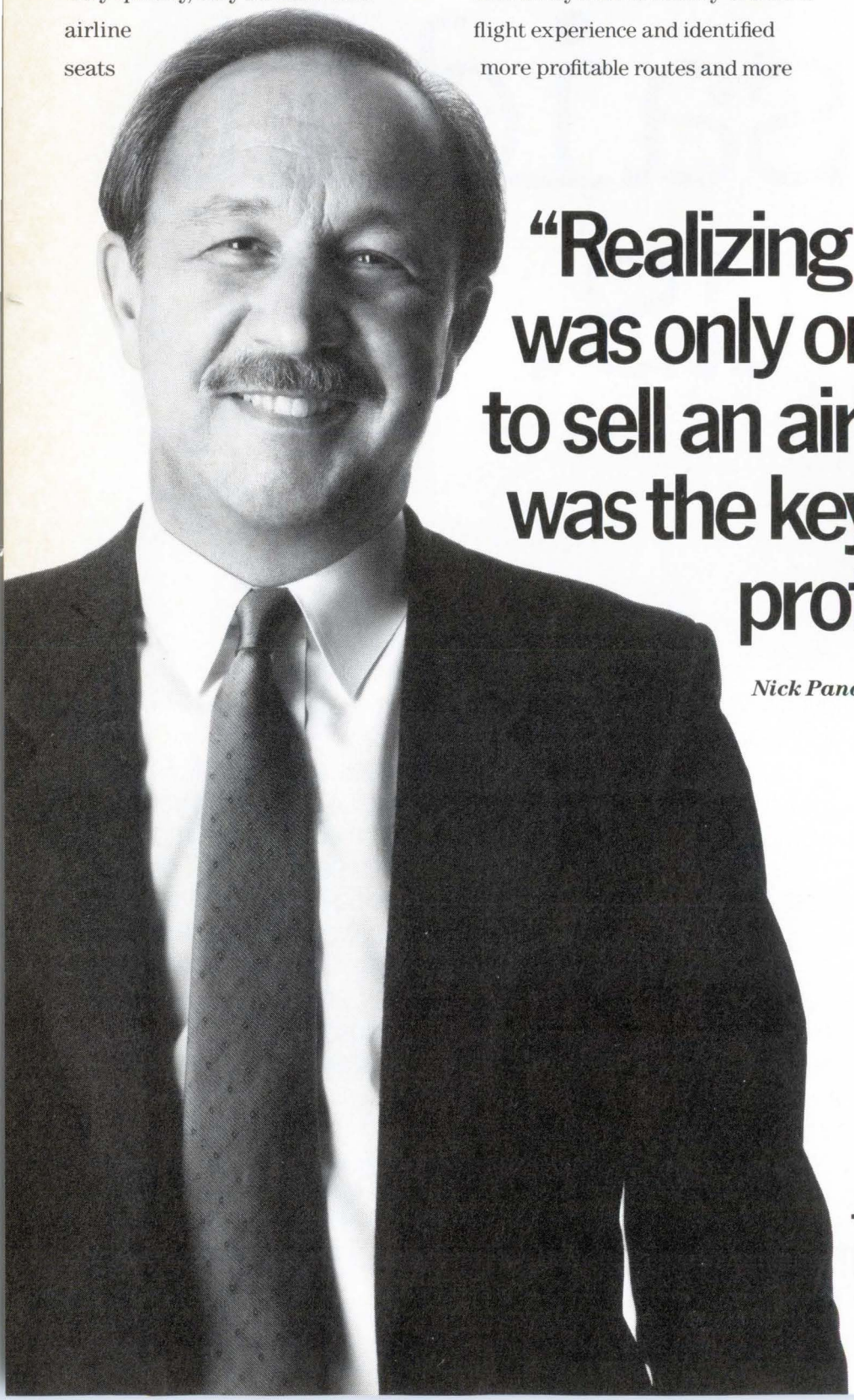
Nick Panaccio and his colleagues don't just help the customer, they help the industry.

UNISYS and airlines. The power of 2.



"Realizing that there was only one chance to sell an airline seat was the key to more profitability."

Nick Panaccio, Worldwide Marketing, Unisys.

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my current job as project leader [for] schedule analysis, in charge of five people.

Q: What is the balance between technical and management responsibilities in your job, and how do you see that balance evolving?

RISTWAY: I'm not a manager. I'm strictly a technician. About 60% of my job is on the technical side. But my boss says he's going to see to it that I develop those management skills. I'm getting a great deal of exposure now to areas like writing requests for proposals and procurement procedures.

BILICH: I see myself becoming a dinosaur because my skills are in the mainframe IMS area. New technologies are going to come along that will increasingly depend on personal computing and on fourth generation languages. I have to improve my skills in those areas. At this point, my job is probably 40% management and 60% technical. And I see the management side growing.

FLEISCHOOD: I don't necessarily see myself as a dinosaur because my skills are evolving. I can't knock technical skills—they're what got us where we are today. We all went in as technicians. Right now, my job is 60% management and 40% technical. But it's changing, and I'm changing. Five years from now, my job will probably be 90% management and 10% technical.

BURNETT: Right now, my job is about 65% management and 35% technical. My management has made it quite clear that I am there to manage people and projects. They don't want me coding. And I don't really miss programming, except perhaps some hands-on design and analysis work. What I see happening is that sophisticated end users are taking over some of the development initiative and responsibility. We are becoming more support oriented and less development oriented. But I think that the technical background is essential to be effective.

BILICH: At Chevron, the technical track isn't available to as many people as the management track. I'm on the technical track right now, but I expect to be on the management track. Most people at my level at Chevron are expected to manage. I feel very strongly that supervising technical people doing technical work requires that you build up their credibility in you and that you understand the technology and the problems they're dealing with.

CHEVRON'S JOE BILICH: "I want to move away from financial and back-office systems and into systems that really support company operations. MIS has to be involved in the revenue side of the business to become critical to operations."

LEICHTER: There's a new skill evolving that's somewhere in between management and technical. I think a lot of the work is being shifted to software development. And the skill that ties it all together is evaluation—the ability to evaluate new technology without necessarily becoming that technical. I'm talking about a management skill, the ability to make technical decisions without becoming the technician.

Q: In what area do you predict the next technological breakthrough will come?

LEICHTER: I see more software, especially mainframe software. The quality of the stuff out there for the pc is so far in advance of mainframe software. We're in the '70s in terms of the technology that's in use in the large installations, and we've got a long way to go.

RISTWAY: I agree. Right now, the hardware is so much more advanced than the software. Microcomputer software is lagging far behind the hardware capabilities. For example, there is little software on the market right now that can take advantage of the 80386 coprocessor.

BURNETT: Another area that I see having some impact is artificial intelligence. Who knows what fifth generation languages are going to look like? Just sitting here thinking about that is mind-boggling.

BILICH: I think the revolution is going to come in software and I'm not sure that bodes well for those of us in applications development. Take for instance the applications generators we're starting to see come on the market now. Or voice recognition software. I can very easily envision a user describing his work flow into the system, and it comes out with an executable piece of code.

Maybe we'll hire English majors, or grammarians who can speak precisely, but I don't think we'll need the professional applications developer to do the intermediary work of translating requirements into something the machine can understand. That's a software evolution.

LEICHTER: Somebody's got to develop that software, but it won't take as many people. We're not all going to be doing it.

FLEISCHOOD: Software houses are going to be writing a lot of outstanding decision support software, but within corporations, there are going to be more buyers and users than internal developers.

LEICHTER: Which is why it's not necessarily the technical skills that we're going to need the most. It's the translation and evaluation skills and the ability to integrate all these things that have come down the line.

Q: What role does IS play within the corporation and do you see that role changing in the future?

BURNETT: There was a time in some companies when working with dp was an afterthought. People would tell us what to do and that was it. At Coca-Cola, Corporate Information Services is actively involved in planning future goals and objectives. MIS is a major consideration in the company's functional areas, so we're working closely with company management to help the achievement of company goals and objectives.

I think that our area of responsibility is shifting somewhat. I see the end user doing more development. I see MIS people functioning more as internal computer consultants, trainers, and maintainers of some of the older software. I can envision people coming out of the MIS environment and being absorbed into the user environment as a part of those functional areas. I don't view that as the death of MIS. I just think that could be part of the evolutionary process.

LEICHTER: It's different in the financial services industry. Information is our product. There isn't anything else without it. So if our computer system folds up, we're out of business in a matter of days. Merrill Lynch's future, or any other

Advice to the Next Generation

Eager to hear the voices of experience, DATAMATION's panel of aspiring IS professionals asked us to pose some pragmatic questions to our roundtable of information systems veterans. Our group of sages for the computer ages were James Collins, formerly of Johnson & Johnson; Jack Jones of Norfolk Southern Corp.; Carl Reynolds of Hughes Aircraft Co.; Irwin Sitkin of Aetna Life & Casualty Co.; and Frank Wagner, formerly of Informatics Inc. (see "Today's View from the Top," p. 48).

Q: To reach the top management position in information systems you have to pay a price. Is it worth it?

JONES: I think so, but that's a very individual set of values.

COLLINS: If you have to ask that, you're in the wrong business.

WAGNER: That they asked the question means they understand the problem. There are many people who want to be managers and don't know you have to pay a price.

REYNOLDS: There's so much pressure to be a manager today. I don't remember that pressure when I was coming up in the business. I did what I wanted to and it worked out.

COLLINS: You have to want to be a manager because you love taking risks and you love making decisions. You should not want to be a manager just so you can buy a BMW.

SITKIN: No one asked me, but years ago I decided being president of Aetna wasn't a job I wanted. I just wasn't willing to give that much to the job. I put in 60 to 70 hours a week. I do it because I'm having an impact on a major business, which gives me some ego satisfaction. If I thought I wasn't having an impact, I wouldn't be there.

REYNOLDS: For many dp organizations, the visible impact isn't proportionate to the effort. Sometimes it's hard to see that you're effective to the organization. Failure is always visible but success isn't and that creates a strain.

JONES: You keep going as long as it's fun. I'm still in the railroad business because it's fun—big boys playing with big trains.

Q: What personal attributes have contributed to your success?

JONES: I made it a habit not to use jargon or words bigger than one or two syllables. I try to explain complicated things in a way that makes sense.

COLLINS: Being a commander [in the military] under combat conditions was probably the best thing that ever happened to me because I learned how to make judgments and how to get people to believe me. That's being a good manager.

WAGNER: I like people. I'm always concerned for them.

SITKIN: Self-perception can lead to deception. But I feel I'm very people oriented, and I enjoy getting something done through someone else's effort. I have a willingness and desire to lead. I'm an entrepreneur, and I'm willing to take risks.

REYNOLDS: I think I'm a problem solver and persistent. I have an innate desire to understand why things work and don't work, and if they are not working right, I want to fix it.

Q: What advice would you give young managers?

REYNOLDS: If I were 30, I probably wouldn't plan to be in corporate dp in five or 10 years. There will be action there, but it's going to be fairly specialized. The real action will be out in the functional areas. We may have seen a peak in the importance of the MIS director who knows the nuts and bolts.

DATAMATION's panel of IS veterans offers words of wisdom to aspiring professionals.

JONES: Get interested in the business you're in, or get out of it.

COLLINS: Select an industry that you are interested in. Then select a company that you are interested in. Start out in MIS. Then work your way through the company as best you can. You probably ought to change functions two or three times. Generalists are the ones who get the top spots.

WAGNER: Do a lot of job hopping. Never stay in one place more than two years. Find out what environment matches your personality by working for several different companies.

SITKIN: What will it take for today's IS professionals to stay ahead and advance in a constantly changing environment? Understand what's changing and what's remaining the same. Accept end-user responsibility and be willing to consult and serve. Improve your communication skills. Learn more about managing data in a distributed environment.

How can IS professionals start preparing today for tomorrow's environment? Study the business you support. Be open to create change. Understand that an architecture doesn't start with the mainframe, but with the businessperson. Change yourself from constant doing to constant learning. If you don't grow every day, you're not going to survive.

Smart forms: What electronic forms do that desk top publishing can't.

It's the difference between making forms with a computer and using forms on a computer.

Desk top publishing is a very efficient way to produce documents, including forms. It automates the *creation* of forms. But it doesn't really automate forms.

Electronic forms technology does. Electronic forms do everything paper ones do, without paperwork. You can fill them in, route them, distribute copies, approve them, revise them and file them, all on your system.

New technology from Electronic Form Systems actually *combines* your forms and your computer system — and the combination makes both more powerful.

The key: Keep the data and the form separate.

If you fill in a form created with a desk top publishing package, the data that fills the blanks becomes part of the form. With electronic forms, you *see* the form and the data together on the screen and on the printout, but *the system sees them as separate files* that can be manipulated separately.

That separation unleashes impressive power.

How a smart form helps a company work smarter.

Filling out paper forms takes a lot of time. Every process in your company is subject to the speed limit of paper. Electronic forms remove that limit.

The form appears on the computer screen. It looks just like the ones your company uses now. As the user enters information, the form helps fill itself out.

The form can do calculations with the data entered in a given blank and enter the result in another blank. For example, an invoice form can add the sales tax by itself.

The form can automatically pull in data from an existing database. When you put a customer's name on an order form, for example, the form can add the address, phone, account number, billing instructions, whatever you wish. Once on the form, this "imported" data can be modified just like data entered at the keyboard.

When the same information goes on several pages of a form, the legal description of a piece of property in a mortgage document, for example, you enter it only once. The system automatically puts it in all the right places. (A mortgage company went from six sets of documents per person per day to thirty-six.)

Information on one form can trigger the system to pull all the other forms to make up a set. To assemble an insurance policy, for example, the system can key on the state and the insured's age and automatically pull all the proper endorsements.

Desk top publishing can't do anything like this.

How you "teach" your smart form.

To tell the smart form what to do with the data entered in each blank, you create a "form map" with software from Electronic Form Systems. It doesn't require programming skills; it's less complex than a spreadsheet.

You can tell each blank:

- A formula for automatic calculation with that data and where to put the result.
- Other locations where this data should go on the form and other forms.
- What other forms should be included in the set.
- Criteria for valid data: whether it should be letters, numbers, dollars, how many digits, how many decimal places, and so forth.

How the smart form can "teach" the user.

When you tell the smart form what to do, you can also tell the user what to do. You can create individual help windows *for each blank.* When the user gets stuck, a touch of F10 brings up a window with detailed instructions on what the company wants in that blank.

Your forms become the capture point.

Most companies spend money to capture the same information twice: First when someone puts it on a form, and later when someone reads it off the form and enters it into the computer. Electronic forms end this duplication because data entered for the form can be exported to a DOS file for use in all your other applications. Data capture for the form and data capture for the computer are one.

When someone fills out an order form, for example, the sales information could be automatically sent to your inventory application. Travel expenses could be automatically copied from expense reports to a Lotus® spreadsheet in the department head's PC. Billable hours could be sent from individual time sheets into the billing and accounts receivable package.

To tell the system where to send the data, you create an "external data map" with software from Electronic Form Systems. Data can be exported (or imported) in Data Interchange Format, PRN (delimited ASCII), or System Data Format. In addition to Lotus, Electronic Form Systems supports dBase III, communications software and customer-supplied file transfer packages.

A true electronic form will eliminate hidden costs.

The smart form from Electronic Form Systems is more than a better way to make forms. It's a better way to manage information. It lets people work faster. It lets you stop handling the same information twice. And it cuts several other costs associated with paper forms. Some of those costs are visible, but the largest of them are hidden.

Visible cost — Creating forms.

With the Formcoder from Electronic Form Systems, you can create a new electronic form *and be using it* in less than two hours. No typesetting, no artwork, no printing. And it doesn't take a programmer; a good word processing operator can do it.

Visible cost — Inventorying forms.

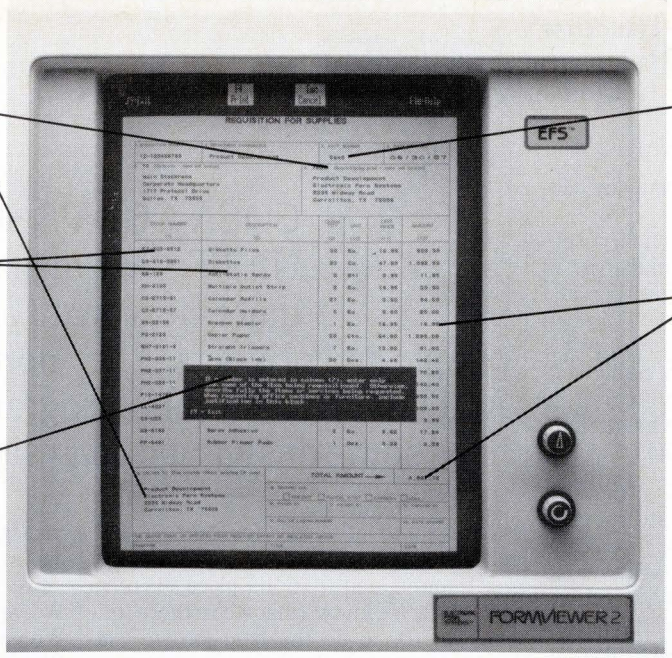
Your company now leases thousands of square feet to store forms. And money is tied up in forms inventory, probably six figures.

Electronic forms are stored in the

When the same information goes on several pages, you enter it only once. The system can automatically fill in standard information like a customer's address.

You can pull data in from other files and export data for use with other applications.

You can create help windows for each blank on a form. Then the F10 brings up a window with instructions on what the company wants in that blank.



You can set criteria for any field. The system alerts the user if the wrong type of data is entered — a letter where a number should be, for example.

The form can do calculations. For instance, it can add total costs on a requisition order and automatically place the sum in the proper space below.

To tell the smart form what to do with the data entered in each blank, you create a "form map" with software from Electronic Form Systems. It doesn't require programming skills; it's less complex than a spreadsheet.

computer so most of that money goes right to the bottom line. You can store as many as 5,000 different forms on an IBM® microcomputer and an unlimited number on a mainframe.

One insurance company projects annual savings of $1.8 million in warehousing costs alone.

These savings are significant, but the visible costs of paper forms are only the tip of the iceberg. The hidden costs can be ten, twenty, maybe fifty times greater.

Hidden cost — Using the wrong form.

There's a Murphy's law of forms: If the wrong form *can* be used, it *will* be.

With electronic forms you can control *who* uses a form, *which* form they use, and what they use it *for.*

You can restrict certain forms to certain people or departments.

Nobody will confuse two forms that look alike. They request a form by name or number and that's the form the computer gives them.

When a form is revised, you simply replace the old one with the new one in the computer.

Hidden cost — The cost of running out.

Right now, several people in your company have run out of a form they need. They're wasting time looking for more. The missing form is also *delaying revenue,* slowing the whole financial pulse of your company.

Electronic forms never run out. Supply always equals demand. One insurance company produces 15,000 policies every night using electronic forms. They are never short a single policy page.

Hidden cost — Forms obsolescence.

Needs change, laws change, and suddenly a lot of your paper forms aren't worth the paper they're printed on. One bank estimates that out-of-date forms were costing them $35,000 per month.

Electronic forms eliminate this waste entirely. When a form goes out of date, you just move it to another computer file and put the new one in its place.

Hidden cost — Forms management and enforcement.

With technology from Electronic Form Systems, the creation, management and processing of every form in your company are brought into a single integrated system. You'll get up-to-the-minute summaries of how many times a form has been used, how long since it was revised, what the current revision looks like, and so forth. Bootleg forms disappear.

Combine the power of forms and computers.

The computer has given business paperless typing, paperless filing, and paperless mailing. No large company could afford to be without them today.

Now the paperless form is here. And Electronic Form Systems offers proven hardware and software that are already working in hundreds of installations. It is the only fully integrated system capable of handling forms creation, forms management, and forms processing. You can implement it as a centralized system based on your IBM mainframe or as a distributed system using IBM microcomputers. You don't have to rewrite your applications software to use it, and it works with several different makes of printer.

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financial services industry company's future, is entirely tied to MIS.

At a place like Merrill Lynch, corporate systems is going to continue to be an entity, an extremely viable entity in and of itself that cannot really be absorbed into the business functions. In reality it is the business function. We're really selling our customers our ability to process their transactions, our ability to get them accurate quotes of prices quickly.

RISTWAY: It's the same way at the SEC. We provide a service to the attorneys of the SEC. For them to do their jobs of enforcement and regulation, we have to give them the information they need.

So I see the MIS role at the SEC as becoming more important as we become more proactive. The goal of the office automation system we're implementing is to anticipate future needs. Because we provide access to moment-to-moment stock quotations, legal databases, and analytical tools, they need us very much. Because of the nature of our industry and because it's electronically based, we have a very important role.

BILICH: At Chevron, our business is not information, it is oil. And those of us in dp are well-advised to remind ourselves of that periodically. We really need to remember that our organization is supporting the real business. It's wise to remember that we are not there just to make the computers do neat things. We certainly look for opportunities to do things that would generate revenue, but we are definitely the tail, we are not the dog.

FLEISCHOOD: MIS is very important at American. Our senior vice president reports directly to the chairman of the board, unlike other corporations where you go through the controller's department or finance.

MIS is undergoing a period of extreme growth and diversification. This means everybody from the senior vice president to the programmer trainee has a new role: customer-oriented entrepreneur. We even treat people within the organization differently—they're our customers. We've come along with service-level agreement contracts. We're considered a scarce resource by the corporation, and there is a charge-back facility to handle all of the things that we do. And in that sense, we are considered something that somebody must draw on and budget for.

BURNETT: Information systems is part of the financial arm at the Coca-Cola Co.

COCA-COLA'S SONDRA BURNETT: "My management has made it quite clear that I am there to manage people and projects. They don't want me coding. And I don't really miss programming, except perhaps some design and analysis work."

We're there primarily for support and problem solving. We don't take our users for granted, and we don't place MIS on a pedestal. We know what we're there for, and we try to do the best job we can meeting our users' needs.

Q: Do you think IS plays a strategic role in your corporation?

LEICHTER: Merrill Lynch has a diverse set of products out in the market, and what we're doing right now is evaluating them. We're trying to see where we're making money and where we're not, which is a lot harder than it seems.

Strategic for Merrill Lynch means getting our internal evaluation in place. Systems like the ones I'm working on—performance measurement systems—are strategic. We are trying to use our information systems to help make strategic decisions.

BILICH: At Chevron, we're engaged in a review of all our information processing to see just what can be cut out. That's at the chairman's direction.

BURNETT: At Coca-Cola, we're asking our users to provide a business justification on requests for new development, as well as on other kinds of support and maintenance issues like enhancements and reports.

We want to develop a mind-set of not just asking for something because it would be a nice-to-have, but because it's really got some purpose, that it's going to either help productivity, provide information in a more timely manner, or positively affect the company's bottom line.

FLEISCHOOD: When I think of the strategic role of MIS at American Airlines, I obviously think of the reservation system SABRE. Not only does SABRE support the operation of American, but it also brings in substantial profits to the airline because we market it to all the ticketing agents and travel agents throughout the world.

Within the last few years, upper management has been looking at SABRE and saying, "Maybe we can draw some more tangents off the SABRE system. We've got a great pool of dp personnel. We've got 4,500 people in our dp shop. We've got some sharp people in there. Let's see what else we can do."

BILICH: I think the strategic involvement of MIS is something you can talk about a lot, but until the people who are footing the bills and using those services recognize that information systems can contribute to the success or failure of corporate strategy, information systems is just going to be tactical or pure implementation. We're just not going to be as strategic as we might want to be. A large part of our function is still going to be back office.

Q: Where do you see yourself five years from now?

LEICHTER: That's a tough question to answer. Five years ago, I would not have predicted that I wanted to be where I am now. And yet I'm very happy to be here.

While programming and running computer systems is a challenge, an even greater challenge is managing the people who can run those systems. Those are the skills I have to have. I see myself trying to keep a technical handle while really emphasizing the management skills and moving into a more organizational planning role within a financial services company like Merrill Lynch.

RISTWAY: What I'm doing now is very challenging, but I'm not the manager of the system I'm working on. I'm just one of the worker bees. At some point, I would like to have the opportunity to start from the ground level and design and develop an integrated office automation system myself.

If I go the management route, I won't necessarily stay in data processing. Good managers are good regardless of what area they're in. And you don't have to have a strong technical background as long as you have an overall un-

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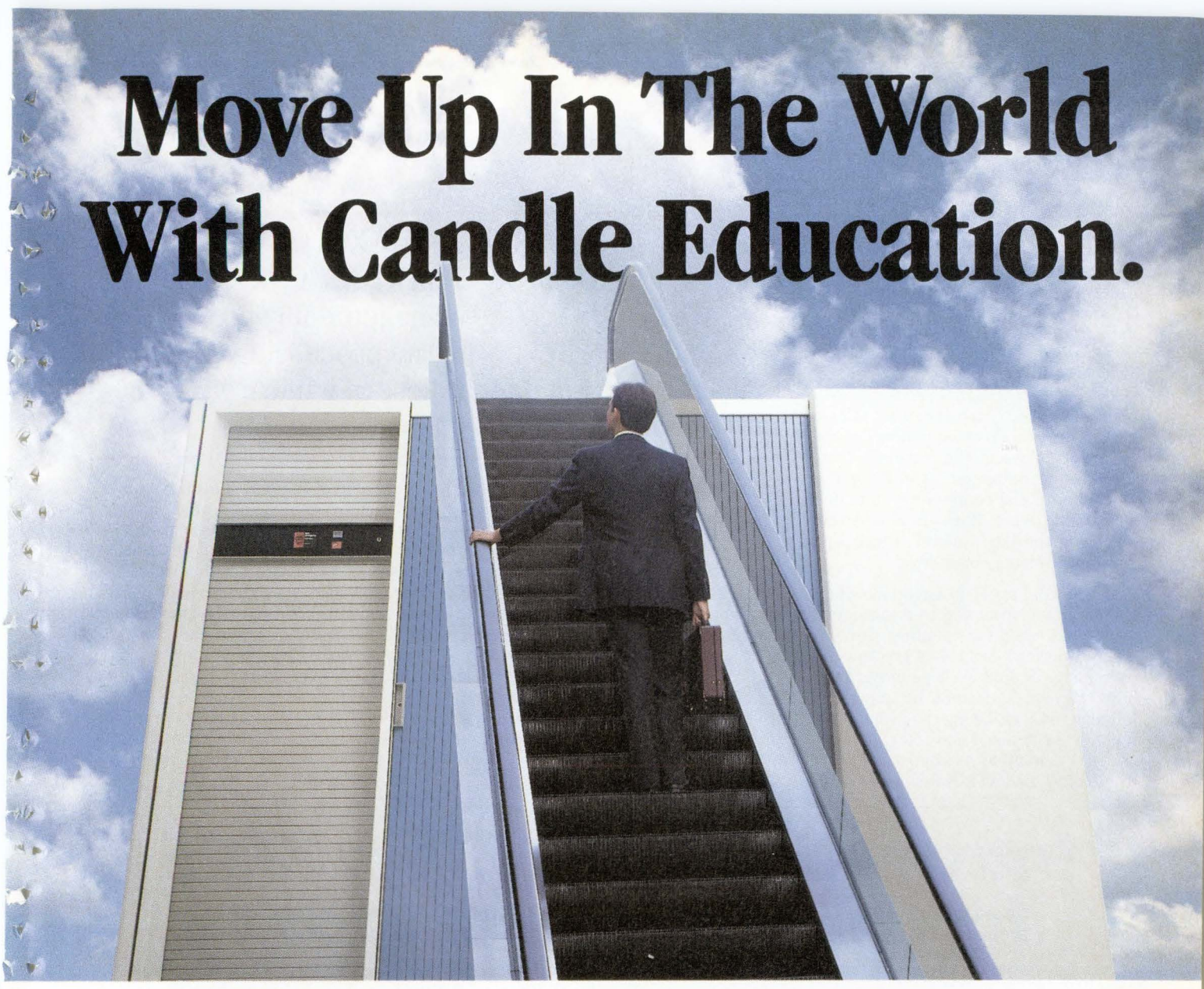

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derstanding of the area you're managing.

BILICH: I would like to develop systems by working much more closely with end users. I want to move away from financial and back-office systems and into systems that really support company operations.

MIS has to be involved in the revenue side of the business to become critical to operations and to management. The opportunity to be involved in developing a new work flow in the business that's based on a computer system—rather than layering the computer system over an existing work flow—is a real challenge. I would like to address those problems at the management level.

FLEISCHOOD: I could do a good job where I am and get promoted to a managerial level. Or I could take another pathway. Since American Airlines is growing and expanding, I could perhaps move into a brand new area. I could be one of the founding fathers, laying the groundwork for new systems. I have the potential now to move up as a technician, at least to the director level. A few years ago, I would have said I want to be a first-line manager in five years and a director in 10 years. Today, I have more options, better choices.

SECURITIES & EXCHANGE COMMISSION'S BARBARA RISTWAY: "If I go the management route, I won't necessarily stay in data processing. Good managers are good regardless of what area they're in."

BURNETT: I'm looking for increased responsibilities and challenges. I want to stay in management but I also need to establish credibility to move into areas that have an impact on the bottom line in the organization. Traditionally, dpers haven't received either the recognition or the credibility required to move into those executive-level positions outside MIS.

So one of the real questions I have is, should I stay in MIS? At what point or at what level should I move out of MIS into another functional area? Or are MIS professionals going to gain the credibility to be viewed as a resource that provides real solutions for real problems within the business environment and that can operate effectively outside the traditional data processing arena? ■

Coordinating and editing this roundtable were former assistant features editor Stephen G. Davis and assistant editor Mary Kathleen Flynn.

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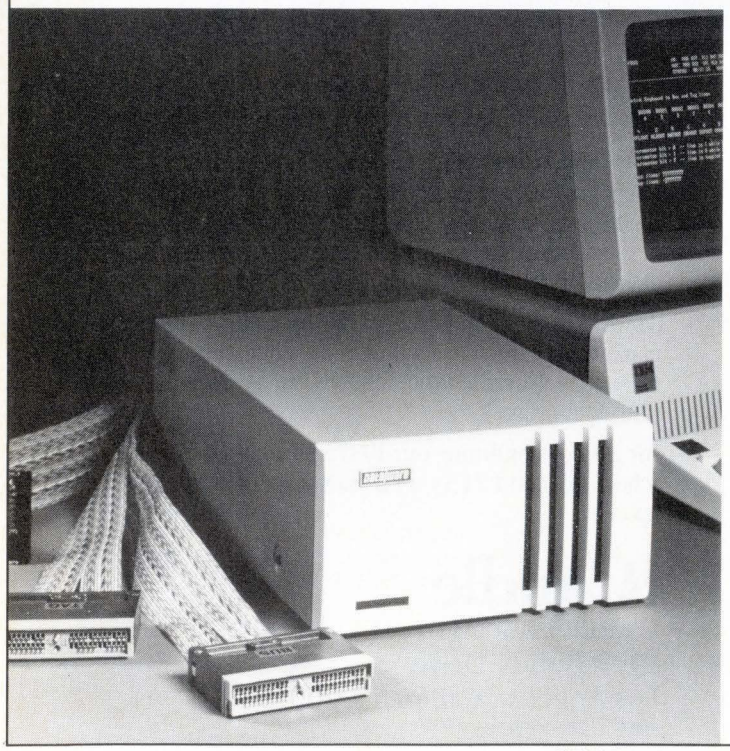

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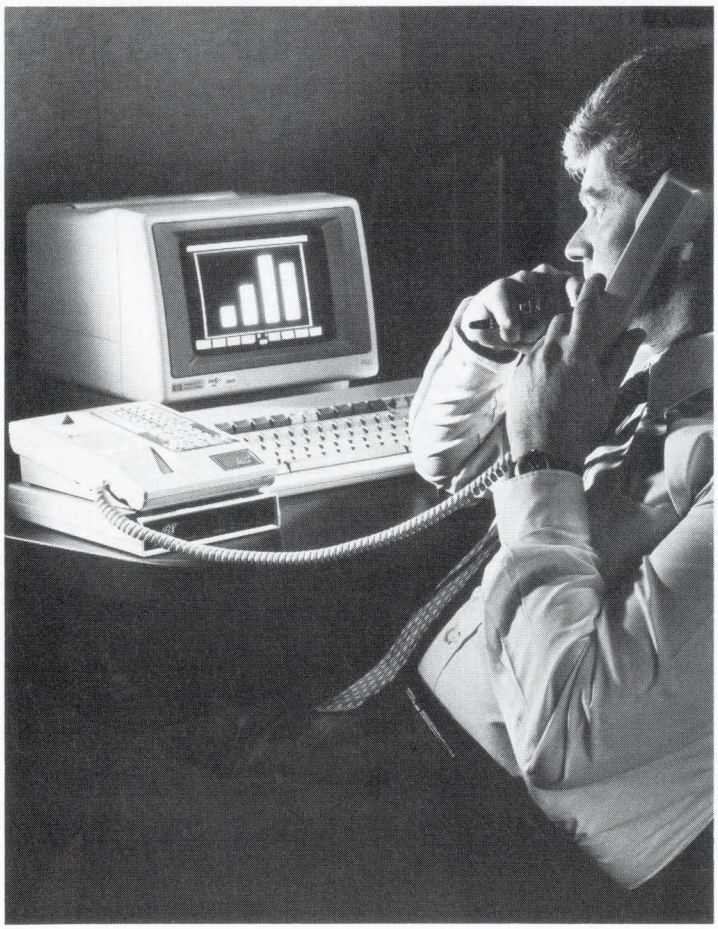
Everyone's talking about what they saw on the telephone.



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Present trends suggest that the next three decades in information processing will be as revolutionary as the last three. The combination of peer networks, a MIPS glut, and artificial intelligence will remake the structure of corporations and redefine the meaning of work.

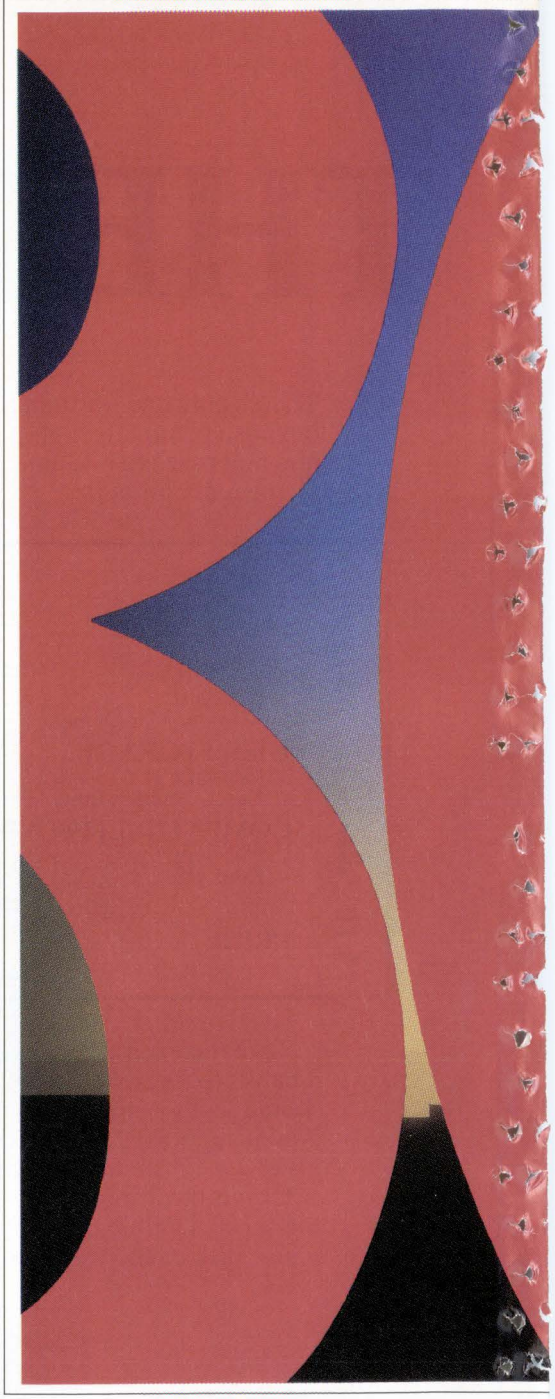
REACHING 30 YEARS

Toward 2017

BY RALPH EMMETT CARLYLE

Computer futures are gestating in labs all over the world, from machines that mimic the human brain to biochips that use our own protein and DNA cells to store information. The feeling seems to be that whatever you can conceive of, it is probably brewing in some research house somewhere on our globe. Noted "seers" have information technology futures mapped out to the eighth generation of computers and beyond. The odds are, they say, that in 30 years our familiar personal computer will have evolved into an intellectual—even emotional—partner, whose cognitive skills far exceed our own, and whose innards are a combination of biomolecular and electronic components. Of these androids of tomorrow, Earl Joseph, former staff futurist at Sperry Univac and founder of Anticipatory Sciences Inc., St. Paul, says, "Rather than just being repositories of knowledge, this eighth generation computer's stock-in-trade may be wisdom."

The technological revolution has spawned a ravenous demand for visions of the future; and though futurists such as Joseph are comfortable with their pictures of what automation makes possible, they are the first to admit that, human nature being what it is, the resulting social and economic systems are much harder to foresee. To paraphrase science fiction writer Isaac Asimov, it's easier to foresee the automobile than the traffic jam, the atom bomb than nuclear stalemate, the birth control pill than women's liberation. The march of technology is seemingly inexorable and, to some extent, predictable—Earl Joseph, for example, foresaw the advent of the microprocessor—but how corporations will absorb and apply the new machines is veiled in mystery.



Photograph by Walter Wick

After pondering the implications of a few variables—VLSI, distributed dp, communications, and AI—futurists are at least agreed on one outcome when it comes to corporate America at the dawn of the twenty-first century. Current hierarchies and vertical chains of command, they say, are badly out of tune with our information economy and have begun to be supplanted by what have been labeled the "unorganizations" of tomorrow: emerging corporate structures that are more a state of mind than a place; structures that will change so rapidly that they will be as disposable as Kleenex; ephemeral forms in which members of a new information elite may emerge to re-

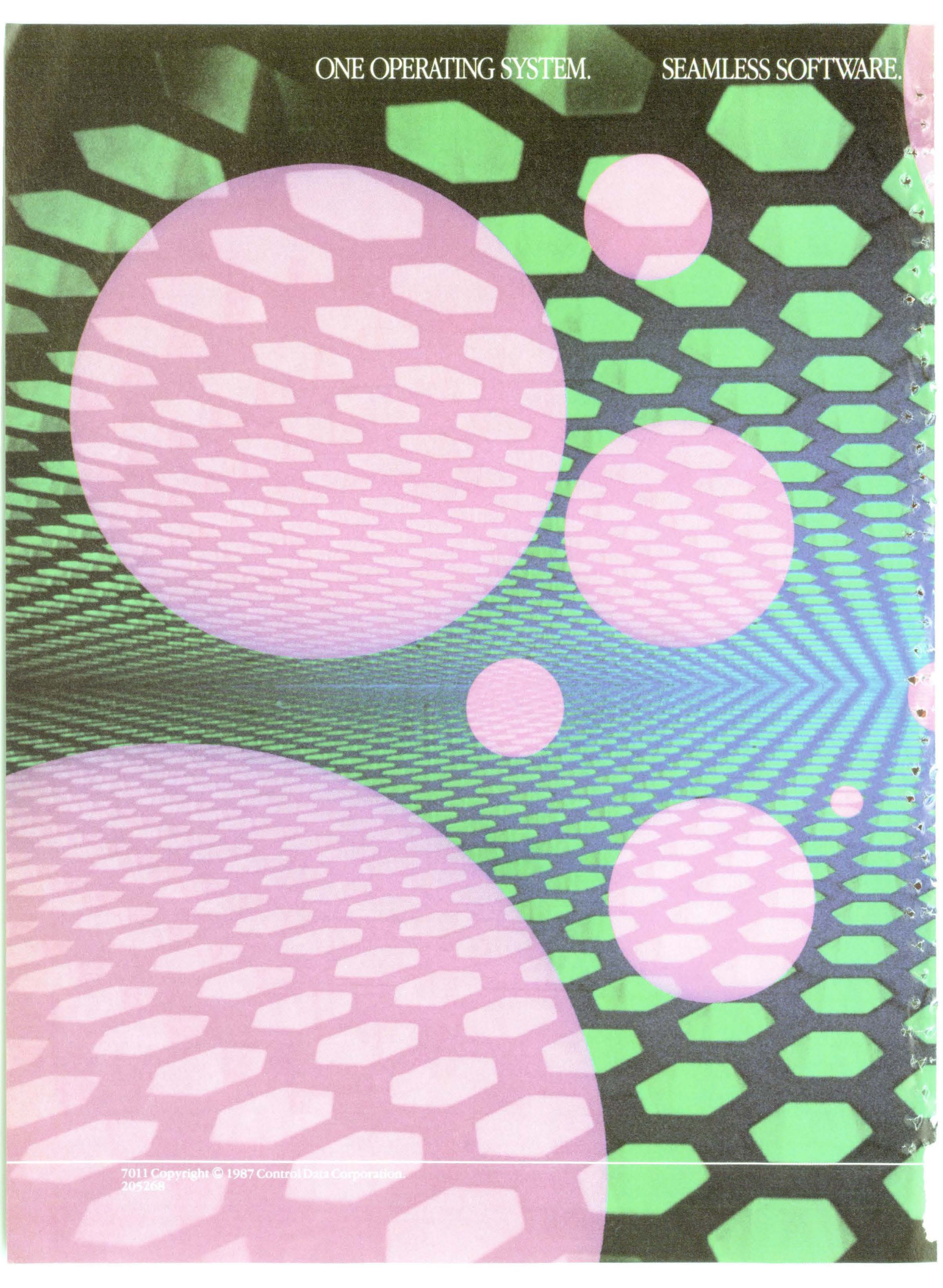
place the company man of today; forms in which corporate loyalty is a thing of the past.

Rather than witnessing the triumph of bureaucracy, as Orwell envisioned in *1984*, the 1980s have seen the beginnings of its downfall. Frontier organizations, such as the Travelers Insurance Cos., Hartford, Conn., and Dallas-based Texas Instruments, are pioneering more democratic solutions. Joseph Brophy, Travelers' senior vice president of MIS, says, "We have the technology to turn traditional hierarchies on their head and create a corporation of peers or equals that is far more responsive to change." Brophy is building a two-tier arrangement of mainframes and IBM PCs (some 60,000 by 1990) with an intelligent network in between.

One Small Step for Man . . .

IBM senior vp and chief scientist Ralph E. Gomory suggests that such peer networks are the next big step in what he refers to as man's "evolutionary drive" to manage his data more effectively and turn it into useful information. "Many companies are only as good as the information they use to make decisions," says Gomory, who adds that IBM's mission is to help its customers build networks across the company.

These emerging networks may hold the key to knowledge and job creation in the twenty-first century, but some futurists argue that, first, these will be responsible for traumatic job displacement in the 1990s and for the ascendance of an elite new class of information worker. The process is already in motion. MIS managers at such companies as Equitable Life, New York, and the Bank of Boston have seen both staffs and budgets slashed as computer power is decentralized. Next to go could be a whole middle tier of clerical, supervisory, and administrative staffs. "They don't add value to the business," says Brophy of the process of selling insurance. "They just push paper around. Once data are cap-



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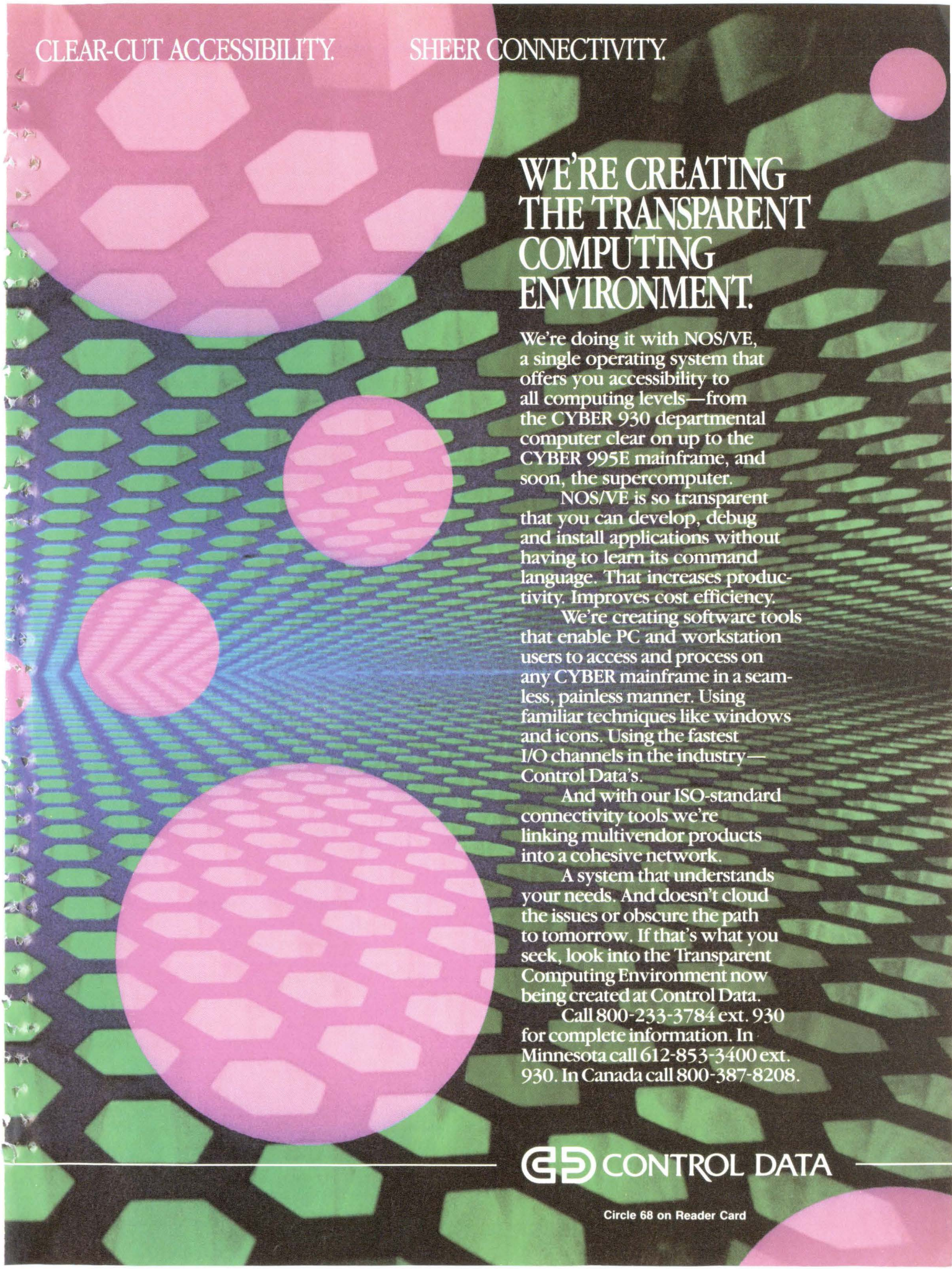
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tured electronically at source [by knowledge workers] you don't need [clerical and administrative workers] any more." Shocking as it may seem, Travelers expects to have dispensed with all its clerical and secretarial staffs by 1995.

The Rise of the Generalist

The social consequences of such corporate downsizing are hard to predict. Might we not be replacing an Orwellian nightmare with another perpetrated by the executive suite in the name of efficiency? Is there a technology backlash or Luddite rebellion in our future? Will AI systems achieve their fullest potential as the preferred vehicle for retraining displaced staffs?

The futurists are adamant that new knowledge will create new jobs. But where?

As peer networks mature, AI and expert systems software will be embedded into their structure so that routine operations and decision-making can be handled automatically. This could result in a further shedding of layers of middle management, experts believe. Over time, this software will become integrated to combine the functions of, say, manufacturing, finance, and marketing, so that in the twenty-first century even the ranks of the knowledge workers will be pruned. "A highly prized, and highly paid, type of information worker could emerge," futurist Joseph explains, "one that uses the integrated software to combine formerly specialized skills." This worker could be part finance manager, part engineer, part programmer—but always the generalist.

The new networks won't always emerge in a planned fashion as at Travelers. When bureaucracies become stifling, networks can arise spontaneously and with great political force. This is exactly what happened within IBM, as internal memos supplied by former employees show. In 1978, IBM management discovered that it was the owner of a 200-cpu network linking its research staffs. The network had materialized over a two-year period without any explicit mandate or governing organization. Bigger surprises were in store, however, for IBM's top executives: in 1981, with 400 nodes worldwide, the network began to be used by employees to air their complaints about working conditions and IBM management. The more articulate researchers demanded a return to IBM's founding principles of respect for the individual and closeness to the customer, which they claimed had been buried under the growth of IBM's business and bureaucracy.

A memo from one researcher spoke of his "alienation" and lack of a sense of reality caused by his working at such a great distance from IBM's customers. Others talked of the "true spirit" of IBM being present in VNET (as the network came to be known). "It's odd how you can feel closer to a bunch of people you know only by names and addresses than a colleague working across the aisle from you," said one. Still others talked about VNET as a substitute for "that magic combination" of management and technical people, free from a corporate bureaucracy, dedicated to a common goal. In general, the memos urged IBM to adopt a network management style and create smaller, more autonomous entrepreneurial groups.

IBM's Ralph Gomory believes peer networks may be the next big step in managing data more effectively.

Photograph by Ken Kerbs

Once the trickle of VNET memos became a flood and the complaints reached the highest level of IBM management, the company's response was to declare that these electronic mail files were, as one terse memo put it, a "non-business use of IBM dp assets and must be removed from the system." IBM, as we know, has since instituted more liberal policies. The company calls 1987 its Year of the Customer and is downsizing to rid itself of bureaucracy and recapture its former corporate vitality.

The VNET memos offer clues to the future peer network experience and how it may evolve. The sense of being part of a select club, an "IBM within IBM" as one researcher put it, was very strong in the network community. Their loyalty was to computer science, to their profession—not to IBM. New York-based consultant Frederic G. Withington, who is a member of DATAMATION's advisory board, predicts that as the corporations become a loose assemblage of part-time, piece work, and "associate" employees in the years ahead, loyalty to the company will erode even further. "In effect, you'll have no HQ, few leaders, and few chains of command; just lots of individuals linked by lateral communication. One has to wonder about cohesiveness. Where will the organizational spirit and identity come from?"

Travelers' Brophy says that bonding will be achieved by intuitive management hired for its motivational and people-oriented skills. "These are the types of managers we're looking for now," he points out. "Men and women who can feel their way through the network and focus on relationships between staff."

Intelligent Networks May Be Next

VNET also provides pointers to the type of AI software that will be embedded into the networks. One of the first things the researchers did was to develop encryption techniques to make the net more secure. They saw this evolving into a real-time screen or filter that also protected individuals from information overload and electronic junk mail.

"We've started to do the same sort of thing," says Brophy. "To protect me from useless data, I'm preparing an interest profile of my preferences. We're also setting up standard responses to a number of queries—for example, telemarketing—and software that screens and ranks telephone calls in order of priority."

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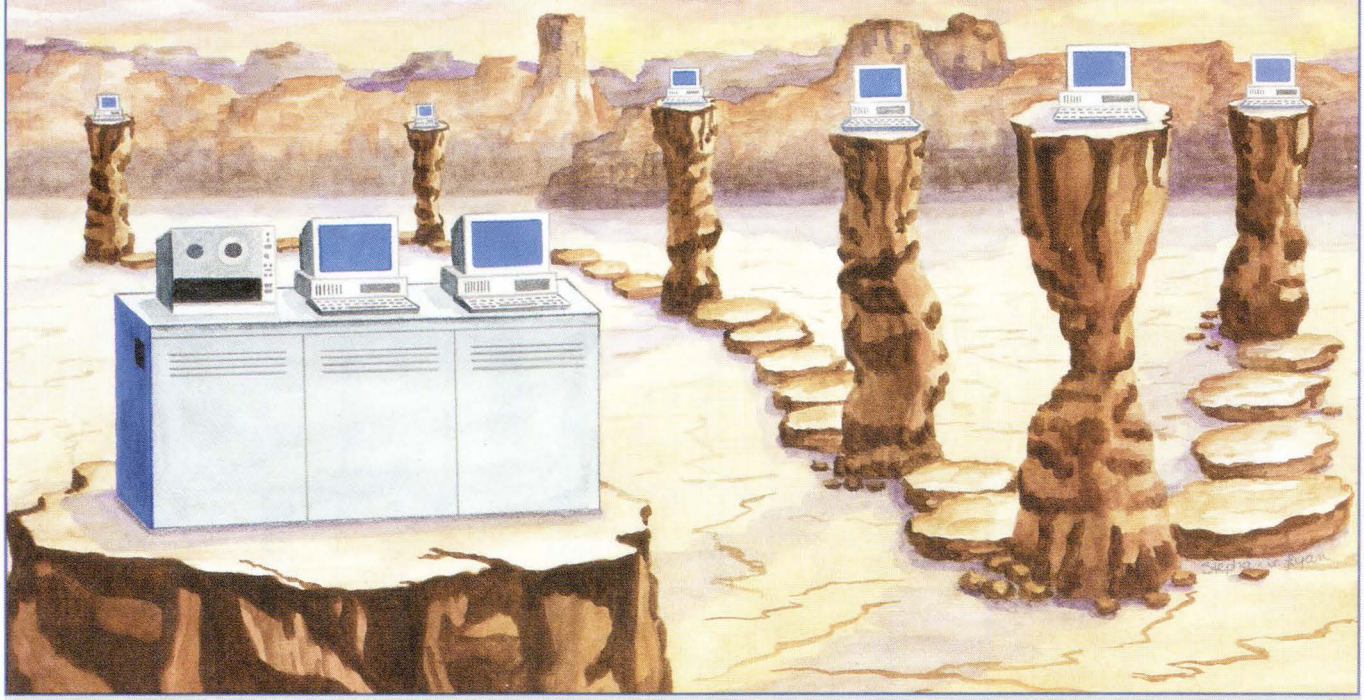

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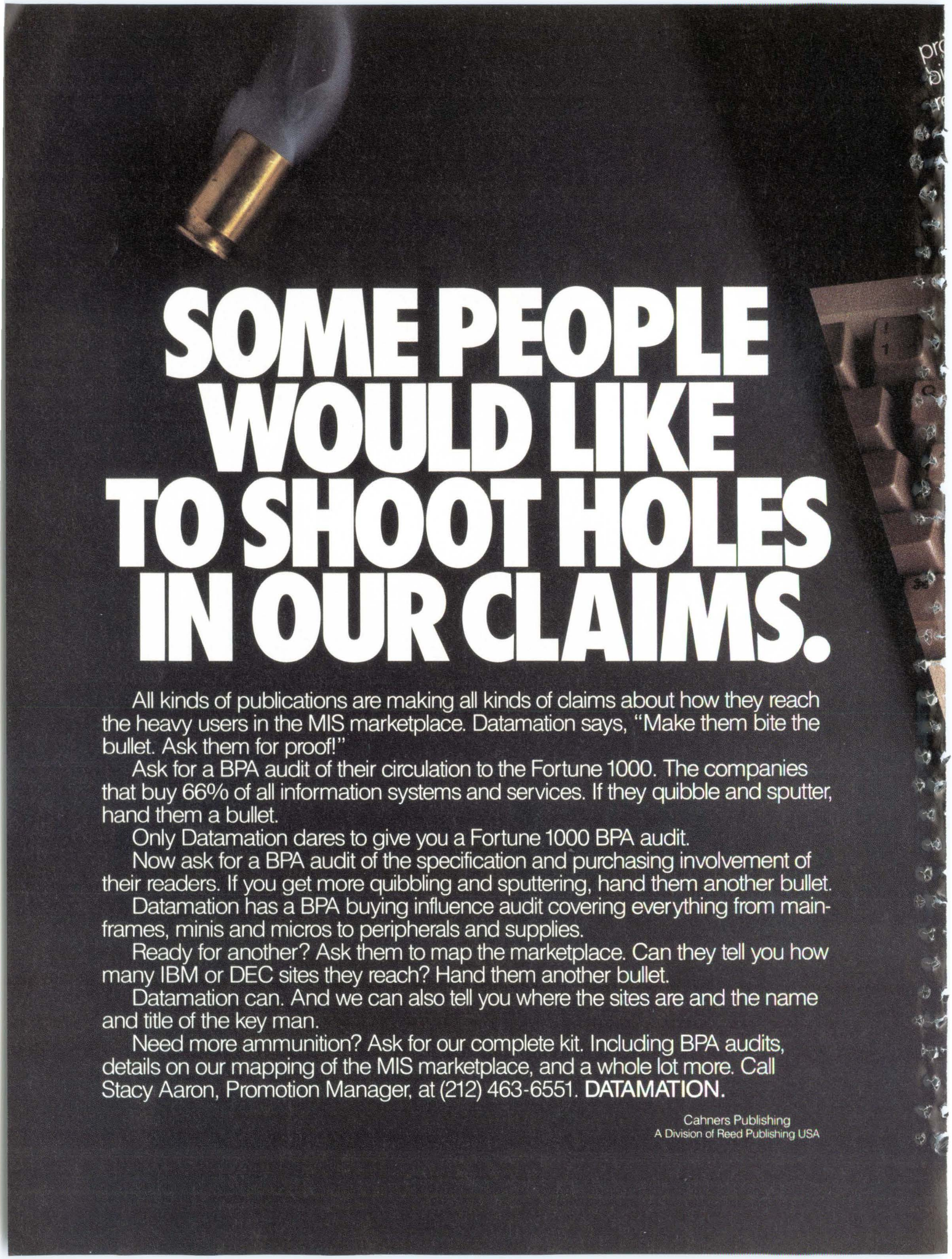

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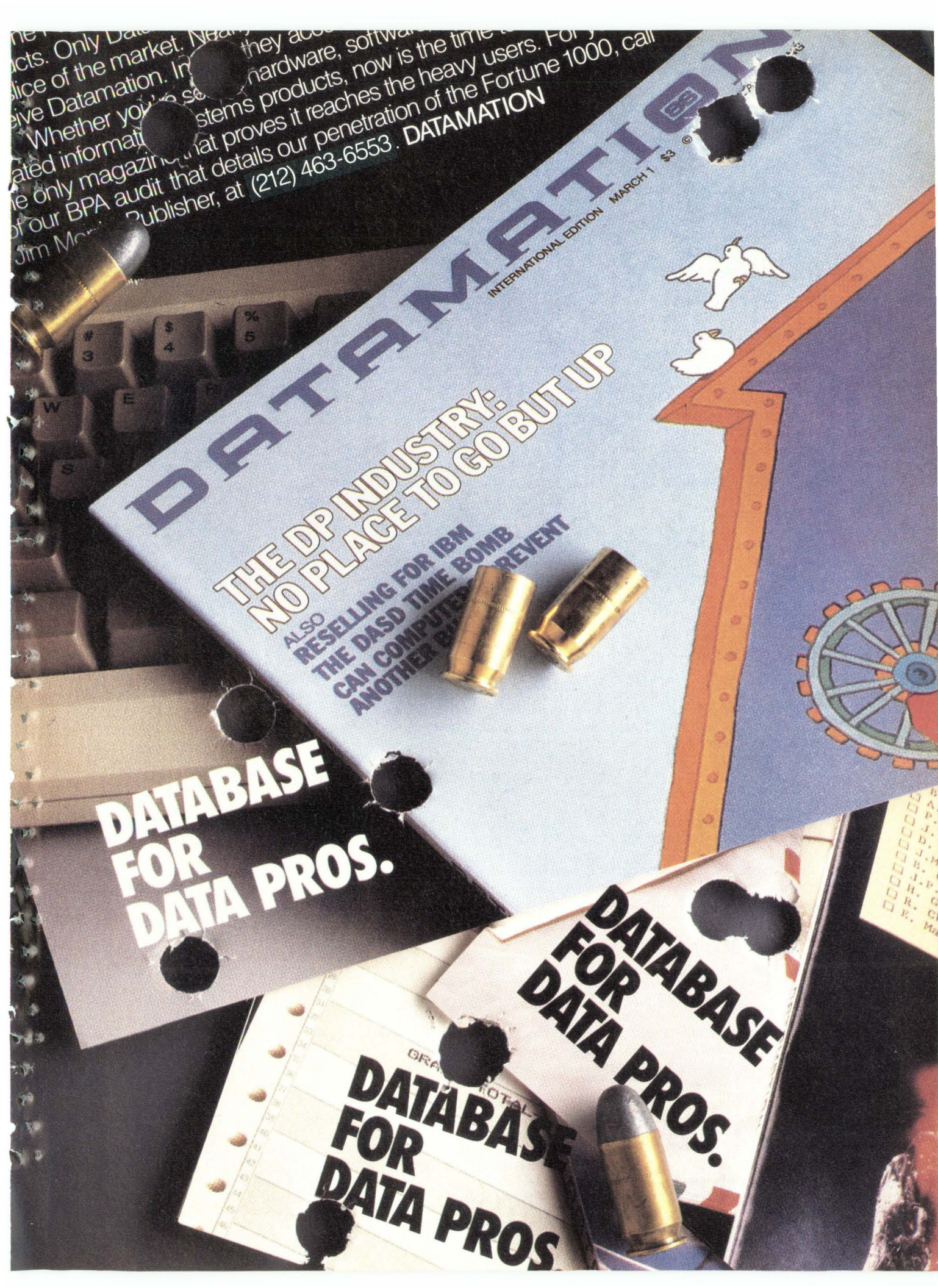
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Brophy and other managers are also attempting to embed some of their know-how and expertise into the network. "For example," he says, "how I would analyze a real estate transaction."

Similar efforts have been under way at the CIA for some time, according to sources. "Project Safe" screens incoming worldwide data according to the preferences of individual analysts.

Withington suggests that network customers, suppliers, and vendors may be permitted to include their interest profiles on the network for a moderate fee. "Once refined," says Withington, "this technique could revolutionize marketing." He also points to the efforts of networks to include expert systems for such things as remote diagnostics and operational scheduling.

Texas Instruments, which has one of the biggest private networks in the world, has hired a number of IBM experts to put their expertise into a software program known as COATS (Computer Operator Assisted Training Software), which helps anticipate and deal with crashes at large mainframe data centers. "You might say that we mined the heuristics right out of their heads," says project director Tom Barrett, who adds that the IBMers are in regular contact with TI in order to enrich the knowledge pool.

CORPORATE LOYALTY MAY BE A THING OF THE PAST.

Sometimes, these exchanges are carried out network to network. Brophy has installed software to aid IBM technicians who want to maintain or upgrade Travelers' mainframes. "This can lead into research and other strategic partnerships between the two of us, or between IBM and a block of its customers at one time." In this way, networks could grow into meganetworks and be used to facilitate mergers between corporations, with one prospective partner simulating the operation of the other on its computers.

As nets become increasingly intelligent, they will be able to anticipate user needs and help them solve a host of prob-

Life in the Network Age

There's no doubt about it. The world of tomorrow will be a wired world, brought closer together by today's communications technology. "The future growth in networking will mean that societies and industry sectors will be unable to remain isolated from each other," declares William H. Melody, a professor of communications at at Simon Fraser University, Burnaby, B.C.

A former chief economist at the Federal Communications Commission, Melody is the driving force behind a research project that is probing the effects that information and communications technologies could have on all areas of society in the future. The ambitious effort, run by the U.K.'s Economic & Social Research Council, is the only program of its kind in the world.

As the project's point man, Melody takes a realistic view of tomorrow. "Certainly, the two extreme views of the future—that current trends will either lead to the ultimate decentralized democracy, or to total centralized control of the world—are both silly." Helping to keep progress under control will be the demands of people using the new technology tools. Those demands should be level-headed, which means that the oft-repeated visionary view of the home as office, with fingertip access to anybody and to any knowledge bank in the world, is optimistic in the extreme.

"One of the major results of research into new technologies over the last few years," Melody explains, "is the discovery of the irreplaceable nature of face-to-face contact. The fact is that there's only a limited amount you can achieve without bringing people together. Studies have shown that videoconferencing only works with people who have met and know each other on a personal level."

The information explosion will detonate a demand for a new breed of workers. "There will have to be many intermediary experts," predicts Melody, "because as more information becomes available, there will be an ever greater demand for filtering it." Melody expects these "information seekers" to play a significant role in the years approaching 2017.

The job of governing a country is also going to be a trickier task in the technological times of the twenty-first century. Nevertheless, Melody doesn't see power reverting to the populace. "The notion that technology will increase democracy so that we can all vote on every issue, for example, is simply not realistic."

In a world based on networked global industries, nation-states will have a declining influence on the factors that have an impact on their economies. At the same time, the clout of transnational corporations is likely to increase. "These changes will seriously affect the ability of nation-states to control their own destinies and economies," surmises Melody. "Take the current round of international corporate mergers. Another few bursts of that kind of activity over the next 30 years and you will have some pretty big corporate monoliths.

"Perhaps the model for a future society will be to have markets dominated by these international monopolies or oligopolies. That means," says Melody, "that antitrust policy, competition policy, and trade policy will have to be radically reassessed." In addition, international relationships will be even more crucial to world trade than they are today. Melody sees international organizations like the General Agreements on Tariffs & Trade and the International Telecommunications Union providing "some common ground for countries to negotiate their differences."

Combine all these changes in the world's power structure and trade economics with the international networking trend and you could have a recipe for disaster. "The losses and breakdowns," warns Melody, "could be catastrophic. Look what's happening today in the financial world with networked, 24-hour global trading. If a bank's network goes down, billions of dollars can be lost in a few hours. And if you break down the type of transactions being done, you find that a very low percentage is related to real trade. The vast majority deal in speculation, in futures, or in financial assets. The world's money markets now seem to resemble more of a casino than anything else."

It is this scenario of economic uncertainty and social vulnerability that worries Melody. "At this point," he says, "we must ask ourselves whether it makes sense to make the maximum use of our networking capacity."

BY PAUL TATE

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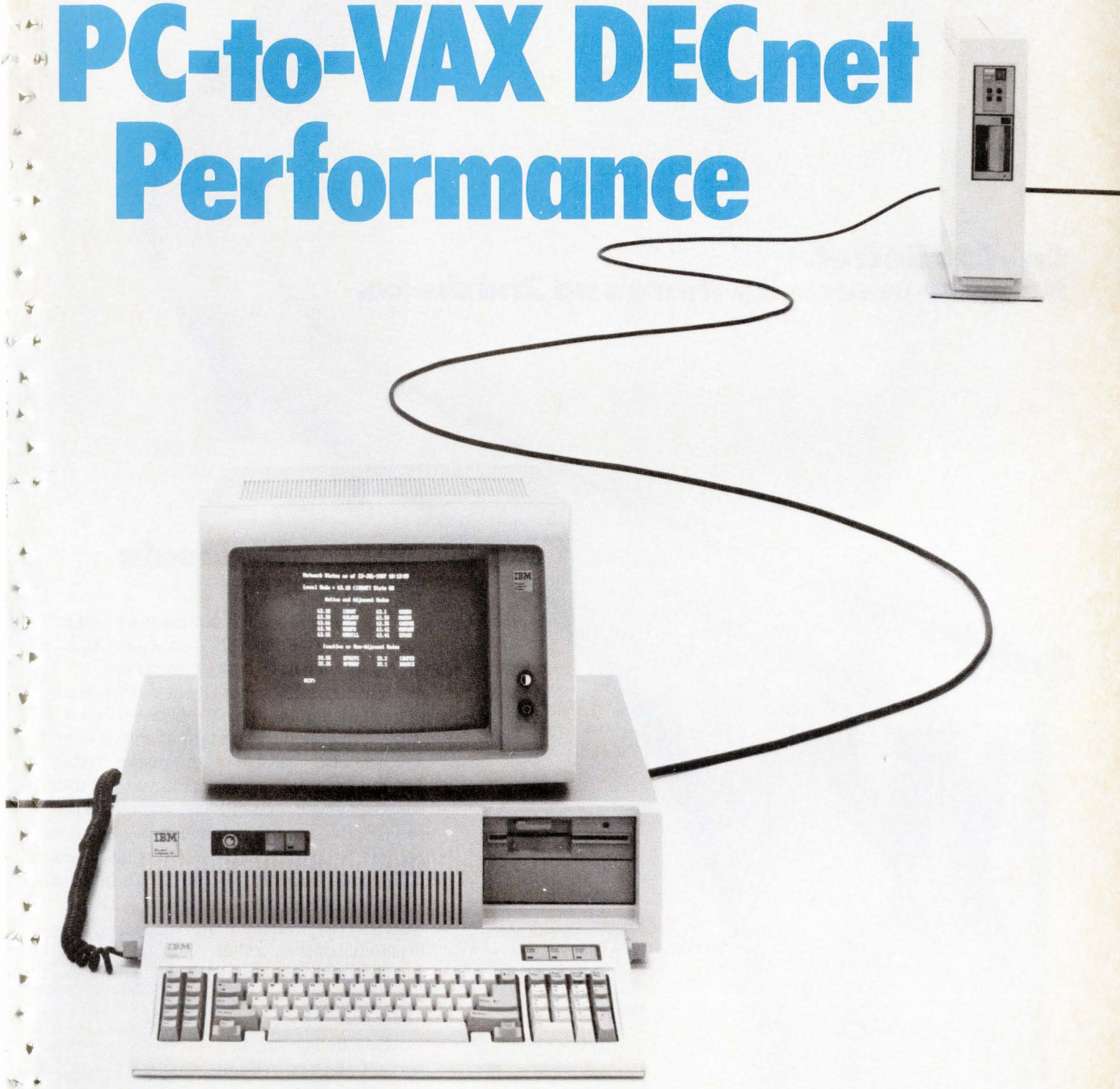

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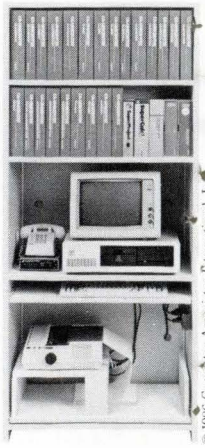

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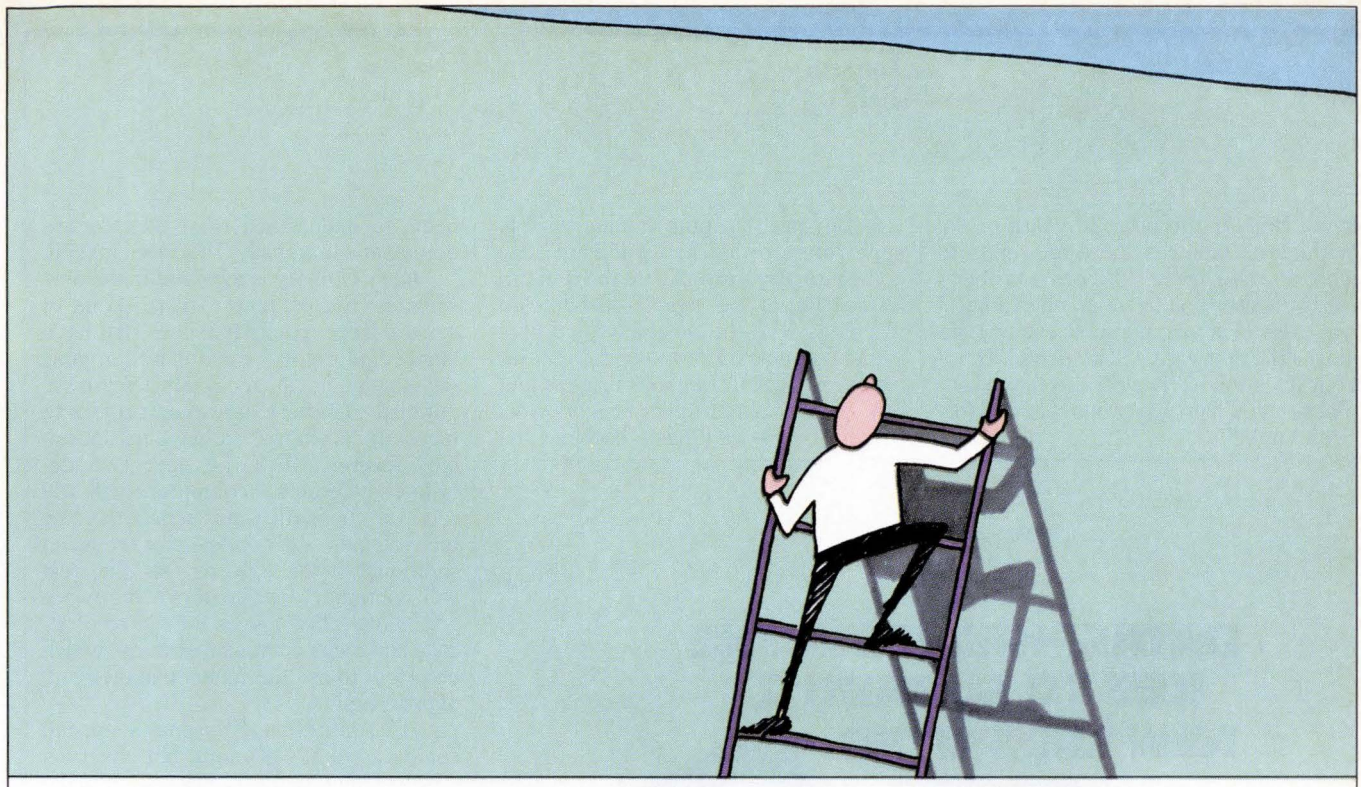

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lems. But for the next 20 years or so, Withington believes there are limits to what AI can achieve. "Where a problem can be described in a precise, logical way—for example, personal estate planning—the software will be useful. But if your question is, 'How do I achieve happiness?' you'll probably find that AI is forever dumb."

Beyond this time frame, what Joseph refers to as the "wild card" may come into play. Joseph sees the wild card as a fusion of the logical capabilities of machines with the flexibility (and occasional sloppiness) of biological entities. "Once we get to biomolecular computers—built in part from human brain and protein cells—we'll have machines that begin to understand what humans are getting at emotionally," declares Joseph.

IBM's Gomory is aware of these possibilities; the computer giant is one of several large research houses that have begun exploratory research into organic technology, in which circuits are grown, not made. Gomory, however, prefers to focus on "probable" rather than "possible" futures. "For the next two decades," he states, "computers will still rely on magnetic and semiconductor technologies, with optical storage as an additional factor." He reveals that IBM will continue to drive down hardware prices over 25% a year for the next decade and focus on miniaturization, which he refers to as "the fundamental engine of progress."

He admits that all this may seem dull compared to AI's glamour, but observes it is declining hardware prices that make all the new networking applications possible. Now, he points out, "We can all lavish MIPS on the human interface and on the task of making the networks as seamless and transparent to the user as possible," he says.

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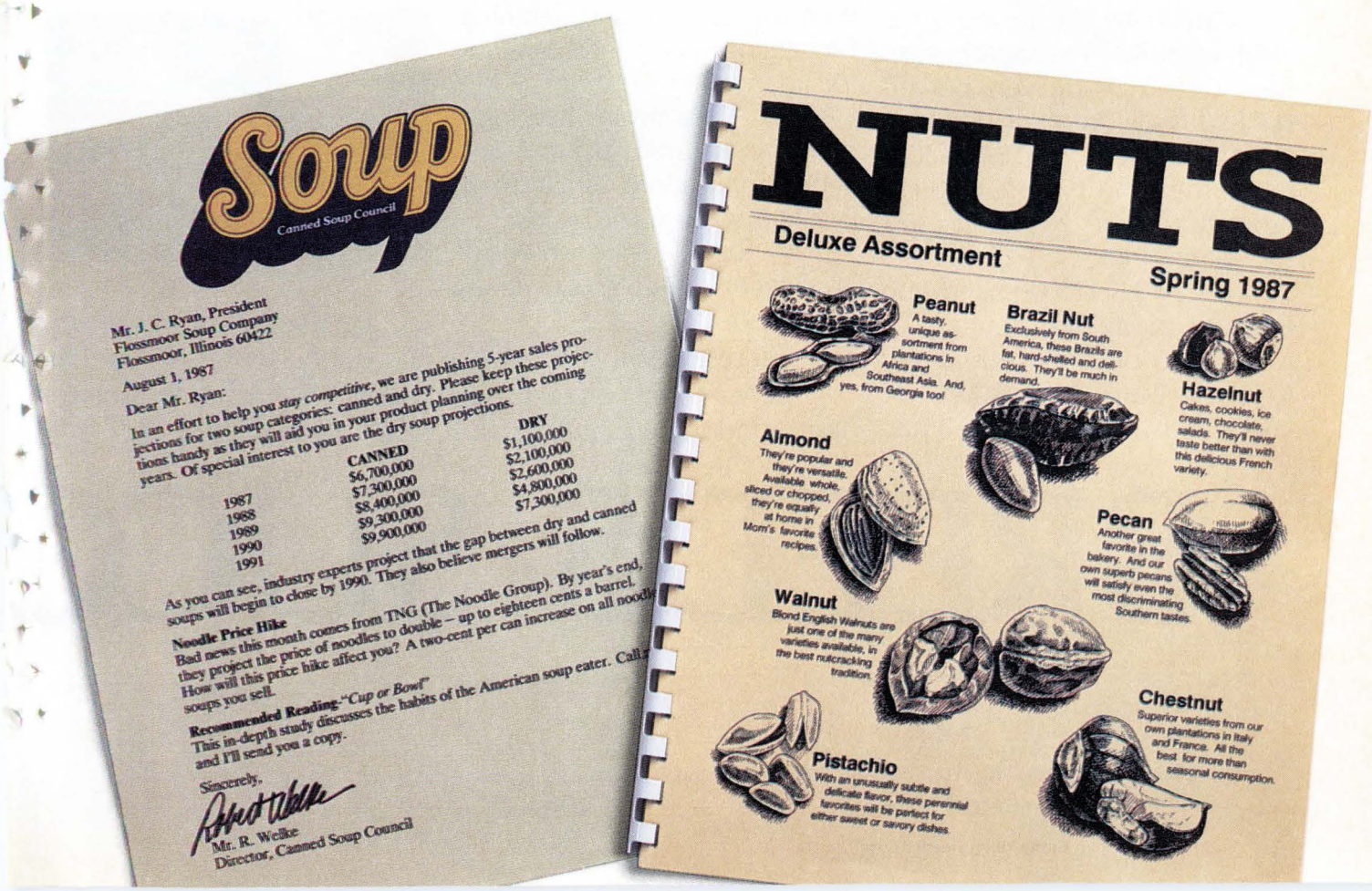

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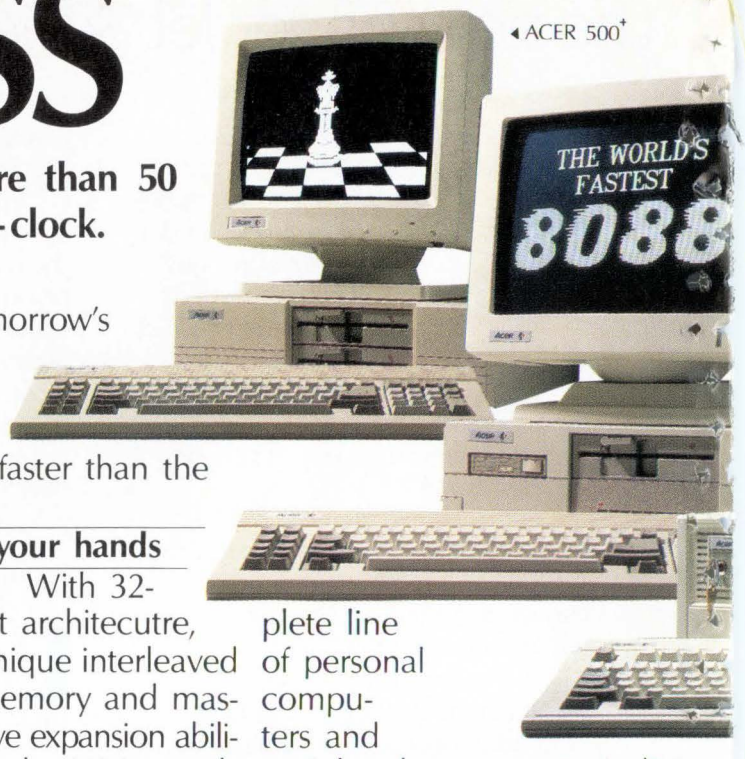

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- STAT	PFK 22	STATISTICA
- AI	PFK 5	CHEMICALS
- DB2	PFK 9	CUSTOMER
- DENVERVM	PFK 13	DENVER VM
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For users who don't require session management, full security and menu services can be provided by Network Access. TPX and Network Access sessions may even be combined in the same menu. Efficient access in multiple CPU environments can be provided by the Affinity feature of both TPX and Network Access.

By giving the TPX user a session with STX, the ACL (Automated Conversation Language) feature of TPX can be programmed to connect to and access an external data network, perform a retrieval, journal the results, and then disconnect—all initiated with a single keystroke.

BEFORE

AFTER

If several STX sessions are made available to the TPX user, then X.25 session management can take place. Imagine a stockbroker with one terminal who looks up a stock quote on one application, then switches to an order entry system to buy or sell the stock.

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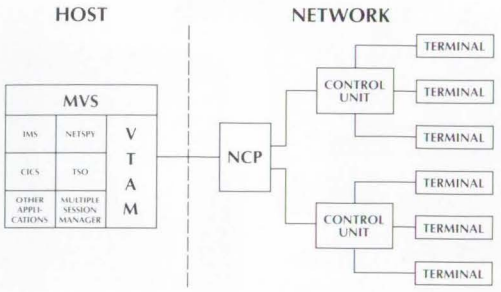

When using a multiple session manager such as TPX, you can access many different applications from one terminal. NetSpy has interfaces to TPX to measure true "end-to-end" response time. This information is not available from any other source.

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OFF-LINE

THE 386-BASED MICROCOMPUTER has provided a platform for developments in a number of areas, particularly multiuser capabilities, graphics, and integrated operating system technology.

Sun River Corp., a Jackson, Miss.-based startup, recently announced a fiber-optic workstation, the Sun River Cygna 386, that was specifically developed to take advantage of the multiuser capabilities of the 386 microprocessor. It connects to an AT-bus 386 system, such as a Compaq Deskpro 386, or a machine using the Intel 386 ATS motherboard. The communication link is by way of a full-duplex fiber-optic cable. Depending on the application, from four to 16 users can be connected to a 386 AT-bus machine, and from eight to 32 users can be connected to a 386 with a 32-bit internal bus. Cygna 386 uses a star topology with a data transfer rate of 32Mbps, which, Sun River says, is several times the present rate of 20,000bps on a standard ASCII RS232C terminal.

"DOS-under-Unix" software drivers for the system, which run Microsoft DOS 3.2 as a task under AT&T Unix V.3, are being provided by Interactive Systems, Santa Monica, Calif.; Phoenix Technologies, Boston (VP/ix); Locus Computing, Santa Monica, Calif.; and Microport, Scotts Valley, Calif. (Merge 386). Digital Research Inc. in Monterey, Calif., and the Software Link, Atlanta, are providing operating systems that emulate DOS 3.2, while Softguard in Santa Clara will provide drivers for its VM-386, which supports multiple DOS virtual machines.

The company claims the star configuration of the Cygna is preferable to a LAN in a closely coupled work group because it removes the LAN bottleneck for high-density data exchange, while providing the familiarity of DOS. Thus, graphics-intensive DOS applications are provided in an integrated multiuser environment.

The Cygna 386 is host-dependent in that the user's application is executed in the host 386 computer. It supports EGA, EGA+, CGA, Hercules, and MDS monochrome graphics. VGA and MicroChannel support are planned, and both Microsoft Windows and X Windows are supported now.

The Cygna 386 fiber-optic station will be sold separately from the operating system. A CGA version is $1,599 and an EGA version is $1,899. Production quantities will be available in November.

HARDWARE

The Xerox XPS 701 has been enhanced to be a multiterminal publishing environment.

Xerox Augments Its Publishing System

Production publishing capabilities of the XPS 701 system are enhanced.

BY THERESA BARRY

Xerox Corp. has added six new hardware and software products to its XPS 701 electronic publishing system. The enhancements, according to Xerox, enable users to create a multiterminal publishing environment.

The hardware components of the system include the new 7650 Pro Imager scanner and the Peripheral Expansion Cabinet (PEC). The 7650 is a high-resolution graphics scanner that enables users to scan photographs, halftones, and other illustrations into the XPS 701. It features 600dpi to 1,200dpi resolution, paper-handling capability up to 11½ by 17 inches, two-second per page scanning, and up to 256 levels of gray scaling. It will be available in the fourth quarter, priced at $8,500. Included with it is Xerox Publishing Illustrator's Version 2.0 software, which is also slated for fourth-quarter availability. If purchased separately, it costs $1,500.

The PEC allows users to increase the XPS 701's storage capability to the 300MHz necessary for a multiterminal configuration. It features a parallel printer port and accommodates four 300MB hard disk drives. It's available in the fourth quarter for $8,500 and includes a parallel port, cabling, and power supply. The first 300MB disk with controller is $13,000; each additional disk is $10,000.

Xerox also has announced Version 4.0 of XPS 701 software for fourth-quarter availability. It includes support for additional XPS design/pagination emulation terminals, Interpress (page description language) preview, enhanced forms design, and expanded output device flexibility for Host Forms Description Language forms. It's free of charge to existing 701 customers. Another enhancement is a software module that enables the Xerox 6085 Professional Computer System and the Xerox Publishing Illustrator's Workstation to serve as design/pagination terminals on the XPS 701. It also has a windowing capability. The price is $2,495, and it's available in the fourth quarter. In addition, Xerox has come out with conversion software that allows the 6085 to send documents generated by its ViewPoint software to an

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DATAMATION

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The TeleVideo 955. Seeing is believing.

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(Unretouched photo)

TELEVIDEO 955
(Unretouched photo)

SALES ANALYSIS LATEX SPECIALITY PRODUCTS INC. PERIOD: Q3, 1985

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	1010000000	NEW YORK	APEXINC	33333888899	KL234	87654	200	10/02/85	NWPHILIDE	NEW YORK	ACMETRS	
	1022777754	BOSTON	ZINCINC	33388990044	KL234	50987	007	12/01/85	CENTRALLA	BOSTON	AJAXAIR	
	1000000456	CHICAGO	AASEWER	98750372378	KL230	90867	999	ONHOLD	WOODLAWN	CHICAGO	DUMAIR	
	1098857363	ATLANTA	TVSINC	77493887549	KL239	99999	808	11/19/85	ATLANTANW	AUGUSTA	EWFRT	
	1075849 48	MINNIAP	XYZCORP					/07/85	MINNSTPAUL	MINNIAP	TRUCKER	
	1083584088	SANFRAN	JAKINC					/28/86	SANJOSESE	SANMATEO	SHORTAIR	
	1086574637	SANJOSE	ACDCORP					/08/85	SACRAMENTO	SANJOSE	EZHAULER	
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Dynamically allocated non-volatile function key memory	512	128
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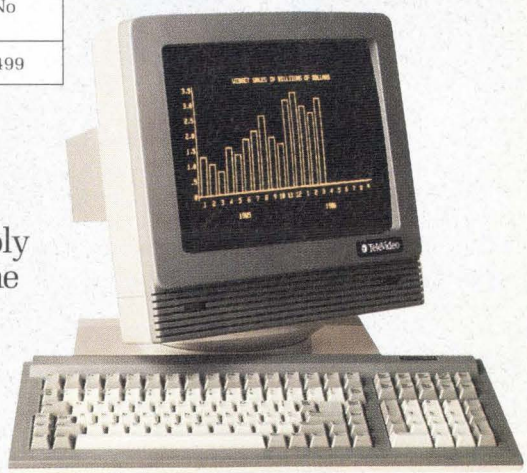

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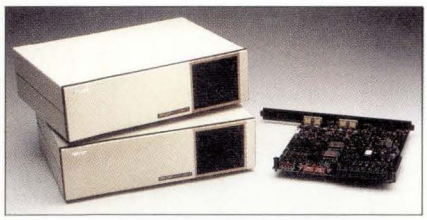
XPS 701 for editing and formatting. It's available in the fourth quarter for $250. Xerox has dropped the base price of the XPS 701 from $68,000 to $55,000. XEROX CORP., El Segundo, Calif. CIRCLE **275**

Multiplexor

Micom rolls out first in a family using proprietary technology.

Micom's new proprietary Advanced Packetized Voice (APV) technology has been used for the first time in its Oneliner 56Kbps integrated voice/data multiplexor. Micom's APV technology uses algorithms implemented in digital signal processors to allow the efficient use of channel bandwidth for high-quality transmission at low data rates. Oneliner consists of a multichannel, full-duplex 9.6Kbps voice digitizing card implemented in Micom's modular time-division multiplexor. Oneliner can be configured with an integral statistical multiplexor board. Micom says its APV technology is geared toward those users who lack the volume of voice and data communications to justify T1 rates and equipment.

Oneliner multiplexes multiple synchronous and asynchronous data channels as well as up to four 9.6Kbps voice channels over a 56Kbps digital circuit.



Each card provides two digital voice channels. Oneliner connects to a voice PBX and supports E and M signaling types I through V.

Oneliner is available now in a range of configurations, with prices beginning at $4,635. MICOM SYSTEMS INC., Simi Valley, Calif. CIRCLE **280**

Second Generation Hypercube

Intel supercomputer includes commercial application software.

Intel Scientific Computers (iSC) has announced the iPSC/2, the second generation of its iPSC family of concurrent supercomputers for large-scale scientific and engineering applications. The iPSC/2 is available in configurations between 16 and 128 processing nodes, with up to 1GB of memory and 38MFLOPS in performance. The iPSC/2 VX, with a vector arithmetic accelerator at each node, is available in configurations of up to 64 nodes with a peak performance figure of 400MFLOPS. The system features Direct-Connect routing, which avoids the delay of store-and-forward message relay mechanisms and allows programmers to use all nodes of the machine with minimal delays between nodes. Also featured is a programming environment called Concurrent Workbench, which offers simultaneous access to the iPSC/2 system from a network of engineering workstations.

Intel has also introduced NEKTON, a fluid dynamics and heat transfer software package from Nektonics Inc., Bedford, Mass.

The iPSC/2's price ranges between $200,000 and $2 million. Beta testing begins in late October; volume shipments are scheduled to begin in January 1988. INTEL SCIENTIFIC COMPUTERS, Beaverton, Ore. CIRCLE **276**

Removable Disk Drives

Iomega offers 5¼-inch drives using Bernoulli Box technology.

The four new Iomega Bernoulli Box II products now available are all 20MB 5¼-inch half-height boxes. Installation kits for the drives are available for the IBM PC, XT, and AT; Compaq Portable 286, Deskpro, Deskpro 286, and Deskpro 386; Leading Edge D2011E; Unisys IT; and Tandy 300HL and 300HD.

Iomega's new drives are the Model 20+20 Bernoulli Box II external dual-drive system, priced at $2,499; the Model 20 Bernoulli Box II external single-drive system, priced at $1,599; the Model 20 Master Bernoulli Drive 2 internal single drive, for $1,299; and the Model 20 Slave Bernoulli Drive 2 second external drive, priced at $1,200. Also available, for $900, is the Model 20U upgrade kit. It allows users to expand a single-drive external subsystem to a dual-drive subsystem. Iomega says it will continue to offer and support its eight-inch products. IOMEGA CORP., Roy, Utah. CIRCLE **277**

AT-Compatible Workstation

Reuters company offers first commercially available product.

IDR Inc., a U.S. subsidiary of Reuters, has been building communications controllers since 1973 for use only within the Reuters worldwide news network. IDR has entered the AT-compatible market with the IDR 386 Workstation.

The workstation has a compact (14 inches wide, 16 inches deep, 4.88 inches high), single-board design. The board uses Intel's 80386 microprocessor and the Chips and Technologies AT chip set. Standard with the workstation are 2MB of on-board RAM, two RS232C serial ports, one Centronics parallel port, a keyboard, a floppy disk drive, a hard disk drive, an EGA adapter, a real-time clock, and three IBM-compatible expansion slots. The controller and all associated components are on one board. An 80387 math coprocessor is optional, and the floppy disk, hard disk, and EGA controllers can each be disconnected to allow the use of external expansion card controllers.

The IDR 386 Workstation is $4,495 and is available now from oems and vars. IDR INC., Hauppauge, N.Y. CIRCLE **278**

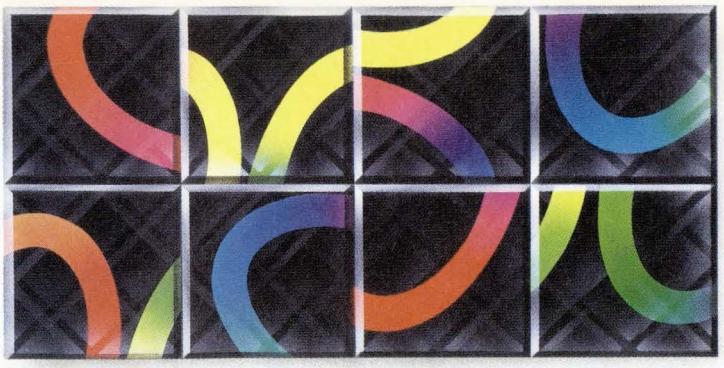
Graphics Adapter

Compatible with IBM's Video Graphics Array standard.

STB Systems Inc.'s VGA Extra adapter provides VGA resolutions of 320 by 200 pixels with 256 simultaneous colors, as well as 640 by 480 pixels with black and white and 16 colors. All colors are available from a palette of 256,000. It also offers 640 by 480 pixels in 16 shades of gray; 320 by 200 in 64 shades of gray; and high-quality 720 by 400 pixels.

The VGA Extra offers full compatibility with the EGA, CGA, MDA, and Hercules graphics standards, according to STB. For spreadsheets and terminal emulation applications, it provides 132-column display and eight-by-14 character cell text. Dual 15-pin analog and nine-pin TTL display connectors are included to support analog and digital output to monitors.

Available for the IBM PC, XT, AT, PS/2 Model 30, and compatibles, the VGA Extra is priced at $495. STB SYSTEMS INC., Richardson, Texas. CIRCLE **279**



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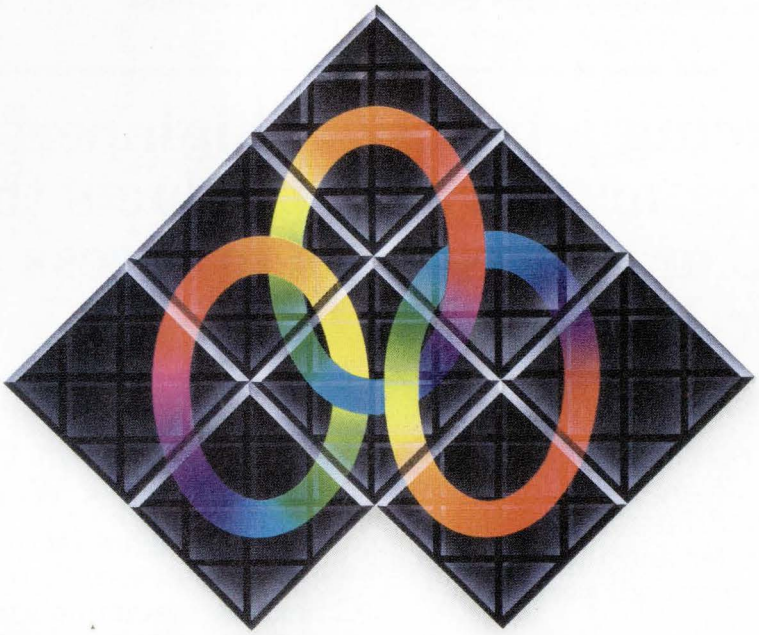

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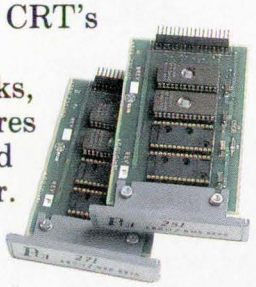

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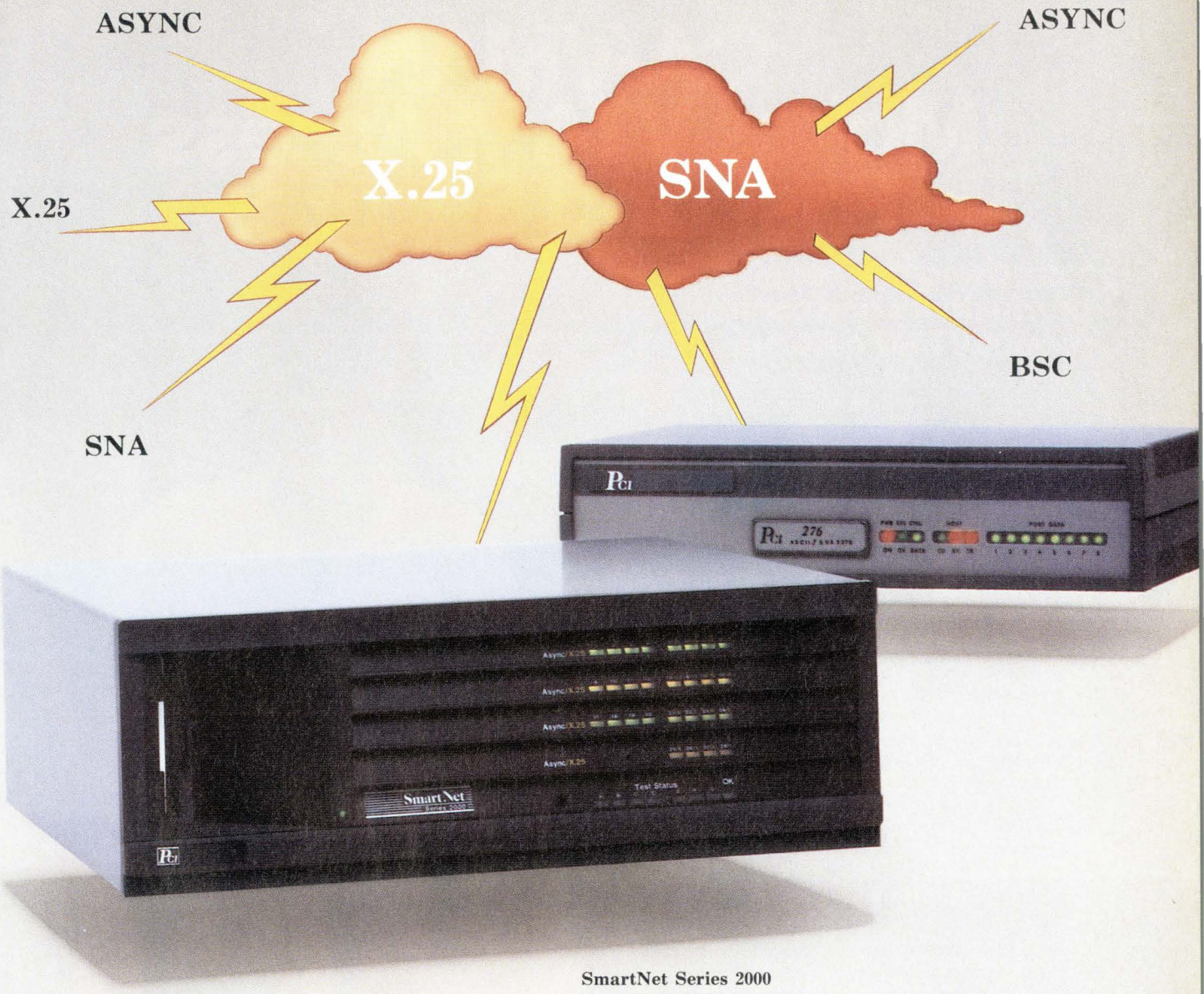

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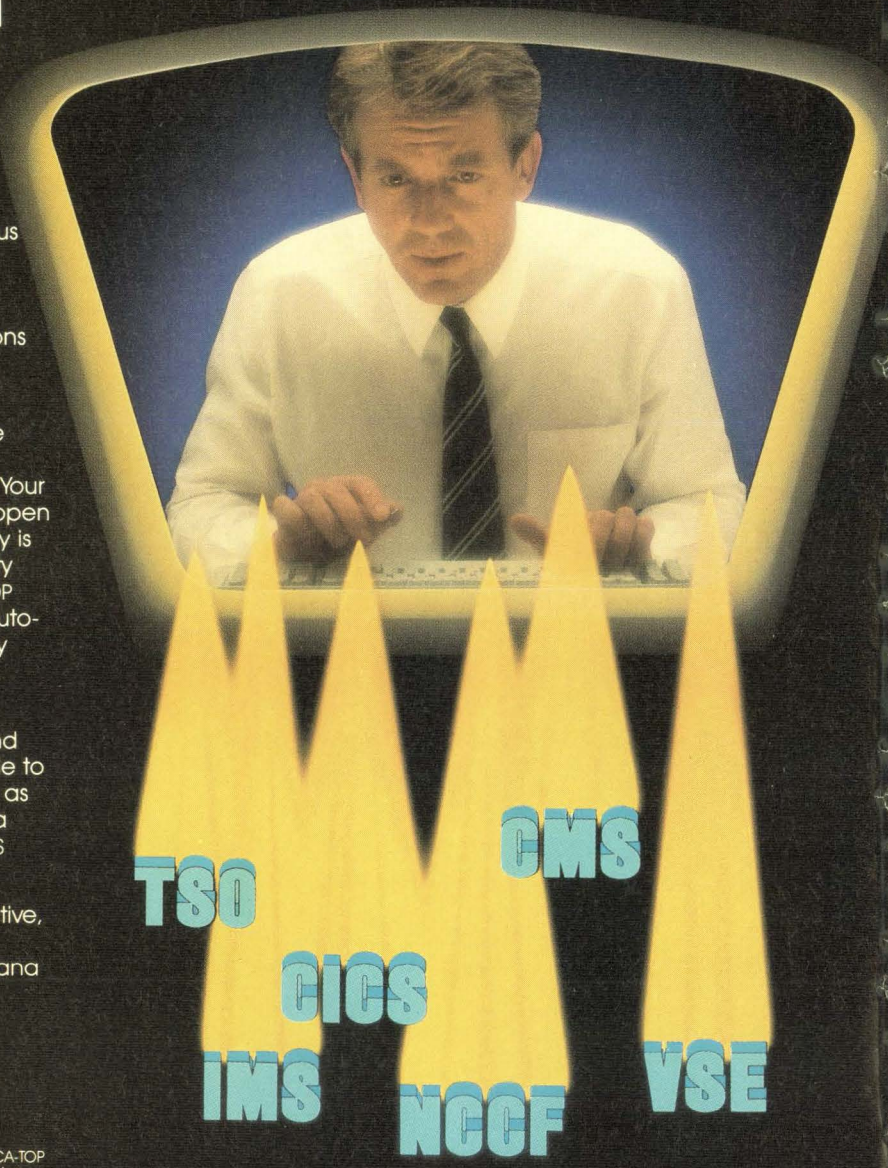

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UPDATES

TRAVEL AND ENTERTAINMENT is thought to be the third largest controllable corporate expense, after salaries and data processing. The *Journal of Accountancy* estimates that business travel costs will be about $112 billion nationwide this year and should register annual growth between 10% and 14% through 1990. Both the Tax Reform Act and the Federal Civilian Employer and Contractor Expenses Act of 1986 initiated significant changes in the treatment of some entertainment expenses, and, as a result, management is monitoring this area more closely.

In an effort to capitalize on this, American Airlines has introduced its Capture travel and entertainment expense management system. The software is initially available for the Digital Equipment Corp. VMS environment. According to Al Ramacciotti, president of Capture, a division of AMR Corp., the parent company of American Airlines, the Capture system is designed to control all phases of the travel cycle, including pre-trip planning, travel policy compliance, employee expense reimbursements, and travel advances. By providing this control, says American, corporations will save money and will have a comprehensive, historical travel-related database that can be consulted for such things as travel vendor negotiations and budget reporting. User benefits include faster reimbursements, claims American.

Capture allows individual travelers to make reservations through the normal channels, and, because Capture is interfaced to computer reservation systems, the information is transmitted to the corporate office automatically. Travelers are provided with a travel plan and worksheet, which contains prearranged expenses such as airfare and hotel and can be amended as necessary for out-of-pocket expenses. After the trip, the traveler enters the expense report into Capture via a screen that mirrors the company's traditional expense report. Management approval can be done on-line with a personalized code number.

Capture is written in Informix fourth generation language. It will be available in the fourth quarter. A midrange system on a DEC MicroVAX platform is priced at about $50,000.

Ramacciotti says American is in discussions with other vendors for automating the entire expense management process.

Photograph by Richard Howard

SOFTWARE

Symbolics' CLOE system allows for the development of 80386-based applications.

Symbolics Brings AI To 386-Based Micros

Three software modules are to be delivered by the end of the year.

BY THERESA BARRY

Symbolics Inc. has announced CLOE (Common Lisp Operating Environment), a three-module package that allows applications to be developed on Symbolics systems and delivered on 80386-based micros. A software link package called Symbolics SNA 3270 and a Symbolics C software development environment also have been introduced.

Three modules make up CLOE—one for delivery and two for applications development. CLOE Runtime, the delivery module, executes the application on the targeted 80386-based delivery system. It's a native 80386 Common Lisp run-time platform with extensions such as multitasking, support for New Flavors object-oriented programming language, exception handling facilities, and a garbage collector.

The modules for applications development are the Symbolics 3600-based Developer and the companion 80386-based Application Generator. The Developer is used to support the development and maintenance of applications targeted to be compatibly delivered on the 80386-based platform. The Symbolics 3600 system comes standard with the Genera software system. Application Generator is a superset of Runtime with a Common Lisp compiler, as well as performance monitoring and metering tools used to fine-tune the application to its target environment. It includes tools to strip out features not necessary for the end user.

Priced at $4,000, CLOE is slated to be available by year's end.

Symbolics SNA 3270 provides the 3600 family of Symbolics systems with access to data on any IBM mainframe or plug-compatible that runs IBM software. It will be available in December and is

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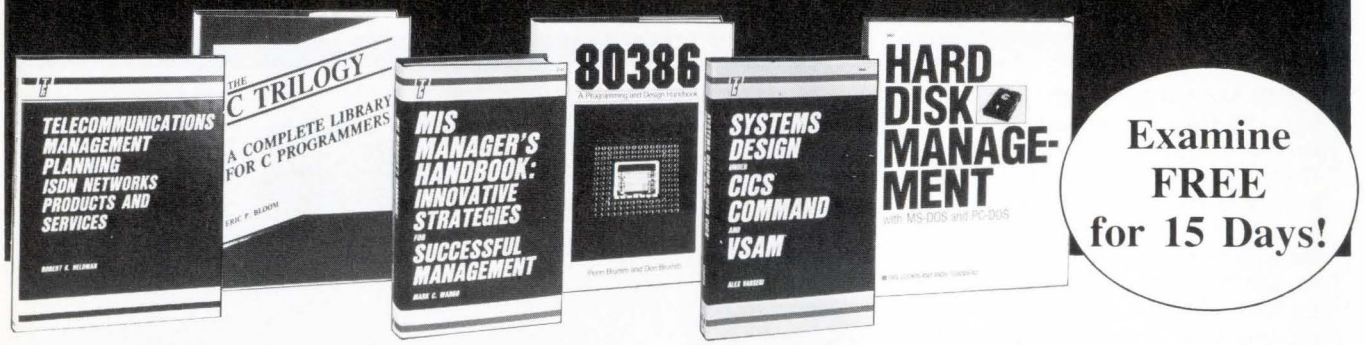

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priced at $6,950 for a single cpu license.

The Symbolics C software development environment will be available in early 1988 for $3,000. Symbolics says it will offer full ANSI support. SYMBOLICS INC., Cambridge, Mass. CIRCLE **250**

VM Dump Analyzer

Kolinar enhances its analysis tool for VM/CMS.

KProbe/2 is the enhanced version of Kolinar's KProbe dump analysis tool for VM/CMS system and applications programmers. It includes support for VM/SP, VM/HPO, and VM/XA SF.

Kolinar claims the new version provides total support for the VM/SP release 5 console facility. Using the windowing support of XMenu/2, a companion product from Kolinar, a user can display several dumps or different parts of a dump simultaneously. A new single-level display option causes a currently running KProbe subcommand to exit before a new subcommand can be executed. Included is a library of macros for displaying and checking the consistency of VM/SP, VM/HPO, and CMS major control blocks. Users can invoke them through a hierarchical, task-oriented menu. Kolinar says it plans to add macros for VM/XA SF, RSCS, GCS, TSAF, and PVM.

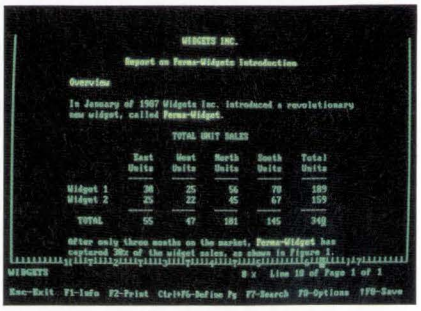
A perpetual license for KProbe/2 is $18,000 and an annual license is $4,900. KOLINAR CORP., Santa Clara. CIRCLE **251**

Word Processor

Symantec offers enhanced version of Q&A.

Q&A Write from Symantec includes font and laser printer support and integration with popular business applications software programs.

The font and laser support allows users to select up to nine fonts in each document directly from a Q&A Write menu and to output to a laser printer. It supports the HP LaserJet, the Apple LaserWriter, and other popular laser printers. Q&A Write enables users to run such applications as Lotus 1-2-3 directly from the Q&A main menu, and it can import spreadsheets into documents for editing, as well as include 1-2-3 graphs and spreadsheets in documents at print time. It can also run Ashton-Tate's dBase II and III from the main menu and run mail merge with dBase, 1-2-3, Q&A, and other ASCII databases. In addition, it is compatible with all major LANs that support MS/DOS or PC/DOS 3.1.



Q&A runs on the IBM PC, XT, AT, PS/2, and compatibles with 348KB of RAM. The package includes both 3½-inch and 5¼-inch disks. The price is $199. SYMANTEC CORP., Cupertino, Calif. CIRCLE **252**

VAX COBOL Product

MCBA adds a new module to accounting/distribution system.

Sales History from MCBA is the twelfth module in its VAX COBOL product line, which it launched in late 1986. MCBA plans to provide 18 packages in its Manufacturing Resource Planning system.

Sales History is a management tool for planning sales strategies and tracking results. Among its features is the ability to obtain data automatically when invoices are printed. It also allows the manual entry of data. Sales analysis reports present sales volume and profit percentages so that users can locate profit sources. Sales comparison reports allow users to compare year-old data with data from current periods.

Sales History, like others in the system, runs on Digital, Wang, HP, TI, AT&T, Altos, NCR, Honeywell, Unisys, Concurrent, IBM PC, XT, and AT hardware. Prices range between $2,000 and $4,000. MCBA INC., Glendale, Calif. CIRCLE **254**

Remote Spooler

Broderick Data Systems rolls out facility for IBM System/38.

Remote SpoolPrint/3X from Broderick Data Systems allows users to transfer printed output automatically from an IBM System/38 source to a remote System/36 or System/38 printer. Multiple remote systems and multiple devices can receive and print spool files. The program monitors local output queues and transmits available spool entries from each monitored output queue to the specified remote systems printer or printers. There is no limit to the number of active remote printing tasks on a source or target system, and no user application programming changes are needed.

Remote SpoolPrint/3X is priced at $1,800 for the S/38 and $500 for the S/36. BRODERICK DATA SYSTEMS, Mansfield, Ohio. CIRCLE **255**

Connectivity Program

Supports terminal-to-host communication over SNA.

In conjunction with Dutch electronics firm Philips International, the Orion Group has developed sna0123 Facility, which provides communications support for devices emulating IBM's 3270 and 3770 terminals and peripherals, as well as 4700 and 3650 systems used in financial applications.

The sna0123 Facility, written in C, may co-reside in a processor with Orion's sna62 Peer Communications Facility so that users can conduct LU 0, LU 1, LU 2, LU 3, and LU 6.2 sessions simultaneously over a single communications link. The sna0123 Facility is available to oems and systems integrators. ORION GROUP INC., Berkeley, Calif. CIRCLE **256**

Operating Environment

Virtual Systems' program connects up to 32 terminals to one pc.

Quick Connect is a program that allows as many as 32 terminals to connect to an IBM PC or compatible, allowing users to access spreadsheet, word processing, and DBMS programs simultaneously. It runs on PC hardware in a star configuration, with each terminal connecting directly to the host. Working between the operating system and application programs, Quick Connect distributes cpu processing time by using a scheduling algorithm. Virtual Systems says this method can be used at 40% to 80% of the cost of a comparable LAN solution.

Quick Connect features e-mail capability, modem communications, a cash box feature to protect specified files, and password security. It's distributed on both 3½-inch and 5¼-inch formats, and it requires 256KB of RAM, DOS 3.0, and one or more PC or ANSI terminals attached via RS232C serial lines. A hard disk is preferred. A two- or three-user system is $295, a four- to seven-user system is $595, and a system for eight users or more is $995. VIRTUAL SYSTEMS INC., Walnut Creek, Calif. CIRCLE **253**

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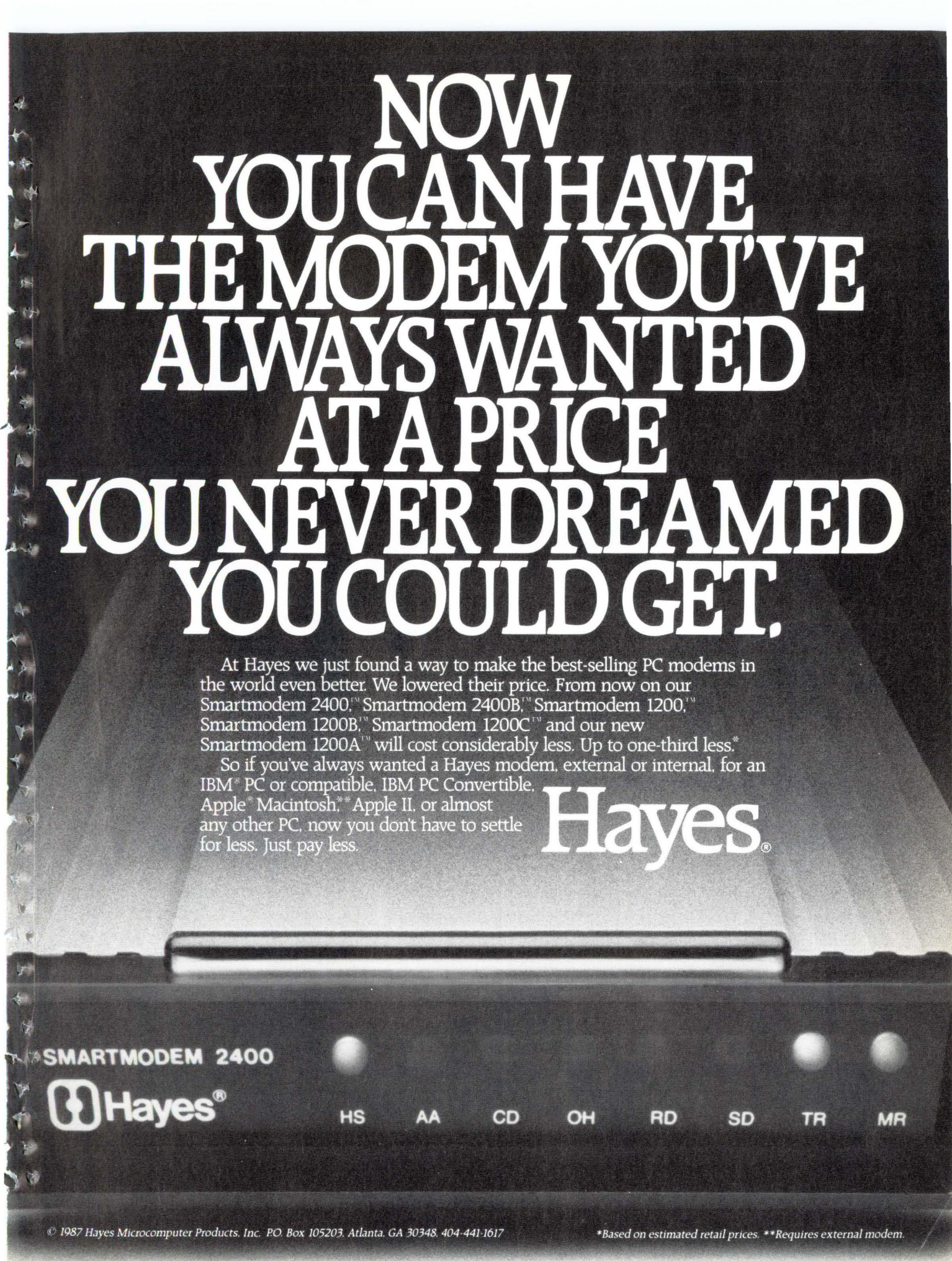

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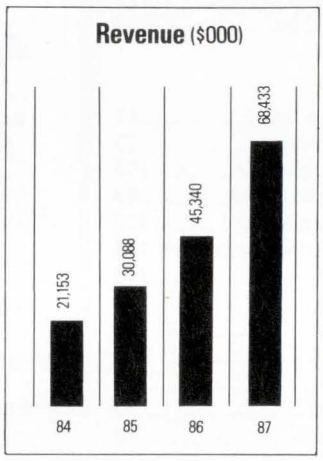
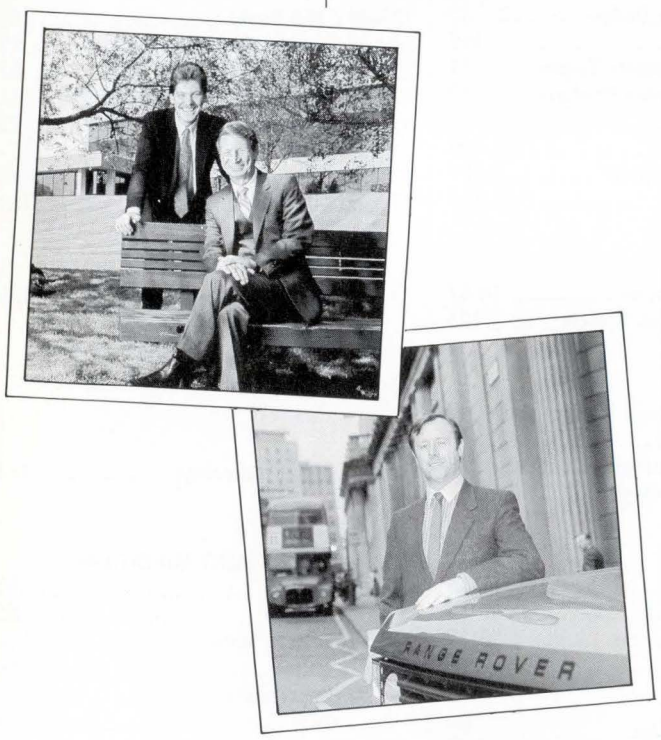
Cognos Results in for Fiscal '87, First Quarter '88

Cognos Incorporated, developer of the advanced development language PowerHouse, closed the first quarter of the 1988 fiscal year with revenues of $19.5 million, a 26% increase over the first quarter results for 1987. Net income was $1.5 million, up 53% over the same period a year earlier.

Highlights for the quarter included improved profit margins and a number of product releases. Included was PowerHouse Architect, a product for the Hewlett-Packard marketplace, which quickly became the fastest selling new product in the company's history.



Cognos ended FY '87 with a 51% increase in revenue.



The 1987 Cognos Annual Report featured customers from around the world. Included were PowerHouse on VAX users (from left to right): Bill Jackewicz and Arnold McMaster of BASF Corporation, Parsippany, N.J.; Alan Alcock, Land Rover Limited, West Midlands, England.

FY '87 Highlights

Cognos ended the 1987 financial year, its first as a publicly traded company in Canada, with excellent results — highlighted by a 51% increase in revenues and earnings per share of 61 cents a share, a three cent per share improvement over the forecast outlined in the August 1986 prospectus. Net income was $5.0 million, with $0.9 million for FY '86. Both earnings per share and net income for FY '87 exclude a non-recurring sale of investment tax credits.

Product Support Services

Cognos' move to strengthen its Product Support Services is reflected in the fact that it represented 25% of revenues in 1987.

The 1987 Annual Report shows sales in Europe, at $20.8 million, now represent 30% of company revenues. The U.S. accounted for 51% of revenues, Canada for 11% and a further 8% came from Australia and the Far East.

Income from continuing operations before tax was $1.4 million in FY '85, $2.2 million in FY '86 and $6.8 million in FY '87. These amounts reflect a reduction in operating expenses as a percentage of revenue and exclude the effect of a $2.5 million non-recurring sale of investment tax credits in FY '87. The company sold investment tax credits concurrently with its initial public offering of common shares in Canada in August 1986. □

Cognos U.S. Stock Offering Raises $20 Million

Cognos became a publicly traded company in the U.S. on July 1, 1987 when, along with certain shareholders, it sold 1.7 million shares. The company raised $20 million, which will be used for future expansion, development of new software products and the potential acquisition of complementary products and companies.

NASDAQ Listing

Cognos is being traded on NASDAQ, the National Association of Securities Dealers Automatic Quotation (System), a computer-based exchange on which many advanced technology stocks are listed. It came less than one year after Cognos first went public in Canada with shares traded on the Toronto Stock Exchange.

Solid Financial Ground

"The U.S. issue gives us the ability to make acquisitions of products or companies that will strengthen Cognos' position in the software industry even further. And, of course, it now opens a local market for our U.S. investors, providing them the opportunity to share in our success and providing us a new source of capital," says Donnie Moore, Cognos chief financial officer.

The U.S. issue was co-managed by Alex. Brown & Sons Inc. of Baltimore and Robertson, Coleman & Stephens of San Francisco. □

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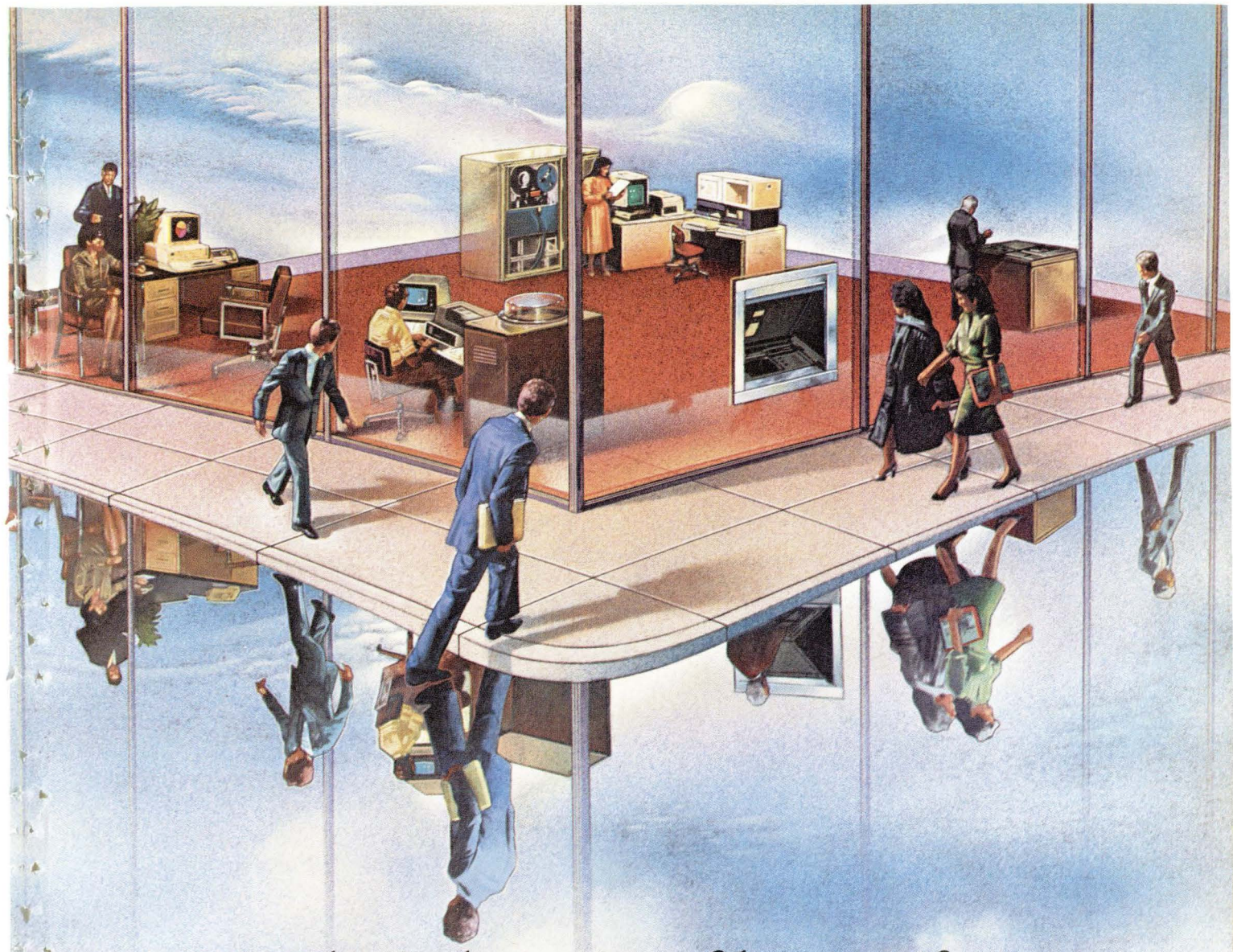

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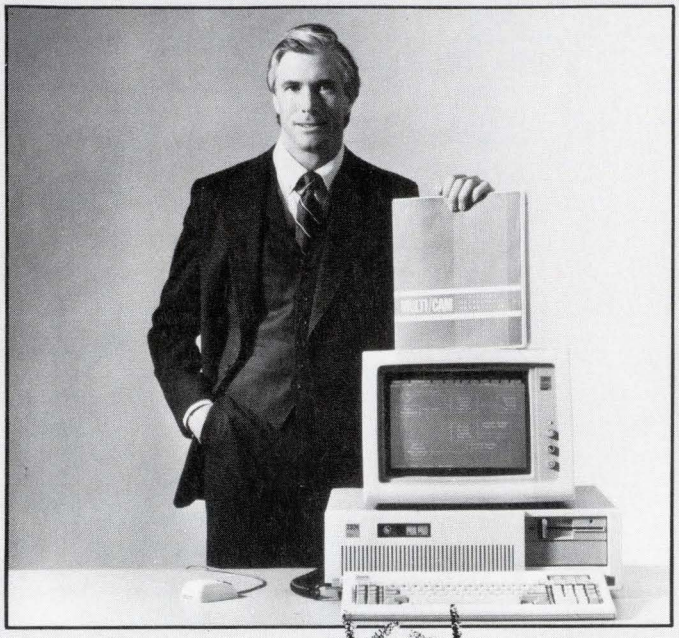

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The Byte of the Undead

I met a systems programmer,
With eyes all bright and gleaming,
And stopped him in the hall to ask,
Of what he could be dreaming.

He looked and smiled a secret smile
And hesitated slyly,
Then said the upgrade he'd received
Had changed his world quite highly.

Where his data danced a waltz,
And I/O's minuetted,
Now his db's boogalooed,
Main mem'ry pirouetted.

Then soon (he said) his network links
Would spread out nationally
And hexadecimal'd be embraced
By everyone passionately.

I left him with his binary dreams
And thoughts of data empire,
Glad to flee the clutches of
The Computer Systems Vampire.

NEIL ZOD
Consultant
GE Consulting Corp.
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Strategic Planning

We should be banning
Strategic Planning.

It makes us all
Take our eyes off the ball,
While we wave our arms
And invoke magic charms
Like OSI,
And EDI,
All kinds of AI,
And such pie in the sky.

Instead of thinking
We perform headshrinking,
By hiring consultants
With costly resultants.

We espouse CIM
With knowledge too slim;
We develop a yen
For ISDN;
We make complex plans
For unwanted LANs.

We turn into abusers
Of our patient users,
By smoking pot
While their systems rot.

Can you blame me for panning
Strategic Planning?

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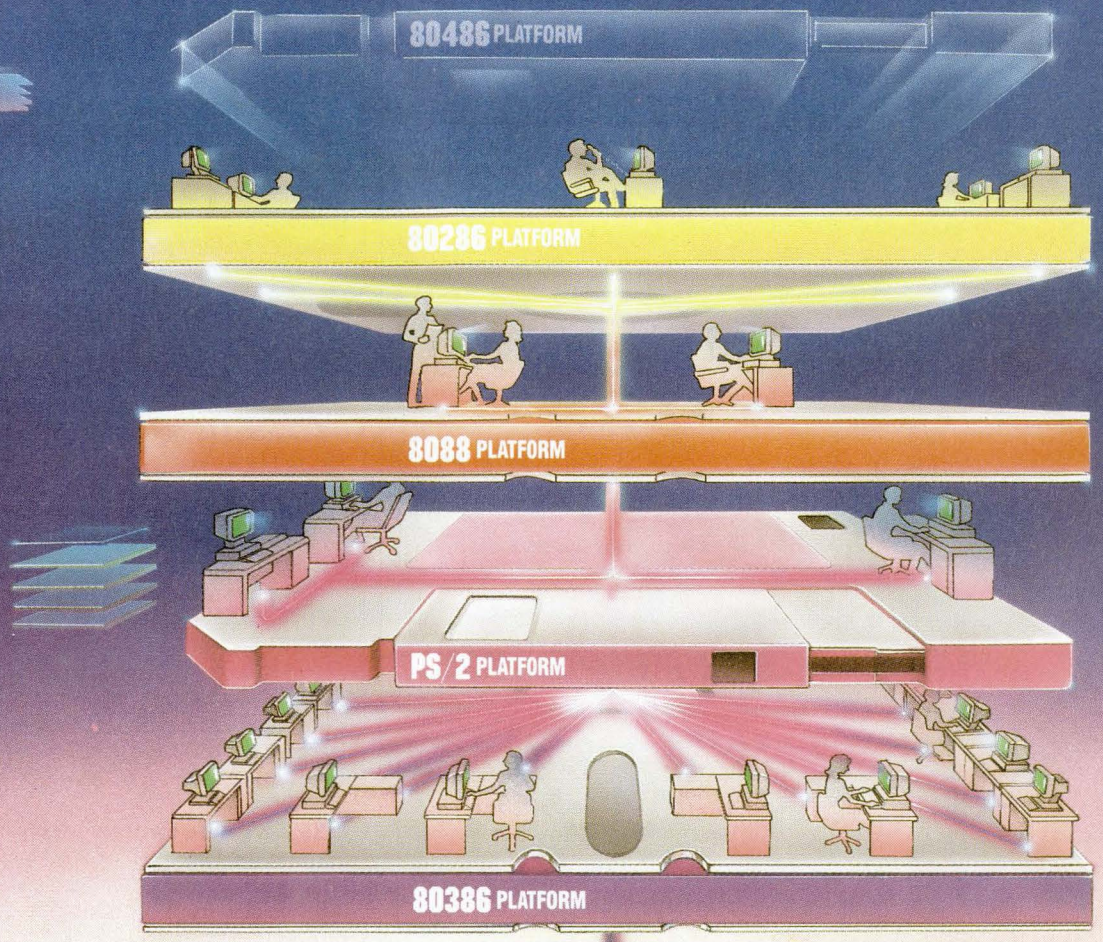

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Telecom '87.
Oct. 20-27, Geneva. Contact International Telecommunication Union, Place des Nations, 1211 Geneva 20, Switzerland, 44-22-995-1111.

Advantech '87 (International Advanced Electronic Technology Exhibition).
Oct. 23-29, Shanghai. Contact SHK International Services Ltd., 22/F, Tian An Centre, 151 Gloucester Rd., Hong Kong, 5-8326100.

Fall Joint Computer Conference.
Oct. 25-29, Dallas. Contact Infomart, 1950 Stemmons Freeway, Dallas, TX 75207, (800) 367-7100.

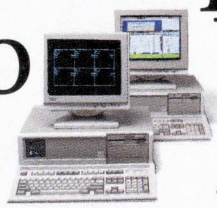
CEPS (Corporate Electronic Publishing Systems Conference).
Oct. 26-28, Boston. Contact Cahners Exposition Group, 999 Summer St., P.O. Box 3833, Stamford, CT 06905, (203) 964-8287.

Unix Expo.
Oct. 27-29, New York. Contact National Expositions Co. Inc., 49 W. 38th St., New York, NY 10018, (212) 391-9111.

World Conference on Electronic Printing and Publishing.
Oct. 28-30, Washington, D.C. Contact Henry Freedman, Electronet Information Systems, 1605 King St., Alexandria, VA 22314, (800) 433-8968 or (703) 739-5510.

Conference on Departmental Computing.
Oct. 29-30, St. Louis. Contact Donna Skaggs, CSDP, Washington University, Campus Box 1141, One Brookings Dr., St. Louis, MO 63130, (314) 889-5380.

ICCC '88 (International Conference on Computer Communication).
Oct. 30 - Nov. 3, Tel Aviv. Contact Jehuda Kella, 9th International Conference on Computer Communication, P.O. Box 50006, Tel Aviv, 61500, Israel, 03-654571.

From LANs and Peripherals, To  Workstations and Network Servers, To 5250 and 3270 Gateways, And Now, To An Advanced Network Operating AST-Advanced NetWare System.

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1987 Editorial Calendar and Planning Guide

Issue Date	Recruitment Deadline	Editorial Emphasis
Oct. 1	Sept. 11	Unix
Oct. 15	Sept. 25	Departmental Computing
Nov. 1	Oct. 12	Printers
Nov. 15	Oct. 26	Mini/Micro Survey
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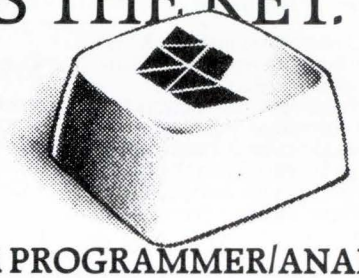

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Positions require background in UNIX* and "C" and a knowledge of device drivers. Must have experience in one or more of the following areas, async/sync host communications (e.g. IBM, Sperry, Burroughs); LAN's; Wide Area Networks (PDN/DDN) including protocols such as TP-4, TCP/IP, or ISO/OSI standards.

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Senior and intermediate programmers are required for challenging positions in the implementation and productization of secure UNIX* systems. Working knowledge of UNIX* internals and the DoD "Orange Book" Trusted Computing Base (TCB) is required. Implementation experience with a secure operating system is highly desirable.

For consideration, send your resume in confidence indicating your area of interest to:

Unisys Corporation
Attn: Ms Lynne Tibolla
Employment Dept. 1v, Bldg. C
322 North 2200 West
Salt Lake City, Utah 84116

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Systems Programmers

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Our systems analyst/programmer positions involve **marketing support of large-scale systems and complex mini and micro networks or on-site customer support of similar installations.**

If you have five to seven years of professional experience in any of the following areas, we should be talking:

UNISYS 1100 Series systems software (OS/1100, System Generation, MASM; Performance Analysis; DMS-1100; TELCON; CMS; MAPPER)

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Immediate opportunities are available at the following locations: **Asheville, NC; Ft. Collins, CO; Jacksonville, FL; McLean, VA; Pensacola, FL; Suitland, MD; and Washington, D.C.**

For prompt confidential consideration, forward your resume (or letter) to:

Unisys Corporation
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We are currently developing a large, IBM mainframe based system for data and message handling and dissemination. The system utilizes IBM 3xxx and 43xx, PL/1 programming, MODEL 204 and INQUIRE DBMS, and IBM Systems Programming. All positions call for a BS in Computer Science or a related degree.

Staff Engineers

- software system lifecycle engineering, including task leadership
- five years minimum experience required

Applications Programmer/Analysts

- coding, unit testing, and integration testing
- requires at least two years related experience

Software Test Analysts

- design and document test cases and procedures
- conduct and evaluate tests
- perform related integration and test activities
- one to two years experience

Senior Software Test Analysts

- maintenance release testing
- system performance monitoring
- test documentation
- three to five years experience required

Software Performance Analysts

- develop automated test tool, test case, and procedures
- calls for two to five years of experience

Systems Engineers

- systems specification
- concept design
- requirements traces
- performance, analysis, architectural definition, interface design, and tradeoff studies
- five years of experience required

Software Systems Security Engineers

- security engineering
- analysis of large mainframe systems (requirements definition through deployment)
- security documentation, audits, and related tasks
- at least four years of experience

Database Applications Engineers

- IDMS/R, BIMS DBMS, and PL/1 applications and programming
- two years experience required

Management Information System

This exciting project involves the development of a large, VAX-based MIS to provide top decision-makers in the DOD with contracts management, cost reporting, personnel status, logistics and program management services. The system operates under VAX/VMS, is programmed in Fortran, and utilizes ORACLE DBMS with ISSCO graphics. Positions require a BS in Computer Science or related degree.

Work Package Managers

- manage cost and reporting of Software Maintenance Tasks
- manage two to four programmer/analysts
- ensure adherence to task schedules and budgets
- requires four years minimum experience

Programmer Analysts

- design, code, test, document, and maintain software
- two years experience required

Senior Programmer/Analysts

- take leadership role in the development of software and systems analysis activities
- requires at least eight years of experience

Requirements Management System

We are presently developing enhancements to Management and maintaining a large interactive and batch system operating in an IBM 308x and 309x environment in support of requirements management. On-going work involves PL/1 applications programming, Teradata (DBC/1012) and GIM DBMS, VM/CMS systems programming, and software integration testing. A BS in Computer Science or related degree plus 2-5 years experience required.

Systems Programmers

- design, develop and test enhancements to IBM mainframe based data management systems, including IBM, ATM, IDMS/R, SOL and NOMAD

Programmer/Analysts

- design, develop, test, document, and maintain software to a large IBM mainframe environment operating under VM and MVS, and PL/1 programming

The hard work of developing superior software has super rewards. We can offer competitive salaries, complete benefits including flexible scheduling, complete health coverage, and much more. For consideration, send your resume to: **TRW Systems Division, Department DA 987, 2721 Prosperity Avenue, Fairfax, Virginia 22031.**

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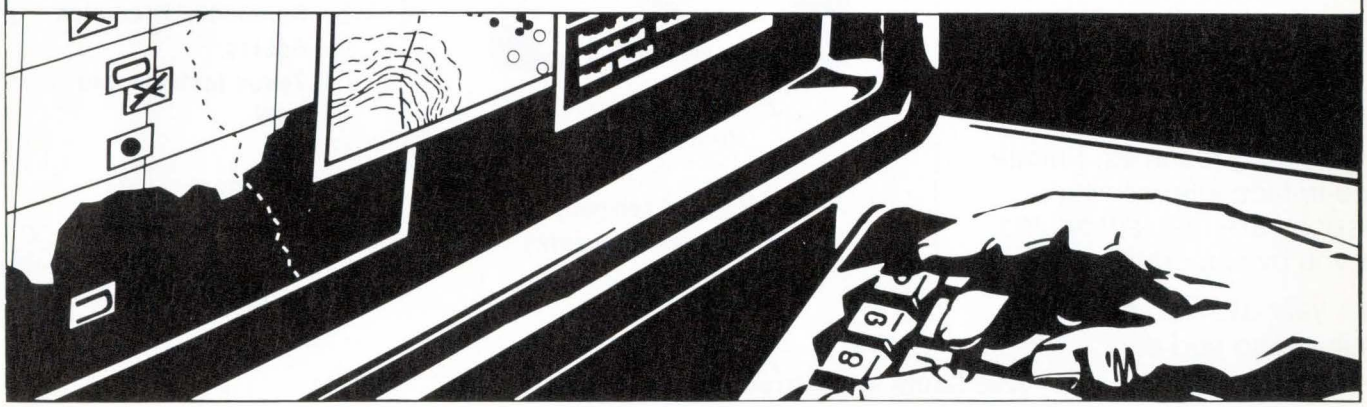

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- ☐ **Boston**
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Home Address: _____
City _____ State: _____ Zip: _____
Home Phone (include area code): _____

PRESENT OR MOST RECENT EMPLOYER

Parent Company _____
Your division or subsidiary: _____
Location (City, State) _____
Business Phone if O.K. to use: _____

EDUCATION

Degrees (List)	Major Field	GPA	Year Degree Earned	College or University

POSITION DESIRED

_____

EXPERIENCE

Present or Most Recent Position From: To: Title:

Duties and Accomplishments: Industry of Current Employer:

_____

_____

_____

Reason for Change: _____

PREVIOUS POSITION:

Job Title: _____
Employer: _____ From: _____ To: _____ City: _____ State: _____
Division: _____ Type of Industry: _____ Salary: _____
Duties and Accomplishments: _____

COMPENSATION/PERSONAL INFORMATION

Years Experience	Base Salary	Commission	Bonus	Total Compensation	Asking Compensation	Min. Compensation

Date Available _____ I Will Travel ☐ Light ☐ Moderate ☐ Heavy ☐ I own my home. How long? _____ I rent my home/apt. ☐

☐ Employed ☐ Self-Employed ☐ Unemployed ☐ Married ☐ Single Height_____Weight_____

Level of Security Clearance _____ ☐ U.S. Citizen ☐ Non-U.S. Citizen My identity may be released to: ☐ Any employer ☐ All but present employer

☐ WILL RELOCATE ☐ WILL NOT RELOCATE ☐ OTHER _____

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