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FEBRUARY 15, 1987
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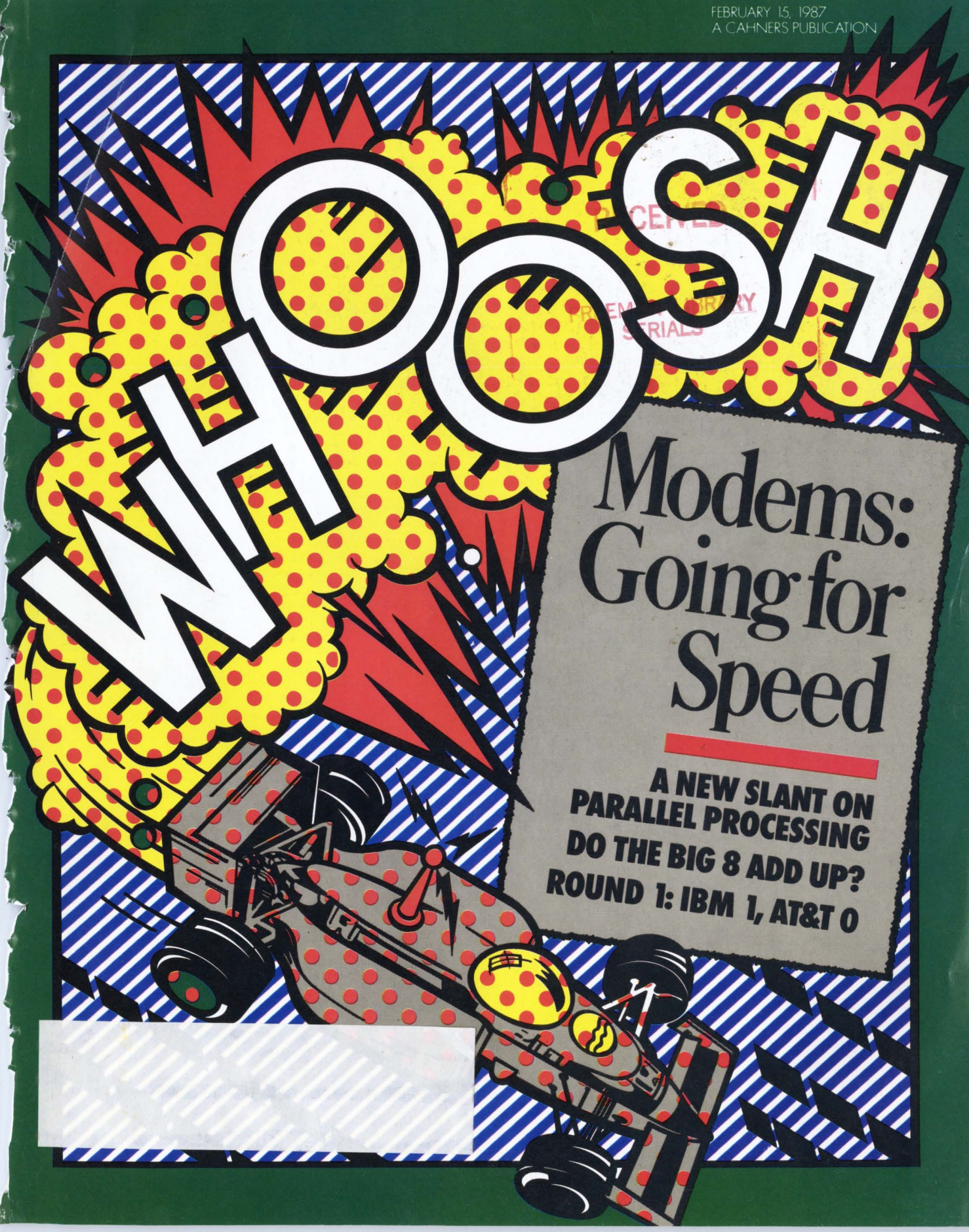

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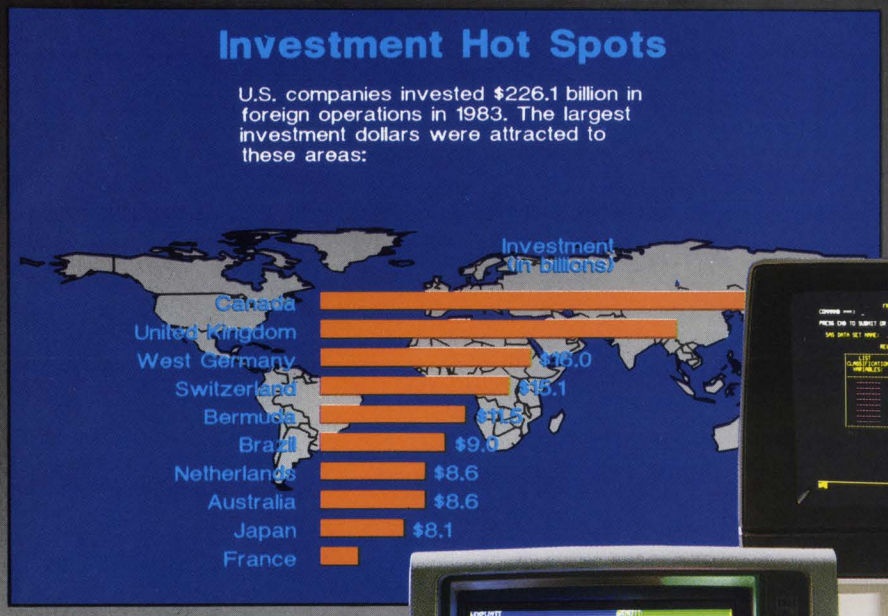

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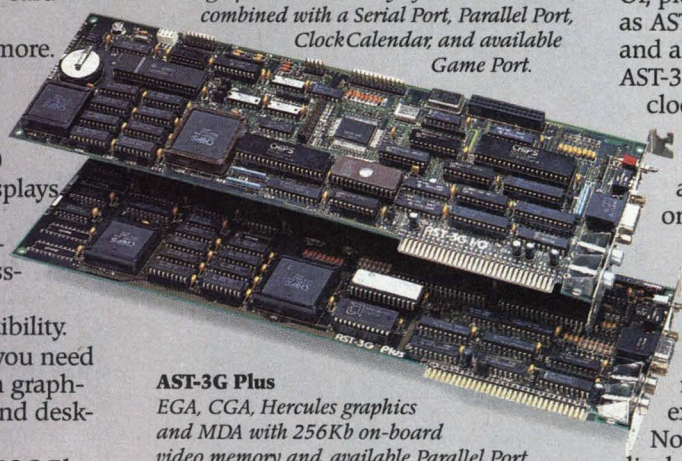

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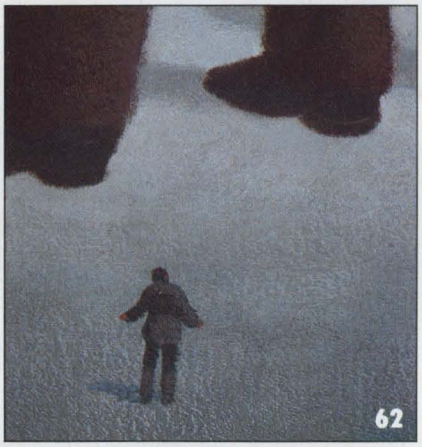

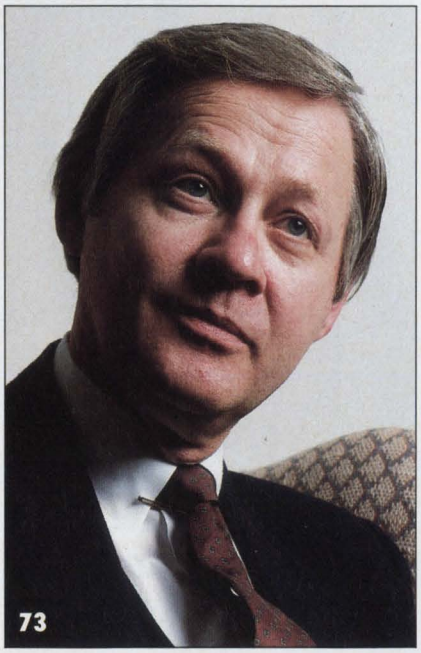

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DEPARTMENTS

OEM EDITION 48-1

COVER ILLUSTRATION BY DOUG TAYLOR

OEM EDITION

FEBRUARY 15, 1987
VOLUME 34
NUMBER 4
THIS ISSUE, 191,368 COPIES

Editorial

All the Wrong Choices?

AT&T says it is not getting out of the computer business. But many in MIS still don't know AT&T's in that business.

More than three years after deregulation, AT&T is still thought of by most as "the telephone company." AT&T still holds its own as the dominant long distance communications supplier, but can it go the long distance toward becoming a vendor of integrated computer/communications offerings? (see "Round One: IBM 1, AT&T 0," p. 37).

We asked that question of 22 members of the DATAMATION Executive Panel, comprised of MIS executives in Fortune 1000 companies. As managing editor Parker Hodges reports on p. 38, most have no experience with AT&T as a computer supplier. Only three of the 22 MIS execs knew of any AT&T micros or minis in use in their corporations. The most positive response we got to the question of how MIS evaluates AT&T's minicomputers was that they are "better than IBM's, worse than Digital Equipment Corp.'s." Most say they have no idea, no experience on which to base judgment—and no plans to find out.

AT&T had more promise than most companies for huge success in the computer business: its very foundations are in electronics. Bell Labs, founded in 1925, is responsible for many of the most important technological developments in electronics today—the transistor, the laser, and the solar cell, to name a few.

But it's a long road from the labs to the hearts and minds of MIS.

Three years ago, we were looking at AT&T as IBM's soon-to-be rival. Now, in 1987, we see AT&T dismissing up to 40,000 employees, its data systems operations losing big money, and its hoped-for savior, Unix, promising much but delivering less than had been wished for (see "Barking Up the Wrong Tree," p. 22). After going outside—the company and the country—for computers to market, AT&T recently brought in an Olivetti executive to run its computer business.

Where will we find AT&T three years from now? Who knows—maybe it will be a subsidiary of Olivetti. Funny? I'll bet Carlo de Benedetti won't laugh at that one. . . .

Rebecca S. Barna

REBECCA S. BARNA
EDITOR

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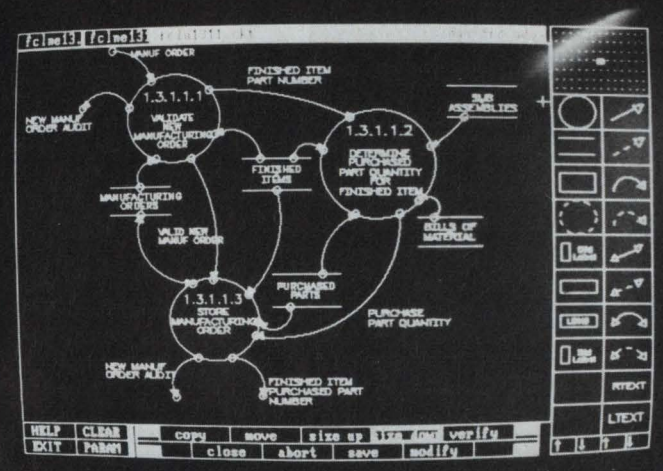

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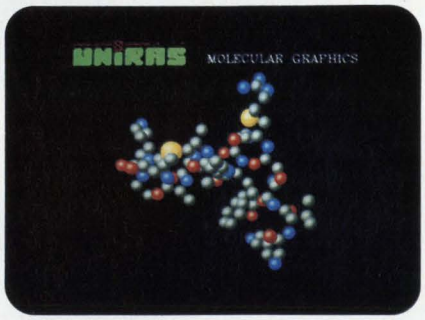

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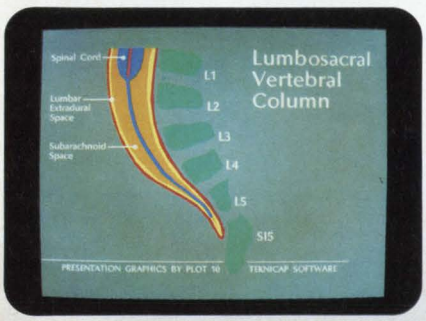

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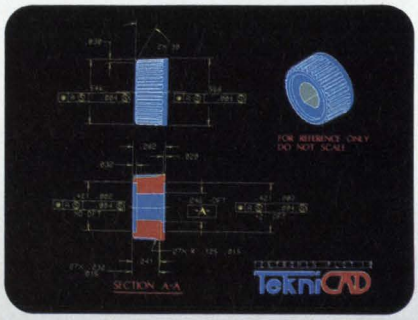

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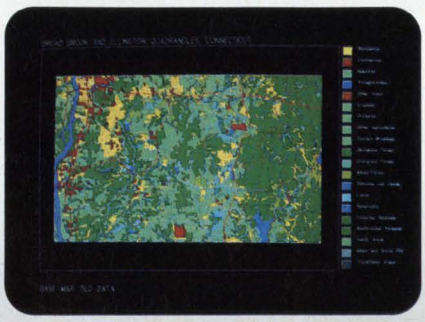

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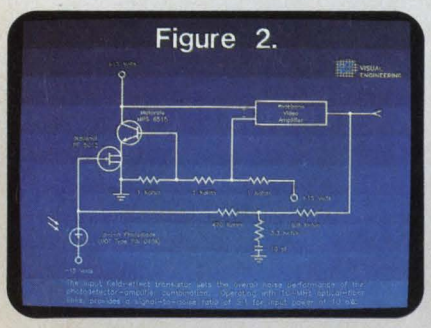

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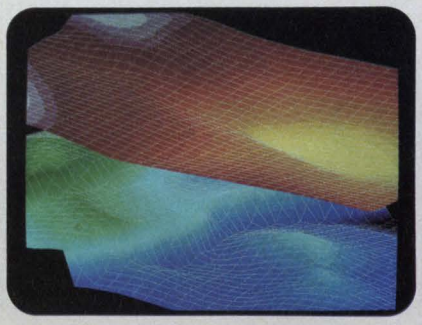

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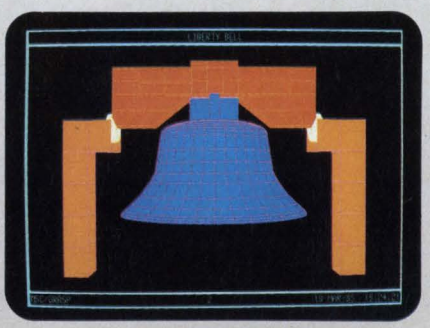

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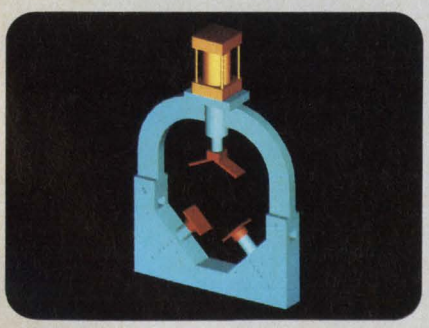

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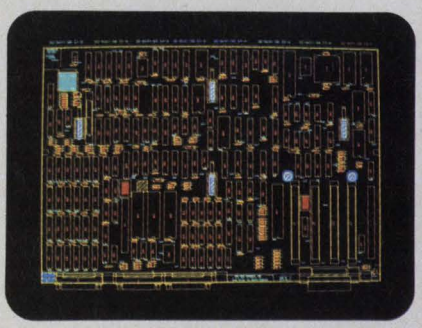

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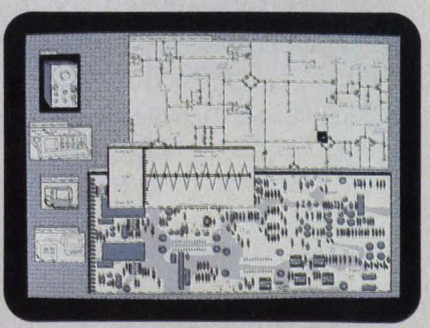

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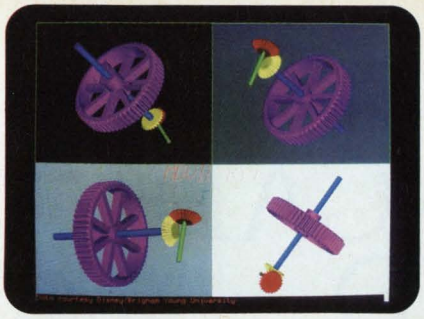

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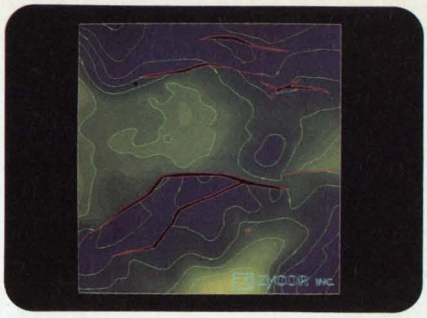

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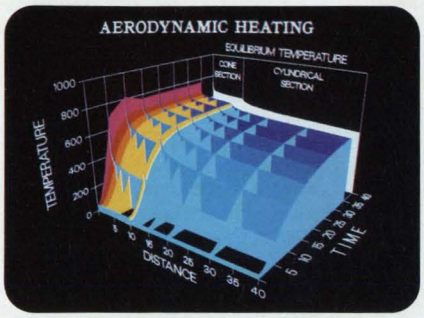

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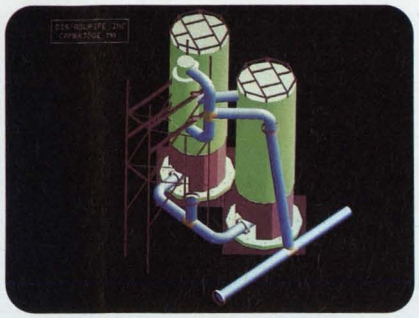

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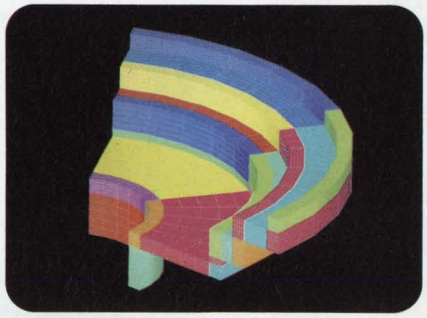

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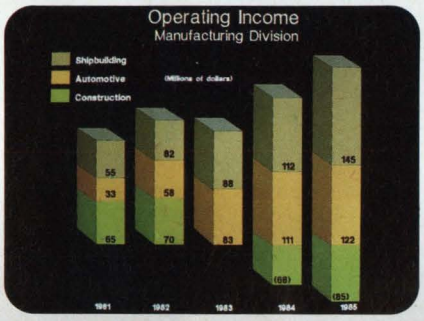

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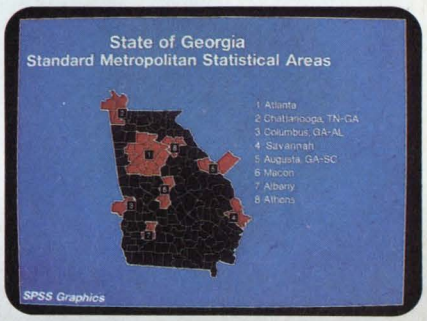

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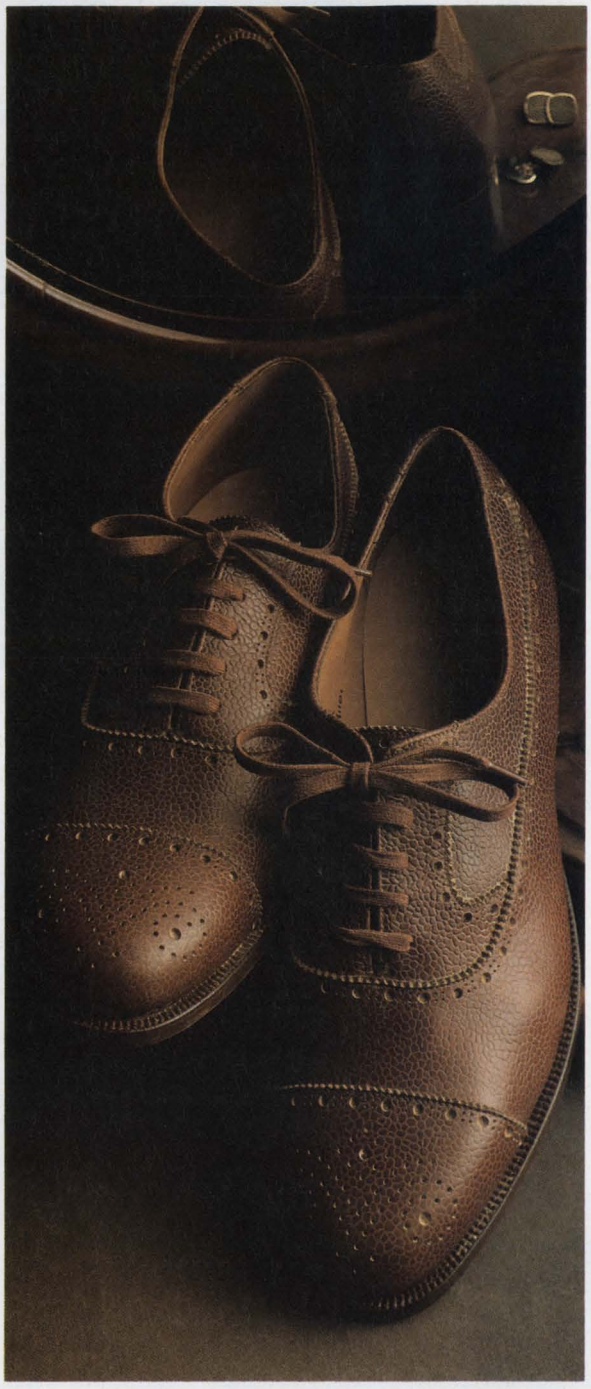

Getting the right merchandise at the right price to the right place at the right time is a challenge for any retailer. But when you're expanding by 80 stores a year – like Pic 'N Pay Shoes is – it requires some pretty fancy information system footwork. No wonder the largest self-select shoe chain in the Southeast selected Cullinet Software for its versatile Information Center Management System.

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Look Ahead

ACQUISITION IN PRIME'S FUTURE?

NATICK, MASS. -- Is Prime Computer planning to build CAD/CAM market share through acquisition? The $860 million computer maker is rumored to have held talks with McDonnell Douglas Information Systems Group, St. Louis, regarding the latter's Manufacturing and Engineering Systems Co. Neither Prime nor McDonnell Douglas spokesmen would comment on the rumors. Those rumors gained momentum, however, after Prime raised $250 million through a debt offering "to finance acquisitions which complement or expand" its business. Both companies focus primarily on mechanical design and architectural, engineering, and construction CAD software.

AMDAHL'S INCENTIVE

SUNNYVALE, CALIF. -- Amdahl Corp., reacting to IBM's recent introduction of the 3090 Model 600E computer, is taking a look at accelerating general availability of its own high-end system, the 5890 Model 600. This machine had been expected to be available in production quantities in the fourth quarter, but now a possible target is the third quarter. The four-processor model 600 is undergoing tests inside Amdahl.

A TOKEN OF SUPPORT

LITTLETON, MASS. -- Digital Equipment Corp. is developing token ring passing network technology for a high-speed successor to its Ethernet-based local area network. Development work here aims to release a 125Mbps fiber-optic network based on the emerging Fiber Distributed Data Interface (FDDI) standard. According to DEC recruitment ads, the LAN will include bridges to slower networks -- such as its own 10Mbps Ethernet LAN.

IBM'S LU 6.2 ADVANCES

GENEVA, SWITZERLAND -- IBM is on its way to winning worldwide standard status for part of its LU 6.2 peer-to-peer communications protocol, despite opposition from ANSI. At a recent subcommittee meeting of the International Standards Organization (ISO) in Paris, a major subset of the IBM protocol was proposed by IBM, Bull, and Siemens as an Open Systems Interconnection standard for transaction processing. It was approved by France, the U.K., and Italy. ANSI, with a more general purpose protocol, found itself greatly outnumbered. The ISO's Subcommittee 21, Working Group 5, will now produce working drafts of a definition, and a protocol specification including parts of LU 6.2. These documents will be refined at a meeting in Washington, D.C., this month before going to a meeting in Tokyo in June. A finished proposal should reach the ISO this fall for final ratification.

Look Ahead

A BRIGHTER LIGHT WANTED

WASHINGTON, D.C. -- If CBEMA has its druthers, its next president is going to be a really, really big name. A household one, even. Not that Vico Henriques, involuntarily deposed after nine years on the job, was an unknown quantity. He just wasn't a bright enough light on Capitol Hill to satisfy CBEMA's members, even though they themselves don't much like the limelight. And look for the big spenders in the trade association to spend some very serious bucks to land their new chief, despite CBEMA's financial straits.

PROTECTING THE FLANK AT CRAY...

MINNEAPOLIS -- Perhaps Cray Research is feeling a tinge of pressure from companies such as Convex and Alliant, which have made inroads in the market for near supercomputers that sell for under $1 million. Word is that Cray may soon announce price reductions or a scaled down version of the X-MP. Cray executive vp of marketing Marcelo Gumicio says the company will not announce a completely new machine, but will improve the price/performance of its existing machines.

...AND IN WASHINGTON

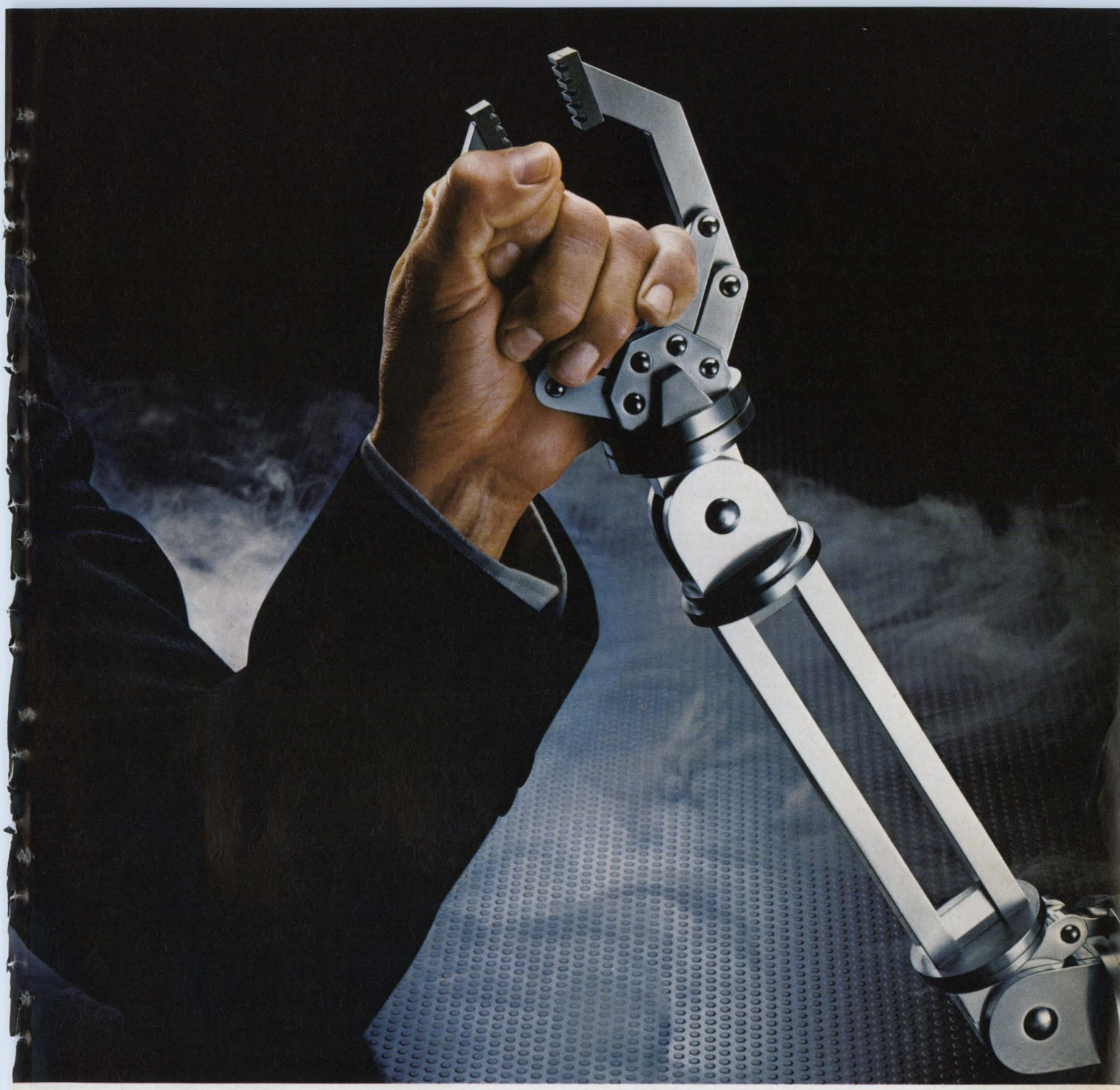
TOKYO -- Since Japanese and U.S. negotiators failed in last month's Market-Oriented Sector-Selective (MOSS) talks to agree on the existence of trade barriers against the sale of U.S. supercomputers in Japan, watch for new moves by the U.S. government in March to limit the import of Japanese systems. That is when the U.S. trade officials conclude their investigation and recommend whether the U.S. should invoke section 301 of the 1974 Trade Act. That would allow the U.S. to slap high import duties and other restrictions on Japanese systems. The Japanese, meanwhile, continue to deny that there is any problem.

GRAPHICS GALORE

CHELMSFORD, MASS. -- Apollo Computer plans to upgrade the graphics on its Domain 3000 in the first of several expected moves to give the low-end system a broader role in its workstation line. The entry-level system, introduced last year with support for four-bit planes of graphics memory, this month will see upgrades enabling support for eight-bit planes of graphics memory. Later in the year, it is rumored, the company plans to bring out a version supporting 24-bit planes of graphics memory.

NOT AN ACT OF SOLOMON

CAMARILLO, CALIF.-- Venture capitalists are forcing a division of 2½-year-old Vitesse Electronics Corp. into two separately owned companies. Founded in August 1984 with $30 million in funding, the company needed a second round early this year, but there were



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no venture capitalists interested in both of its activities -- high-speed, digital, gallium arsenide, large-scale integrated circuits, and a line of mini-supercomputers. So two new companies are in the birth stage, with one expected to be named Vitesse Semiconductor Corp. and the other Vitesse Computer Corp.

WANNA MAKE A DEAL?

NEW YORK -- And you thought the American applications software industry was bad. Talk about wheeling and dealing! Sources tell DATAMATION that Japanese companies, including Hitachi, NEC, and Fujitsu, are practically giving away supercomputers in Japan and Europe. In competitive bidding situations, one vendor and a well-placed user said, the Japanese are offering product for the price of the service contract, and discounts may run as high as 75% to 90% off list price. Meanwhile, the U.S. trade representative (USTR) is a month away from completing an investigation of Japan's supercomputer trade practices.

PHILIPS MAKES UNIX MOVE

APELDOORN, THE NETHERLANDS -- With its characteristic lack of urgency, Dutch electronics giant Philips will finally make its move on the Unix business systems market this week. The company's Telecommunication and Business Systems division will add two Unix ranges, the Motorola-built P9070 running Unix V and the in-house designed P9X00 running a Philips derivative of Unix, MPX. The P9070 will be sold into the var market and as an introduction to Unix for users of the P7000 distributed mini. The P9X00 is being positioned as a financial terminal. First European shipments will be made in June. No decision yet on whether Philips's Data Systems, Dallas, will handle the machine or whether it will have a marketing partner outside Europe.

RUMORS AND RAW RANDOM DATA

Nixdorf Computer of Paderborn, West Germany, is planning to add 2,000 people to its payroll this year, lifting its worldwide work force to a total of 27,600 employees. A large proportion of the new staff will work on software development. . . . Interest in a 80386-based microcomputer appears to be building at Tandy Corp. Latest rumblings are for the giant Fort Worth electronics retailer to bring out such a machine this year, and perhaps as early as this summer. A key factor for Tandy is the price for such machines coming down to the $3,500 level. . . . In an unrelated development, the Software Link, Atlanta, is beta testing an operating system called PC/MOS/386. Insiders claim that this operating system will take full advantage of the 80386 chip and also run MS/DOS applications.

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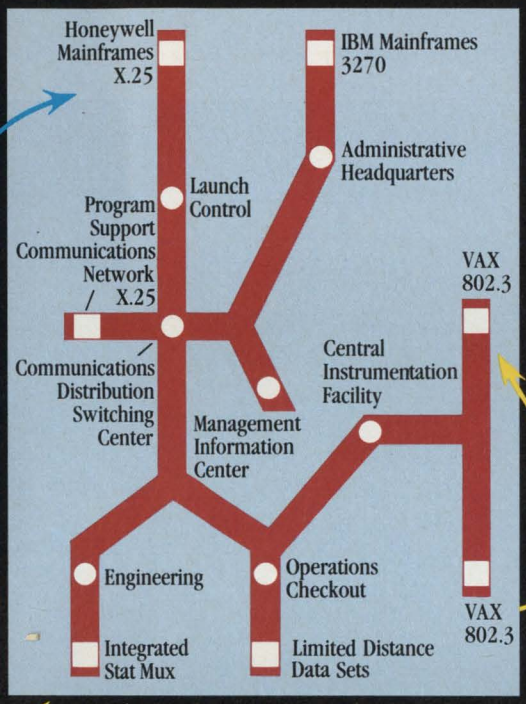

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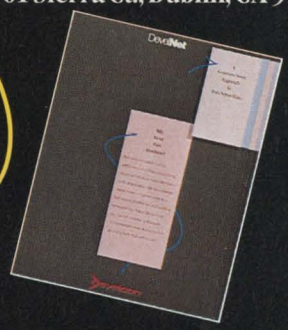

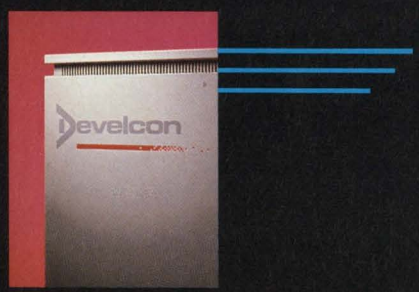

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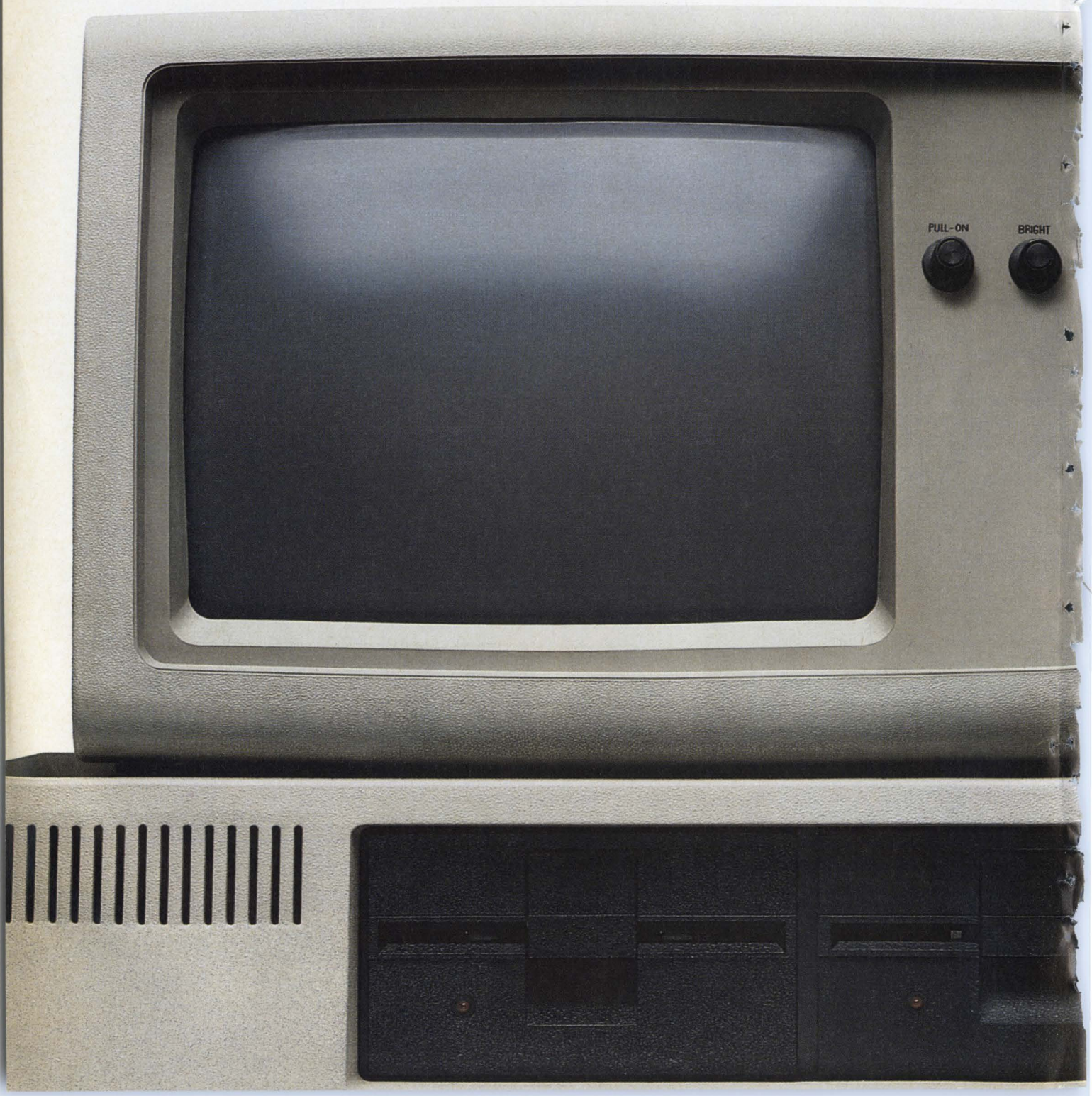

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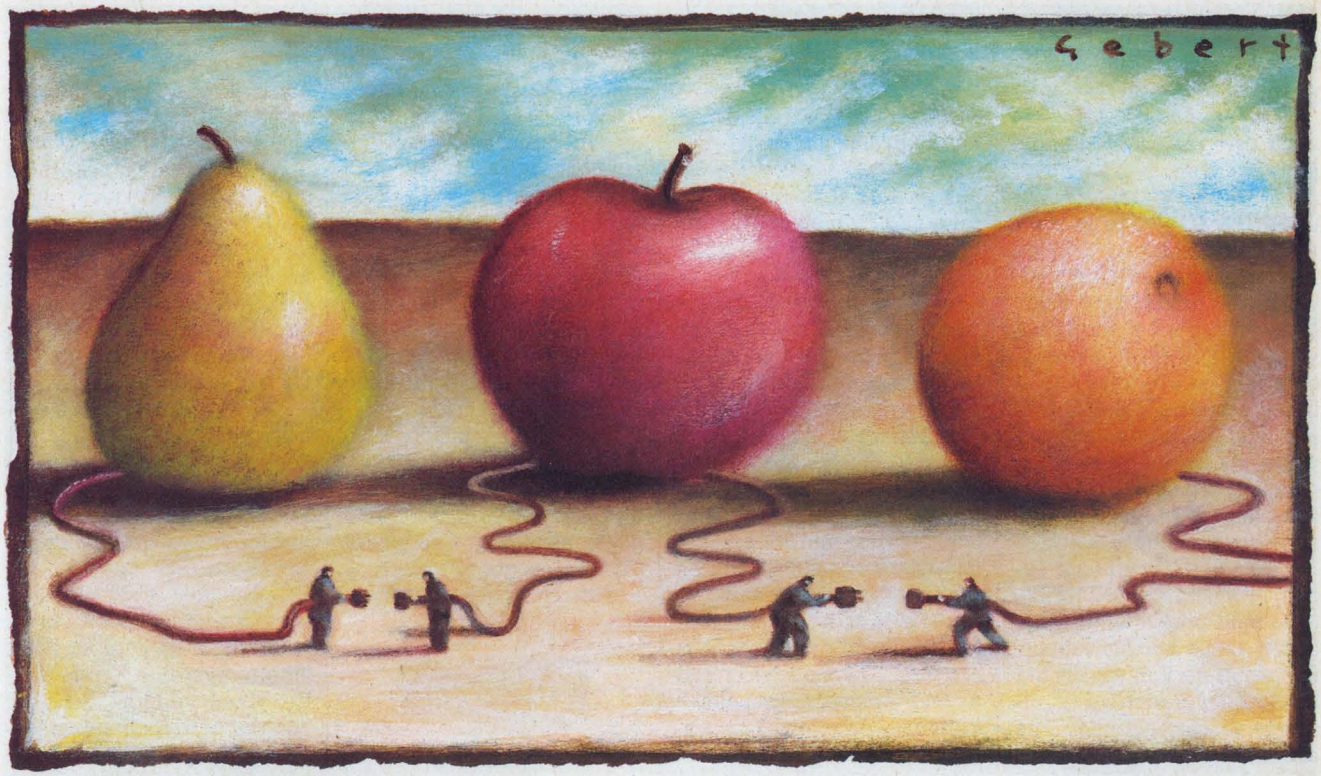


Illustration by Warren Gebert

They Just Can't Wait to Integrate

With OSI in the distance, users and vendors are turning to proprietary solutions to link disparate systems.

BY GARY McWILLIAMS

When General Electric's Aerospace Business Group operation in Largo, Fla., last year sought to integrate manufacturing and business systems from three vendors, it did so using ostensibly proprietary network protocols. GE wanted to tie Hewlett-Packard 3000 manufacturing systems to its IBM mainframes using a DECnet network installed for office automation.

GE was able to achieve its multivendor network without relying on—or waiting for—Open Systems Interconnection (OSI) protocols. "We needed to have multivendor communications long before OSI," says J. Richard Reynolds, manager of networks and integration, Neutron Devices Department, GE Aerospace Business Group. "We would have had to wait for OSI and we couldn't."

Similarly, Fairchild Semiconductor's chipmaking operation in South Portland, Maine, also connects its Digital shop-floor systems and IBM mainframes using the Ethernet-based DECnet and a third-party package. Why DECnet? "Ethernet runs throughout the plant," says production services manager Andrew Nichols, "so it seemed the easiest way."

Whether for immediate connectivity or better use of an existing LAN, a number of companies are discovering they can use otherwise proprietary networks to provide multivendor communications. Off-the-shelf hardware and protocols from third-party suppliers and a growing number of computer vendors are breaking open what once were closed network architectures. For many users who have concentrated computer purchases on a few vendors, support for OSI has become less of an immediate concern.

The Talk Was of Standards

"The talk in the last few years has been 'standards.' What it means to the great majority of users is the ability to connect to their installed architecture. People aren't going to rush out and buy OSI; they want connectivity with what they have installed," says Patrick C. Gordon, director of data communications research at the Yankee Group, Boston.

The emergence of proprietary network protocols to address the mixed vendor situation seems to resemble the options that have arisen for connection to IBM Systems Network Architecture (SNA). For example, both TCP/IP, the Department of Defense-supported protocol, and Digital Equipment's DECnet gained new adherents in the last year as alternatives to existing network protocols offered by many vendors.

TCP/IP support is soon to be available from such OSI proponents as Wang Laboratories Inc., Lowell, Mass.; Prime Computer Inc., Natick, Mass.; Charles River Data Systems Inc., Framingham, Mass.; and IBM. Software that permits Apollo Computer Inc., Chelmsford, Mass.; Elxsi Ltd., San Jose; Sun Microsystems Inc., Mountain View, Calif.; and Hewlett-Packard, Palo Alto, to communicate using DECnet has also been released in the last

year. The support varies from limited file transfer to the ability to serve as a full network member.

OSI supporters discount such offerings as unimportant. Indeed, even users of these protocols won't rule out using OSI standards in their shops in the future. To OSI supporters, proprietary networks, no matter how modified, can never be considered serious long-term rivals to standard protocols. "SNA-based products and OSI products will be the two primary ways" to connect to other vendors, argues Data General's director of systems and software Barbara Babcock.

Wang's Tim Sloan, senior product manager for coexistence products, also believes those adding support for proprietary protocols are looking at short-term answers to connectivity. The broader trend is still toward OSI, where a homogeneous network management and support scenario is possible, he says.

Wang's planned TCP/IP support doesn't undermine Wangnet or its OSI commitment as much as it represents an "interim" solution to providing multivendor connections, Sloan says. "Long term, everybody will be looking to OSI, but that doesn't help customers today. It's pretty apparent that the effort within ISO [International Standards Organization] to provide connectivity using international standards is just a little bit too far off."

A Matter of Speculation

Just how far off is a matter of speculation. Sloan sees a workable OSI network available in less than two years; others say a full implementation is as much as five years away. Stuart Wecker, president of Technology Concepts Inc., Sudbury, Mass., a developer of protocols that mimic DECnet, says, "I believe we're facing a five-year window before OSI protocols are widely available. There are two issues: getting to an OSI with virtual terminal, file transfer and access, and electronic mail support, and having all the vendors implement it."

Wecker has translated his beliefs into products. His company—recently acquired by Bell Atlantic Corp., Philadelphia—developed protocols that enable Unix-based systems to attach to DECnet as VAX computer equals or to be run independently. The package is currently being converted to run on Sun, Valid Logic Inc., Elxsi, and Unisys Unix-based computers. "Even when OSI is available, there's no reason to get rid of what you have," he says.

John M. Cencioso, director of marketing at Edge Computer Corp., Scottsdale, Ariz., says offering a DECnet capability through Technology Concepts is part of its plans to penetrate VAX sites. "We don't believe we could come into the DEC environment without DECnet."

GE's ability to link its HP and VAX computers came from recent adaptations to HP's AdvanceNet software to support file transfer via DECnet. "The primary reason we ended up using DECnet was because it was available first," says Reynolds. MAP remains the ultimate objective at GE in Largo, but its success with the HP-to-VAX link has other GE plants looking at the connection, he says.

Network suppliers such as Ungermann-Bass Inc., Santa Clara, and Proteon Inc., Marlboro, Mass., have also begun to support a variety of network protocols such as Xerox Network Services, TCP/IP, and DECnet to increase their market reach.

"PEOPLE AREN'T GOING TO RUSH OUT AND BUY OSI."

Among others seeking to expand beyond their proprietary networks, Apollo has pledged to enable its Domain network to support Ethernet and network access to higher-level Network File System and Remote File System protocols developed by Sun and AT&T. The company also plans to support the OSI/File Transfer Access Method protocols in 1988 release.

While no vendor would claim that support for multiple network protocols diminishes plans to support OSI, some users say there's little difference to them whether they realize connectivity using proprietary or nonproprietary protocols. Bankers Trust ties its IBM mainframes and DEC VAXs together using an Interlink Computer Sciences Inc. attachment that supports data transfer at IBM channel speeds, says distributed processing technical support vice president Stanley Rose. Interlink boasts 80 users with about 120 of its packages installed, including E.I. Du Pont de Nemours & Co., Wilmington, Del.; the Gillette Co., Boston; and GTE Corp., Stamford, Conn.

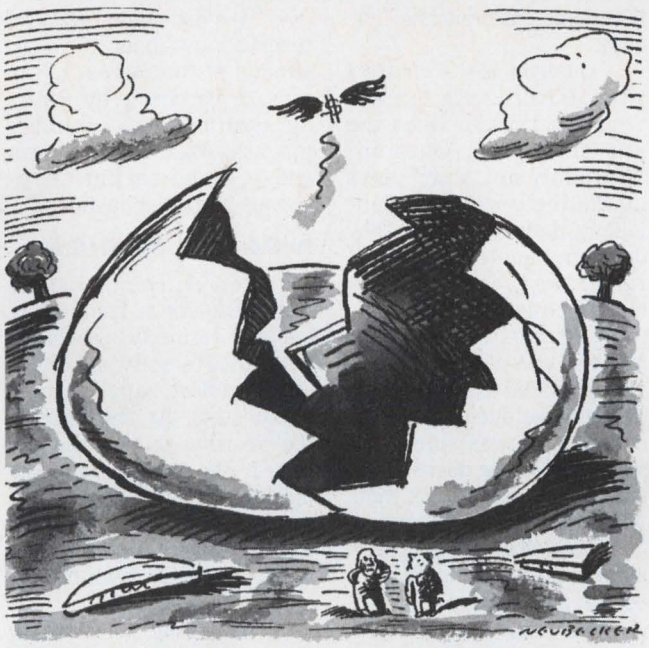
"It [the IBM-to-DEC connection] takes away the urgency of OSI support for us because what we need is done. We wouldn't change to OSI just for the sake of changing," says Rose.

Because OSI, like any standard, aims to provide a basic level of compatibility among systems, some analysts see vendors building "quirks" into their implementations or providing proprietary features to distinguish their networks.

Such distinctions are likely to appear with greater frequency as OSI gets closer. Digital, for one, will maintain proprietary features in DECnet where it believes comparable OSI features provide less functionality. In those instances, the OSI equivalent will be an option.

Apollo, while supporting data sharing and access to a variety of manufacturers' computers, "will never acknowledge that all these things are equal," says vice president and chief technical officer David L. Nelson. However vendors end up distinguishing themselves as OSI picks up steam, it's probable that proprietary networks will never vanish entirely. Says Kimball Brown, a computer industry analyst at Dataquest Inc., "It's getting better but there will never be the pure open systems. There will always be quirks because the vendors cannot get by with open systems." ■

STUART WECKER: There's no reason to get rid of what you have.



The Net That Didn't Catch Anything

Financial reasons alone may not explain why IBM and Merrill Lynch scuttled Imnet.

BY SUSAN KERR

Sure, nobody knows for certain what IBM's going to do next week, but if tradition serves us well, 1994 may well be a year of déjà vu.

For those of you who haven't thought that far ahead or received poor grades in history, 1994 should be the year IBM takes its third shot at breaking into the financial services industry. But unlike its previous unsuccessful attempts beginning in 1974 and 1984, it's improbable that in this next supposed venture IBM will be accompanied by Merrill Lynch, Pierce, Fenner & Smith Inc.

Just days after calling it quits on a joint venture with IBM called International MarketNet (Imnet), Merrill Lynch signed a deal calling for Automatic Data Processing Inc., Roseland, N.J., to develop a customized quote service system for internal use. This ADP product will be in lieu of Imnet's never-completed system and will replace industry leading supplier Quotron Systems Inc., inside Merrill Lynch. Over the next several years, ADP is expected to provide Merrill Lynch with upwards of 20,000 IBM PC-compatible systems.

Jumping Into Another Venture

Thus, it seems unlikely that Merrill Lynch will jump headlong into another venture to sell computer systems and brokerage services to competitors. However, IBM, which is none too keen to discuss Imnet (requests to interview executives involved with the Imnet decision were refused), isn't totally down on the market, says a corporate spokesman. "If the question is whether IBM will continue to pursue operations in the business services market, the answer is yes," he says.

Although IBM clearly backed the decision to close Imnet, many say Merrill Lynch was the instigator. Merrill Lynch reportedly attempted to sell part of its 50% share of Imnet to other Wall Street firms before deciding to close down the company. Merrill Lynch didn't return calls by press time.

A Sizable Investment

The primary reason was economics. Sources maintain that Imnet chewed up between $70 million and $100 million, although the IBM spokesman claims that "IBM's investment is considerably less than" those figures. Nevertheless, financial considerations were the basis for the decision, he says. "In the current environment [an Imnet] product could not be marketed profitably."

This current environment has IBM on a stringent cost-cutting campaign, while Merrill Lynch is questioning, according to some analysts, whether it wants to be in a business that calls for products difficult to develop and that has two well-entrenched incumbents.

Certainly, those problems seemed surmountable in March 1984, when the two announced the separate company called Imnet. The purpose of Imnet was to develop an information delivery and office automation system to be sold not just into Merrill Lynch's 400 sites but also to other brokerage and financial houses. That was easier said than done. In the course of its three-year existence, Imnet abandoned plans to use the 3270 PC as a product base, shipped only 100 of its entry-level standalone PC-based System 100s, and barely got a handful of its cornerstone product, the PC and Series/1-driven System 500, into beta sites.

At least that's a little better than their experience in 1974, when Merrill Lynch announced that all its account executives would be supplied with specially designed desktop systems from IBM. That product fell by the wayside and IBM quietly withdrew from the market.

But yet there are curious elements to the decision to close Imnet.

Number one is the timing. Imnet was just beginning to place its long-awaited System 500 product in test sites within Merrill Lynch, Drexel Burnham Lambert Inc., and Paine Webber Group Inc., all of New York. Why pull the plug before the company barely had a chance to get started?

"We were in the process of getting up to testing their branch-office system," says one System 500 beta site participant who asked not to be identified. "We had all the hardware and all the wire strung; then a hold was called [a week before the formal announcement]. We weren't told why."

Some speculate that IBM and Merrill Lynch moved to clean the books by the end of 1986, given that the announcement was made Dec. 31. IBMers and Merrill Lynchers say there was no legal or financial reason as far as the date goes. Instead, it occurred after a normal busi-

THE PRIMARY REASON WAS ECONOMICS.

Illustration by Robert Neubecker

ness review meeting.

"If you look at the cost of developing a system like this, the development expense is relatively small compared to the cost of fielding it," says one Merrill Lynch insider. "We're talking major costs, such as field service. It was a good time to reevaluate."

IBM has also made no secret of the heavy-duty cost control program it has in place. For example, nine days after the Imnet closure, IBM withdrew from the laboratory instruments business. And, at Merrill Lynch, the key executive who put together the Imnet deal is no longer with the company, leaving Imnet without its original champion.

Yet, why did an idea that seemed so great just a few years ago flop?

One reason boils down to basics, says one Wall Streeter. "The Imnet organization just wasn't ready to make it happen. The company wasn't formed by the greatest entrepreneurs in the world. It may be tough to build an infrastructure when for your whole life it's been done for you."

The Competition Heats Up

Recently, this infrastructure had to face much tougher, well-funded competition, namely ADP, which not long ago acquired Bunker Ramo Information Systems to become a major player in the Wall Street front office. Acquisition mania also hit Quotron, which was purchased by Citicorp within the past year (see "Place Your Bets," Dec. 1, p. 28).

Unlike the ADP-Bunker Ramo situation, outsiders are hard pressed to find any benefits that the Citicorp deal has brought to Quotron. One theory why ADP was chosen over Quotron in the last round is that Merrill Lynch, according to a Merrill insider, fears that Citicorp is becoming a competitor in its mainstream investment business.

Ironically, it is also possible that a key reason behind the Citicorp-Quotron deal was Imnet. Following the announcement of Imnet's formation, Quotron's stock fell 30% in one day. While Quotron doesn't go as far as saying Citicorp's takeover was unfriendly, it and the price Citicorp paid were hardly welcomed with open arms.

Quotron also felt the sting of Citicorp last year when Shearson Lehman Brothers Inc. decided against being the first major site for a new product to have been developed and marketed by Quotron and AT&T. According to reports, Shearson was to purchase $150 million worth of products and services during a five-year period but canceled the deal following Citicorp's acquisition of Quotron. AT&T, in turn, has apparently decided to drop out of the quote side of the brokerage services market.

JUST HOW BIG THE ADP DEAL WILL BE IS UNKNOWN.

Just how big the ADP deal will become is still unknown. ADP senior vice president Arthur F. Weinbach declines to disclose the potential worth of the Merrill Lynch deal to his company, but he says that throughout the first quarter of 1987 the two companies will "jointly define Merrill's specific requirements." ADP then expects to deliver first systems to Merrill Lynch by year's end, after which "we'll probably have two more years to roll out to Merrill's 600 domestic branches," he adds.

Quotron has a contract with Merrill Lynch through September 1988. Does the ADP deal affect Quotron? "Certainly not now," says marketing vice president George Levine, but "if they develop a quote system like Imnet was, long term it could," he concedes.

Just two days before the ADP win was announced, Levine appeared to be breathing a little easier due to the Imnet collapse. "I was somewhat surprised by the decision" to shut Imnet, said Levine then. As to the whys of the move, he replied that "Developing a system is not an easy process. It takes a lot of technology—technology in networking, applications, hardware and software, and then an understanding of the industry. IBM and Merrill certainly have a great deal of that, but it takes a certain order of magnitude above that."

While it is not believed that ADP will use much, if any, work completed by Imnet, it is following a direction pushed forward by that defunct entity. To Imnet's credit, it is primarily responsible for a new technology emphasis on Wall Street—distributed processing. Whereas the standard setup has been to supply leased, dumb terminals on brokers' desks, all the big players are experimenting with intelligence at the desktop, for example, an IBM PC.

Although ADP and Merrill Lynch won't discuss details about their deal, Weinbach says the system ADP will provide will be based upon an an AT-compatible platform.

Paine Webber MIS director Martin Stein, who says his company was benchmarking Imnet's System 500 but had never signed an agreement, notes that Paine Webber questioned not just the viability of Imnet but also its decision to use the Series/1.

"We had some technical reservations about the constraints of the Series/1," he says, "in particular, the capacity constraints on a controller that size. We wanted to wait and see the technical response to those questions."

Neither Architecturally Great

Stephen Lee, corporate vice president at Paine Webber and formerly associated with Imnet's software development effort, supplies some perspective. At the time of the decision to use the Series/1, the system was the only thing available in the IBM product line "with SNA connectivity and a way to connect to PCs, neither of which was architecturally great."

According to sources, those questions notwithstanding, a huge chunk of work still remained before the System 500 would have been viable.

"We needed a whole vehicle, and it wasn't there," says a beta customer about the System 500. "We may take 20 different services like price feeds and market data services from a quote vendor. There was nothing there from Imnet. If I deliver a piece of furniture to you and you can't get it out of its crate, what's it worth to you? Well, this was an uncrated product."

One lesson from Imnet is that IBM can and does fail. Leon Williams, currently president of MicroPro International Corp., San Rafael, Calif., was formerly head of the Monchik-Weber Corp., New York, which did some of Imnet's original software development. "This proves the complexity of a good quotation market system," he says. "If you can imagine 100 messages a second being distributed over 100,000 terminals with a half-second delay, that's an extremely difficult problem they had to solve." But, he adds "IBM tries every 10 years" anyway. ■

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CIRCLE 13 ON READER CARD

OPERATING SYSTEMS

Barking Up the Wrong Tree?

Users and vendors have their doubts whether Unix will ever make it into the MIS department.

BY JEFF MOAD

If Unix is ever to start making strides toward establishing itself as a viable alternative mainframe MIS operating system to IBM's MVS/XA, it seems there would be no time like the present.

For one thing, although IBM's commitment to mainframe Unix has been lukewarm at best, two of its major mainframe competitors have had plenty of reasons to look for OS alternatives. Legal and technical problems have made it difficult for Fujitsu and Hitachi to maintain operating system compatibility with MVS/XA and have forced both vendors not only to attempt to negotiate large cash settlements with IBM, but also to rewrite large parts of their own operating systems and rethink whether and how to remain in the IBM-compatible computer business.

At the same time, mainframe vendors Amdahl Corp. and National Advanced Systems in the U.S. and Siemens in Europe, while staying clear of legal difficulties with IBM, have been looking for a competitive advantage over IBM, something other than just a lower price tag to lure mainframe users. To that, add steadily increasing IBM system software prices, and you would think mainframe users as well as vendors would be in the market for an alternative.

But mainframe vendors and the vast majority of their MIS users are far from ready to stray from the MVS fold, and if or when they do, they aren't at all sure that Unix is the logical alternative. Although IBM, Amdahl, Fujitsu, Hitachi, and Unisys in the non-IBM-compatible world all have versions of Unix running on their mainframes, most vendors continue to market mainframe Unix primarily to technical and government users, markets they see as incremental to their primary commercial MIS customer bases. Although vendors see some commercial applications originally written for Unix-based minicomputer hardware migrating to mainframes with Unix, none are currently willing to invest the time and money it would take to develop the transaction-oriented facilities Unix would need as a mainstream dp operating system. Nor are they ready to start pitching mainframe Unix to a customer set already heavily invested in MVS application software.

Unix Will Dominate

AT&T alone continues to insist that not only will Unix continue to grow as the standard operating system in the technical workstation and midrange system market but that it will also emerge as the key commercial MIS operating system. "It won't happen overnight, but in five to seven years, Unix will be the dominant operating system for mainframes," says Larry Crume, president of AT&T's Unix Pacific operation, who is trying to sell Japanese vendors and users, among others, on Unix.

So far, both Fujitsu and Hitachi have started marketing mainframe Unix. Fujitsu is selling a version of Amdahl's UTS implementation, and Hitachi offers a version of Unix System V that runs on top of its VMS virtual OS. Neither Fujitsu nor Hitachi, however, sees Unix as a way around the challenges posed by staying close to IBM compatibility. Fujitsu, which is currently in arbitration with IBM over charges it copied parts of MVS/XA, believes that "the Unix OS cannot replace other operating systems," says systems engineering department manager Yasuyuki Yamana. "In some fields Unix is particularly good, [but] if Unix is modified to cover every application, it will lose its strengths." He adds that mainframe Unix is weak in transaction processing but strong in scientific applications and software development.

Fujitsu, which started selling a guest version of UTS in April 1985, says it has shipped 50 Unix systems. Although the company won't say how many of those are running on mainframes, observers believe it is only a small percentage of the total. Most of Fujitsu's Unix base reportedly runs on minicomputers. In fact, Fujitsu originally started marketing Unix to counteract DEC, not to compete with IBM. "Previously, when our customers wanted Unix, they had to buy DEC machines," says Yamana.

Hitachi introduced its version of Unix, developed by Interactive Systems, Santa Monica, Calif., only in November, and isn't scheduled to start shipping it until next month. Hitachi projects 300 sales of its HI-UX/M over the next four years, but few if any of those licenses will go into MIS applications. "Business users already have a lot of big software assets," says Hitachi marketing and planning general manager Tsuneo Uraki. "We don't see the conversion of already existing applications software to Unix." Fujitsu is already shipping a native mode version of UTS, and Hitachi plans to refine its offering "sometime in the future," a spokesman says. Both mainframe vendors see the upgrades merely offering better performance for engineering and scientific users, however, not transforming Unix into a viable dp operating system.

Not Ready to Promote Unix

The most successful Unix backer to date among the mainframe vendors is Sunnyvale, Calif.-based Amdahl, which analysts estimate has between 300 and 350 of about 450 mainframe Unix installations worldwide. Its UTS product has enabled Amdahl to establish itself as a vendor of systems software in addition to mainframe hardware, but even Amdahl is not ready to promote Unix as an alternative MIS operating system. "Users like it [UTS] in the scientific and engineering markets. We've never tried to sell it in our normal commercial market," says Amdahl senior vp William O'Connell.

The exception is AT&T itself, historically a large Amdahl mainframe customer and a user of UTS for MIS as well as engineering and technical applications. According to Andrew Schroter, manager for systems programming at AT&T's interactive network optimization unit, the native mode version of UTS is supporting database-oriented transaction applications as well as network software development and capacity planning activities. Many of those applications were written to run on 3B20 or VAX hardware. They were shifted to an Amdahl 5860 running UTS when more power was required.

"That's the way Unix will infiltrate MIS," says Schroter. "Applications will be written for minicomputers, especially those that support relational databases like In-

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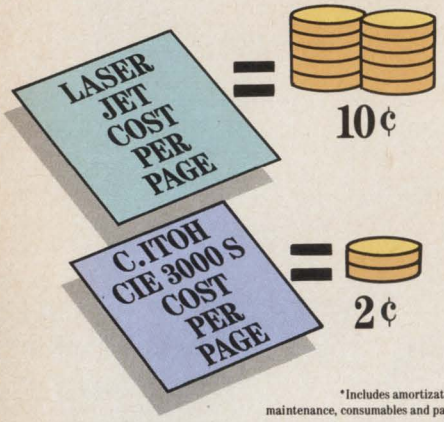

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CIRCLE 16 ON READER CARD

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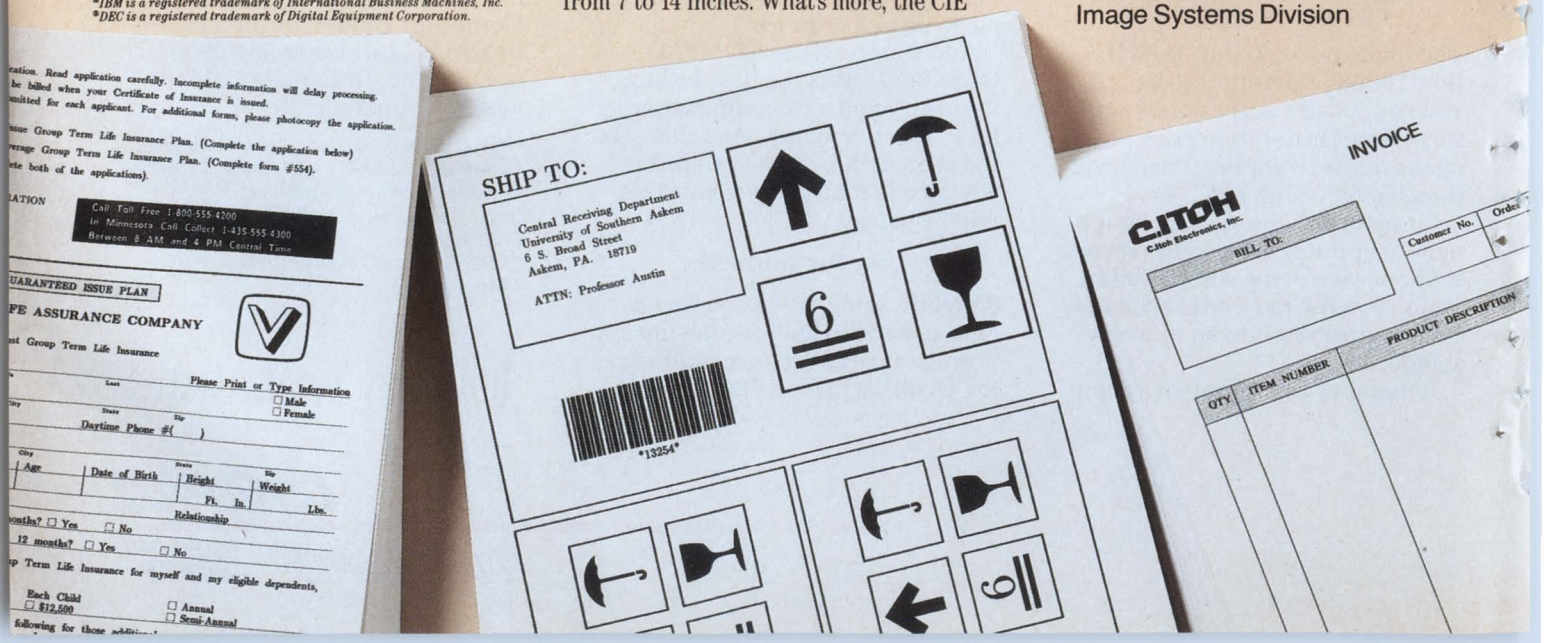


A Tree Grows in Japan

"The Unix workstation market in Japan is about to explode. If companies want to make a mark in Unix in Japan, they'd better do it now or within the next two years." So claims a not necessarily disinterested observer, William Joy, Unix guru and vp of R&D for Sun Microsystems, Mountain View, Calif. Joy made the comments while in Tokyo recently to address a Unix trade fair. His enthusiasm is not without foundation. Indeed, there are signs that the market for small Unix systems is the newest arena in which Japanese manufacturers have decided to compete furiously with one another. The resulting intense activity not only will galvanize the domestic market, but can be expected to eventually spill over the borders and become a battle for export markets as well.

All the marketing and manufacturing efforts in the world obviously wouldn't do much good without receptive customers, and manufacturers report that sales are healthy. Sony, for example, began shipping its 68020-based BSD 4.2 Net Work Station (NEWS) (no relation to Sun's window system) in January, and claims the first four months' production of 500 has already sold out. Hitachi says it has orders for 4,000 units of its Creative Workstation 2050, a 68010-based System V machine for office automation and artificial intelligence introduced last year, and is planning to deliver its first engineering workstation later this month. Fujitsu, too, is reportedly confident enough of the market to be readying for introduction its own 680X0 engineering machine in the near future. NEC says it has begun shipping its EWS4800 engineering workstation. Names less prominent in computers are also getting into the act, including Casio, Ricoh, and Sharp, while NCR, Apollo, and Sequent are among the foreign brands available.

The other critical factor besides eager customers is third-party software development, and here, too, indications are favorable. Declares Larry Crume, president of AT&T Unix Pacific, "We have about 700 cpus running source code in Japan, concentrated in the workstation area." Although he does not offer figures on how many sublicenses of binary code there are, Crume says Japan is the only market where commercial source licenses outnumber those of universities. "Lots of new software houses want to develop applications."

A major increase in relatively portable applications software could be a double-edged samurai sword, however. Japanese vendors have typically avoided any semblance of standardization in small-scale computers, preferring to lock their customers in with a variety of operating systems and dedicated machines. An abundance of software could make it easier to sell hardware, but it could also make it easier for customers to switch to a competitor's machine.

Tsuneo Uraki, a marketing and product planning general manager at Hitachi, has some ideas as to how Japanese manufacturers might meet this dilemma. "Although there is a 50-50 chance to change, there are also hardware features that are different," he says. "But in computers, marketing capability is more important than manufacturing skill, and the main competition will still be in the area of application software."

If Uraki is correct, in-house software development will remain the cornerstone of Japanese computer makers' strategies even as they move to Unix. The real payoff from Unix may come when it's time to move overseas. Hitachi, for one, has announced it is considering sales and eventual production of its workstations in the U.S. According to general manager Uraki, homemade software wouldn't make it in the States. "It's difficult to adapt to American culture in the area of software, but we see a big possibility in the U.S. market if we supply our hardware with American software. Without Unix, it would be hard to get software developed in the U.S."

BY ROBERT POE

formix. Then they will migrate to mainframes." Schroter acknowledges that that won't happen in a wholesale fashion until new Unix facilities supporting transaction processing and error recovery are improved. "But efforts are now under way to provide those facilities," says Schroter. "It won't be long before everything MVS can do, Unix can do."

It's unclear, however, who will invest in developing those facilities to make Unix fit into the MIS world. The major developers of systems software management tools, such as Uccel and Boole & Babbage, so far have continued to put most of their eggs into the MVS basket, leaving only smaller entrepreneurial concerns such as Aim Technology, San Jose, to develop Unix tools. Observers say IBM, with its current guest-based IX/370 offering, seems content to play a follower's role rather than one of leadership, and the other mainframe vendors have decided to place new Unix facilities development low on their list of investment priorities. Some are even questioning whether to offer Unix on their mainframe hardware at all.

"If we do anything on the large machine it will only be to host Unix as an additional OS, and if we decide to run Unix as a native OS it will only be on our small mainframes," says Klaus Gewald, head of operating systems development at the data systems and communications division of Siemens, which resells Fujitsu mainframes as well as its own hardware. "There are a number of reasons for this. The practical reasons are that we have allocated a lot of people and money to developing Unix on the micros and minis, and we can't do everything at once. The competitive reason is that we have our own operating system for mainframes, the BS 2000, and if we offered Unix as an alternative we would be competing with ourselves."

Mainframers Hesitate

Even Amdahl is hesitant to invest in developing MIS-oriented facilities for Unix. "We've got plenty to do in the next few years selling into the engineering and scientific markets and developing products to improve connectivity between UTS and SNA," says O'Connell.

Mainframe vendors aren't the only ones hesitating to invest in mainframe Unix for MIS applications; even some users with Unix applications running on smaller hardware hesitate to make the jump to a mainframe Unix OS. One such user is New York stock brokerage Dean Witter, which, like many such firms, has some programmed trading applications written for 68000 Unix-based hardware marketed by Quotron. Dean Witter is looking to migrate those applications onto larger systems, says MIS vice president George Ross, but it won't necessarily be a Unix mainframe system. "I wouldn't rule it out, but we're looking very hard at the Stra-

tus system in that environment. They've come on very strong in the last six months."

Working against a Dean Witter commitment to mainframe Unix is IBM's less than aggressive support for the operating system. "We're part of Sears, and Sears is pretty much an IBM shop," says Ross. "Once we see IBM deliver native mode mainframe Unix, there might be more willingness to get involved here."

Hesitant users point to a continuing gap between AT&T's Unix V.3 standard and current ANSI efforts to come up with an official industry standard as another reason to stay away from current mainframe implementations of Unix.

Even if mainframe vendors and most users continue to turn away from mainframe Unix in MIS environments, there should be a healthy niche market for mainframe Unix implementations, analysts say. San Jose-based Dataquest says the 450 current mainframe Unix installations should grow to about 900 by 1990, not including implementations for supercomputers. That growth rate far exceeds the one predicted by most analysts for MVS mainframe installations.

Meanwhile, some longtime Unix-market watchers are urging AT&T to stop trying to transform its operating system into an MVS challenger and instead focus more on promoting higher-level standards such as OSI that can accommodate several operating systems and different hardware on the same network.

"AT&T has made a good start in conforming rigorously to the Remote File System part of OSI," says Robert March, chairman of Unix minicomputer vendor Plexus Inc., "but AT&T is barking up the wrong tree trying to make Unix fit as a dp operating system." ■

TRADE ASSOCIATIONS

This Exec's for You

The charter for ADAPSO's new administrative chief is to expand the trade group's Washington presence.

BY WILLIE SCHATZ

When the ADAPSO search committee considered whether its new executive director should know the industry or know Washington, it wasn't even close. Government, by a knockout.

"We want more government relations presence this year," says Jay N. Goldberg, chairman and ceo of Money Management Systems in New York and chairman of both ADAPSO and the search committee. "We recognize now that we can have a significant impact on things going on in Washington affecting the industry. We want to be more involved. People in government don't know enough about ADAPSO."

So what else is new? We're hardly talking a household word here. But sometime during its five-month headhunt, the search committee decided that it would be easier for the executive director to go to school on the industry than it would be to learn about Washington.

"One of our highest criteria was getting someone who knew how to get things done in Washington," says George Raymond, Goldberg's predecessor and president of Automatic Business Centers, Moorestown, N.J. The other members of the search committee were John P. Imlay Jr., chairman and ceo of Management Science America Inc., Atlanta, and Fred Lafer, senior vice president and general counsel of Automatic Data Processing Inc., Roseland, N.J.

"Our broad concerns tend to be issues that are handled in Washington," Raymond says. "Things like domestic and international communications, software piracy and protection, and how to improve international competition. What happens here is of great concern to us.

"We wanted someone who has experience, savvy, strength, and knowledge about Washington and can be comfortable there. So we didn't talk to many people within the industry. We focused on trade association management and Washington experience. Our main issues aren't technical in nature. We didn't think a high degree of technical competence in the industry was necessary."

That's why George DeBakey got the job. He'll be the first to admit he doesn't know the industry.

"They should have picked someone who knows the industry," says a source within ADAPSO's committee structure. "George is a nice guy. He has no negatives with any particular segment of the industry. And that's all I'm going to say."

But in the Washington game, this guy's a player.

GEORGE DEBAKEY: "I can get all the help I need from the ADAPSO staff."

You can't spend 15 months as deputy assistant secretary for science and electronics of the International Trade Administration and not learn how to maneuver through Washington's governmental labyrinths. DeBakey specialized in dealing with a variety of trade issues affecting high-technology industries, particularly those affecting international competitiveness.

Private Sector Experience

Another factor that surely swayed Messrs. Goldberg, Raymond, Imlay, and Lafer was DeBakey's private sector experience. Prior to the ITA job, DeBakey was vice president of international trade services for Fleet Financial Group in Providence, R.I., assisting small- and medium-sized high-tech companies in developing international markets for their products. From 1974 to 1983, DeBakey held a variety of positions in international and domestic marketing and business development in the electronics and telecommunications divisions of Rockwell International.

"From my background, it's easy to see the role Washington plays in what happens in the industry," says DeBakey, who was scheduled to report for work onFeb. 9.

"I want the members to become more active and more involved. They haven't been around Washington enough. We've got to raise the visibility of issues that are important to them. We need to do more consciousness-raising among all our companies.

The organization also has many members, be they large or small, who haven't been quite sure they're getting what they're paying for. What we've got here is a failure to communicate—at least as it's perceived by many of the members—between the

members and ADAPSO's staff. Nor has it always been clear who's the boss (see "Coming of Age," Oct. 15, 1986, p. 66).

That feeling was surely exacerbated by Jerry Dreyer's title of "president." Dreyer, who had been head of the trade association staff from 1969 until his resignation last fall, thought it would enhance ADAPSO's Washington presence. But when Dreyer left, replacement Luanne James became "interim executive director." All parties agreed that James was simply buying time for the board to select Dreyer's successor. They disagreed on whether the title would leave when James did.

"There was considerable discussion about the title," Goldberg admits. "We felt, and still feel, that if 'president' becomes an issue, we can raise it at any time. It's easier to go from executive director to president than it is to go the other way."

"I personally think 'president' is hogwash," Raymond says. "Executive director connotes the senior server and employee of a member-driven organization. The presidential title has a different connotation.

"We've pushed on George that this has to be a member-driven organization. I'd rather see John Imlay testifying before Congress than George DeBakey. We want an organizer and expediter, not necessarily a doer. In the past we've been too complacent about member participation, especially with the high-level executives. It's been benign neglect by ADAPSO. Now we're sending a message to the membership: this person's accountable to you."

Nothing like having more than 900 bosses, right?

"I PERSONALLY THINK 'PRESIDENT' IS HOGWASH."

And if all goes according to chairman Goldberg's plan, there will be more than 1,000 ADAPSO members by the end of the year. They range in size from IBM to mom-and-pop garage innovators, and getting them together on a position paper or statement to Congress is no picnic in the park.

Despite the fractiousness, ADAPSO has been united far more often than it has been divided. The group arguably has the most effective, visible Washington presence of any high-tech group.

"If this were any other job, I'd still be at ITA," DeBakey says. "I know I haven't been a trade association manager. But I can get all the help I need from the ADAPSO staff.

"I know the members are my boss. They're our clients. I'm going to get the ceos more involved, because they're my best salesmen. When they come to Washington, I want them to walk away saying 'DeBakey is doing a hell of a job.'" ■

FACTORY AUTOMATION

A View from the Factory

Bar code readers and optical card readers are the bases of a growing niche in the data entry market.

BY EDITH D. MYERS

Electronic wagering is paying the bills today for True Data Corp., a 16-year-old data collection company in Irvine, Calif., but the firm is betting its future growth lies in what it sees as the burgeoning market for factory data collection systems.

True Data is not alone in its view of this market. A study released late last year by the New York research firm Frost & Sullivan projects the market for factory data collection systems (FDCS) will grow from $117.3 million in 1985 to $576.9 billion in 1990, for an annual compound growth rate of 37.5%.

James McKee, True Data's chairman, founded the company in 1971 to manufacture a card reader on which he held a patent. In 1976 and again in 1978, he proposed business plans for development of optical card readers (OCRs) for factory data collection systems, called Mark Sense readers, which were turned down by the board of directors.

McKee left the company and helped form another company called Digital Datacom to do factory data collection systems. This company was sold to Honeywell in 1983.

Meanwhile, True Data had become big in wagering with its reader and Mark Sense cards. The company supplies the lion's share of optical card readers for on-line data terminals operated by 17 state lotteries nationwide.

The company was also growing in the education field for test scoring and in vote counting. McKee, however, never lost sight of his goal of making it big in factory data collection.

Then along came the XT and AT, which were just what McKee had been waiting for. In 1984, he repurchased a controlling interest in True Data and set out to develop the factory data collection system the company calls TDC Perform.

The hardware key to this system is the SDT-100 optical scanning terminal that simplifies data reporting by operators without high-level training. Up to 128 scanning terminals can be tied into a production network. A memory resident software package, also called Perform, serves as a bridge between the data collection terminals and a timeshared personal computer.

Leonard Robbins, president of Cast-Rite, a Gardena, Calif., die casting company that has been beta testing the

system for a year, believes an increasing emphasis on statistical process control (SPC) in the manufacturing industries will lead to growth in adoption of FDCS.

True Data isn't alone in the market. F&S sees competition on many fronts. It estimates IBM has 38.5% of the market, but IBM doesn't sell unbundled factory data collection systems, offering them only in conjunction with total CIM packages. But McDonnell Douglas Manufacturing and Engineering Systems, St. Louis, is a value-added remarketer (var) for IBM with its Plant Com System offering, which has been on the market since January 1984.

NCR, through its Data Pathing Division in Columbus, Ohio, offers several factory data collection systems, marketing them directly and through vars. Sperry Corp. (now part of Unisys) began offering factory data collection systems, hardware only, software only, and bundled systems, in July 1985 and has several dozen systems in various stages of installation.

Other players are coming from a variety of different directions. Coming from the world of bar code devices is Computer Identics, Canton, Mass. Robert Shallow, senior vice president of sales and marketing, believes the popularization of bar codes for industrial use, coupled with dropping system costs, is fueling the growth of FDCS markets. "Bar codes are now a de facto standard for factory data collection," declares Shallow.

Gene Crawford, vp of sales for Dataworks, a San Diego manufacturing application software publisher and a True Data distributor, leans to Mark Sense (where pencil marks on a formatted card are read by sensing devices). He lists "mark sensing at input" as one of two major features that led his company to select the True Data Perform system to sell to its customers.

Dataworks' systems run under the Pick operating system with the primary computer suppliers to date being NCR/ADDS (Dayton, Ohio), McDonnell Douglas Computer Systems Co., Altos (San Jose), IBM (Series 1 and 4300), and Ultimate Corp. (East Hanover, N.J.).

A "Phoenix from the ashes" story is that of Time Information Systems, Provo, Utah. A group of employees of Dynamic Time Systems took over a product called DTS, after their company went out of business last August. Some 600 DTS systems are installed. Time Information sells the basic DTS product and oems a product to the Profit Division of the West German printing giant, Heidelberg Printing, which sells it as the Profit System to large printers. ■

JAMES MCKEE: He eyed the data collection market 10 years ago.

BENCHMARKS

Sperry Official Resigns

James B. Aldrich, senior vice president of corporate planning at Unisys and the second highest ranking executive at Sperry Corp., says he plans to resign his post. At press time, Aldrich said in published reports that he would leave by the end of January and that the duties offered to him by Unisys, the company formed after the acquisition of Sperry by Burroughs Corp., were not commensurate with his position at Sperry.

It's Official

Dallas-based Uccel Corp. has finally announced its acquisition of two companies that support and market ACF II, a data security system (see Look Ahead, Nov. 1, p. 9). Uccel paid approximately $27 million for SKK Inc., Chicago, and Cambridge Systems Group Inc., Santa Clara. Instead of using its more than $100 million in cash, it purchased the companies, which had combined revenues of $30 million, with proceeds from a bank loan. After a year of divestitures, Uccel is now acquiring software products that fit in its market niches. Uccel also bought California Software, Los Angeles, for $3 million in cash. That company markets an on-line system called Netman for MVS, VM/CMS, and DOS environments. Uccel picked up another West Coast company, Triangle Software, San Jose, for $3.7 million in cash. This vendor's main product is a software package called JCLCheck. In other transactions, Uccel has acquired ISS-Three from International Systems Services Corp., New York, for an undisclosed amount. This capacity management system for the MVS environment will be used with the vendor's UCC-16 capacity management system. Uccel has also entered into an agreement to buy Mazdamon, a network performance measurement product from Graham Software Corp., Toronto, for an undisclosed amount. Uccel completed these transactions the last week of 1986 and the first week of this year.

SAS Acquires Lattice

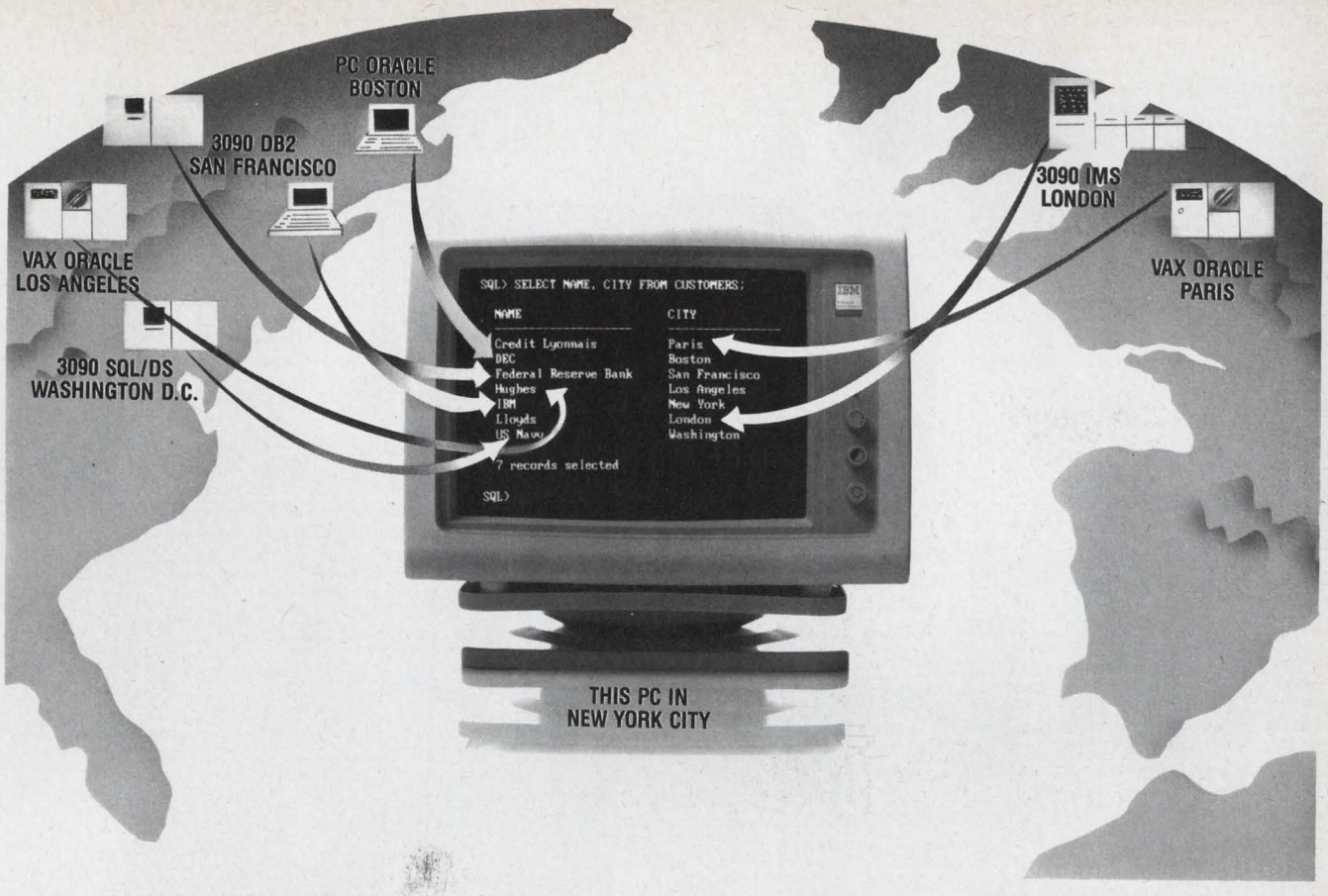
SAS Institute Inc., Cary, N.C., has acquired Lattice Inc., Glen Ellyn, Ill., developers of the Lattice C compiler, for an undisclosed sum. This is the first acquisition for SAS, developer of SAS System data analysis product for mainframes and minicomputers. The relationship between the two companies began in 1984 when SAS acquired the right to implement Lattice's microcomputer C compiler for the IBM mainframe environment.

No Deal

Pansophic Systems Inc., Oak Brook, Ill., has broken off talks with SPSS Inc., Chicago, for acquiring SPSS (see Benchmarks, Dec. 15, p. 44). Systems software supplier Pansophic signed a letter of intent last December to acquire SPSS, maker of statistical analysis software, for $32 million. A Pansophic spokesman says the two companies weren't able to reach an agreement.

An Eye for an Eye

A suit filed by Lotus Development Corp. alleging copyright infringement against two competitors, Paperback Software International, Berkeley, Calif., and Mosaic Software Inc., Cambridge, Mass., has resulted in some backlash. Adam Osborne and Richard D. Bezjian, presidents of Paperback and Mosaic, announced they would countersue. Lotus charges that the companies' products, VP Planner from Paperback and The Twin from Mosaic, infringe on Lotus's copyrights on its 1-2-3 spreadsheet package. The Lotus suit also charges the two companies with false advertising and unfair trade practices. ■



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SQL*Star is a location-independent, hardware-independent, network-independent, DBMS-independent open system.

Location independence means users don't need to know where their data is located. Whether it's on one computer or on dozens. On one desktop, in one building or around the world.

Hardware independence means users don't need to know on what kind of hardware or under which operating systems their data resides. On mainframes, minis or micros. Under MVS, VM/CMS, VAX VMS, PC-DOS, UNIX or many others.

Network independence means users don't need to know what networks are used to transmit their data. DECNET, SNA APPC, coax connections, Ethernet-TCP/IP, async or others.

DBMS independence means users don't even need to know what DBMS is providing the data: ORACLE, IBM's DB2 or SQL/DS. And in 1987, even VSAM, IMS and other non-SQL DBMSs.

SQL*Star is an **open system,** so you needn't be limited by the network and DBMS interfaces provided by Oracle. Our SQL*Star Toolkits allow *you* to develop your own custom interfaces to networks or DBMSs. And our national consulting organization is ready to assist you with those specialized interfaces.

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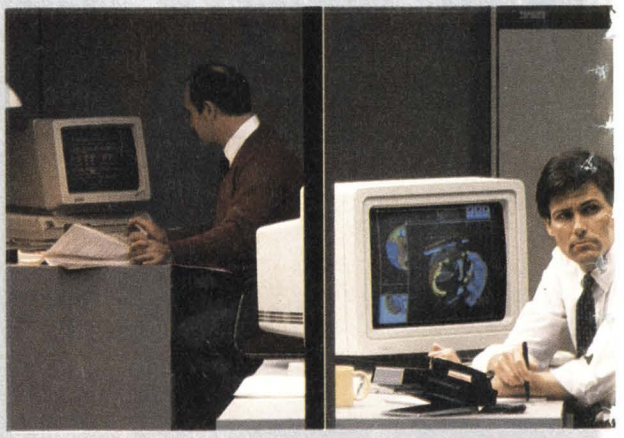

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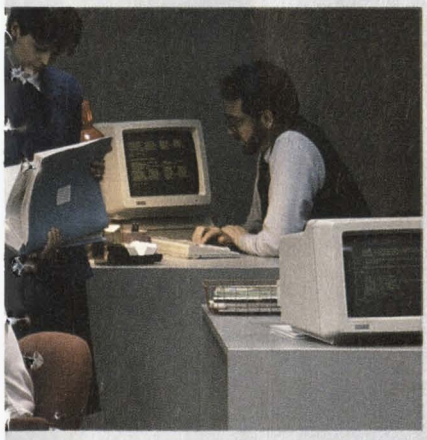

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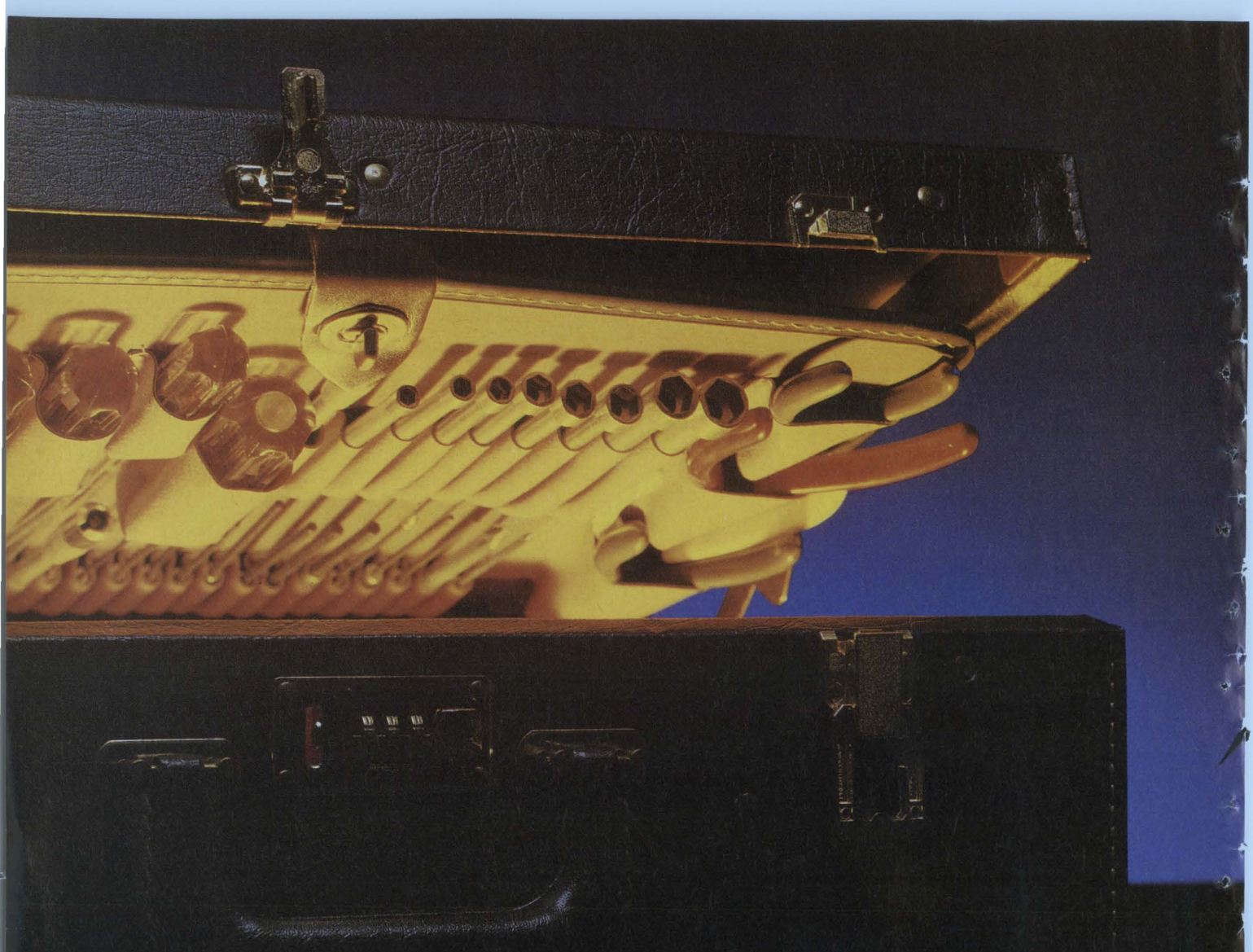

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Behind the News

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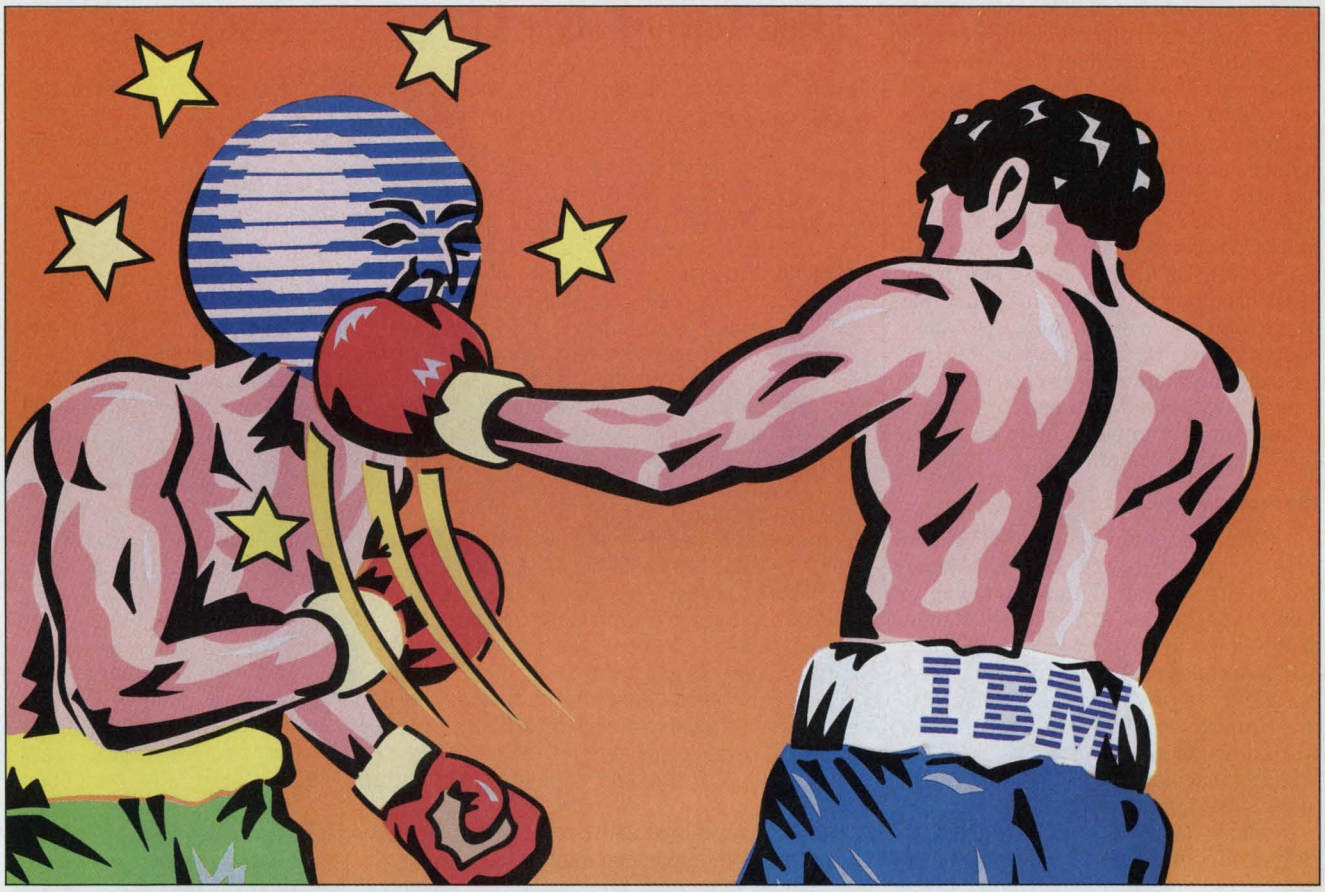


Illustration by Scott MacNeill

Round One: IBM 1, AT&T 0

AT&T is big and has fought hard, but IBM remains undisputed champ.

BY JOHN W. VERITY

AT&T, once championed as the one company capable of challenging IBM's dominance in computers, has barely scratched the Big Blue giant after two years of competition. Losses, layoffs, and leftover computer inventory are about all the telephone company has to show for itself. IBM, despite sour financials recently, seems as strong as ever in data processing and it's expanding rapidly into the one area where AT&T is strong, communications.

Hopes may have been inflated beyond reason, but it was only a few years ago that the impending showdown between America's two "information giants" was being described as a "clash of the titans," an earthshaking slugfest between "King Kong and Godzilla." Common wisdom held that once AT&T was divested of its operating companies and freed to enter the dp arena—the terms under which it settled an antitrust suit that the government seemed bound to win—IBM would finally meet its match.

"The stage is set for a bout in a ring of worldwide dimensions," wrote noted industry watcher Frederic G. Withington in a special issue of DATAMATION (July 1982) devoted to the "coming collision" of IBM and AT&T. For years, AT&T had pleaded with the FCC for permission to take on IBM, and now, with divestiture at hand, its chance had come.

AT&T seemed a strong contender for the dp crown back then. Communications, its strong suit, was an increasingly important component of data processing systems. The company possessed the biggest, most powerful communications network in the world. It also ran Bell Labs, which had more Nobel laureates than any other institution like it. Revenues, moreover, were closer to IBM's than those of any other major computer maker. Best of all, virtually every one of IBM's domestic customers was already an AT&T customer, and many were using AT&T's computer-based switches. Even if it were never actually to deck IBM, AT&T was thought to have a good chance of leveraging its way from dominance in communications into a strong, second-tier position in computers.

The bell has sounded to end round one, and by all accounts IBM has won hands down. As far as computers go, the telephone company is slumped back in its corner where it's soaking bruised fists, tending to a black eye or two, and wondering, perhaps, if it can go even the next round.

AT&T has lost more than a billion dollars in its two years of selling computers and has barely shaken, no less broken, IBM's grip on data processing. AT&T's minicomputers are still found predominantly within the company itself. Its pri-

mary line of pcs (produced by Olivetti of Italy), forced by market demand to be compatible with IBM, has faced waves of cut-priced clones from Asia and has won only a small share of the market. Its attempts to gain the confidence of dp managers as a viable computer supplier have had little effect, recent polls show (see "Thank You for Calling AT&T"). Ambitious plans for a multiprotocol data network, Net/1000, have been scrapped. Most disappointing of all in light of the past few years' proselytizing, AT&T and a host of fellow evangelists have yet to create from the vaunted Unix operating system a solid, unified platform from which to build an alternative to IBM's dominant commercial dp systems.

The Profit Struggle

AT&T's revenues of about $35 billion have seen little growth since divestiture and profits are flat. With sales failing to meet expectations, AT&T is wielding a heavy ax to cut costs. It just let go some 30,000 employees; thousands more had been laid off previously. Late last year the company disclosed a $600 million write-down of inventory, including Unix-oriented machines that just won't sell in today's IBM-dominated marketplace.

Meanwhile, as AT&T struggled to stay in the ring, IBM forcefully entered AT&T's traditional markets from a variety of directions. It acquired Rolm Corp., which gives it a substantial share of the private telephone switch market. It bought a chunk of long-distance telephone service supplier MCI Inc., AT&T's most aggressive competitor in that arena; recent history suggests that, over time, IBM will likely buy further into MCI. It successfully reentered the value-added network business and quickly beat AT&T to a major contract for an insurance agency network. IBM also extended its broad international reach by striking major deals with telephone authorities in Great Britain, West Germany, and Japan. Finally, and most subtly, IBM helped emasculate AT&T's most impressive dp product, Unix, by bringing out its own, incompatible versions of the operating system (see "AT&T, IBM, and Unix").

IBM, then, has lost little if any ground to AT&T and is well positioned to continue its expansion across the dp-communications landscape. The remaining question is whether or not AT&T can play in the computer game in any meaningful, profitable way. Will it succeed in the future where it has evidently failed so far?

"We are not getting out of the computer business," states AT&T spokesman Barry Campbell. (Despite repeated requests, the company declined to make available any computer executives to be interviewed for this article.) "There's no way we're going to get out."

The spokesman concedes that AT&T is retrenching—"refocusing," he calls it— but insists that selling dp goods and services remains "very important to AT&T's future growth." How important, he declines to say. Nor does he provide any information on the volume of AT&T's

Thank You for Calling AT&T

A spot telephone survey of 22 DATAMATION readers, all MIS executives of Fortune 1000 companies, revealed little good news for AT&T.

Here are some answers to the first question, "In your opinion, what accounts for AT&T's performance as a computer company?"

- "Inexperience in selling in a competitive market. Their products don't seem different or attractive."
- "They lack the expertise needed to build a good business."
- "Unrealistic view of the market."
- "They're not really a serious computer company."
- "They don't communicate effectively with information system executives. Their products and services are just average; there is no differentiation."

While some respondents said AT&T was doing a good job integrating computing and communications, particularly within AT&T itself, one executive said, "I can't really say, because the only person I've seen from them is the telephone repairman. I haven't heard much about their computer operations."

Not hearing from AT&T was a theme that ran through the responses. Fully half the list said that AT&T has not tried to sell them any kind of computer. Asked to compare AT&T's sales effort with those of IBM and Digital Equipment Corp., only three of the 22 executives gave answers that could be considered at all positive.

- "I would say they are about equal as far as I know."
- "Better than average, but not outstanding because of lack of computer production."
- "Excellent as far as their communications equipment is concerned, but I wouldn't be able to comment on their efforts in the computer industry."

More typical reactions to AT&T's sales efforts are the following comments.

- "Poor, nonaggressive sales efforts. They haven't tried to sell me or any of my colleagues any models. They sell as if they were still in the telephone business. . . ."
- "I've never talked with a representative and I haven't seen any sales marketing other than their many commercials."
- "Very fragmented. Their marketing sales representatives are not informing end users about products."
- "They never sent any sales market representatives to my company to sell any of their merchandise."
- "They don't have good sales efforts. The products they're introducing have been on the market for years, and they are just introducing their renditions."
- "They don't have good sales efforts because they know little about the computer industry."

With potential customers harboring these ideas, it isn't difficult to understand why only a few in the sample are actually using AT&T hardware.

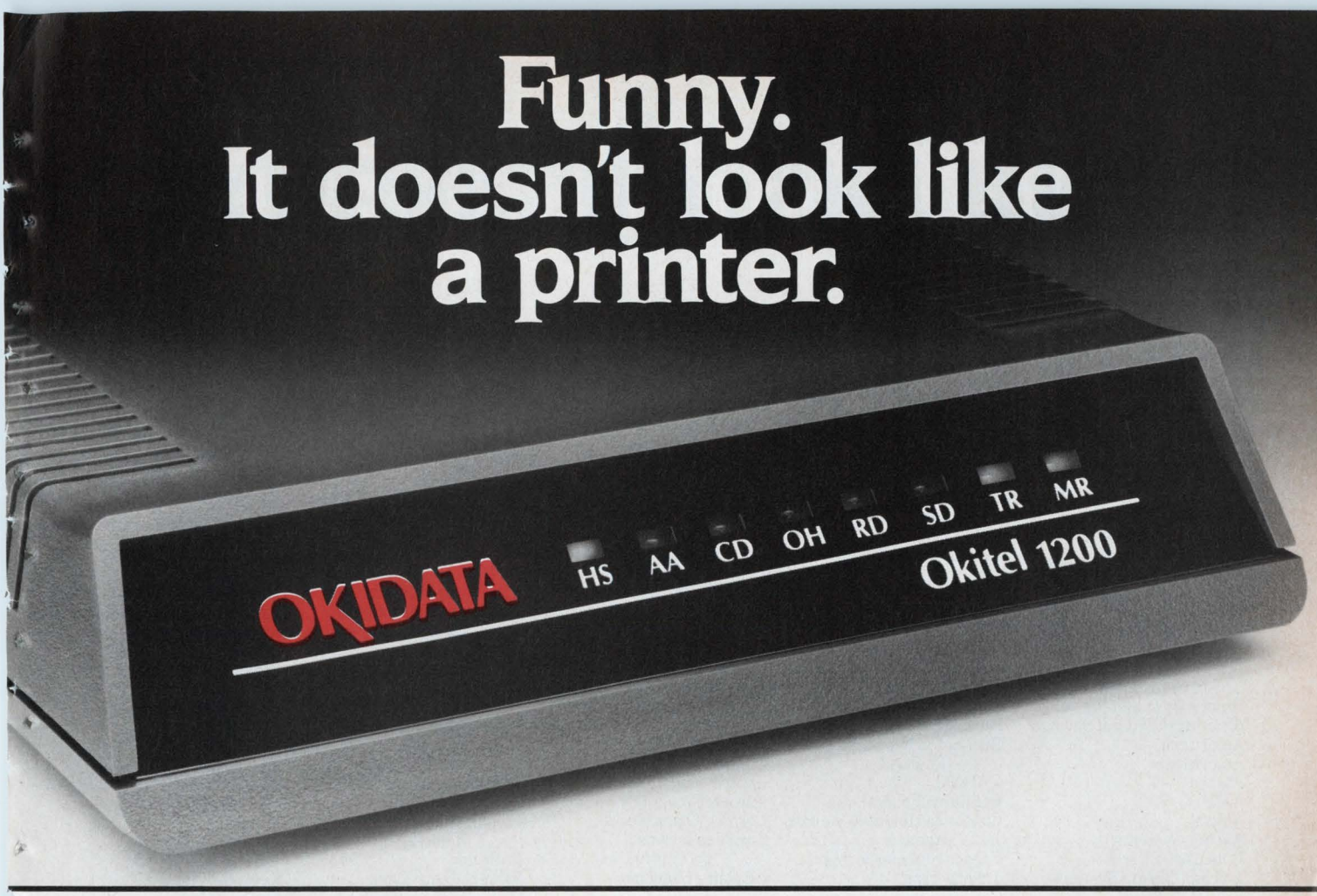
Perhaps more telling, not one of the other 19 executives had plans to buy any AT&T computers.

Still, the executives did have some good words for AT&T's products. One executive judged AT&T's minicomputers about equal to DEC and IBM equipment. Another said, "They are probably as good as IBM, but when it comes to office automation, DEC is ahead."

AT&T's microcomputers did manage to inspire some positive superlatives. One respondent called the AT&T micros "excellent. I have no complaints." Another said, "The machine is very good. The speed in microprocessing is number one." A third executive described the micros as "fast, reasonably priced, and reliable."

BY PARKER HODGES

Funny. It doesn't look like a printer.



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If your company is among this list of IBM 30XX mainframe users, it is also most likely to be among those spending up to 70 percent of their software dollar maintaining unstructured COBOL.

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Northrop Aircraft
Northwestern Bell
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Sea-Land
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Sears Canada
Sears Corporate Communications
Sears Roebuck
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Shared Medical Systems
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Trust Company of Georgia
TRW
TWA – Trans World Airlines
UCCEL Corporation
Union Bancorp
Union Gas
Union Mutual Life
Union Pacific Railroad
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CIRCLE 23 ON READER CARD

AT&T, IBM, and Unix

Clearly, AT&T has been no King Kong to IBM's Godzilla. And there are reasons to believe that it never will be. The telephone company, according to one economist, is likely never to gain more than a tiny market share in data processing as long as the industry is dominated as it is by IBM.

"AT&T has no long-term relationship with data processing managers as does IBM," states Richard Thomas DeLamarter, author of *Big Blue: IBM's Use and Abuse of Power* (Dodd, Mead, New York, 1986). The book provides an economic analysis of IBM and shows how, against all competition, IBM maintained and exploited a long-standing dominance in commercial data processing.

DeLamarter notes that IBM has 70% or more of the commercial mainframe market, which gives it unique, "monopolistic" advantages over all other computer manufacturers. "The history of the industry shows that entering the high end of the commercial computer market against IBM is very expensive. General Electric, RCA, and Xerox all failed and so did Control Data and Memorex. IBM's discriminatory pricing denied them the resources they needed."

DeLamarter, interviewed recently, sees AT&T facing similar prospects as it tries to sell data processing gear and services to large corporations. As competition in long-distance services continues to drive prices down, he argues, AT&T's financial resources will diminish—that, or its market share will fall. He notes that it is MCI, IBM's communications partner, that has been particularly aggressive in cutting prices in the long-haul market.

"AT&T's recent cutbacks indicate that it doesn't have the resources to stay the distance," the Brooklyn economist says. "How long can it hemorrhage at the current rate?"

Not long, he thinks, for as data processing and communications intertwine with each other over time, a "seamless web" will be formed between the two, and IBM, by virtue of its controlling the mainframe business—and, by extension, most of the computer network business—will hold many advantages. "If there's no seam to unravel, then how do you get into the market? Communications will no longer be the freestanding business it is today. AT&T will have to enter the mainframe business in order to stay competitive. But I doubt that AT&T can do that and make a profit."

Ironically, Big Blue is already keeping the industry's great white hope at bay with a quietly administered but effective dose of the very same medicine the telephone company once used against competitors during simpler times.

For decades, the American Telephone & Telegraph Co. monopolized the telephone business. Its monopoly was sanctioned early on by the U.S. government as a "natural" one, for it was obvious that the nation would be served most efficiently by a single, regulated supplier of telephone service. If more than one telephone network were permitted, the government thought, America's streets would soon become snagged in a tangle of competing telephone poles and wires. For unavoidable economic reasons, therefore, it was deemed best to let a single company have all the business.

For many years, communications technology changed little and the natural monopoly argument easily justified AT&T's running the only network in town. The national goal of "universal" phone service was largely achieved. But to many people the idea of natural monopoly did not seem to apply to the equipment that attached to the network—telephone instruments, switchboards, and so forth. Were there really efficiencies to be gained from letting AT&T have all that hardware business, too? Surely many companies were capable of making telephone gear that would work just as well as that of Western Electric, AT&T's massive manufacturing arm. Even if no U.S. company wanted to compete, there were competent foreign telephone companies that could enter the U.S. market at a profit. Competition, it could be argued, would only goad Western Electric into being more efficient and ensure that U.S. customers got the best equipment at the best prices.

No way, said AT&T the monopolist. It earned enormous profits as the sole U.S. supplier of telephone hardware and it exploited every ounce of its political and financial clout to retain them. In court and in front of regulators, AT&T argued repeatedly that only Western Electric telephones could be trusted not to damage the nation's one and only network. Non-AT&T hardware, the telephone company claimed, might easily zap the vital network with harmful electrical currents and ruin service for everyone. By raising such fears, AT&T was able to keep the hardware business to itself for many years.

Its case began to look suspect, however, when the company fought heavily in court to prevent customers from attaching even the most passive (i.e., nonelectrical) devices to their telephones. The most famous example was its vigorous resistance to a simple plastic cone designed to shield the telephone mouthpiece from surrounding office noise. That product couldn't possibly have damaged any network, but AT&T nevertheless wanted to avoid having a precedent established that other suppliers could then use to their advantage.

As electronics development accelerated in the 1950s and 1960s, all sorts of new telephone devices became available. Except for the few that it decided to purchase and market under the Bell label, AT&T again fought tooth and nail against any non-AT&T equipment being attached to its wires. A series of court decisions finally broke AT&T's lock, but only gradually: the company won the right to require the new telephony suppliers to have their products certified and to use a special network protection device supplied only by AT&T. This simple but high-priced (relative to cost) protector was supposed to shield the network from potentially damaging currents. By requiring competitors to use it, AT&T effectively cut into their profit margins. To add insult to injury, AT&T sometimes sold identical "foreign" equipment under its own label, but in that case no protection device was required at all.

What AT&T had been doing all along, of course, was controlling the interface into its network. Whether or not stray signals indeed might leak into its wires from non-Bell gear was questionable, but AT&T was determined to control all connections to those wires for reasons of commercial gain. For years its carefully crafted technical arguments helped it protect the hardware monopoly against all competition.

Now, as DeLamarter describes in his book, controlling interfaces has always been key to IBM's enormous commercial success in data processing. Again and again the company has changed interfaces to foil competitors and, as much as possible, it has ignored industry-standard interfaces that lay outside its direct control. For instance, the book shows, when users in the 1960s sought to attach to their IBM 360s the many AT&T-owned ASCII terminals they already had installed, IBM did everything it could to ignore ASCII (a standard that had been approved and in use since the 1920s) and to avoid supporting it wholeheartedly. Even as it publicly professed support for all industry standards, ASCII in particular, the computer giant waited until 1976 before actually offering a machine, the Series/1, with ASCII as a standard option.

"The key issue for IBM," stated a chart prepared for IBM's Corporate Management Committee in 1968 (as described in DeLamarter's book), is, "which will show better P&L?—Standardization to achieve an overall growth of the computer industry? [or]—Minimum standardization in order

to achieve competitive advantage?"

Standards reek of broad compatibility, DeLamarter claims. Compatibility on too wide a scale is something to which IBM has long had an aversion since that creates large, fixed targets for competitors to aim at and reduces the competitive game to one of price and performance. Incompatibilities help IBM segment its market and price discriminate between different sets of users (see "Square Pegs, Round Holes, Big Bucks," Oct. 1, p. 52).

The relevance of this to AT&T's current situation is simply this: the telephone company has tried, through its broad promotion of Unix and a standing invitation to all others to join in, to create a new set of interfaces that would lay outside IBM's control. These interfaces would supposedly change by agreement between all industry participants, not at the whim of a single supplier, and would therefore make possible compatibility between various types of computers. The way AT&T speaks of it, Unix and compatibility go hand in hand.

"Unix is the functional glue for distributed processing," declared Jack Scanlon, who headed AT&T's computer marketing, in an interview last spring. He viewed Unix as the means by which networks of workstations and minicomputers would communicate with IBM mainframes once all three machines were outfitted with the AT&T operating system. At the time, Scanlon claimed that over 200 suppliers had adopted Unix and that some 250,000 machines were running the software. He said he expected the latter number to quadruple in just two years.

Unix may or may not be the proper technical solution for all applications on all types of computers, but AT&T and its supporters have reckoned that if enough vendors and users were to adopt a single, common version of it, their critical mass would establish a viable, de facto alternative to IBM's MVS and PC/DOS. Indeed, Unix today is available on everything from pcs to supercomputers.

CAREFULLY CRAFTED TECHNICAL ARGUMENTS HELPED AT&T PROTECT ITS HARDWARE MONOPOLY.

But once again, working from a unique position of power, IBM has undermined AT&T's efforts in subtle ways. Big Blue has introduced no fewer than four versions of Unix (for the PC, RT, 370, and Series/1), each slightly different from the other, which only confuse and fragment the Unix parade. Only by marching to the beat of a single drummer will that parade achieve its goal of fixed interfaces, of course, but with IBM, the industry's predominant hardware supplier, itself offering four different Unix versions, unification is that many steps further away. Since there has been no previous instance of IBM adopting a major operating system from another source, it is hard to believe the company truly wants to see Unix find wide acceptance at all—in any case, certainly not on AT&T's terms.

"IBM is not serious about Unix," agrees Gartner Group's Fritz Ringling. He says that multiple IBM Unix offerings confuse the issue to IBM's advantage, and adds that "there are just not enough software packages available under Unix to make it worthwhile for IBM [to totally support Unix]."

He is not ready to call AT&T's Unix effort a failure yet, however. He points out that the federal government increasingly requires Unix capability in computer bids and that, along with the open systems interconnection (OSI) standards effort, could work to the company's advantage. "But it's a long, long road," he concludes.

(The Unix market is also fragmented because two different versions of the operating system, Posix and AT&T's System V, are wrangling for acceptance as *the* industry standard (see "Taking Off the Cuffs," Dec. 1, p. 18). AT&T has had other troubles with Unix, too. Although the telco won an estimated $900 million, 10-year contract to supply the ultrasecret National Security Agency with 3B minicomputers on the basis of those machines' great Unix capabilities, NSA now is reportedly seeking other suppliers because AT&T has been unable to deliver Unix applications as promised. The deal, easily the biggest AT&T has won in the free market, was hoped to signify AT&T's ability to deliver machines outside of the telephone industry.)

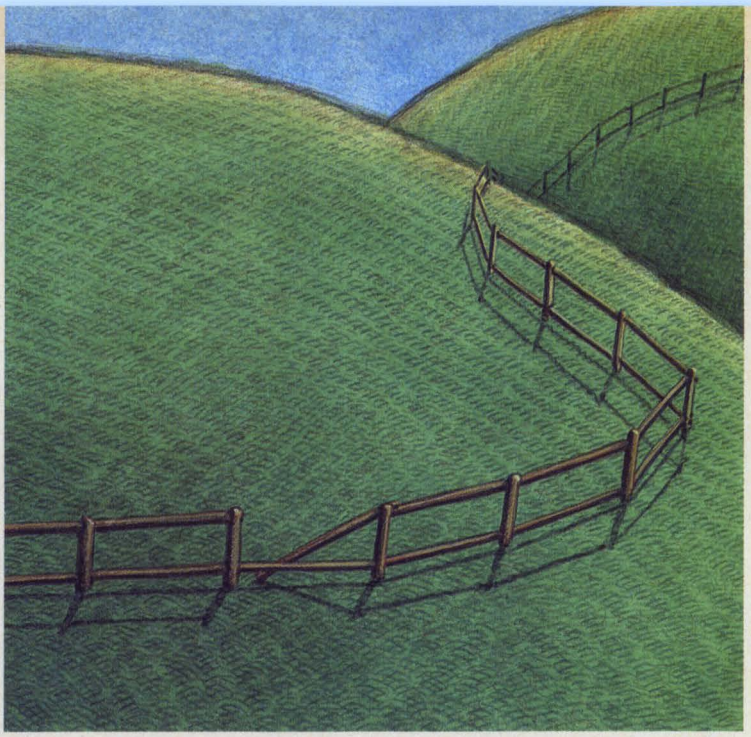
DeLamarter points out that because IBM is the world's dominant supplier of mainframes and related operating systems, it enjoys great discretion in determining the nature of the interfaces competitors need to attach their various products to 370s and SNA networks. It may cost IBM a few extra dollars to make a particular interface peculiar and difficult to copy, the economist explains, but if that difficulty then delays entry of others into the workstation market, say, with compatible gear and if it raises their development costs, the higher profits that ensue make it all worthwhile for IBM.

By virtue of its control over interfaces, IBM has instilled much fear, uncertainty, and doubt—Dr. Gene Amdahl's famous "FUD factor"—in the minds of dp managers everywhere. They are simply scared, says DeLamarter, to commit too heavily to other vendors, even the enormous AT&T, which may be forced out of the market by IBM at any time. This holds true particularly for markets that require machinery that communicates or attaches in some way to IBM's mainframes.

When AT&T chooses to compete for standalone business for machines that are to work independently of IBM-centered networks, it is likely to face stiff price competition. Peculiar interfaces mean little in that segment of the market, and it will tend to display classic commodity pricing characteristics. Such has been the case in the noncorporate pc arena, where AT&T and partner Olivetti (as well as IBM) have had to slug it out with hordes of low-priced Asian products. IBM remains by far the dominant supplier of pcs to large corporations, its most important and profitable customers, and those who care most about connecting pcs into networks.

Finally, despite its overwhelming market share, IBM has avoided all government regulation of its business and it therefore remains free (unlike AT&T, which is still regulated in its most profitable business, long-distance transmission) to set prices at any level in relation to costs. DeLamarter has documented IBM's frequent price discrimination when facing strong competition and there seems nothing to stop it from using a similar strategy now and in the future. If it effectively gave away entire 360 systems to win the mainframe market in the 1960s (ruining several major competitors in the process), there's no reason to believe IBM won't do the same to win the departmental computing and workstation markets of the 1980s and beyond. Ultimately, DeLamarter explains, it is a matter of how much money AT&T is willing to lose in competition with a monopolistic IBM that will determine how long it stays in the computer business.

"I think AT&T will become just another niche player," DeLamarter concludes.



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computer sales or the profitability of its Information Systems unit; such data are "proprietary," he claims.

This has not stopped others from speculating. The Gartner Group, a research house in Stamford, Conn., estimates that AT&T lost between $700 million and $800 million on its computer business in 1985 alone. The losses have been masked by the high margin profits earned from the vast rental base of telephone equipment, leading AT&T Information Systems to break even, says Gartner analyst Fritz Ringling.

"Computers will never be a significant portion of AT&T's revenues," comments Ringling. "AT&T has said it won't get out of the computer business, which I believe, but it will consolidate and downsize its computer operations to fit the size of the market share it has captured so far. If they sell computers, okay, but it will be as part of a larger package including network services."

Evidently, that share is rather small in both the minicomputer and personal computer sectors. A DATAMATION/Cowen & Co. survey of mainframe users taken last spring found AT&T garnering 4% of planned distributed processing applications based on minicomputers. As for pc usage by IBM mainframe customers, AT&T was named as prospective supplier for only 2.2% of the planned unit purchases through this year. IBM, on the other hand, clocked in at 75% in both of those categories. Evidently, IBM's unique strength in mainframes gives it great sway with users who decide to connect smaller machines into 370-based networks. With IBM having sole control over key data communications interfaces, adopting AT&T's or any other vendor's gear for critical network applications can be risky business.

AT&T has yet to crack the all-important commercial dp arena, IBM's traditional power base. A later DATAMATION/Cowen & Co. poll, of users' buying patterns taken last fall discovered that most planned purchases of AT&T 3B minis (54.8%) were still going to AT&T sites. Shipments of those DEC-like minis to outsiders, however, were found to be expanding, most rapidly in the manufacturing, education, and government sectors. On the whole, Unix is sought primarily in technical and engineering sites, not commercial ones.

Ringling says the 3Bs, developed by Western Electric with predivestiture needs in mind, may excel in certain applications typical of telephone operating companies, such as call accounting, but they lack appeal in applications where price/performance is at issue. Indeed, according to the latest DATAMATION/Cowen survey, their primary appeal is strong support of Unix, not price/performance; IBM's strengths, on the other hand, are its reputation as a vendor and its financial standing.

Marketing Misadventures

More harmful to AT&T's performance during the past two years has been what most analysts agree was a less-than-ideal computer marketing effort. In brief, observers explain, the company was just not ready to compete in the cutthroat computer arena after so many years as a regulated monopoly. Compared with other computer makers, which are generally lean and experienced, AT&T's management was green and unprepared for what it encountered. The Information Systems unit entered the computer arena in bloated condition with 110,000 employees, many of whom have since been removed.

AT&T IS ESTIMATED TO HAVE LOST ALMOST $800 MILLION ON COMPUTER BUSINESS IN TWO YEARS.

To crack the pc market, the technical standards and price structure of which were being defined solely by IBM, AT&T decided to buy equipment from its 25%-owned partner, Olivetti, but that relationship was shaken when AT&T also began selling Unix-oriented pcs built by Convergent Technologies. AT&T was seen as misreading the commercial market's demand for Unix on such small machines and has since drastically scaled back the Unix pc marketing effort, but the damage was done.

Meanwhile, AT&T introduced Starlan, an office networking scheme designed to use standard telephone wiring. The concept has been adopted by numerous manufacturers as an alternative to Ethernet and IBM's complex and still hazy token ring product. How much AT&T has gained from Starlan is hard to estimate.

For its part, AT&T claims to be "refocusing" its marketing efforts away from sales of raw computer boxes to what it calls "data networking." This, says the company spokesman, entails "a total solution approach" to providing wide area and local networks that would connect into IBM mainframes, where most business information resides. The idea is to "connect islands of information" within corporations, including personal and departmental computers. As yet, the spokesman adds, "the strategy is not finalized. We don't have all the piece parts in place." AT&T still plans to sell standalone computer equipment, he notes, but the major focus will be on combined sales of network services and equipment. Under way, he claims, are plans to build "applications" that may be tailored to specific industries. He adds, "We don't have the total answer now."

Gartner analyst Ringling wonders if they ever will. He views "data networking" as "too fuzzy a concept" to count on, especially because AT&T has been rather vague so far about the term's definition. "Is this just another attempt to bring out Net/1000?" he asks, referring to AT&T's ill-fated public network, which was itself a reworked version of another such network (Advanced Communications Service) that AT&T tried to develop in the late 1970s.

Nevertheless, AT&T reportedly claims "data networking" is a worldwide business worth $135 billion, of which the company has gained about 9%. It says the market is growing at 15% a year, primarily as multinational companies strive to connect their various offices. The company emphasizes its long history of building voice networks as evidence that it can expand profitably into the quite different market for data networks as well.

Ringling sees international business as "crucial" to AT&T's future growth, but that will depend largely on how many national telecommunications markets AT&T can, with the help of other U.S. suppliers and the government, deregulate and open to foreign competition. Most of the world's telephone companies are

Marching, Heads Down, Into the "Unprotected" Band

As body counts go, AT&T's is right up there. And it was AT&T's means, not its end, which caused the most pain to the most bodies.

"It's a combination of the forced layoff and the personal insult," says a former staff manager who spent 16 years with the company. "People can understand forced layoffs. It's just the way it's being handled."

The way it's being handled is by mass mailings from senior vice president Jim Edwards. In a "Dear Fellow Employee" letter—sort of the business equivalent of "Dear John"—Edwards informed the recipients that there is a "force imbalance" in the organization. That imbalance had manifested itself in too many people in many areas, people whose skills didn't match the jobs in other areas, and not enough people in a few other areas.

To alleviate these dire straits, AT&T decided to reorganize the divisions of its new Business Management Group (BMG) into a "more flexible, efficient, cost-effective structure. On the whole that means there will be fewer available jobs in the BMG than we have now." That realignment would be achieved through a "Force Management Program" (FMP), which "encourages employees to voluntarily leave the company by providing them with a financial incentive to do so." If there weren't enough volunteers, there would be involuntary separation.

The management summary of the FMP said it was designed to retain employees who possess the critical skills, knowledge, and performance levels necessary to meet current and future business needs; ensure fair and consistent treatment of all employees; and maintain a positive public image in the local, financial, and labor markets.

The organization implementing those tasks was charged with ranking employees into bands. Around 20% to 30% of the new BMG were placed in the "protected" band. That meant they were "regarded as having critical skills needed by the organization in the future," and therefore were excluded from the FMP. All others were "designated as eligible for the program."

In AT&T's eyes, the FMP was positively perceived. But employees didn't quite see it that way.

"I came back from my vacation last fall and the first thing I hear is that my function isn't needed," says a former international marketer in the computer systems division who had received superior performance ratings for his entire four-year stint. "They asked me what I was doing in my job. Then they sent me a questionnaire." Then they told him that he had been placed into one of the categories eligible for the FMP.

"It's the human resource equivalent of packet switching," the former staff manager says. "Data comes in, gets mixed around, and comes out the other end. Who's ever seen a bit or a byte? No one ever saw or heard the people who were making the decisions about who would leave or who would stay."

Sometimes employees made that decision themselves. The staff manager turned down both a promotion and a chance to live in the "protected" band to see if there was life after AT&T. He and the former international marketer are trying to find it by starting their own business.

"The most unconscionable thing is that the senior executives are implying that anyone who's leaving BMG is dead wood," the former staff manager contends. "They've essentially been told either their function isn't needed or they've performed poorly. Both of those may be absolutely untrue. It's management's insecurity. All they're thinking about is who they want around them in a survival situation, rather than trying to understand someone's function and what function that particular manager needs."

That attitude has been a long time coming.

It wasn't so long ago that AT&T, like IBM, was the kind of place where you married the company. The company went to considerable lengths to protect its employees from arbitrary and capricious firings. You put in your time and climbed the career ladder. After reaching a lower-management or middle-management rung, you—not the company—decided whether to go up or down. You could work there for 20 years to life and never meet a person who would be fired.

But that was BD (before divestiture). As the great rending asunder approached, the atmosphere became decidedly less familial.

"The relationship between American Bell and AT&T Information Systems had deteriorated so badly that each lost sight of customer satisfaction," says a product manager who spent 20 years at AT&T before leaving 18 months ago for a job with a major competitor. "The commitment was to survival.

"The company turned inward. The customer first, last, and always philosophy wasn't there. The customer focus was gone. At that point [1984], I started talking about getting out."

If the inside world was bad, the outside world promised to be horrifying. Waiting out there was competition, a totally unknown entity to a company which had lived in its sheltered little monopoly world ever since Alexander Graham Bell told Watson how much he wanted him.

"The nature of the company had to change because of competition," says Bob Robinson, a former district manager of sales operations who spent eight years at Pennsylvania Bell and 24 at AT&T before leaving in 1984. "When I got there, you felt you could be married to the company. You couldn't when I left."

You probably can't now, either, but you can stick around and play a part in the revised AT&T, which if nothing else will surely be leaner and meaner.

"Was FMP communicated to the employees the best possible way? It wasn't," says a staff manager with less than 10 years' tenure who made the "protected" band and is staying. "They dragged it out, and you were always wondering if the person opening your door had a pink slip.

"But from a business point of view the company is doing a wonderful thing. It's going to be a much better place to work and we're getting back to [being] a customer-driven company.

"I want to stay here because my job isn't finished. And as far the FMP goes, I think the company treated its employees fairly. It didn't have to pay anyone anything. It didn't have to give advance notice. They could have told me, it's been nice, but don't bother coming in on Monday. That's real world."

That's why they love it on Wall Street and hate it in Morristown and Basking Ridge.

BY WILLIE SCHATZ

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government-operated monopolies. "Opening those markets will take a long time," he says, "and AT&T's efforts may backfire." Although AT&T has a strong European partner in Olivetti, it lacks a similar connection in the all-important Asian market.

Finally, AT&T has chosen to link up with various established dp companies. It has a deal with Electronic Data Systems, Dallas, the General Motors computing arm; reports circulated late last year, in fact, that AT&T sought to acquire EDS. It is also bidding jobs with Boeing Computer Services, Seattle. Finally, AT&T is understood to be coming to some kind of an arrangement with Japan's Fujitsu, a mainframe company that may opt to back Unix as an alternative to remaining in the costly catch-up game of IBM 370 compatibility. ■

LAN REPORT 5

A Hard Look at LAN Choices.

Novell's LAN Report Package makes choices easier.

The flexibility of local area networks allows users to assemble LANs using network components that best suit the needs of the installation. But choosing those components can be a confusing process.

Novell, Inc., has published two reports designed to make the process easier: the *LAN Operating System Report 1986* and the *LAN Evaluation Report 1986.*

These reports help users evaluate network components and make informed decisions when choosing the components that meet their needs. Hardware and software issues are separately evaluated in the two reports, and extensive performance benchmarks are included.

Software Choices.

Choosing a network operating system, or LAN software, is the most critical aspect of designing a network. Simply, the better the operating system, the better the network. The *LAN Operating System Report* contains an in-depth analysis of LAN software, beginning with an examination of LAN software standards such as MS-DOS 3.1 and NETBIOS, and the file server environment. Issues like internetworking, system reliability, security and performance are addressed as well.

The *LAN Operating System Report* also evaluates Novell Advanced NetWare, the IBM PC Network Program and 3Com 3+. The report shows users how the design and implementation of these products translates into real performance.

Hardware Options.

The *LAN Evaluation Report 1986* focuses on evaluating network hardware. It examines hardware issues that affect LAN performance, including an analysis and benchmarking of major LAN products.

"Hardware and software issues are separately evaluated in the two reports..."

A key element of the study is the NetWare Evaluation System. The system provides a mechanism for matching site needs to specific hardware. Whether a new network is being planned or an existing site is being upgraded, the study is useful in the performance evaluation of any network.

System planning starts with the network interface card (NIC) and cabling. NICs analyzed in the study are:

- AT&T StarLAN
- Corvus Omninet
- Davong MultiLink
- Gateway G-Net
- IBM PC Network
- IBM Token Ring
- Interactive Systems Vista LAN/PC
- Nestar PLAN 2000
- Novell S-Net
- Proteon ProNET
- Standard Microsystems ARCNET
- 3Com EtherLink
- 3Com EtherLink+

The report analyzes each NIC according to its access scheme, raw bit rate, on-board processor and NIC-to-host transfer method.

Another important component of the LAN is the network server. In examining network servers, the *LAN Evaluation Report* looks at several performance indicators. Processor type is the most obvious feature to differentiate servers. However, other factors important in determining server performance are also evaluated, including processor clock cycle speed, wait states, server memory cycle speed, memory channel and transfer bus channel. And the report examines the effect of disk channel speed on network performance.

In addition to providing a careful examination of LAN hardware, the *LAN Evaluation Report* features an evaluation formula. Using the formula, a LAN's estimated future site activity is measured and matched to the appropriate LAN hardware.

To Get the Reports.

The *LAN Operating System Report 1986* and the *LAN Evaluation Report 1986* are available free of charge from Novell. To obtain a copy of the Novell Report Package, call or write Novell Corporate Communications, 122 East 1700 South, Provo, Utah 84601, (801) 379-5900.

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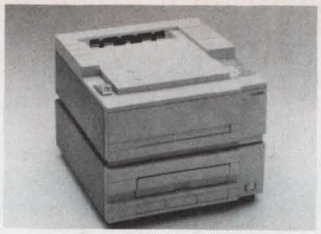

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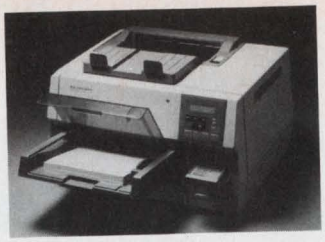

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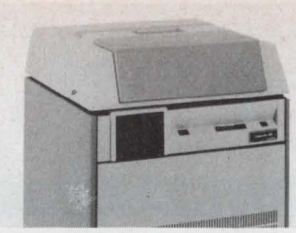

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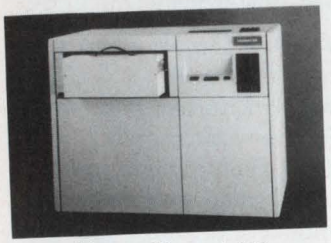
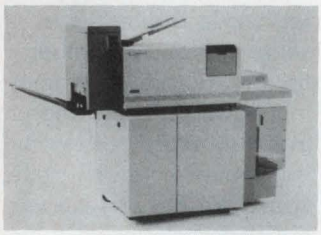


Linotype Linotronic 100

Apple LaserWriter/LaserWriter Plus



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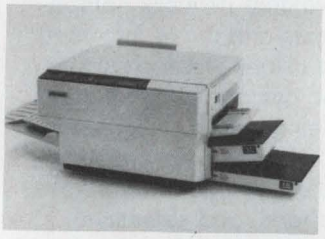
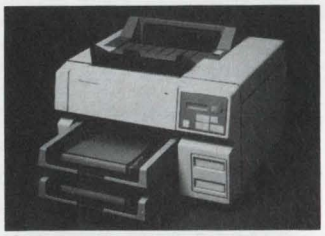
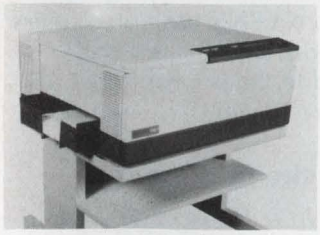


Dataproducts LZR-2665

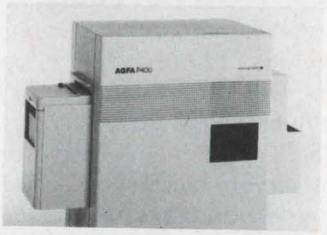
NEC SilentWriter LC-890



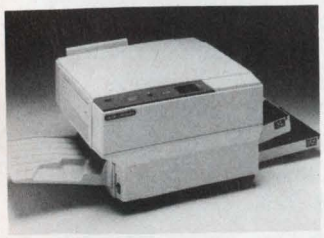
Texas Instruments OmniLaser 2115



Diconix Dijit 1/PS



Agfa-Gevært P400PS



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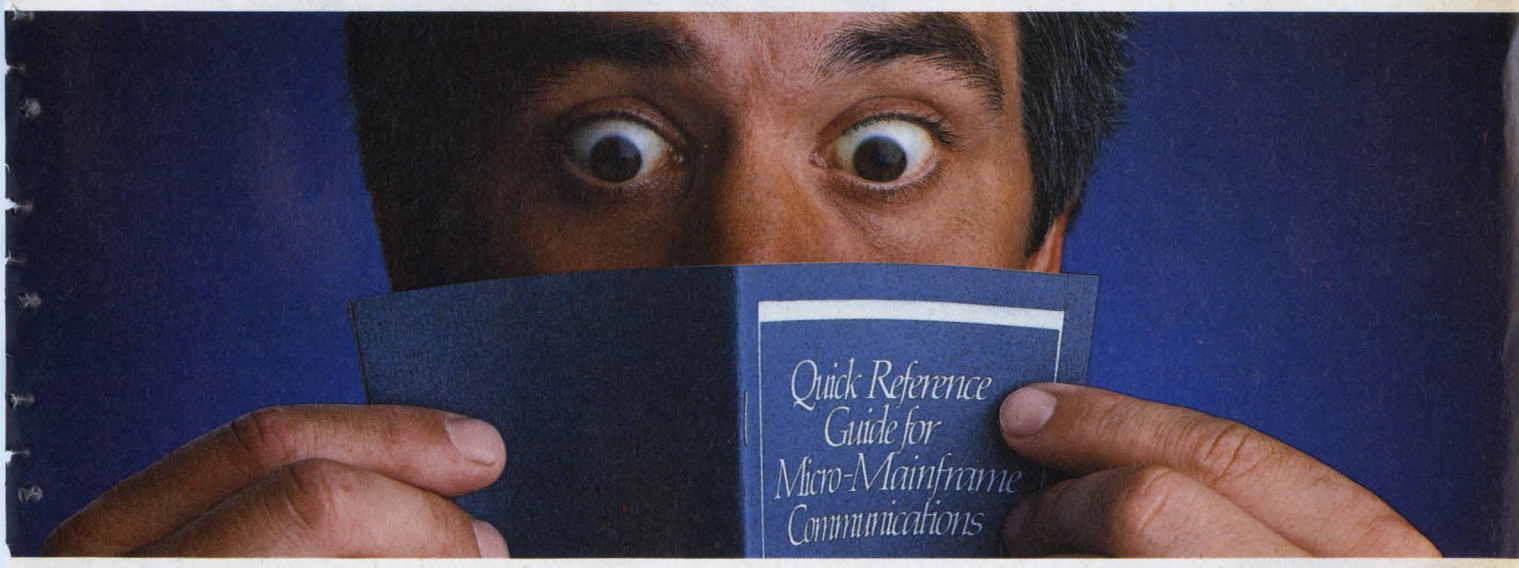

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CIRCLE 28 ON READER CARD

Modems and multiplexors are moving data at a faster clip and at a lower cost per bit. While modems are picking up the pace by supporting higher speeds across communications links, muxes are playing a bigger role in efficiently slicing up ever-broadening bandwidth. Above 2,400bps, it's a synchronous world that's being invaded by pc modem makers. New digital services provide even faster rates at 56Kbps and T1's 1.544Mbps. Conventional multiplexing technology finds new markets at these faster speeds, and compatibility with common carrier services offers more choices to today's communications user.

Going for Speed

BY BILL MUSGRAVE

The pace of information processing continues to accelerate, with ever-faster systems appearing on desktops and in dp centers. The quest for speed extends beyond computer systems to communications hardware and facilities that move data faster and at less cost per bit.

Micro users want more speed, particularly when transmitting large files. Mainframe users, who also want to get on the fast track, are finding that digital transmission services offer greater speeds at less cost than several analog lines that carry the same volume. Also helping pick up the pace are datasets that support faster speeds across communications links and multiplexors that efficiently allocate ever-broadening bandwidth.

On the switched network, the 1,200bps speed limit that was in force for nearly a decade has gone to 2,400bps in less than three years. Even greater speeds will be common within another three years.

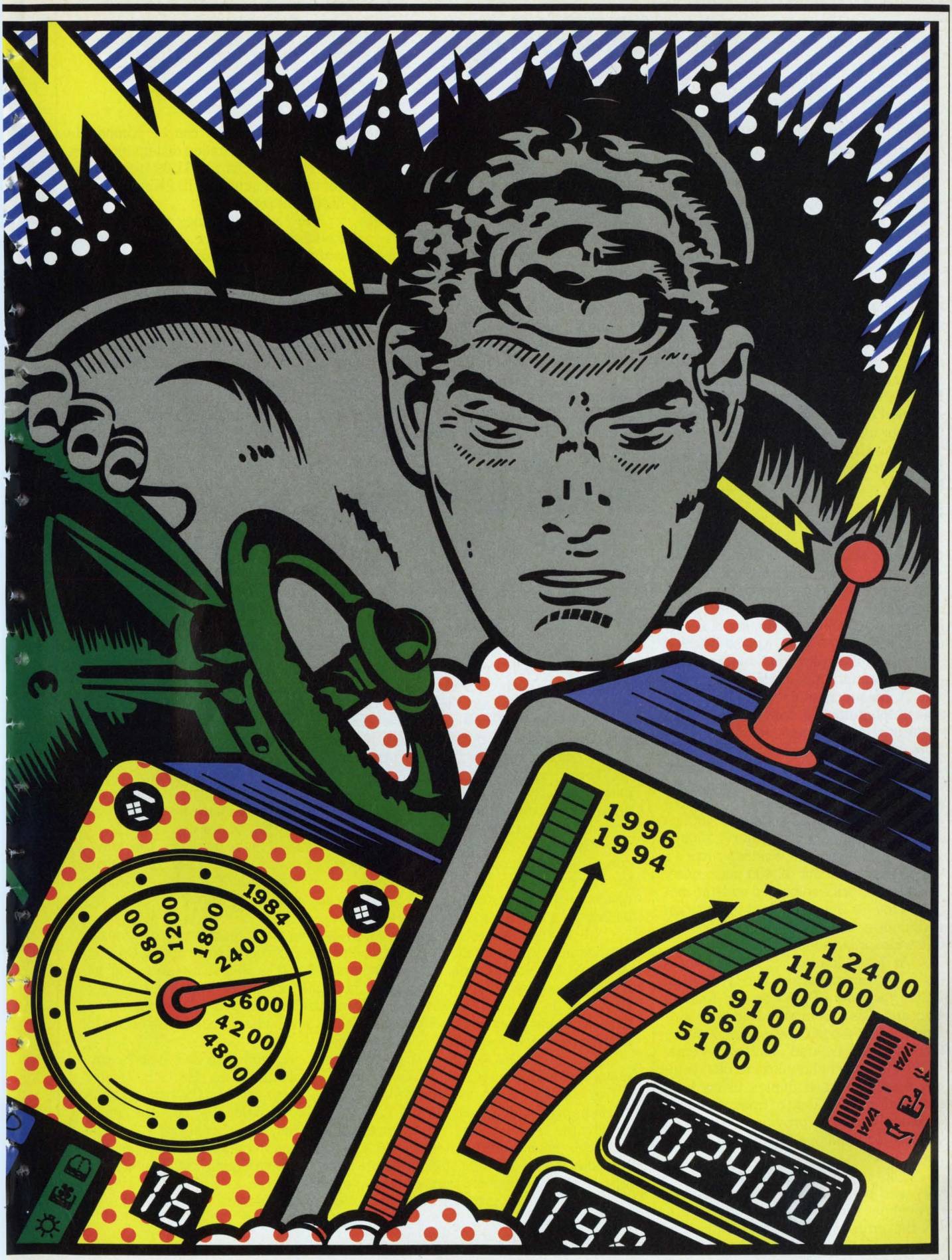
Lower prices will also be the order of the day. As prices fall and compatibility issues become resolved, the installed base of high-speed dial modems will grow at a faster clip. Look to the past for a pricing lesson—in November 1984, a 2,400bps modem listed for around $800; today, premium-brand, 2,400bps dial modems sell for less than $600, while some internal modems for the PC and clones go for less than $300.

These modems, which have become commodity items, conform to several standards. Some of these standards are formal, while others have evolved as the marketplace has matured. From the beginning, CCITT Recommendation V.22bis defined the way modems communicate at 2,400bps full duplex over dialed connections. Most products include compatibility with Bell 212A-like modems for 1,200bps and 300bps operation. Some also come with V.22 at 1,200bps, providing compatibility for international communications.

Most dial modems use the AT command set developed by Hayes Microcomputer Products, Atlanta. The reason is simple: AT is the *lingua franca* of personal computer communications packages. Microcom Networking Protocol (MNP) from Microcom Inc., Norwood, Mass., seems to be the most popular technique for error control over the link between modems. Many datasets also provide buffering, which allows the terminal-modem interface to operate faster than the connection.

Dozens of companies sell these modems, including Anderson Jacobson, San Jose; Multi-Tech Systems, New Brighton, Minn.; and Bizcomp, Sunnyvale, Calif. An-

Illustration by Doug Taylor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Going for Speed

derson Jacobson (AJ) may have the "most compatible" modem in this market. Its Hayes-compatible model AJ 2400-T with optional MNP can communicate with a wide range of devices: CCITT V.22bis, V.22, V.23, V.21, and Bell 212A, 202S, and 103 modems.

Above 2,400bps, it's a synchronous world. Some manufacturers adapt conventional synchronous modems to the dial environment. For instance, Universal DataSystems, Huntsville, Ala., offers half-duplex synchronous modems for the PC. Dubbed the Sync-Up family, the equipment operates at 2,400bps with Bell 201C compatibility, at 4,800bps as specified by Bell 208A and 208B, and at 9,600bps using CCITT V.29 modulation. The Sync-Up line also includes software for bisync and 3270 SNA terminal emulations.

No Market Favorite

While there are other fast modems on the market, none has become the market favorite. Such firms as AJ and Infinet, North Andover, Mass., provide synchronous autodialing modems that operate at speeds to 9,600bps full duplex in accordance with CCITT V.32. AJ also offers a 4,800bps full-duplex dial modem that uses proprietary modulation.

A unique modulation scheme enables Alpharetta, Ga.-based Digital Communications Associates' Fastlink modem to reach speeds in the 18,000bps range. Fastlink, which operates with different carrier frequencies to suit line conditions and traffic, can use as many as 512 carriers. Compatible with today's 2,400bps modems as well as with older 1,200bps and even 300bps units, Fastlink carries a big price tag—about $2,400 per device. It's this high price combined with the modem's use of a nonstandard modulation technique scheme that will probably stymie widespread adoption of Fastlink.

At least four other modem makers—Microcom; Racal-Vadic of Milpitas, Calif.; Fastcomm Data Corp. of Reston, Va.; and Case Communications of Columbia, Md.—push the speed limit to 9,600bps and beyond. These modems, which simulate full-duplex circuits, actually operate at half duplex using V.29 modulation. (This type of transmission is commonly used to provide two-call dial backup for 9,600bps full-duplex leased-line users.)

This range of modems uses protocols with data compression to increase throughput and eliminate errors. In fact, it's the protocol that makes these modems compatible—or, in most cases, incompatible. At some speed, they can talk to each other, since all of them can operate at a slower rate that's compatible with most installed dial modems.

Microcom and Case use MNP Class 6 for error control and data compression. Both claim speeds in the 9,600bps to 19,200bps ballpark and both charge roughly $1,800 for their modems. Racal-Vadic uses its homegrown Superset MNP on its 9600VP, priced at $1,495.

Selling various units that support 9,600bps in simulated full duplex, Fastcomm Data also offers a "Turbo" mode for one-way, 19.2Kbps file downloading. The datasets use a proprietary link protocol. Depending upon the model, the Fastcomm modems can be compatible with nearly all installed dial-up modems. The company charges $1,099 for a Turbo version that supports 19.2Kbps one-way file downloads.

In addition, the unit supports 9,600bps interactive communications with another Fastcomm modem and it can operate with most installed dialed modems at 2,400bps and slower.

Modems capable of true full-duplex speeds to 19.2Kbps operate over leased voice-grade lines. This is made possible by error correcting. The technique, called forward error correcting, does not eliminate all errors, but it does improve the signal-to-noise ratioof the line enough to allow these faster speeds.

Paradyne's VHS 19.2 modem for 19.2Kbps operation over voice-grade

In Sync and Into Standards

Just because a modem is fast on the line doesn't mean it's fast in all applications. For instance, modems that operate faster don't necessarily provide the greatest throughput in multidrop applications. In such situations, the time it takes to start transmission in response to a poll can be more important than the actual speed of the transmission.

CCITT standards specify generous training time—the amount of time it takes for a modem to turn on its carrier signal and synchronize with the polling end. In the case of 14.4Kbps modems, the V.33 recommendation allows nearly 1.4 seconds for synchronization—that's enough time to send 20,000 bits. Modem makers can and do beat the specs, but at 14.4Kbps it's still slow. For 9,600bps, however, there are some mighty fast learners. Fujitsu's M1923L, priced at $2,195, is the fastest trainer, taking as little as 7.5msec.

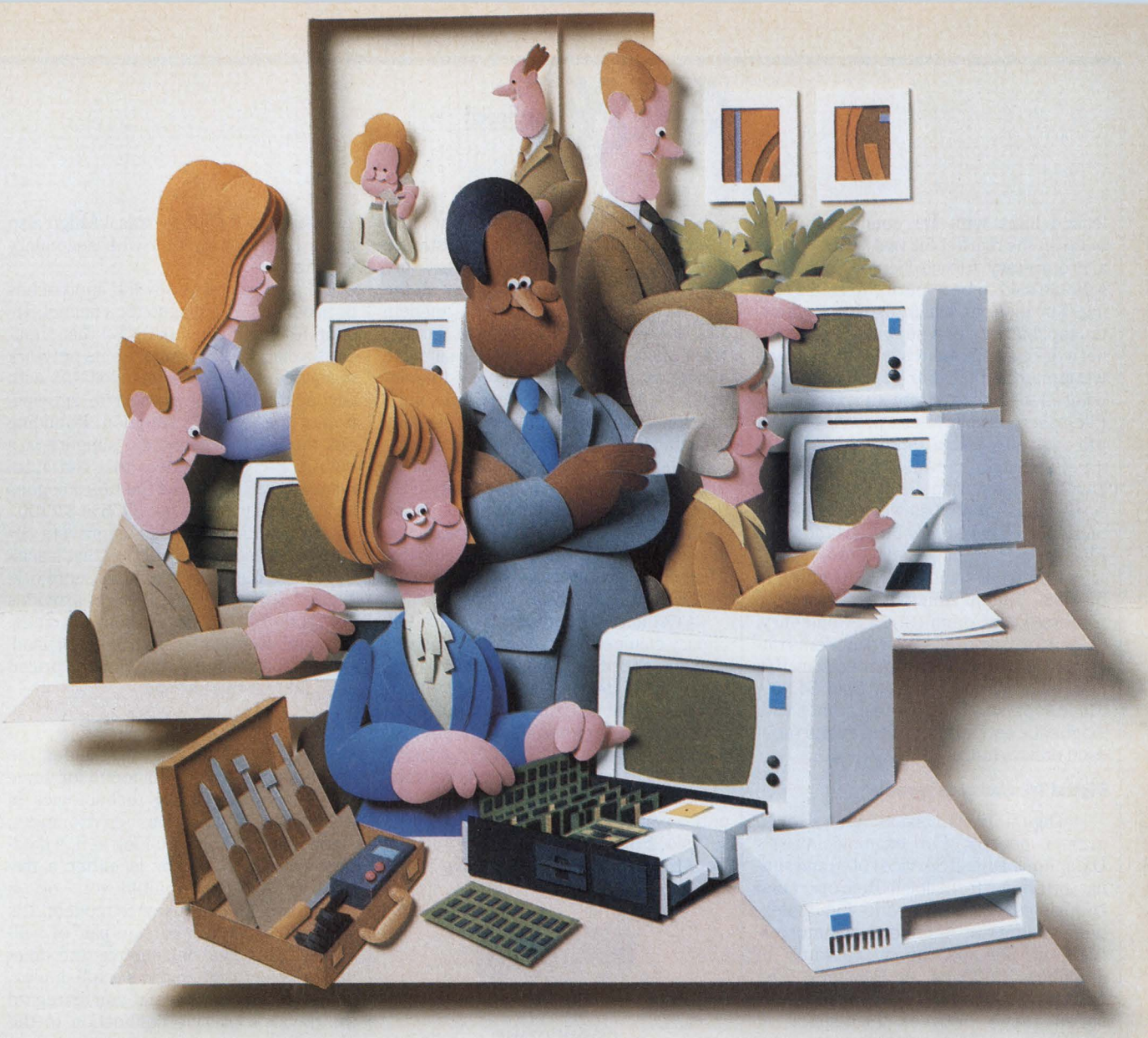
While Fujitsu is the speediest synchronizer, Hayes is the quickest standardizer. Today, most dial modems claim Hayes compatibility—compatibility that means virtually any communications package written for a pc can control the modem. Hayes compatibility applies to the modem/host command interface; it has nothing to do with the way modems communicate on phone lines.

The Hayes AT command set controls and configures the modem. To be Hayes compatible, the modem must not only accept AT commands, it must also provide the same response codes. The Atlanta company, which holds a patent requiring delays at the beginning and end of the escape sequence, wants to license that patent, for a royalty, to compatible vendors.

Meanwhile, Microcom, Norwood, Mass., uses a different type of licensing arrangement for its error-protection scheme, the Microcom Networking Protocol (MNP). The firm has licensed many vendors at $1,500 a shot to use MNP, which is not one protocol, but a set of upward-compatible protocols. The upper levels of MNP provide various degrees of data compression and dynamic adjustment of block sizes based on line quality. Higher levels automatically adapt downward for compatibility with the modem at the other end.

CCITT's Modem Working Party is currently attempting to define an international standard for error control on dial-up links. Microcom and Hayes have alternative views of what that standard should be. Microcom put the original three versions of its widely used MNP into the public domain so that they could be considered by the working party. Hayes, on the other hand, is promoting an X.25-based protocol, playing on its international acceptance and compatibility pluses. The company is also counting on X.25's large pool of technical talent and its multiplexing potential to support its argument as a standard.

If MNP continues to gain momentum and becomes as firmly entrenched as the Hayes AT command set, then whatever the CCITT Modem Working Party decides may have little effect on U.S users.



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CIRCLE 29 ON READER CARD

Going for Speed

leased lines with D1 conditioning has been on the market for two years. It uses a proprietary forward error correction scheme said to be superior to trellis coding. The modem, which also has diagnostic capabilities for use with Paradyne's network management system, sells for a whopping $9,000. For users who don't want all the bells and whistles, the Largo, Fla.-based company has a newer, budget-priced, trellis-coded 19.2Kbps modem in its Challenger series that sells for $4,000. Codex, Mansfield, Mass., makes a 19.2Kbps modem as well as 16.8Kbps modems. Racal-Milgo, Fort Lauderdale, Fla., has a 16.8Kbps product too.

Companies such as NCR Comten in St. Paul; Fujitsu America, San Jose; and General DataComm (GDC), Middlebury, Conn., provide trellis-coded modems rated at 14.4Kbps. Many modems in this market are priced at less than $4,000. More sophisticated gear that comes with diagnostic support sells for several thousand dollars more.

Digital Transmission Speedier

Digital transmission allows even greater speeds. For example, AT&T's Dataphone Digital Service (DDS) and similar offerings from local Bell operating companies (BOCs) provide full-duplex, point-to-point or multipoint communications at 56Kbps, or at subrates of 2,400bps, 4,800bps, or 9,600bps. The 56Kbps rate is often called wideband—a speed range between high-speed at 19.2Kbps and T1 at 1.544Mbps.

Instead of modems, DDS uses a Channel Service Unit (CSU) to terminate each end of the line. A Data Service Unit (DSU) that connects to the CSU provides the digital interface for the user's equipment. Many vendors, including Micom Systems in Simi Valley, Calif., and Penril DataComm in Gaithersburg, Md., build combination DSU/CSUs.

The interface to DDS is simpler because it is all digital and it is less expensive than a modem. DSU/CSU combinations generally sell for between $500 and $1,500. Some support only subrates of 2,400bps, 4,800bps, and 9,600bps, while others operate in subrates and in full 56Kbps.

Service-level objectives call for DDS to provide 99.5% error-free seconds of transmission and 99% availability. Still, some potential users still want secondary diagnostic channels analogous to those provided by diagnostic modems.

Vendors such as Infinet are ready to serve that need. Infinet's Integrated Diagnostic Modem IDM 556 is a 56Kbps DSU/CSU that provides diagnostic capabilities that are compatible with the company's modem diagnostics and network management systems. To simulate a diagnostic channel on a point-to-point link with IDM 556s at each end, the units multiplex diagnostic information into any available time on the link. Diagnostic information defers to data, so there can be times when it isn't possible to simulate the back channel. Infinet markets a similar implementation for DDS subrate channels of 9,600bps, 4,800bps, or 2,400bps. The subrate version costs $1,895, while the 56Kbps model sells for $1,995.

AT&T actually defined DDS with a secondary channel. The DDS with secondary channel specification has been around since early 1984, when it appeared as Technical Publication 62120, but as of late last year, neither AT&T nor any BOC had tariffs for the service. AT&T, which is anxious to see what the operating companies will do, isn't likely to file a tariff until a pair of BOCs are ready to offer the service. Several BOCs, including Pacific Bell, have filed or are preparing to file tariff applications. Initially, Pacific Bell expects to offer the service on a limited basis to selected customers.

ERROR CORRECTING MAKES THE FASTER 19.2KBPS SPEED POSSIBLE.

Some vendors are ready for DDS with secondary channel now. Amdahl's Communications Systems Division in Richardson, Texas, was the first to market a DSU/CSU combination; it was announced in January 1986. It has two models: the $1,050 DSU-II 96 for subrate DDS links, which has an async secondary channel that operates from 75bps to 300bps; and the $1,350 DSU-II 56 for 56Kbps operation, which has secondary channel rates of 300bps, 1,200bps, 1,800bps, or 2,400bps. Racal-Milgo also has a DSU/CSU for DDS with secondary channel.

Paradyne takes several approaches to provision of a diagnostic channel. Its 3056 BSU, a 56Kbps DSU/CSU that simulates a diagnostic channel for its network management system, includes DDS with secondary channel support in anticipation of the service's adoption. Rounding out the 3056's diagnostic support is a built-in Bell 103 modem that can automatically call for help if the DDS link goes away. Paradyne lists the 3056 at $1,100.

In addition to dedicated private circuits, DDS also has an offering that's analogous to the dial telephone network. AT&T's Switched 56 service provides area code 700 numbers in some 60 cities. GDC and Kentrox Industries, Portland, Ore., sell dialing DSU/CSU combos priced at $3,500 for this service.

Venerable Technologies Still Used

Not everything is new under the sun, however; use is still found for some venerable multiplexing technologies in today's communications environment. Depending on how you look at it, a data-over-voice multiplexor is either a frequency division multiplexor or a full-duplex, limited-distance modem. It's a mux because it creates a pair of half-duplex data channels above the telephone voice band, and it's a full-duplex, limited-distance modem if you disregard the device's passive connection to the phone line.

Data-over-voice muxes simplify the procedure of installing and moving terminals because they eliminate the need to pull cables to any point served by a phone extension. The units operate by modulating data streams onto carrier frequencies well above the range of human hearing and even further above those frequencies used by the telephone system for voice and signaling. Teltone of Kirkland, Wash.; Infotron Systems, Cherry Hill, N.J.; and Gandalf Data, Wheeling, Ill., are among the firms that provide these multiplexor-modems. Prices per end in the $250 to $350 range are common.

Most data-over-voice products are designed for use within the customers' facilities. These devices piggyback data onto the wiring that connects telephone sets to the dial telephone network or to in-house PBXs.

Extension wiring converges at the PBX or network interface, where another mux removes the data and makes them available to local computers or to a time division or statistical multiplexor for

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Most of these products support sync, async, or both with RS232 interfaces, although a few, such as Teltone's Noax, use IBM 3270 Type A coax interfaces. These units make it easier to locate 3270 terminals away from their cluster controller. Teltone also offers a data-over-voice multiplexor to telephone operating companies. Intended to augment Centrex service offerings, the DCS3 Data Carrier System is engineered to operate in a telephone central office from 48V DC power. In operation, it functions as a customer-owned in-house unit. At the telephone company end, data can be multiplexed onto private circuits or they can be distributed through a BOC data switching service.

Data-over-voice on in-house extension wire simplifies installation, but most multiplexing aims to cut costs by efficient use of rented capacity. As link speeds increase to wideband and beyond, dividing bandwidth becomes essential. Using wideband for individual terminal traffic is a pure case of overkill. For terminal traffic, there are statistical multiplexors that communicate over wideband links. Such companies as Com-Design, Goleta, Calif., and Tellabs, Lisle, Ill., sell stat muxes for wideband use.

Several products suited to DDS subrate and wideband communications are available in the Micom Box series of communications engines. Optional subrate Integrated Service Units, which are actually combo DSU/CSUs, interface the smaller Box Type 2 engine to DDS. Plug-in firmware cartridges turn the Box into a stat mux, a multidrop stat mux, or an X.25 Packet Assembler/Disassembler (PAD).

Larger engines, such as the Type 3 and Type 4, support wideband composites to 72Kbps. Firmware for these engines includes stat mux, X.25 PAD, and X.25 packet switch. Eight channels of synchronous data can be time division multiplexed (TDM) along with statistically multiplexed terminal traffic in a Type 4 engine. Prices for a dedicated version of that TDM, called the Type T, start at $1,695, while the Type 4 stat mux/TDM starts at $2,695.

New Interest in TDMs

DDS is generating new interest in TDMs. Racal-Vadic; Astrocom, St. Paul; and Avanti Communications, Newport, R.I., are among the many companies in the market. Racal-Vadic's 7556 is a basic six-channel synchronous multiplexor that accepts RS232 synchronous data streams at standard rates 2,400bps to 19.2Kbps and multiplexes them into a 56Kbps signal. The 7556 sells for less than $1,500, and even with an optional DSU/CSU, it still costs less than $2,000. Sister company Racal-Milgo offers a larger and more sophisticated product in its Omnimux TDM series of eight-channel and 16-channel muxes. The devices, which support input channel speeds from 1,200bps to 48Kbps, generate a composite signal at 9,600bps to 128Kbps. The Omnimux series can also operate under Milgo's CMS network management system. Omnimux TDM starts at $2,700 for an eight-channel mux.

A key application for wideband muxes is feeding T1 equipment. After all, that 56Kbps DDS link is derived from a telephone company standard 64Kbps voice channel—one of 24 that make up a T1 signal. Timeplex, which has moved aggressively into T1 for data, calls its Voplexer a "DataVoice" mux, although it is quite different from the data-over-voice multiplexors used in-house. A 56Kbps-64Kbps TDM, the Voplexer is well suited to DDS and can also be used for cascading into a T1 mux. An optional voice digitizing interface preempts one half of the composite bandwidth.

Beyond wideband is T1. Once used exclusively within the telephone system, T1 has evolved through three distinct stages over the past five years. Even before there were tariffs for T1 service, some users installed private links using their own media such as copper wire, private microwave, or optical fiber. Some early T1 multiplexors were aimed at local applications—within a building or on a campus—using a customer-owned transmission system perhaps comprising standard telephone company repeaters or microwave radio.

Both Teltone and Micom entered this market early with products that supported terminals scattered around campuses. Both saw local T1 muxes as a complementary product for their data-over-voice systems. Micom also uses T1 muxes to interconnect its data switches and to link terminals and computers to them. These devices remain viable, especially for local data distribution.

The common carriers began offering service on a piecemeal basis around the country several years ago. Carriers also became more discriminating about the T1 signals they transported. While the early campus muxes communicated at the right rate of 1.544Mbps and met the necessary electrical conditions, some of these devices conflicted with a formatting requirement that every 193rd bit be available for telephone company use. Even though some local operating companies may provide unformatted lines, AT&T's Accunet T1.5 service demands a formatted signal. Only governmental agencies are exempt from this requirement.

A New Wave of Muxes

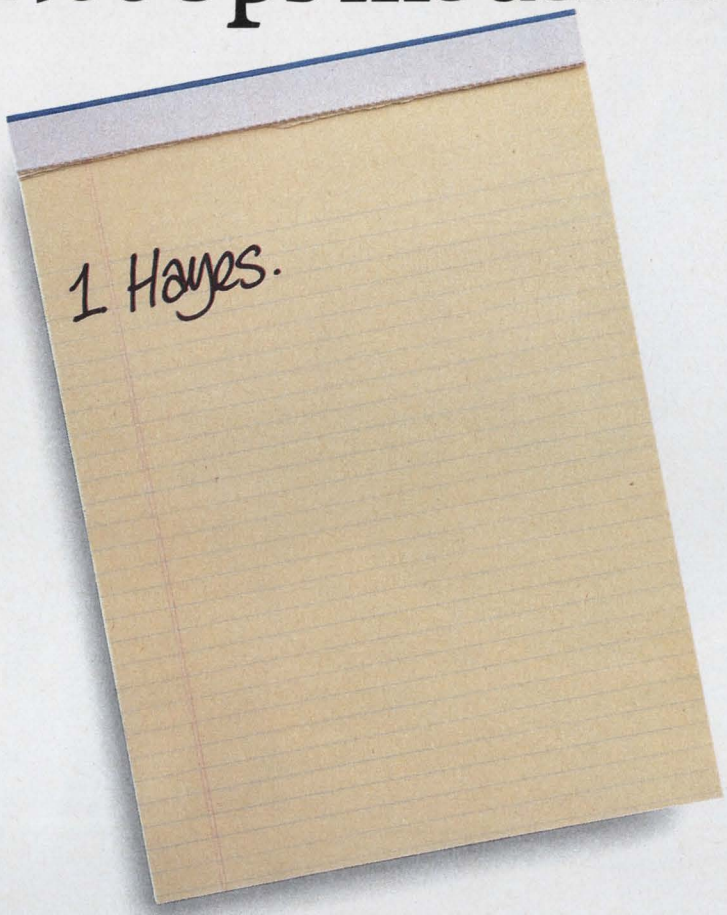
During phase two of T1 development, a new wave of muxes appeared from vendors such as Avanti, Infotron Systems, and Timeplex, Woodcliff Lake, N.J. The muxes gave the telephone company its 8,000bps, which still left 1.536Mbps for data and anything else customers might want to transmit digitally.

These suppliers quickly realized that they could use T1 bandwidth more efficiently than the telephone company. Instead of the phone company's two dozen voice channels at 64Kbps each, 100 data channels could easily be fitted into the T1 pipe. Vendors providing private networks created with proprietary multiplexing even offered to transport voice digitized in the telephone company's standard form or in the more efficient formats that took as little as 16Kbps. Since the new equipment complied with telephone company standards, the common carriers could transport the data. Proprietary multiplexing, however, which used the link more efficiently, also limited product compatibility.

Today, new common carrier service offerings have prompted T1 vendors to provide additional compatibility with telephone company standards. Companies now offer support for telephone company-defined formatting and framing techniques that enable use of new services. Telephone company channel banks (voice digitizing muxes) coexist within some multiplexors, and direct PBX interfacing is also possible. Users now have a real choice in the communications arena. They can use highly efficient multiplexing to provide a private network that operates over T1 facilities, while at the same time reaping the enhanced service advantages that can accrue from increased compatibility with the telephone company. ■

A former associate editor with DATAMATION, Bill Musgrave is a California-based freelance writer specializing in computers and communications.

A complete list of things to know about 2400 bps modems.



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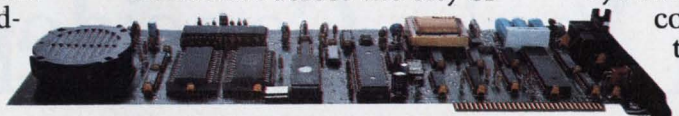

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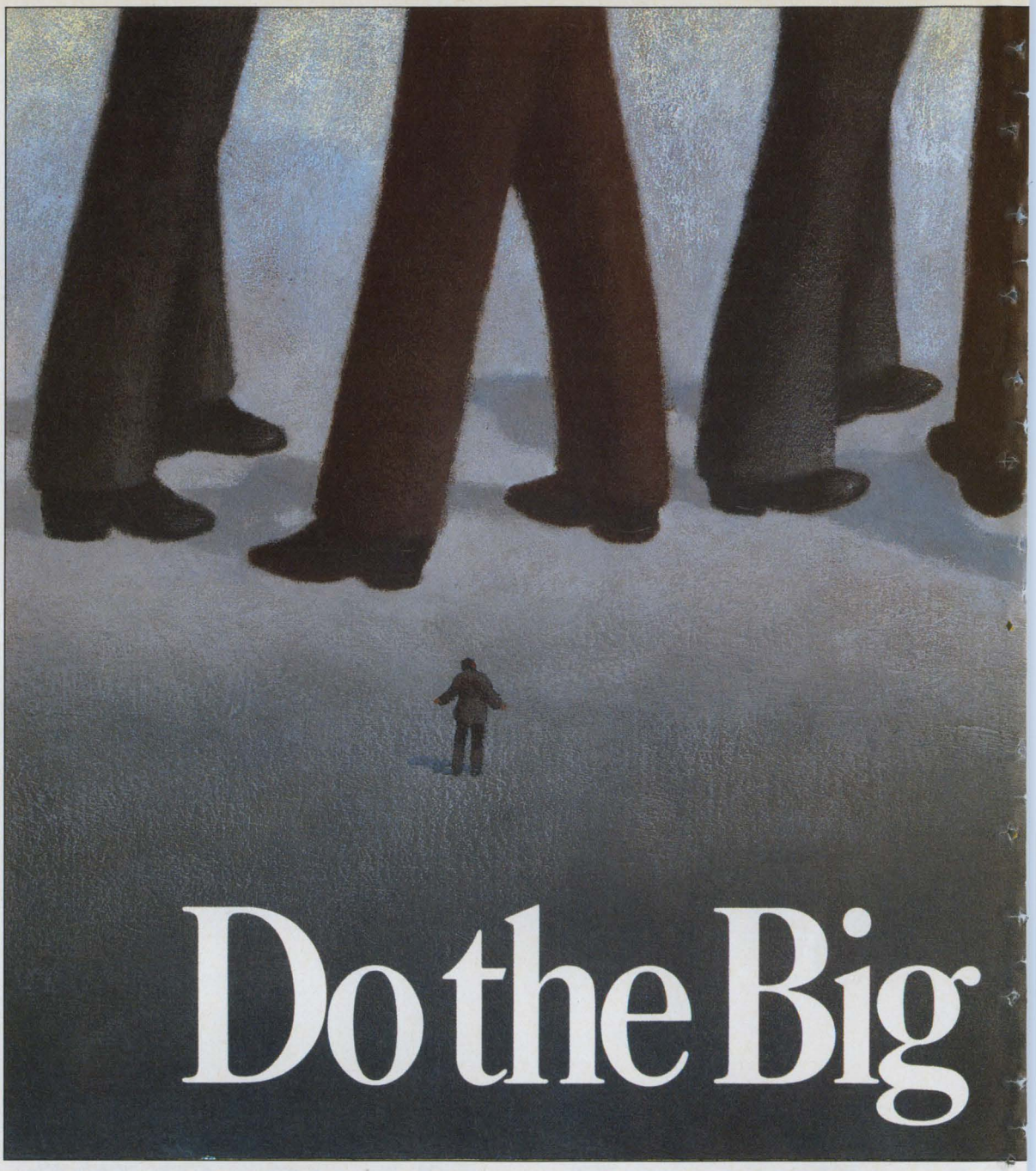
The Big Eight accounting firms certify the financial reports of the biggest corporations around. Nowadays, the Big Eight also design information systems for these same customers. They offer consulting services that range from strategizing with commissioners, ceos, and cfos to actual coding, installing, and testing applications. Customers include AT&T, American Express, IBM, Wendy's International, Westinghouse, and federal and state governments. Market research firm INPUT says the Big Eight did $980 million in consulting business in 1985, and DATAMATION estimates their 1986 income will be some $1.2 billion. Critics say there is a "conflict of independence," but satisfied customers keep coming back for sizable help from these army-sized consultants.



Do the Big

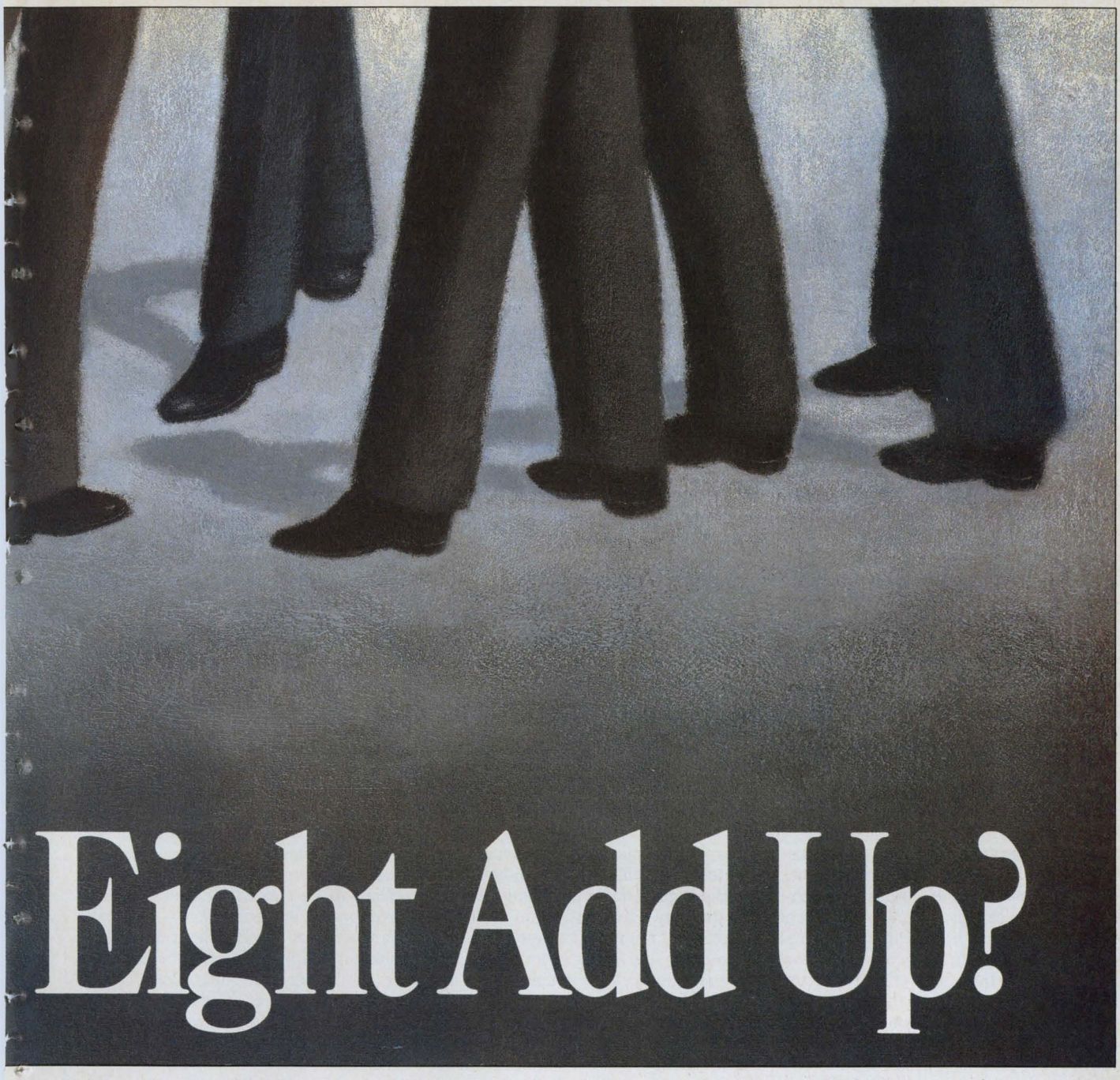
BY PARKER HODGES

Keep an eye on your accountant. Not that he'll spirit the company exchequer to Brazil or sell your secrets to a corporate raider. No, it's because he may want to do your data processing. He definitely wants to tell you how to do it. Chances are as good that he'll be hired by your MIS department as they are that he'll be hired by the company's chief financial officer.

For a long time, the Big Eight accounting firms (see "Who and Where") have made a lot of money certifying the probity of American business's reports of its financial dealings. Nowadays, more and more of the Big Eight's revenues come from data processing consulting. Customers for the Big Eight's dp consulting services include AT&T, American Express, IBM, Wendy's International, Westinghouse, and the government, both federal and state. Howard Anderson of the Yankee Group says, "In the early days, the auditing side carried the consulting side. Now, the consulting side is helping to carry the auditing side."

According to INPUT, the Mountain View, Calif., market research firm, in 1985 the Big Eight did $980 million in information systems consulting, including system design, installation, testing, and training. This year, DATAMATION estimates they will take in more than $1.2 billion for helping business and government handle their data processing. The Big Eight will earn this money for consulting services that range from strate-

Illustration by Rob Colvin



Eight Add Up?

gizing with commissioners, ceos, and cfos to actual coding, installing, and testing applications.

Some of the firms cover the whole range from the boardroom to the computer room. Arthur Andersen can field an army of programmers to implement an entire system. Others stop short of actual software writing: Touche Ross's associate managing partner and director of advanced technology, Bill Atkins, says, "We do not market any software. We do no programming." Instead, Touche Ross will subcontract any programming that its systems require.

The Big Eight have been in the business of dp consulting for as long as three decades. Mel Bergstein, managing director of Management Information Consulting at Arthur Andersen, says his company's first dp job was done in 1952, a payroll system for General Electric. Clint Alston, Ernst & Whinney's national director of Information Systems Consulting, says E&W got into the dp business in the early '60s, and pinpoints hardware selection as an early service. Ed Pringle, the Coopers & Lybrand partner who is national director of consulting, says his firm's entry into dp consulting in the early '60s "was a natural growth of accounting consulting."

Arthur Andersen has the biggest consulting operation of the Big Eight, its market share hovering at about 50%.

For fiscal 1986, Bergstein says Andersen billed its clients for about 20% more units of consulting than the year before, raising consulting revenues about 30% to $635 million out of total revenues of nearly $1.9 billion. This beat handily Andersen's target of 15% annual growth in hours billed. Bergstein also says that while Andersen's consulting services have traditionally been sought by line management, increasingly it is the information systems executive who is buying.

Arthur Andersen and the Seven Dwarfs

While Yankee Group's Howard Anderson has described the Big Eight consulting constellation as "Arthur Andersen and the Seven Dwarfs," some of the dwarfs can seem immense. Take the now merged and newly christened Klynveld Peat Marwick Goerdeler: in

fiscal year 1986, combined worldwide consulting revenues came to $494 million, out of combined revenues of $2.7 billion. Still, until Peat Marwick's new partner was folded in, its own consulting revenues had been less than half those of Andersen. Following in a bunch are Coopers & Lybrand, Ernst & Whinney, and Price Waterhouse, with the rest trailing off into annual consulting revenues in the double-digit millions.

For most of the Big Eight, conspicuous growth in the dp consulting business has come in the last few years. At Deloitte Haskins and Sells, Don Snyder, national director for Information Systems Consulting, says the expansion in information systems consulting has occurred within the last three or three-and-a-half years. Between 1981 and 1985, Deloitte Haskins & Sells' revenues from "management advisory services" more than doubled to $56 million from $24 million, making the firm one of the smaller Big Eight consultancies. Robert D. Gilges, the partner in charge of Peat Marwick's Information System Services practice, estimates the total information systems services marketplace will reach between $20 billion and $21 billion annually by 1990, growing about 20% a year. Describing Peat Marwick's goals, he says, "We expect to do better than that [growth rate]."

Not everyone is happy about the Big Eight's growing consulting clout. While ADAPSO recently conferred membership upon Arthur Andersen and Price Waterhouse—and other Big Eight firms send "observers" to ADAPSO meetings—some ADAPSO members still think it is wrong for a Big Eight firm to design computing for its audit customers. Bernie Goldstein, president of Broadview Associates, Fort Lee, N.J., is an ex-president of ADAPSO. He recently told DATAMATION, "I think it is improper for a Big Eight firm to sell computer services to its auditing clients. It's a violation of the independence of auditing firms."

Critics' arguments go like this: because the manipulation of corporate numbers is handled by information systems, the certifiers of the rectitude of those manipulations should not be the people who designed the systems and the software that runs them. Bernie Goldstein says, "The idea that there's a Chinese Wall [separating the auditing and consulting functions] is laughable. It's a fiction."

For example, the *Public Accounting Report* states, Deloitte Haskins & Sells has trained its auditing and accounting staff to "cross-sell" consulting services.

David Campbell, ceo and chairman of the board of Computer Task Group, Buffalo, N.Y., is chairman of ADAPSO's CPA Relations Committee. Campbell says, "There is an inherent conflict of interest—or should I say a conflict of independence—in the Big Eight auditing the results of systems they've designed." Campbell says that ADAPSO seriously considered suing the Big Eight "about five years ago." Congressional interest in the activities of the Big Eight is what changed ADAPSO's strategy, he explains.

Congressman John Dingle (D.-Mich.), chairman of the House Committee on Energy and Commerce, also heads that committee's Oversight and Investigations Subcommittee. When several firms failed despite having been granted clean bills of financial health by the Big Eight, Dingle in 1984 decided to find out why. Hearings began in February of 1985, ran through June 1986, and will resume this spring in both the Oversight and the Telecommunications subcommittees. Oversight subcommittee counsel John Chesson specifically noted the potential for conflict of interest raised by Big Eight consulting as one of the dozen or so top issues.

"NOBODY IN A GRAY FLANNEL SUIT EVER WROTE GREAT CODE."

"It is as good a hearing as we're going to get," says Campbell. With the hearings as a forum for its members' concerns, ADAPSO welcomed Big Eight firms to membership. But, as Campbell points out, "We told them we'd be there [at the congressional hearings] to testify as individuals." This testimony is likely to focus on "the conflict of independence." Already, Congressman Ron Wyden (D.-Ore.) has introduced a bill, H.R. 5439, cosponsored by Dingle and 16 other representatives, that will put additional responsibility on the Big Eight firms.

The Big Eight are aware of criticism. They have moved to counter a real threat of even tougher government controls by revamping their own internal rules to make audits more reliable. A task force headed by Coopers & Lybrand partner Jerry D. Sullivan presented its proposals to the auditing standards board of the American Institute of Certified Public Accountants in December. Nevertheless, the Sullivan task force's proposals do not address the "conflict of independence" issue as it concerns the Big Eight's consulting business. Also, early reports of the task force's proposed improvements don't sound very world shaking: Most people probably assumed the auditors were doing these things anyway.

The Brooks Brothers Law

Given the criticism, it is not surprising that, when questioned, not a single Big Eight spokesman needed to look up the percentage of its consulting clients who are also audit clients: the numbers were on the tips of their tongues, and usually hovered in the 20% to 35% range, but reached 50% in some cases. ADAPSO's Campbell suggests the percentage of the Big Eight's consulting *revenues* generated by audit clients is much higher, more like two thirds. In other words, audit clients, while fewer in number, buy more consulting than nonaudit clients.

Another critic of the Big Eight's dp work cited what might be called the Brooks Brothers Law: "Nobody in a gray flannel suit ever wrote great code." Unwilling to be quoted by name—"I still have to work in the industry"—the critic is a veteran of one Big Eight firm's consulting operation. "Big Eight companies are all 'up or out' operations, which means everyone is after a partnership, which means that everyone is in the partner mold. Eccentricity is not acceptable."

Another problem defined by this critic is a result of the corporate culture common to Big Eight firms—on both the accounting and consulting sides: the up-or-out mentality doesn't encourage career managers. The critic says great dp systems are written "by guys in sandals" and managed by "career managers," but that the Big Eight cultivates neither of these. Nevertheless, in 1986, sandals are surely an outdated guarantor of quality code and the Big Eight most definitely have their fans.

What are they good at? Another former Big Eight consultant who still does jobs for Big Eight firms puts it this way: "The Big Eight fields armies of people, pretty good people. They're very good at large systems that aren't very tricky."

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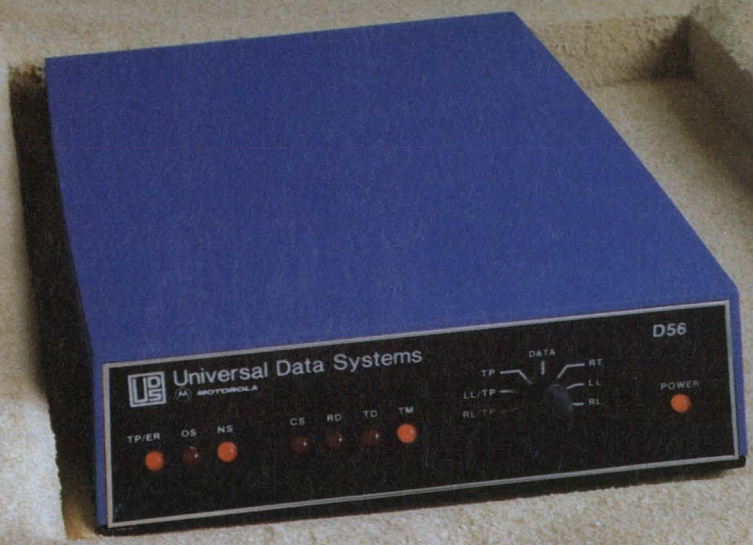

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CIRCLE 33 ON READER CARD

Still, some of the Big Eight do specialize in smaller-sized operations. Ernst & Whinney, for example, describes a "typical" job as one in which six to 10 E&W people, managing a total project team of 15 or so people, spend nine months to a year on the user's site. But Andersen's Bergstein describes his company's specialty as "very large projects for very large clients."

And what are they best at? "Something they've done before," the former consultant says. "If they've already done a system like the one you want, they can build that system again.

"The companies have manuals that spell out the Price Waterhouse way or the Arthur Andersen way. If it's not in the manual, they don't do it. It keeps them from enormous screw-ups."

At Price Waterhouse, for example, it takes five volumes to spell out the firm's Systems Management Methodology. According to Norman Statland, national director, Information Resource Management Service, PW's system begins with SISP, an acronym for Strategic Information Systems Planning, and then proceeds to application development. In the industries where it is possible, Price Waterhouse, like other Big Eight firms, looks for standard packages.

Returning to the point that so troubles ADAPSO and Congressman Dingle, the consultant says the Big Eight do very good jobs for their audit clients on "any kind of system that has to do with audit or accounting. "They do nice, clean jobs when they're going to have to certify the results a few months later."

Carving Out Industry Niches

Each of the Big Eight tends to specialize in particular industries. All of them, from their familiarity with financial reporting, do work for financial services industries. Coopers & Lybrand's Pringle describes his firm as "strongly industry focused," and points to five areas in which the company does 75% of its consulting business. In order of size, they are manufacturing and distribution, health, financial, federal government, and public utilities. Ernst & Whinney is widely known for its work with the health care industry.

Touche Ross's Atkins says his firm is "pretty well balanced across the industries," but does single out manufacturing as "hot right now." (The Big Eight's data processing ambitions also extend beyond consulting. Price Waterhouse is selling software packages and Peat Marwick has bought Regis McKenna, the big computer industry public relations firm.)

The Big Eight's undeniable skill at managing large projects and large numbers of people—often worldwide—is one reason ADAPSO is welcoming Big Eight firms to its membership. "We can learn from them," says Campbell.

These huge consulting staffs can indeed seem like armies. At Andersen, there are 500 partners in the consulting side of the business and 9,000 consultants. Even the "smaller" Big Eight firms have a lot of people on their rolls. Take Touche Ross, which last year did about $70 million worth of dp consulting with 175 partners, managers, and senior consultants and another 700 or so professional staffers.

Bergstein says Andersen gets its staff by hiring MBAs and sending them to an eight-week programming school. "They spend the first year programming. There are 2,000 new hires each year at Andersen, with a turnover of from 10% to 15%, a costly item in the budget, since Andersen spends $5,000 per employee for training in his or her first year. Bergstein describes Andersen as a "meritocracy" in which it takes about a dozen years for the successful to make partner. The 12-year climb to partner is typical throughout the Big Eight. (Some observers note that nowadays it is taking longer to make partner, up from 10 years a while back.)

Partners are well paid. An observer estimates that beginning partners earn about $100,000, a few earn more, but most a bit less, with some earning as much as $125,000; their take then grows at about 12% a year until they hit $150,000; here they remain unless true stardom strikes and they join the handful of senior people who earn between $400,000 and $500,000 a year. On occasion, however, a senior partner can hit really big, and yearly takes of as high as $725,000 are not unknown.

When Something Goes Wrong

But clients don't necessarily see a senior partner very often. "They fly them in to close deals," says one observer, "or when something goes wrong."

Things do go wrong. Indeed, both sides of the best-known recent horror story about a Big Eight firm's dp work have been seen in DATAMATION's pages,

Who and Where

Herewith, a short guide to finding the Big Eight accounting firms' data processing consulting operations. The partner in charge of these services is also listed.

Arthur Andersen & Co.
33 West Monroe St.
Chicago, IL 60603
(312) 580-0033
Mel Bergstein, managing director of Management Information Consulting

Arthur Young & Co.
2121 San Jacinto St.
Dallas, TX 75201
(214) 969-8000
John Sifonis, national director of Information Technology
Richard Welsh, national director of Information Technology

Coopers & Lybrand
1251 Avenue of the Americas
New York, NY 10020
(212) 536-3190
Ed Pringle, national director of Consulting

Deloitte Haskins & Sells
1 World Trade Center
New York, NY 10048
(212) 669-5000

Ernst & Whinney
2000 National City Center
Cleveland, OH 44114
(216) 861-5000
Clint Alston, national director of Information Systems Consulting

Klynveld Peat Marwick Goerdeler
3 Chestnut Ridge Rd.
Montvale, NJ 07645-0435
(201) 307-7000
Robert D. Gilges, partner in charge, Information Systems Services Practice

Price Waterhouse
1251 Avenue of the Americas
New York, NY 10020
(212) 819-4822
Norman Statland, national director, Information Resource Management

Touche Ross
1633 Broadway
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(212) 489-1600
Bill Atkins, associate managing partner, director of Advanced Technology

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Do the Big Eight Add Up?

with New Jersey's Department of Motor Vehicles saying Price Waterhouse done it wrong ("OTIS to the Rescue," Oct. 15, p. 119), and Price Waterhouse pointing an accusing finger at the New Jersey bureaucracy (Letters, Dec. 15, p. 19).

Other big clients, however, seem very happy with Big Eight consulting. Another big contract with state government seems to be working out better for Price Waterhouse—an overhaul of the New York State tax system. The numbers are immense. New York State takes in over $28 billion annually, administering 20 different taxes, including its own and New York City's income tax and sales taxes. More than 6,000 people process more than 30 million forms in 12 district offices; there are also offices for out-of-state audits in Houston, Chicago, and Los Angeles. Until recently, the data kicked up by all of this activity were handled on a Sperry 1100/84 with two IBM 4331s acting as front ends. According to Arthur A. Gross, deputy commissioner of Revenue and Information Management, "there were 23 standing systems, none of them linked."

So taxation and finance commissioner Roderick G.W. Chu's department issued a request for proposal in March 1984. Five months later, beating Peat Marwick and Arthur Andersen, Price Waterhouse got the $8.7 million job of designing and building a new information system for the tax department.

Work started in September 1984. Two years later the tax department is apparently delighted. For example, the new system will tell the department if a New York State resident, trying to beat paying sales tax, has, say, registered his Mercedes 600 stretch limo in Vermont. It will share income tax data with the tax departments of 16 other states.

It will also cost more than had been thought.

Price Waterhouse was originally to have done the work in four segments: 1) a workflow analysis and user requirements definition, $1.3 million; 2) functional and technical design, $2.7 million; 3) detailed design implementation, code, and test, $3.9 million; and 4) maintenance, $800,000.

Granted, the system is bigger and will do more than originally planned. Still, the state had already spent $7.9 million by late autumn 1986, and the plan had only progressed through stage 2 and into the beginning of stage 3. And plans have changed. According to Gross, Price Waterhouse is still going to manage tests and do new design work, but the state is going to take full responsibility for day-to-day coding. Gross is confident that the new system, while a bit more costly than planned, will pay off big when it is complete in September 1990.

Much of the criticism directed at the Big Eight may indeed be inspired by the competition these companies represent. Even so, some ADAPSO members aren't upset by the Big Eight's presence in the dp consulting market. No one denies that many customers like what they get and come back for more. Even the accounting firms' harshest critics will admit that some jobs are natural candidates for the Big Eight's services.

Nevertheless, it is certain that questions remain about whether the Big Eight's bigness always adds up to the right answer. ■

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The PC-to-host coax connection. She was a good piece of equipment working with coax cable and cluster controllers, but time just passed her by. End users started needing more than simple host access. They also needed their PCs to share resources around the office. That's when local area networks came along to fill the need.

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Gary Biddle, the dynamic, 48-year-old vp of management information services at American Standard in New York, believes companies should be able to directly tie MIS spending to the corporate bottom line. He's advocating what other processing pundits call a new form of ROI or return on information. To secure that ROI, Biddle recommends developing a framework to focus MIS spending. American Standard's model, devised by Biddle, has already helped the $3 billion manufacturing company make major dp decisions and weather the long waiting period until IBM, its vendor of choice, can deliver on the product front.

ROI in Real Time

BY RALPH EMMETT CARLYLE

A single, coherent explanation for the computer industry's worst slump in recent memory may never be forthcoming. Analysts have blamed everything from the economy and foreign competition to micromania without really getting to the root of the matter.

Hoping to uncover that root, Gary Biddle, the tall, athletic vp of management information services at American Standard, says, "The fundamental problem is that U.S. corporations have been unable to relate their MIS spending to the corporate bottom line—to revenue and earnings. Without such a connection," he adds, gesturing animatedly in his Manhattan office, "corporations have little understanding of their cost structure."

Put another way: until information technology costs can be tied into some return—what some wags refer to as the "new ROI, or return on information"—corporate management is not really managing at all. As a result, declares Biddle, his eyes challenging, "the MIS budget is out of control."

A 30-year veteran of the highly diversified $3 billion manufacturing concern, Biddle is very familiar with MIS budgets and all they entail. He is also acutely aware of the magnitude of the budget problem he refers to. Corporations, according to Biddle, have spent millions of dollars on information technology without knowing whether they were getting any value for their money.

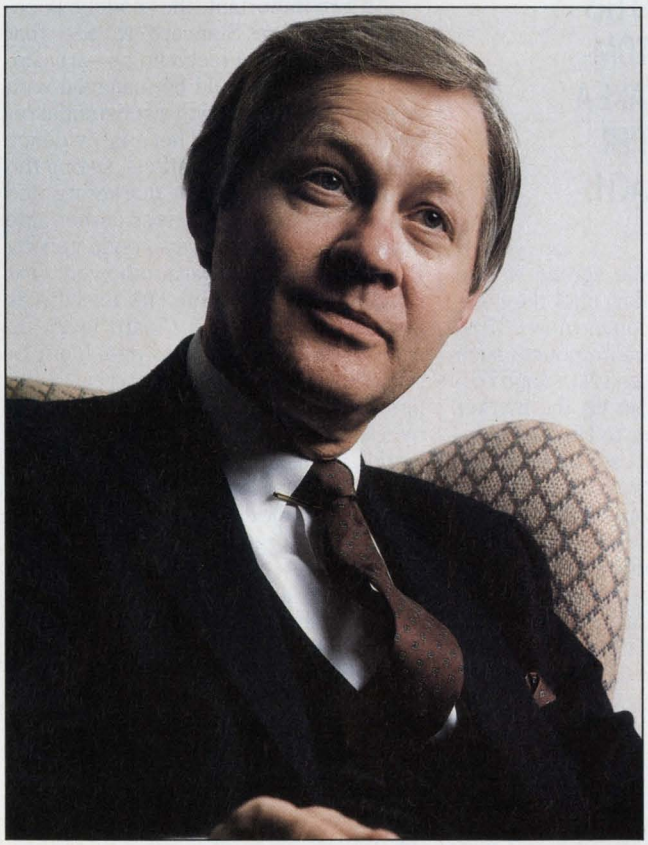
Industry experts report that U.S. corporations usually spend 1% to 3% of their total sales on MIS. Emerging technology that will allow companies to automate the strategic or revenue-producing sectors of their business may raise this percentage to between 5% and 10% over the next five years.

Biddle presents a snapshot of what the spending picture looks like in his industry and in his company: "In the manufacturing business, companies typically spend 1.5% to 2% of total revenues on information technology. We predict that our MIS spending will be 5% of total sales by 1990—a threefold increase over present levels. And we're hearing similar estimates from other large corporations."

Over the past two years, corporate management has been asking itself some pretty tough questions on the subject of technology spending. How, for instance, can you have a cost center that takes up 5% of total revenues without knowing what return on investment to expect? How much should you spend on new information systems technology?

Biddle, for one, thinks he has found some answers. He advocates developing a conceptual framework to focus spending. "Also," he adds, "the framework or methodology must be closely coupled to corporate business goals."

Figuring that one particular picture is worth a thousand words, Biddle pulls out a piece of paper displaying a 3-D model that depicts the way data are structured and flow throughout American Standard. The 48-year-old confessed workaholic says the ambitious model first took shape on the back of a bar napkin in a Chicago hotel in 1982. Biddle,



GARY BIDDLE: "Companies have been unable to relate MIS spending to their bottom line."

Photographs by Andrea Brizzi

who spends 60% of his time on the road, tells how his early scribblings evolved into a sophisticated, and copyrighted, 3-D representation that he refers to as an "architectural model for computing."

Four Business Portfolios

Biddle's "cube," as he calls it, divides American Standard into four main business portfolios: institutional systems, factory automation, end-user computing, and external systems such as the network. The four sectors, which use three architectural levels—communications, data, and applications—are further segmented according to mainframes, minis, and micros. Spending-level objectives are established and monitored for each of the portfolios, which include multiple subgroups, or cells.

The model continues to be a work of synthesis, with contributions coming from various quarters, both inside and outside the corporation.

One thing the model could do, according to Biddle, is provide a bridge between the alien corporate cultures of MIS and management. "My staff tends to be more in tune with the computer industry than the business it's supporting, and vice versa from the management point of view," explains Biddle. "So, we're hoping to use the model as a stepping-stone to a new culture in which we can all talk the same language."

Biddle feels that new culture will be essential to keep in step with the IBM of 1990. That's when the company is expected to unveil products that will be based on its "Summit" architecture and on its R* distributed DBMS technology. These products will cut across the entire corporate organization. "Even though IBM is late with many of its products, many corporations will need time to prepare," says Biddle.

He believes that the 1990s will also be a time when the MIS manager's role will change. "This individual will no longer be responsible for applications, but for the data that run the business. Applications will go to where they make the most economic sense, and not automatically onto the mainframe as before."

Maybe those applications will go onto minis. Biddle maintains that in manufacturing, 80% of the transaction volume should never leave the functional area where it's used. "This means you have to have departmental solutions," he declares. "So, for factory automation we've uncoupled the applications from the mainframe data center and placed them in divisional minicomputers."

The colorful MIS vp reports that his message was "not joyously" received by IBM. Probably not, since Biddle, in early presentations of his model to the firm, criticized the mighty company's weak midrange products. "IBM prefers its customers to adopt a two-tier approach, hoping that its PCs will create a greater demand for its mainframes, not for its less competitive minicomputers.

"While two-tier might be all right for some, our operation is spread worldwide and includes 30 separate MIS organizations. For us, a distributed approach based on three tiers is essential," stresses Biddle, who nevertheless sympathizes with the industry leader. "IBM has been going through a painful transition. They've tended to hold on to the old ways and not listen to the noise levels around them. But, they're on the right track now, even if they can't change direction overnight."

One Blue direction Biddle clearly approves of is the 9370, IBM's long-awaited departmental 370 that he describes as a "glimmer of hope." Acceding to IBM's wishes, Biddle agreed to use "throwaway" 4361 minis until the company can get its hands on the new 9370s.

IBM PREFERS ITS CUSTOMERS TO TAKE A TWO-TIER APPROACH.

Other unannounced products such as new software to extend PROFS and Displaywrite 370 may also hit the market this year. IBM's answer to Digital Equipment Corp.'s All-in-1 software is referred to by insiders as "VM Desk." When asked if he would beta-test this software, Biddle just winks and smiles. "Let's just say we know about the software and about other good stuff that's coming along," he says. That "good stuff" is related to IBM's efforts to produce a VM architecture that, like Digital's VMS, is compatible across all three processing tiers.

So far, Biddle, who prefers to stay with IBM, has withstood corporate pressure to adopt more Digital solutions. "Migrating stuff over to the VAX would just add more technical problems at a time when we're trying to focus on the new culture and on end-user requirements," he insists. "We have enough problems as it is trying to make our three-level IBM processing hierarchy appear seamless and responsive to users."

A Behind-the-Scenes Nightmare

Biddle describes this frustrating exercise as "smoke and mirrors. It's an absolute nightmare behind the scenes. We're pulling database extracts of mainframes, sending data over the phone lines at night—all kinds of things to mimic a distributed DBMS technology that won't begin to emerge from IBM for a couple of years yet."

That doesn't mean American Standard is twiddling its thumbs waiting for Big Blue to deliver. The company's already used its model to make a number of major dp moves that Biddle says made sense to both business and MIS. American Standard's traditional dp operation included in the model's first portfolio ("institutional systems") has stabilized enough so that software packages from independents can now handle mainframe applications. This frees MIS staffers to develop applications for the other three portfolios.

More important, the model has enabled American Standard to see that data—information technology—are capital assets that should be managed with an eye toward achieving a substantial return on investment. There is evidence that other large corporations, seeing the value of information in marketing and business terms, have arrived at the same notion. A recent survey conducted by Diebold's research arm showed that roughly 26% of senior MIS executives now report to the ceo/board level, up from a scant 5% five years ago. Many of these companies have even created the position of chief information officer to oversee the strategic use of their information technology resources.

Such moves could mean good news for the computer business. Many industry experts predict a return to boom times as more and more leading companies devise methodologies to tie their MIS cost structures to the bottom line. To the innovators and visionaries who develop the new models that promise that linkage, the process can be rejuvenating, as Biddle, who's been in the MIS game for 15 years, will attest. "It's like we're involved in the birth of a new profession—information management—and I'm helping to write the book." ■

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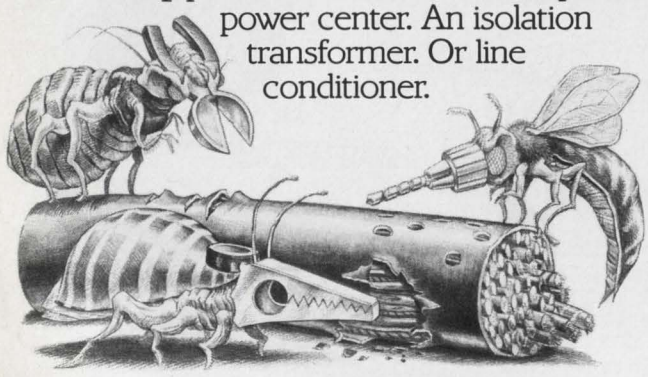

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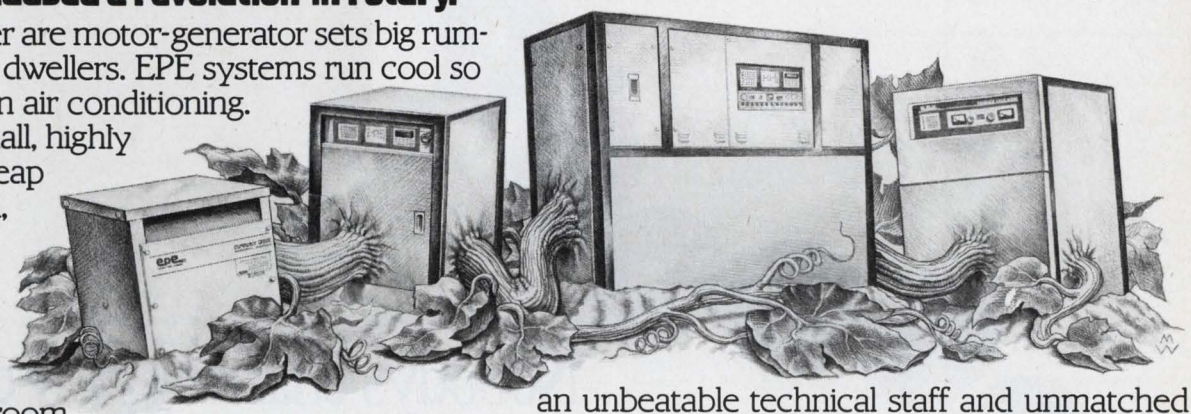

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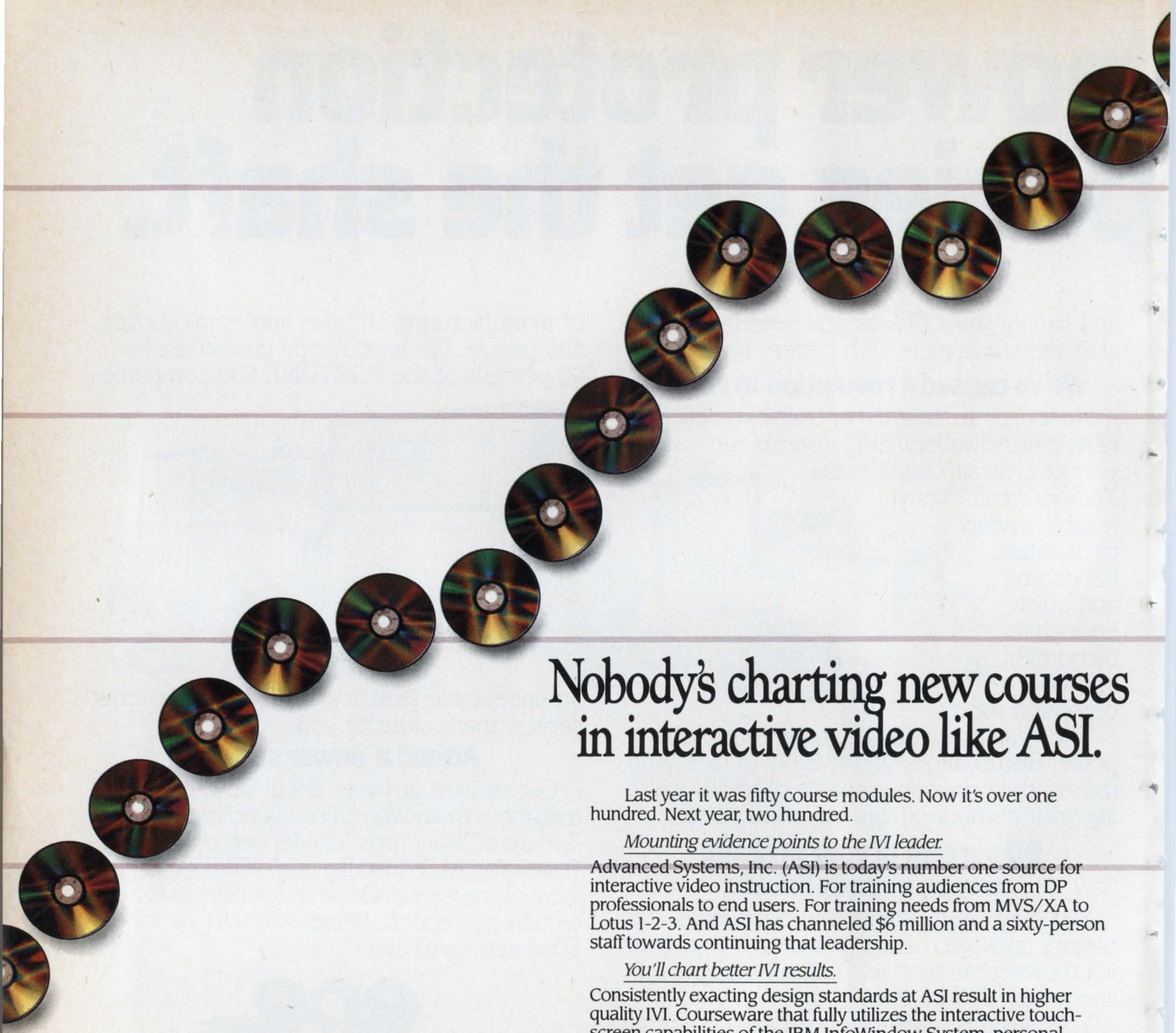

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Parallel processing is what's happening in today's technical computing market, which is growing at a healthy clip of 35% a year—much faster than the commercial sector. In this market, a variety of exotic new computer architectures are being commercialized in attempts to crunch more numbers per second and more per buck. Many of these designs corral the power of dozens and even thousands of microprocessors. One startup company in this fast-paced game claims it has a machine that will find parallelism in places other computers can't reach.

A New Slant on Parallel Processing

BY JOHN W. VERITY

A Connecticut startup company, backed by top brand venture capital, is set to attack the turbulent market for technical computers with what it claims is a radically new type of parallel processor. The technology, an extension of work done by company founders at Yale University, promises parallelism with a "finer grain" than is possible with most traditional and emerging computer architectures.

The proposed machine would not simply process long vectors in parallel, nor merely parcel out different tasks to separate but concurrent processors. Rather, it would execute handfuls of scalar and vector machine instructions simultaneously by packing them carefully into an instruction word as wide as 1,000 bits or more. Although some software chicanery is needed to handle conditional jumps at run time, the end result would be high-octane performance throughout a typical scientific applications program. That extra oomph would not be received just by the easily vectorized mathematical heart of the program, but also by the surrounding scalar junk code.

THE HIGH-PERFORMANCE MARKET COULD REACH $6 BILLION BY 1990.

So claims Joseph A. Fisher, cofounder and executive vp of Multiflow Computer Inc., Branford, Conn., who is the primary inventor of the company's very long instruction word (VLIW) technology. Interviewed late last year, Fisher declined to say exactly when the company would even describe its first product, let alone set a shipping date or price. But Multiflow seems close to making its machine public. It has hired Donald Eckdahl, a veteran NCR computer executive, as president and ceo. It has also raised $17.6 million in venture capital from 13 backers, including Aetna Life & Casualty, Alex. Brown, Olivetti, and GE.

If and when Multiflow unveils its machine, it will immediately find itself competing in a marketplace that already hosts 20 or so new companies and a few established ones. Multiflow's foes in the scientific/technical market will include such companies as Cray Research (Minneapolis), Convex Computer (Richardson, Texas), Alliant Computer (Acton, Mass.), Cydrome (Milpitas, Calif.), and Scientific Computer Systems (San Diego). Growing at a clip of 35% a year, that market is expanding faster than the far larger commercial side. Easier to enter, the scientific branch of the business has attracted many entrepreneurs. It's also one of the few areas of computing where IBM does not rule supreme.

But easy come, easy go. While scientifically oriented computers have been plentiful over the years, few companies that have relied on them solely have survived over the long haul. The survival statistics must be known to the latest newcomers to the high-performance end of the market. Even though these firms claim not to be worried by the competition, all must be painfully aware of the congestion taking place in their chosen arena. The crowd will be thinned down sooner or later, say informed observers.

"We're some way from seeing a shakeout, but I'm sure that all these com-

panies cannot survive for the long term," declares Tim Johnson of Ovum Ltd., the London research house that recently published a report on the parallel processing market. "Of course, some of these companies have only short-range aspirations to serve the research community and make only a few million dollars a year," notes Johnson, who predicts that total sales in the high-performance market could reach $6 billion by 1990.

Only a Matter of Time

With so much money at stake, it seems only a matter of time before industry leaders IBM and Digital Equipment Corp. make their big moves into this stratospheric realm of computing. Either company could bring more resources to bear on the technical computing market than could all the startups combined.

DEC is known to be refining several post-VAX, parallel architectures. Meanwhile, IBM, which already sells a vector processor for the 3090 mainframe, is expected to cascade that technology down to smaller 370 cpus. Late last year the company signaled its intentions by realigning the numerically intensive computing (NIC) marketing efforts within its Information Systems Group and by creating the post of vp for engineering/scientific computing within the Data Systems Division.

A recent DATAMATION/Cowen & Co. survey of scientifically oriented minicomputer users indicates only narrow interest in the recent wave of multiprocessor architectures. Asked if any of their applications warranted the extra computational power available on the new technical computers, only 22% said yes, while 45% said no. Most of those answering affirmatively were in the petroleum/natural gas, national defense, and transportation equipment sectors.

All of this means that latecomer Multiflow will be facing some stiff challenges once it finally gets to market. Those challenges could be even more daunting as a result of the company's goal to serve a market segment broader than most of its rivals do. Multiflow has targeted its business at the "general purpose technical computing" level, as opposed to the vector, signal processing, and even narrower niches pursued by certain competitors. This focus seems to make Multiflow's undertaking riskier than some others in the field.

By aiming for more of the market—namely, the segment where DEC has been so successful with its VAX line—Multiflow is bound to face more competition, especially from well-entrenched suppliers. It is not the most heavily funded of the startups, although $17.6 million is not peanuts and Fisher leaves open the possibility of raising still more cash. On the other hand, if Fisher's dream machine works as well as he claims, the payoffs could be substantial. Performance-hungry technical users want the benefits of parallel processing computers without having to face all the traditional hassles of programming them.

Multiflow's success will ultimately depend on its ability to prove the worth

The VLIW View

The very long instruction word (VLIW) is an idea that is rare but not unprecedented in electronic computing's brief history. Put simply, a wide instruction word can do more work than a narrower one can during each clock cycle. For example, it can simultaneously execute multiple operations such as load, add, and store. This is the essence of the "fine grain parallelism" that Multiflow Computer Inc., Branford, Conn., boasts of.

A particularly sophisticated compiler is needed to construct optimally efficient instruction words. Multiflow's compiler would produce a serial stream of machine primitives during early passes through a source program, as others do. The compiler, after occasionally reordering local sequences to avoid problems of data precedence, would then build wide instruction words, operation by operation. Each instruction word would contain as many as a dozen machine primitives.

The major problem faced by anyone who has tinkered with wide-word machines is how to deal with conditional jumps—branches whose direction depends on run-time conditions. Jumps are found so frequently—on average about once every five to eight instructions, according to Multiflow executive vp Joseph A. Fisher—that they usually find their way into most instruction words that the compiler builds. But since it cannot be determined at compile time exactly which path a program will take at each conditional jump, it is impossible to build correct instruction words every time.

Fisher claims the Multiflow machine has a method that overcomes this obstacle to efficient wide-word computers. To compile VLIW object code, Multiflow uses trace scheduling, a technique that it says is ready for every possible path a program may take when executed. The compiler first makes an educated guess about the direction its target program will take. After analyzing typical codes and developing certain "heuristics," the company built a compiler that Fisher says can discern the proper path "most of the time," packing the wide instructions accordingly.

The real cleverness of trace scheduling, however, lies in the way it handles its own wrong guesses—a process that Fisher describes as "gamble, scramble, and recover." Each time the compiler comes across a conditional branch, it not only makes a best guess, it also makes a second-best guess, preparing a second trace to accomplish that possible program flow. The alternate trace, which becomes part of the load module, stands ready to be called into action if required at run time.

The alternate code is limited in scope, encompassing only as much of the remaining program as needed to reenter the main body of the program as quickly as possible. To take care of further branches that may be encountered within this second trace, still another alternate path, or trace, may be derived from the source code. This process continues until all options are covered.

The secret ingredient in trace scheduling is the *compensation code* the compiler produces at the beginning of each alternate trace. The last instruction of the original trace to be executed before a new trace goes into action always includes the conditional jump instruction that was wrongly guessed at by the compiler. Most likely, that last instruction also includes some other operations that, by the time the jump has been identified as wrong, have already been executed. But now that the jump is wrong, those operations are wrong too. Compensation code at the beginning of the alternate trace actually works to "undo" the unwitting damage done by those now-wrong operations.

Naturally, this scheme, which requires the compiler to do much more analysis than usual, also produces more object code than normal. Fisher, who is reluctant to reveal too much before formally introducing his product, declines to say how much memory space the alternate traces take up—"No, not gigabytes," he says—or how they would be managed within main memory. The former Yale professor simply notes that the compensation code "makes up for the compiler's sins."

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of its rather strange computer to customers who can now choose from almost as many strange computers as Bartholomew had hats. Strange is the word, especially for those weaned on a batch 360.

Take Fifth Generation Computer Corp.'s Dado machine, for instance. Based on a design licensed from Columbia University, the system enlists up to 8,192 microprocessors for such tasks as recognizing speech and searching text. At AT&T, the New York company's computer is being used to process sonar blips for Navy submarines. Vitesse Electronics in Camarillo, Calif., is cooking up hyperfast chips of gallium arsenide for a planned 150MFLOPS computer. A slower, CMOS version was slated to be in oems' hands at the end of last year.

Hypercubes and Butterflies

Then there's Scientific Computer Systems, which has a small (as these things go) Cray-compatible number cruncher that it's developing and marketing jointly with Boeing Computer Services in McLean, Va. Intel Corp.'s 128-node, four-dimensional "hypercube," the iSPC, has caught the interest of, and a couple of orders from, U.S. Air Force Star Warriors. Bolt, Beranek and Newman is launching the Butterfly Machine, a cylindrical grid of closely coupled micros that almost throbs with parallel power. The see-through side panels of the exotic Connection Machine, sold by Thinking Machines Inc., Waltham, Mass., reveal hundreds of diagnostic diodes whose speckled red glow tells of bits buzzing by the billion between 64,000 one-bit processors.

Several factors are responsible for this blooming of a thousand multiprocessing flowers. While computer scientists have investigated such exotic designs for years, primarily for military patrons, only in the past five years or so have their ideas begun to seem commercially viable.

More recently, it has been realized that the traditional uniprocessor seems to be reaching a power plateau as its pacing component, the logic gate, runs into the upper limits of switching speed. In certain cases, two or more "slow" processors operating in parallel may indeed look more attractive than even the fastest single one. From IBM multiprocessing mainframes down to coprocessing pcs, parallel processing has become a proven technique for gaining computing power.

In the meantime, advances in microchip technology have provided computer engineers with highly functional VLSI circuits, powerful building blocks that are available off the shelf. Microprocessors now can be strung together by the dozens or even thousands in a myriad of parallel architectures. Fancier designs may require custom logic chips, but even these are relatively easy to come by, thanks to new VLSI design tools. Powerful software acts as the mortar that keeps these easily stacked silicon bricks aligned and in sync. Compilers, experts say, have shown particular improvement in their ability to take advantage of VLSI hardware features and to locate and exploit more of the parallelism inherent in scientific codes.

Even the construction of computers is getting easier due to the automation of major design, engineering, and manufacturing tasks. Specialty contractors such as chip design houses and silicon foundries have also helped out here. Using their services, computer manufacturers have been able to speed their machines from the sketch pad to the showroom in as much volume as the market demands. Finally, industry standards (the most important evidently being the much-touted Unix operating system) are now widely enough accepted that moving old applications to new machines is not such a chore.

USERS WANT THE BENEFITS OF PARALLEL PROCESSING, NOT THE HASSLES.

Of course, none of this technical activity would amount to much if commercial conditions were not favorable, too. Having seen the heady success of Cray Research, which until recently has had the supercomputer market largely to itself, venture capitalists have been tripping over themselves to pour millions into startups. These ventures promise either to outdo Cray or to attack market segments that that company has ignored.

The cause of high-powered computing has also been advanced by Uncle Sam. High-performance systems are key to the military's well-financed Star Wars program, a major portion of which is concerned with advancing the art of parallel processing. Just as important as this is the fact that the market for scientific computers has broadened to include commercial customers like bankers and actuaries. Some econometric models can dim the lights on even the largest Sierra mainframes.

Multiflow's Fisher is well aware of these factors and of the competition he faces. But he says that despite Multiflow's seemingly late entry, he can still make a buck or two with the machine, the idea for which has been gestating within him since 1978. "All the other companies are scrapping among themselves over two out of 10 technical applications. Only we can do the other eight applications," he claims.

According to Fisher, the Multiflow machine will address a broader range of applications than most other parallel processors. This is the point he emphasizes most to venture capitalists, sales prospects, and reporters. "Our computer reaches places where nobody else can reach," vows Fisher, playing on an advertising slogan for Heineken beer. "We have the potential to grow a large computer company because ours will be the only general purpose product in its price range."

Just how large a company does Fisher have in mind and what will the price range be of that general purpose product? The former Yale professor says only that the Multiflow processor will be field-upgradable and sell for between $200,000 and $1 million, depending upon model.

Gladly, if only abstractly, Fisher describes the inner workings of the Multiflow computer. He believes the machine's design overcomes many of the stumbling blocks that have been encountered by others working with wide-word computers. The main innovation is a compiling technique that Fisher has dubbed trace scheduling (see "The VLIW View"). This has been Fisher's pet project ever since his days at New York University in the late 1970s. A student of his at Yale, John R. Ellis, won the Association for Computing Machinery's 1985 award for best doctoral dissertation with a paper about Bulldog, a prototype compiler for VLIW machines developed at Yale.

Both Fisher and another former student, John C. Ruttenberg, who is now vp of software development at Multiflow, take credit for perfecting the trace sched-

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CIRCLE 44 ON READER CARD

A New Slant on Parallel Processing

uling technique. Multiflow, like other vendors of parallel processors, is counting heavily on proprietary software for the success of its computer.

Fisher claims the Multiflow system will achieve highly competitive price/performance characteristics because it is made up of a collection of relatively low-cost reduced instruction set computing (RISC) processors that are joined together in parallel with some "simple" control circuitry.

But it's only thanks to its sophisticated compiler that the Multiflow machine could hope to compete in today's mature technical computing market. While it may be easy to string powerful, low-cost microprocessors together into a high-performance cluster, there'll be few paying customers unless there is a straightforward way to program that cluster as a single system.

Thus, if Multiflow wants to compete in the general purpose computing market targeted by Fisher, it is critical for the company to deliver readily usable compilers and the Unix operating system it has promised. Then the company would have to prove its performance at the application level.

Omri Serlin, who tracks the parallel computer market at ITOM International, Los Altos, Calif., points to two critical hurdles Multiflow's complex compiler must overcome if it is to be commercially successful. First is raw speed, for only if the compiler works sufficiently fast will it appeal to programmers who must compile code over and over. One solution may be to omit the time-consuming trace scheduling activity until the final phases of a program's development. Second is the elimination of bugs in the compiler itself. Serlin notes that the compiler will put user programs through many transformations, any of which might introduce unknown bugs. Debugging a compiler is no easy task, Serlin says, particularly when it is as complicated a one as Multiflow's.

As Fisher sees it, technical applications programs vary widely in the amount of code that can be vectorized or processed in parallel. At one end of the spectrum, he explains, are the predominantly mathematical signal processing and circuit analysis codes that lend themselves well to "coarse grained" parallel architectures. Those architectures, however, do little to speed up codes that are less mathematical. And it's in this area—executing those junk parts, as well as the pure math—where the Multiflow machine would excel. ■

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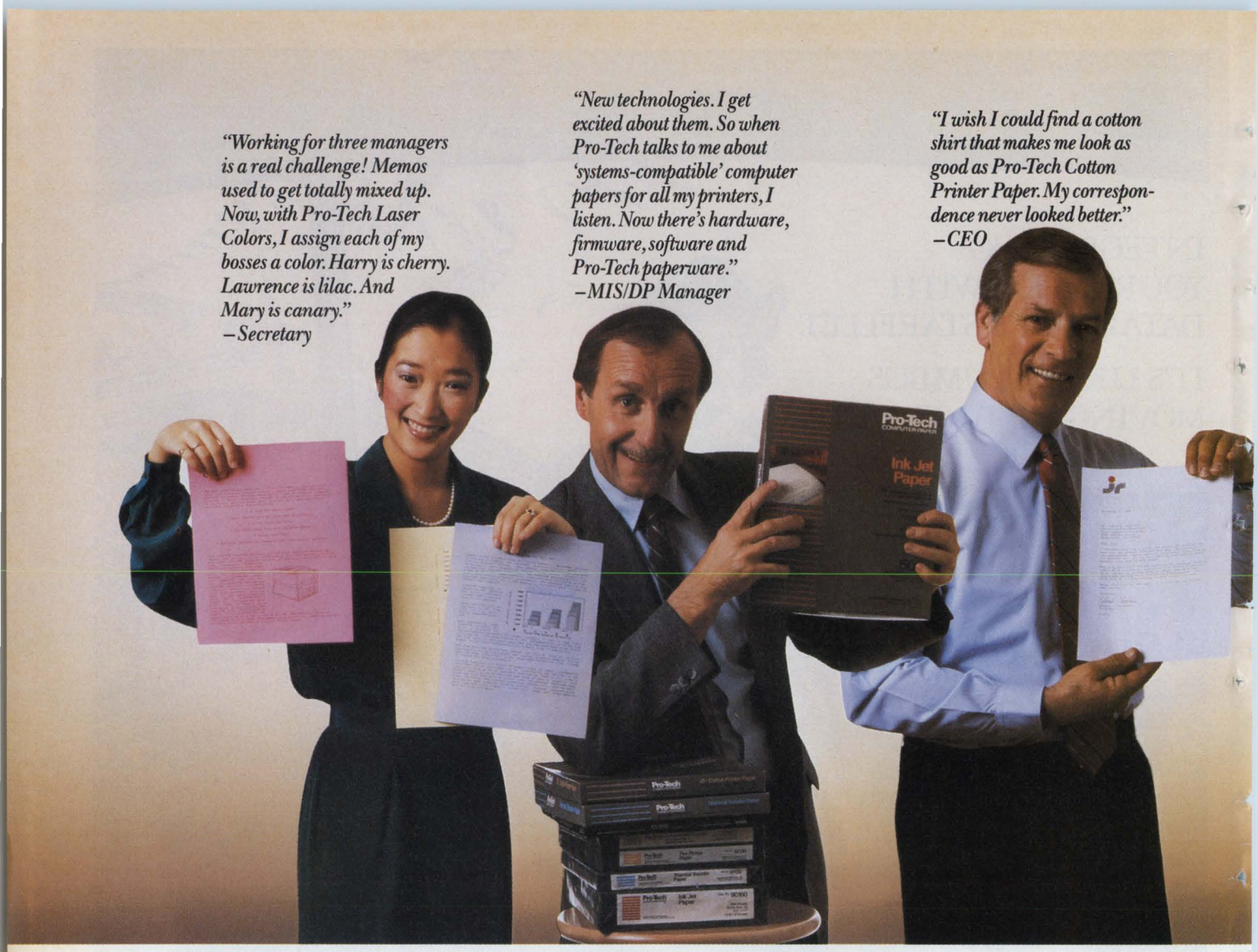

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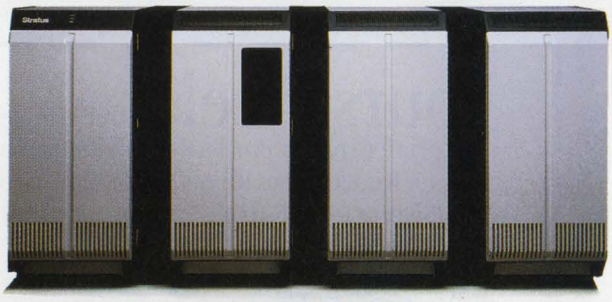

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Real Time

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DEPARTMENTAL SYSTEM buying plans for 1987 are uncertain. This is the finding of a survey of MIS directors of Fortune 500 companies conducted by the Sierra Group, Tempe, Ariz. Sierra reveals that departmental computing is an IBM "weak spot," and that MIS directors do not have complete faith in departmental systems. The report, "Fortune 500 MIS Buying Plans—1987," reveals that 25% of those surveyed plan to increase spending on departmental systems in 1987 over 1986, 20% plan to spend less, and 53% are undecided.

Another finding of the study is that IBM is the most preferred vendor for departmental systems, being favored by 25.7% of those surveyed, and, Sierra reports, by many companies that had no other vendors. Digital Equipment Corp. was the next most popular vendor with 16.8%, Hewlett-Packard was third with 7.1%, and Wang was fourth with 4.4%. Significantly, 38.9% expressed no preference for a departmental system vendor. Sierra reports that "no other product category evoked so little preference for a vendor."

Although MIS executives preferred IBM over DEC by a substantial margin in the 250 largest Fortune 500 companies, DEC is within "striking distance of IBM" in the second 250. Also, those firms in the second 250 planning to decrease IBM systems expenditures outnumber those planning increased expenditures by two to one, Sierra claims.

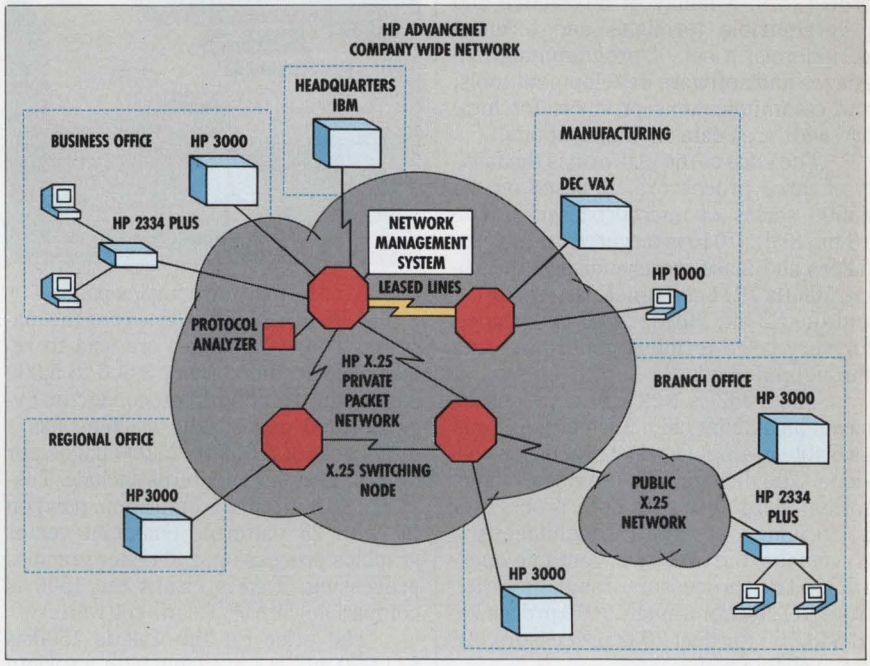
HP barely makes an appearance in the first 250, but it is "roughly neck and neck" with Digital in the second 250.

Sierra attributes this "see-saw" effect to the fact that larger firms tend to standardize on IBM equipment and view office automation as a departmental function, thus Wang's stronger showing in the first 250. Also, MIS directors are not convinced that departmental systems can solve their users' problems. A departmental system is a source of uncertainty in MIS, says Sierra, thus reflecting the immaturity of this technology.

Sierra describes IBM's weak spot as its two-tiered strategy of mainframes and PCs, which leaves little room for departmental systems. And while Digital is strong in this arena, Sierra feels HP, Wang, Data General, and others also see the opportunity.

Merrily Shinyeda, Sierra's president, notes that there will be big opportunities in the area of LANs and connectivity products. "Our study reveals that there are no predominant vendors in this area. When asked if they would buy again from their present vendor, many users said they would look elsewhere."

HARDWARE



Wide Area Network Switch Introduced by HP

Networking capabilities and cost savings emphasized by Hewlett-Packard

BY THERESA BARRY

Hewlett-Packard has introduced a collection of 13 products designed to help users build their own packet switching networks incorporating computers from multiple vendors.

At the heart of the offering is a packet switch that uses the standard X.25 protocol, obtained from M/A-COM Inc., Germantown, Md. Also new are a multiplexor; tools for network design, analysis, and testing; and gear to manage networks. HP says its equipment can be used to tie together LANs of various types found at engineering, manufacturing, sales, and headquarters sites.

The minicomputer vendor is emphasizing its networking capabilities—as is competitor Digital Equipment Corp.—in the face of IBM's widely reported difficulties in that area. HP claims that private networks based on the X.25 standard can offer users great savings as well as additional flexibility in comparison with such proprietary approaches as Digital's DECnet and IBM's Systems Network Architecture (SNA). The X.25 protocol conforms to the emerging OSI networking standard, which many vendors are adopting. HP's switching nodes, based on M/A-COM's CP 9000 II product can accommodate eight, 24, or "several hundred" ports. HP is also implementing Network File System, Revision 3, from Sun Microsystems, seeing it as another emerging standard in distributed file sharing.

Prices for complete networks range from $100,000 to several million dollars. All networks are available immediately. HP claims it will be introducing 10 to 15 new communications products in each quarter this year. HEWLETT-PACKARD CO., Palo Alto. CIRCLE **250**

Computer Line for Retailers

NCR aims at mass merchandisers and department and food stores.

NCR recently unveiled its 7000CP (continuous processing) system platform. The platform includes a family of continuous

processors; a family of interactive and programmable terminals and terminal peripherals; a set of programming languages and software development tools; and communications products for local and wide area data communications.

The core of the platform is the family of three processors, all based on the 68000 series of microprocessors. The 16-bit, 8MHz 7010 is targeted for food retailers and mass merchandisers; the 16-bit, 10MHz 7011 can handle larger stores; and the 32-bit, 25MHz 7032 is designed for very large terminal populations and throughput needs.

The 7032 is NCR's first processor based on a 32-bit chip. Each processor is available in single or dual processor versions. The dual version provides a "mirroring" capability with both processors performing operations simultaneously. If one fails, the other will continue operating. The processors range in price from $11,860 for a single 7010 processor to $48,155 for dual 7032 processors. All are available now.

The interactive terminals offered are the NCR 7050, 7041, 7053 (this one will be available next year), and 7070 models. They're all available in unified and modular configurations. Also offered is a programmable retail terminal, the 7052, which will be available in the second quarter. They are priced from $3,125 for the 7050 to $4,555 for the 7052. Both interactive and programmable terminals feature a family of peripheral options.

The NCR 7000CP supports SNA, bisynchronous, and X.25 wide area network communications. Two LAN options are being offered: MIRLAN (Midrange Local Area Network), available now, and STARLAN, available next year.

Fifty software tools and utilities are being offered. Remote mainframe software, HSF-2 and TALCS, provide for unattended operation of store processors. NCR CORP., Dayton, Ohio. CIRCLE **251**

New Laser Printer

Talaris introduces a 15-page-per-minute machine.

The Talaris 1500 is a 15ppm laser printer featuring 21 standard fonts and a dual page bugger in the print controller. This desktop printer features a resolution of 300dpi and a full-page bit map controller for formatting complex graphics images and text at full resolution. The controller uses the Quic programming language and has 3.5MB of RAM and a Motorola

68000 for formatting complex pages.

A Ricoh LP4150 engine runs the machine. Toner cartridges are said to require replacement every 3,000 to 5,000 pages, the rotating photoconductor every 20,000 pages. The machine has a duty cycle of 5,000 to 25,000 pages per month. Graphics features include Tektronix 4014 graphics emulation, polygon fill with 23 patterns, end-point vector graphics processing, and raster graphics processing. Talaris claims the 1500 is compatible with all Talaris software.

The price for the Talaris 1500 is $11,990 and it's available with a variety of interfaces, including RS232C, Dataproducts parallel, and IBM 3274A. Systems supported include DEC VAX/VMS, IBM VM/CMS, Berkeley 4.3 and System V Unix, IBM RT AIX, Prime Primos, and IBM PC-compatibles. TALARIS SYSTEMS INC., San Diego. CIRCLE **254**

Professional Graphics Adapter

Everex PGA built for high-quality graphics

The Everex Professional Graphics Adapter (EPGA) from Everex Systems provides high-function graphics and emulates a color graphics adapter, monochrome graphics adapter, and a Hercules Graphics Adapter.

The EPGA is compatible with the IBM Professional Graphics Controller and requires one full-length slot of an IBM PC, XT, or AT. It has an on-board 80286 microprocessor and 512K video RAM.

Everex claims the EPGA is an intelligent graphics controller that accepts high-function graphics commands and transforms them into color 2-D and 3-D images on a PGA monitor. Standard features include modeling, viewing transformations, command lists, color manipulation, and programmable text fonts. Graphics and text have a 640-by-480 resolution and are available in 256 programmable colors from a palette of 4,096. Two-color or four-color graphics of up to 640 by 200 can be displayed in CGA emulation mode. Hercules graphics are available in MGA mode. AutoCAD and VersaCAD software written for CAD/CAM applications run with the EPGA. The EPGA is available now for $999. EVEREX SYSTEMS, Fremont, Calif. CIRCLE **255**

Two Pc Terminals

One designed specifically for use with Xenix System V

Kimtron Corp. has introduced two terminals. The KT-7/PC KIX terminal was designed to work with Xenix System V on IBM ATs, XTs, and compatibles. It's said to support all of the escape and command code sequences called for in Xenix. Features include a 14-inch diagonal green or amber screen; one-page standard or four-page optional display memory; IBM PC, ASCII, and graphics character sets; two RS232C serial ports; an IBM AT-style keyboard; and 10 programmable keys. The price is $695.

The KT-7/PC Version L features an 80 by 25 display, the IBM 256 character set, IBM video attributes, an AT-style keyboard, 10 programmable keys, two RS232C, fully bidirectional ports, and tilt-and-swivel adjustments. The price is $499 and it's available now. KIMTRON CORP., San Jose. CIRCLE **252**

Removable Disk Subsystem

For applications requiring portability and security

The Emulex Removable Winchester Disk Subsystem (EMR) is aimed at applications requiring portable, modular data storage.

The EMR subsystems consist of one or two 5¼-inch Winchester disk drives, each encased in a portable drive module (PDM). The chassis is a 19-inch RETMA rack mount, which houses the power supply, drive status indicators, and an MD21/S2 disk controller. The disk controller is said to be able to interface any two large-capacity, ESDI, 5¼-inch Winchester drives to the SCSI bus. An Emulex UC04 Q-bus or UC14 Unibus host adapter is required to connect the EMR subsystem to a DEC MicroVAX I or II, PDP-11, MicroPDP-11, LSI-11, or VAX-11 system. Storage capacities range from 170MB in a single PDM to 760MB in two.

The EMR is available this month from Emulex and authorized dealers. The price is $4,300; PDMs are $3,372 for 170MB and $7,422 for 380MB. EMULEX CORP., Costa Mesa, Calif. CIRCLE **253** ■

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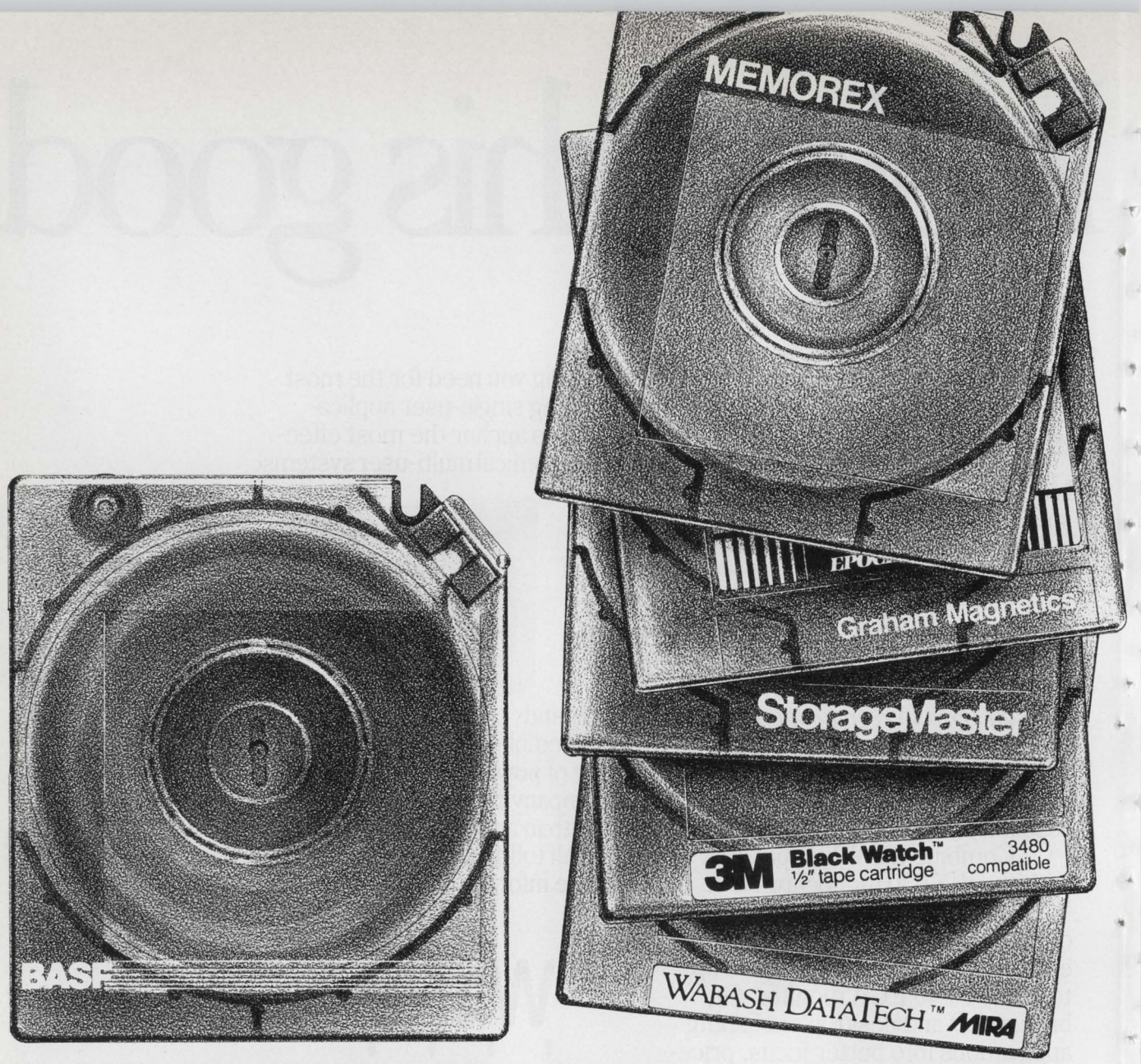

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CIRCLE 52 ON READER CARD

UPDATES

IF THE WINDOW of opportunity for departmental systems hardware vendors opens up over the next five years as predicted by industry analysts (see Off-line, p. 89), there will be a corresponding opening for departmental systems software vendors.

Input, the Mountain View, Calif. computer research firm, says in a report that Fortune 1000 firms will increase their usage of departmental software products by 32% annually over the next five years. By 1991, Input predicts, $7 billion will be spent on them, up from almost $2 billion spent in 1986. This predicted growth rate is stronger than the 19% rate predicted for the overall software market during the same period.

Input gives three reasons why Fortune 1000 departmental software will exceed the overall market growth rate. The first is competitive pressure. Large businesses will be forced to improve management and control of their diverse, decentralized operations in order to respond to domestic and foreign competition. Input feels this will mean increased automation at the lower levels of an organization. The second reason is what Input calls the "willingness of pc-confident end users" to expand to a higher level of automation—the department. The final reason is monetary. Input believes offerings with low cost, high power, low environmental demands, and ease of use will present attractive price/performance alternatives.

Input reiterates the prevalent belief that no vendor has a lock on this market. The leading departmental systems vendors, such as IBM, Digital Equipment Corp., Hewlett-Packard, and Wang, are arrivals from other market segments. They've adapted their products and services to meet the demands of departmental systems solutions. IBM, says Input, is addressing departmental systems with a "mixed bag of post-engineered connectable systems." Digital has adapted an "every-department approach," with its All-in-1 integrated office systems being the glue that holds it all together. Personal Productivity Center software is Hewlett-Packard's offering in this area. Bonnie Digrius, a consultant at Input, adds that vendors such as Oracle, with its RDBMS offerings, and MSA, with its financial packages, will make inroads into the departmental systems arena, as will many other applications and systems software vendors and hardware vendors.

Input's recommendations to departmental systems suppliers are to provide solutions that interface well to a multivendor world; to seek well-defined specialty segments; and to emphasize customer education, training, and ongoing support.

SOFTWARE

Celanese Enters Market With Financial Package

Corporate Class Software, subsidiary of a chemicals manufacturer, will market new application software to corporate users.

BY THERESA BARRY

Celanese Corp., a $3 billion manufacturer of chemicals and synthetic fibers, recently entered the computer software market, forming a new subsidiary called Corporate Class Software Inc. (CCS). The company is making its debut with a high-level financial applications program called Fastar—the Financial Application Solution to Analysis and Reporting.

Fastar is a financial reporting and analysis package designed for departmental use by financial professionals, run on IBM PCs or compatibles. It allows for the collection, organization, management, and consolidation of financial data. It also provides user-defined capabilities for creating financial and corporate reports. International planning and analysis, consolidation, and tax analysis also can be addressed with Fastar. Financial reporting functions include currency conversions, journal entries, hierarchy roll-ups, and computation of year-to-date totals and variances. Audit trails, data verification, and password protection capabilities are also included.

Fastar was initially developed at Celanese as a mainframe-based solution to its data-gathering, reporting, and analysis needs. It was reimplemented on microcomputers by Celanese, and was subsequently redesigned for commercial application. The programming was done by MDBS of Lafayette, Ind., best known as developer of such DBMS products as MDBS III and Knowledgeman, and the expert system software package, Guru. CCS says about 20% of the features are new.

CCS's Fastar is a financial reporting and analysis package designed for departmental use.

Data can be loaded into Fastar manually or from popular micro-based packages like Lotus 1-2-3 and Ashton-Tate's dBase, and from departmental and corporate databases and basic financial systems. Data from outside sources, such as Dow Jones News/Retrieval, can also be incorporated.

Fastar is available now and is priced at $25,000 for a system that supports up to 25 users. It runs on the IBM PC, XT, AT, and compatibles with a hard disk and requires MS/DOS 2.1 or higher and 640KB of memory. It supports IBM token ring, Novell, and Ethernet-based LANs. CORPORATE CLASS SOFTWARE INC., New York. CIRCLE **256**

Three from Informix

Report writer for DB2, database server, and 1-2-3 add-in unveiled.

Informix Software Inc. has introduced three new products.

The first is Report/DB2, a program that is said to allow users of IBM's mainframe relational database to develop complex reports quickly, without having to use a conventional programming language. Informix says it is the first of a family of fourth generation language application development tools and utilities for DB2 that are designed to improve productivity. Report/DB2 uses the same structured query language (SQL) as DB2 to access the data. It runs as a batch program in the MVS environment and is said to complement IBM's query and ad hoc report generating facility, QMF. It allows users to define variables and use logic constructs (if-then-else, while-do, for) to specify a report. Report/DB2 is a conversion of the Informix report writer, ACE, which is currently running in other environments with the Informix RDBMS, Informix-SQL. ACE reports currently running in other environments with Infor-

mix-SQL will reportedly run in the MVS environment using Report/DB2 with minimal change.

Report/DB2 will be available in the second quarter.

Informix's second new product is Informix-Turbo, a database server. It uses Unix System V shared memory, query optimization techniques, and raw I/O capability to manage data and speed access for users. Fault tolerance is provided, says Informix, because the program bypasses Unix to insert, read, and update data directly on the disk and keeps transaction logs of those writes. After a system failure, it uses its logs to restore the database to the last transaction processed. The product will be available in March and the price starts at $1,200. It requires any other Informix product to act as a front end.

The third new Informix product is Informix Datasheet Add-In, the first in what the vendor says is a series of relational database products that add commands to Lotus 1-2-3. The menus and commands of the product are said to extend the efficiency of 1-2-3, allowing users to create databases; add, delete, and modify data; and use query-by-example techniques. Informix Datasheet Add-In also makes Informix application development tools more useful to 1-2-3 users.

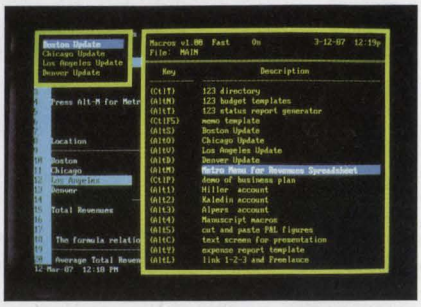
The product will be available in the second quarter, priced at $149.95. It requires Lotus 1-2-3 and an IBM XT, AT, or compatible with 640K of RAM and a hard disk. INFORMIX SOFTWARE INC., Menlo Park, Calif. CIRCLE **257**

Desktop Manager

Combines 12 accessories and a macro generator.

Lotus Development Corp. has introduced yet another new program, called Lotus Metro, a memory-resident desktop manager. Metro features include a macro generator, text editor, clipboard, list manager, DOS file manager, calculator, configuration accessories, kaleidoscope, appointment book, note pad, watch, phone book, and special characters. Lotus claims Metro uses only as much memory as the user needs. Users can configure the PC's memory, choosing a combination of the 13 programs or accessing them all.

Metro's core technology was acquired by Lotus in mid-1985 from Software Arts, Wellesley, Mass. Lotus has signed a joint marketing agreement with



AST Research Inc., Irvine, Calif., which allows purchasers of AST multifunction boards a 50% discount on Lotus Metro. Metro runs on an IBM PC, XT, Portable, and AT, and the Compaq Portable, Plus, and Deskpro. It requires two 5¼-inch double-sided disk drives, 80K of memory for the stay-resident portion of the program, and DOS 2.0 or higher. A hard disk is recommended. Metro, available now, is priced at $85. LOTUS DEVELOPMENT CORP., Cambridge, Mass. CIRCLE **258**

Add-In Program for Lotus

Goal-seeking program for 1-2-3 and Symphony.

Goal Solutions from Enfin Software is a goal-seeking program that adds to Lotus the ability to specify goals that will automatically be solved by the program, claims the vendor.

Up to five goals can be solved simultaneously. The program contains a what-if shell and full-screen form window. Other features include an indexed help screen, the ability to call Goal Solution from a Lotus macro, the ability of the user to interrupt the goal-seeking process, and the ability to display additional information in the form window.

Goal Solutions is available now and is priced at $79.95. Enfin says it is planning six additional modules in this Solution series for release this year. ENFIN SOFTWARE CORP., San Diego. CIRCLE **261**

Remote Duplicate Database

Software system helps protect data on Tandem NonStop systems.

RDF (remote duplicate database facility) system software from Tandem is for users of NonStop systems. It is said to protect data and critical business operations in situations where an entire computer facility may be damaged or inaccessible. RDF maintains a duplicate copy of a database at a designated backup or remote site, using standard communications lines. The backup site can become the primary processing site for critical OLTP applications, says Tandem.

RDF products work with Tandem Transaction Monitoring Facility (TMF) system software, which is part of Tandem's Encompass RDBMS software. RDF maintains on-line replicated databases on a remote node by using TMF audit-trail records that are generated when TMF monitors transactions for consistency. Using these TMF records, RDF processes can continuously update the remote databases, and the changes are sent to the remote or backup node using standard communications links and Expand networking software.

The product will be available in the second quarter. The price will be $27,500 for the initial license with a $300 monthly fee for NonStop VLX, TXP, and II systems; and $13,750 with a $150 monthly fee for NonStop EXT10 and EXT25 systems. TANDEM COMPUTERS INC., Cupertino, Calif. CIRCLE **259**

Lisp Cross-Compiler

Written by Lucid Inc. for Symbolics 3600 workstations.

Symbolics recently introduced its Common Lisp Cross-Compiler. It allows users to move AI programs developed on Symbolics 3600 family machines to general purpose workstations running the Lucid implementation of Common Lisp.

Features of the environment include rapid prototyping, symbolic debugging, incremental compilation, and advanced user interface code generation. The cross-compiler, when integrated with Symbolic's software development environment, Genera, provides users with access to Symbolics Common Lisp; New Flavors object-oriented programming; a dynamic window system; a real-time editor; and a Document Examiner for full, on-screen access to the system's documentation. Lucid Common Lisp does not include some Symbolics enhancements, such as New Flavors, networking, windowing, graphics, and multiprocessing support. Symbolics application delivery systems support all features of Genera, says Symbolics.

The Symbolics Common Lisp Cross-Compiler is priced at $11,900 and it's available now. It requires Genera Release 6.1 or higher on the Symbolics system and Lucid Common Lisp running on the target machine. SYMBOLICS INC., Concord, Mass. CIRCLE **260**

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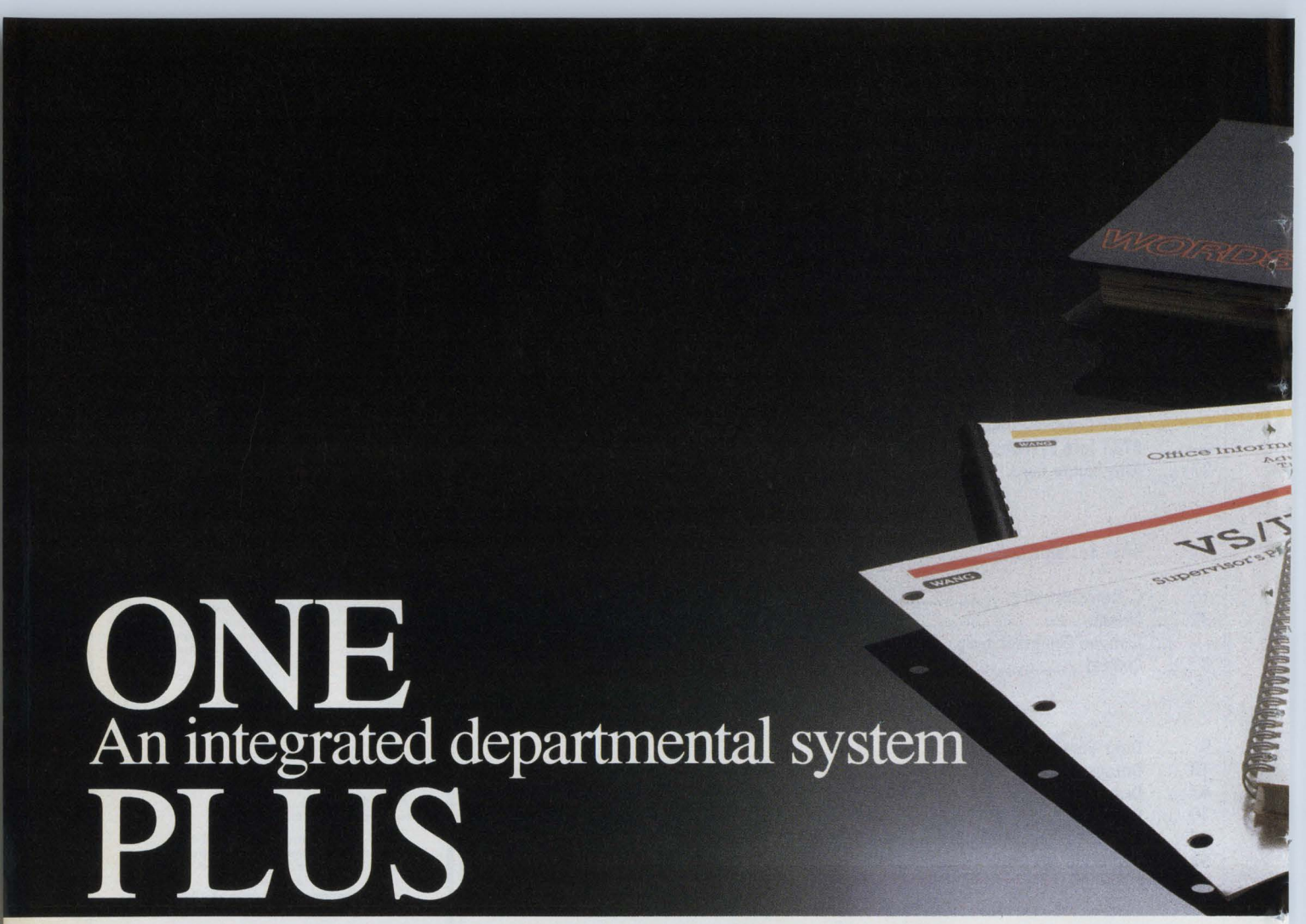

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the ONExchange Library and shared among multiple workstations or used as input to other spreadsheet systems such as Honeywell's ONEcalc.

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CIRCLE 53 ON READER CARD

BOOKS

Of Politics and the Wheel

REINVENTING TECHNOLOGY
by Michael Goldhaber, Routledge & Kegan Paul, New York (1986, 260 pp., $12.95).

BY JOHN W. VERITY

Ever since the Manhattan Project demonstrated how highly organized research and development can accelerate technology by grand leaps, the United States and other industrialized nations have made technology a top political priority. Governments, corporations, and universities work in tight collaboration to produce new technologies and to commercially exploit them.

Here in the U.S. since World War II, we've seen "crash" programs aimed at developing fusion reactors, manned spaceships, cures for cancer, and even antiballistic "shields" to protect us from "evil empires."

Political, economic, and historical interest in technology and its role in modern society swelled immediately after the war. Lewis Mumford continued writing his famous history of "technics and civilization," which greatly influenced such later critics of *homo technologicus* as Jacques Ellul, Ivan Illich, E.F. Schumacher, Langdon Winner, and computerdom's very own Joseph Weizenbaum.

The central question these and other thinkers tackled was, is technology autonomous? "Is technology like a train leaving the station that we can hop onto or get left behind, but whose destination is beyond our control?" asks Michael Goldhaber.

As the title of his provocative book, *Reinventing Technology*, suggests, Goldhaber firmly believes that technology is anything but autonomous, that it is always shaped by the values of those who pay for its development and determine its goals. Technology, he asserts, is fundamentally a human activity and therefore subject to political forces. Goldhaber's view is that if this nation does not begin making informed, democratic choices about the technologies it develops and employs, we can all expect to suffer increased social disruption, further degradation of the natural environment, and a sharp decline in our democratic freedoms.

Goldhaber finds "present and prospective policies are distorted. They are not moving us towards a more just world, and may be seriously endangering even the degrees of equality, democracy, and world peace we currently enjoy."

Thus is set the stage for his detailed proposal of an alternate high-technology policy for the United States, one that would enable most of the people to gain most of the benefit from the large expenses necessarily required. "In short," he says, "we need a way of reinventing technology as a social system so that it can better meet our needs."

Goldhaber, a physicist by training, explores far beyond those who blindly surf some "third wave" and bliss out on "megatrends." He outlines a practical model of political action that could be the seed of a sort of technological New Deal. Instead of waiting for spin-offs from inefficient military and space programs, he would set up new government agencies to identify humane technologies and to fund and coordinate their pursuit.

Central to Goldhaber's vision of a more convivial high-technology-based society is a radical revision of the laws and policies that govern the distribution of knowledge, or information. He would have the copyright, trade secret, and patent laws—those governing so-called intellectual properties—changed substantially. The very notion of intellectual property "is a matter of social policy, and not simply a right... [and it] must be weighed according to the entirety of its effects," he writes.

Goldhaber would legislate an intellectual claims act to regulate the activities of what he calls patent monopolies, or innovation utilities. These are generally large companies that, he says, abuse the current laws. In short, these companies would be required to report regularly their royalties, profits, and production and marketing costs for each intellectual claim they want protected. That information would be used to set price and royalty guidelines for charging others for use of each item.

Surely the author is not so naive as to believe his recommendations will be adopted by America's politicians or their corporate sponsors anytime soon. But he can be sure that those who read *Reinventing Technology* will be moved to change their thinking about, and actions in, this world of high technology. ■

CALENDAR

MARCH

Interface '87.
March 30-April 2, Las Vegas. Contact the Interface Group, 300 First Ave., Needham, MA 02194, (617) 449-6600.

Hong Kong's Computer '87.
March 31-April 3, Hong Kong. Contact James Teele, Business and Industrial Group U.S.A., 1327 Conwed Tower, 444 Cedar St., St. Paul, MN 55101, (800) 626-2295 or (612) 297-6836.

APRIL

The Great April Fair (Informatics and Telecommunications Trade Show).
April 4-12, Milan, Italy. Contact Lisa Tucci, Delia Associates, P.O. Box 338, Route 22 West, Whitehouse, NJ 08888, (800) 524-2193 or in N.J., (201) 534-9044.

SICOB 1987 (38th Annual Conference and Show on Information Processing, Automation, and Office Organization).
April 6-11, Paris. Contact SICOB, 4 Place de Valois, 75001 Paris, France, (01) 42-61-4621.

Infocom 87 (10th Annual Rocky Mountain Exposition and Conference).
April 15-17, Denver. Contact Mile High Chapter, DPMA, P.O. Box 334, Denver, CO 80201-0334, (303) 789-4547.

AI '87 (Artificial Intelligence and Advanced Computer Technology Conference and Exhibition).
April 22-24, Long Beach, Calif. Contact Jim Hay, Show Manager, Tower Conference Management Co., 331 W. Wesley St., Wheaton, IL 60187, (312) 668-8100.

Robots II (17th International Exposition and Conference on Industrial Robots).
April 26-30, Chicago. Contact Gregg Balko, Robotics International of SME, 1 SME Dr., P.O. Box 930, Dearborn, MI 48121, (313) 271-1500.

Expo Bank Asia '87 (Japan's First International Banking Equipment and Technology Exhibition).
April 27-30, Washington, D.C. Contact E.J. Krause & Associates Inc., P.O. Box 70356, Washington, DC 20088, (301) 986-7800 or Norio Sawa, E.J. Krause & Associates Inc., Japan, Akasaka Bergo Hoie 805, 11-14 Akasaka 3-chome, minato-u, Tokyo 107, Japan, (03) 584-1548.

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CIRCLE 54 ON READER CARD

Presenting computers that fit them

IBM presents mid-range computers that offer a difference: Choice.

In the IBM System/3X family and the new IBM 9370 Information System you'll find an array of solutions that allow you to choose a total system to fit *your* business. Rather than tailoring your business to fit a computer system.

Where do these systems fit in?

Here.

Mainframe Territory

If you've already invested in IBM mainframe technology, the new 9370 Information System is a great way to enhance that investment.

The 9370s put IBM's powerful 370 mainframe architecture into a small, affordable package. Because they share a common architecture and offer a choice of four operating systems, 9370s allow you to choose from virtually all of the thousands of application programs available for IBM mainframes. Yet because they don't have to live in computer rooms, 9370s can run these programs from wherever you need them to be.

Here.

Because of the familiar architecture, personnel trained in IBM mainframe use will be at home with 9370s. With new prepackaged software, novices will soon feel at home as well. And 9370s will likewise be at home in many roles: as host systems, departmental systems or remote extensions of existing mainframes.

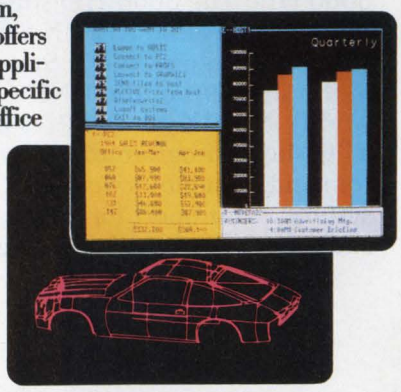
As your needs grow, 9370s can grow with them—with larger processors and more storage that's affordable and easy to install. Giving you a five-fold power range in the 9370 line—and a hundred-fold span of computing power within the 370 family from the entry-level 9370 to IBM's biggest mainframe.

Rugged Individualism

Where you need a standalone combination of power and simplicity—in departments, in dealerships, in distributorships or in small businesses—the IBM System/3X family fits right in.

System/36 is IBM's simplest and least expensive entry point into mid-range computing. In addition to being IBM's most user-friendly mid-range system, System/36 also offers a broad spectrum of application software from specific industry solutions to office applications that suit any business.

Here.



For growth, the System/38 provides a built-in relational data base (allowing you access to data on your own terms) as well as a toolbox of programming aids to help you, in a remarkably short time, custom-design applications that fit the job at hand.

The System/3X family members function equally well

the mid-range in where you need most:

as the largest computers in a business or as departmental computers in large companies. And to provide you with the communications and growth options your business needs, the System/3X family was recently enhanced to provide even smoother peer-to-peer communications, greater host and PC connectivity, and stronger networking with IBM 370 mainframes and PCs.

And if you need more power, you can expand the System/36 and System/38 independently, or you can link them in a network where they can share information and resources.

The System of Choice

One choice you won't have to make with IBM is where to find advanced technology, abundant connectivity options and numerous business solutions.

Because they're in all our mid-range computers, across the board.

Both the 9370 and System/3X families use IBM's one-million-bit memory chips and denser logic to achieve their high power and speed. And two new direct-access storage devices give the 9370 and System/3X increased capacity with unusual economy.

All this technology is fascinating in its own right. But it just gives you more in terms of real mid-range computing options: growth upward to mainframes, highways between mainframes and PCs or other workstations—or flexible connections with networks and enhancements either from IBM or other manufacturers.

And integrated office solutions to meet your needs are available on both systems.

Here.

Where You Work

Perhaps the best fit of all is the way IBM's mid-range computers fit into your working environment. The 9370s are very neighborly. With set-up times of under five hours and rack-mounted components that can be installed like stereo equipment. System/3X family members are simple to operate and fit in easily, too.

All are extremely quiet, need no special air conditioning and operate on standard 110 or 220 VAC wall current.

A Fitting Conclusion

The reason IBM mid-range systems fit in so well is based on a simple piece of logic: they're built to fit your business, rather than vice versa.

To find out more about which IBM mid-range system is the perfect fit for your company, call your IBM marketing representative soon. You'll learn about the kinds of choices you now have in a mid-range computer, and how you can start making them.

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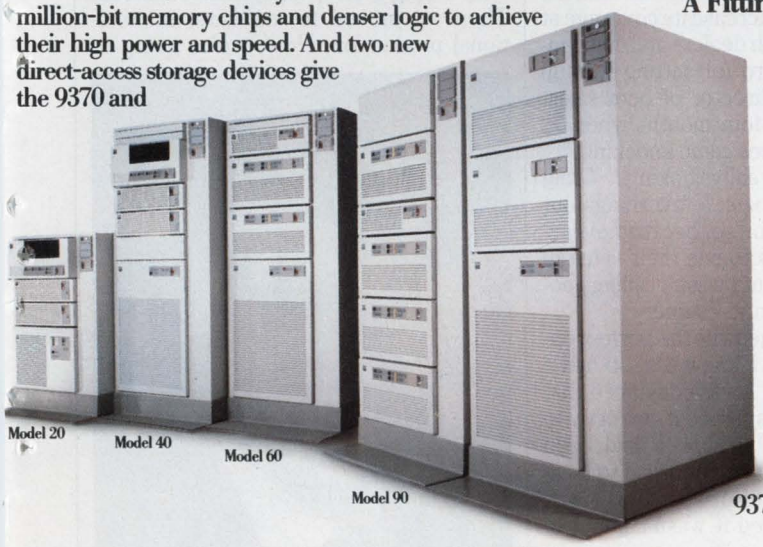


9370 Information System

The IBM Mid-Range. The System of Choice.

PEOPLE

Mind-Set Is His Business

Getting the company's "front line" in tune with customers is the challenge for GE Information Services Co.'s new chief.

BY WILLIE SCHATZ

There was Anthony L. Craig, just minding his business in London as senior vice president of international sales and services operations for General Electric Information Services Co., when they made him a proposition. You're going to trade London for Rockville, Md., they said.

If this was a deal, then so was the one about the bridge. But the words were barely out of GE's mouth when Craig said yes, yes, a thousand times yes.

"After flying 15 transatlantic flights a year, maybe I can cut them in half," Craig says from behind the desk of the president of GEISCO (since renamed GE Information Services).

"I loved working in London," Craig says. "GE's rather remarkable because it gives managers businesses they can run. It puts you on the job without anyone looking over your shoulder. It's just you. You've got the full range of accountability. Working overseas was like running a business within a business. It's exciting.

"I'm really glad to get back to the States, though. After you've been away for a long time [three years, to be exact], it's great to come home."

Actually, Craig has one of the more expansive definitions of "home" you'll ever see. The guy's moved around almost as much as the Fugitive.

The odyssey began in Halifax, Nova Scotia, where he received a BA in mathematics and physics from Dalhousie University. Like most other college graduates, Craig wasn't sure what he wanted to do. Computers didn't even make his top 10.

"I could barely spell computer," Craig says. "I took one class in FORTRAN and passed it. But these were the heady days of the mid-'60s when more jobs were thrown at you than you could count. Besides, the alternative was the oil business. I knew that wasn't for me."

So when IBM offered him the chance to go to three months of school and come out as a systems engineer with a job, Craig leaped at it.

That started a steady climb up the IBM career ladder. From his base in Toronto, Craig installed Canada's first model 30. He was on the team that installed the first model 50. Then it was off to the Maritimes (Prince Edward Island, Newfoundland, Nova Scotia, and New Brunswick) as chief salesman for the provinces. He didn't last long. After selling 230% of his quota, IBM hustled him back to Toronto and made him product administrator for timesharing systems in Canada. After messing with the CP 67 and CP 40 systems, he advanced to product line manager for Canadian data systems. That meant dealing with the 370 and other systems.

Then it was off to Paris, where in 1974 he headed IBM's European project office for advanced systems. He was back in Toronto four years later as manager of systems engineering for Canada.

He finally made it to the U.S. in 1979, when IBM brought him to Armonk as a corporate marketing consultant. He stayed there for three years before becoming the first person in charge of the alternative channel distribution market. IBM's goal was to increase its coverage at the low end through dealers and distributors. Craig's reward for setting that up was being made director of oem sales. He was on the job four months when GE Information Services came knocking.

"I wasn't really looking," Craig recalls. "Oh, I'd check a few things out every six months or so, because everybody always wants to see their value in the marketplace. But I wasn't calling people or sending out my résumé.

"This seemed like the perfect opportunity, though. I knew GEISCO had a gem of a business. I was convinced that they just hadn't positioned it correctly to sell the product. Besides, it had been clear to me for a while that I had to have my own mudpack to play in. And I was just about convinced it wasn't going to happen at IBM."

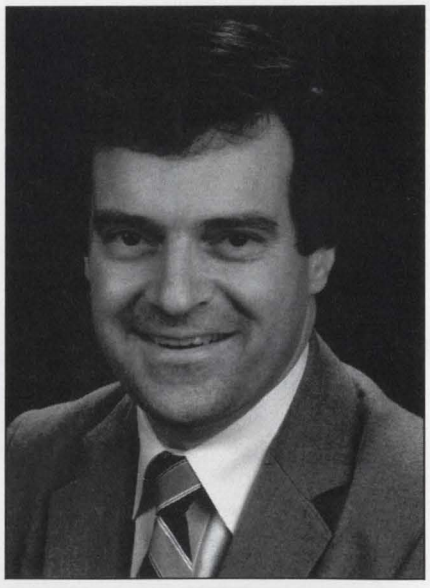
After 17 years, he didn't need much more evidence. And he wasn't about to stick around to check out his theory. So he went to work in GE Information Services' London office, responsible for all the company's activity outside the U.S.

Three years later, it was time to come home. As part of GE's restructuring last October, Craig became a GE vice president as well as main man at GE Information Services, which is now part of GE's new communications and services organization. As vp he replaced Walter W. Williams, who became senior vice president of corporate marketing and sales for GE corporate.

Williams became head of GE Information Services in March of 1983 after Gregory J. Liemandt, then chairman and president of the GE unit, left unexpectedly to become chairman and chief executive of Uccel Corp., Dallas, which was then called Wyly Corp./University Computing Co.

The name and positioning within the company may have changed, but the business hasn't. GE Information Services has gone from a timesharing company to a telecommunications and network-based service provider. The company has the world's largest commercially available teleprocessing network, reaching 750 cities in over 30 countries on five continents. The network is at your service 24 hours a day, seven days a week, 365 days a year. Its largest user is GE.

"The timesharing business was a product consumed by an individual at a single workstation," Craig says. "That was a single-site, analytical business. Then we moved to multisite, multinational production. Now, we're going to



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CIRCLE 56 ON READER CARD

Real Time

multienterprise, multinational business, such as EDI [electronic data interchange].

"My job is to focus the organization so it maintains a single mind-set. Mind-set is the critical part of this business. We are in a competitive international communications business. We've got to carry that mind-set across cultural and international boundaries."

That process seems to be progressing quite nicely, thank you. GE Information Services personnel know each other's first names, whether they're in Bangkok or Buenos Aires. The company is set up horizontally, so the traditional corporate hierarchy is violated routinely. Customers are taken care of without going up and down the command chain.

GE Information Services also is eager to take advantage of what Craig perceives as dp's shift from products to services. The company's strength has always been in finances. With international monetary transactions increasing, it hopes to become the leader in international treasury management and financial custody services. EDI, for example, needs a network to which any device can connect. GE Information Services' network now allows 150 end-user devices to connect transparently. It also permits gateways into almost any device.

"You can buy all the technology you want," Craig says, "but that capability lies dormant unless the front line applies it. Application development takes place at the customer interface. We need a creative front line to drive that through on a worldwide basis.

"My biggest job for the last three years has been educating our field sales force. Now my challenge is to extend that mind-set to all our employees so they feel that customer awareness. My top priority is to energize our front line and create new multiuser solutions."

This is no stroll in the park, folks. GE Information Services has been restructuring for the last few years and has been through several roster changes at the top. If this recent move is truly the end, then Craig's going to have to maintain his customer base while convincing doubters that GE Information Services is the network of the future. He's also going to have to overcome the pervasive perception that the U.S. is one market and the rest of the world is another.

"I can't agree that the U.S. is separate from the international market," Craig says. "It's one global market now and the U.S. is part of it. I can't help thinking that way. I consider myself an internationalist."

That's what happens when you travel so much that a cross-country trip to San Francisco is "all in a day's work" but going to London is "a trip, because you have to stay overnight.

"This is the greatest job anyone could have," Craig says. "It's risky, but I have a healthy respect for risks. You don't shrink from them. You look them straight in the eye and understand all the pieces. You'll never hit a home run if you don't swing at the ball."

When this guy's up, they don't bother with a take sign.

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CIRCLE 57 ON READER CARD

LETTERS

Pyramid Power

"Currents Gone Awry" (Dec. 1, p. 24) contained inaccuracies about my company, Pyramid Technology.

For example, the article stated, "Boeing is reportedly close to abandoning Pyramid. . . ." Pyramid has never even had an order from Boeing. Unfortunate as that is, it makes it impossible for Boeing to abandon us. The article also stated that "Pyramid management until recently put more time and money into product sales than product development." Although cost of product sales is high in our business, Pyramid did spend 21% of revenues on R&D in 1986. This R&D percentage is at least 50% higher than companies at our size typically spend and about 200% higher than the larger minicomputer companies spend. To imply R&D has suffered is incorrect and unfair and as the above numbers indicate, is exactly the reverse.

Believing DATAMATION to be built on upright journalism, we naturally questioned the users quoted in the article as to their dissatisfaction with our systems. We found that our users were distressed to be associated with factually incorrect statements. To correct the misinformation and inaccuracies, you will receive letters from Gregory Crowe, information systems manager of Davis Polk & Wardwell; Ginger Kenney, vice president, technical development, Mirror Systems, a Times Mirror Company; Dr. Stephen Tolchin, technical director, The Johns Hopkins Hospital; and George Badger of the University of Illinois. If you surveyed our prestigious customer list, I believe you would find a very satisfied group of Pyramid computer users.

In fiscal year 1986, Pyramid's revenues grew 30% against a loss of $1.7 million. We ended the fiscal year with cash reserves of $22 million. Pyramid added 60 new customers and had 140 repeat customer orders. These are the financial statistics of a company in a highly competitive market. To harp on the negative is a disservice to us and your readers.

In an October 1986 IDC report titled, "The State of the Unix: A Study of The Unix Marketplace, Part 3," Pyramid was singled out along with DEC, AT&T, and IBM as the companies that produced most (88%) of the medium-scale Unix base revenues in 1985.

RICHARD H. LUSSIER
President, Chairman, & Ceo
Pyramid Technology
Mountain View, Calif.

READERS' FORUM

Compatibility Forever?

One of the tenets of current "right thinking" in the data processing industry is that strict compatibility with the de facto standard is best for everyone. There are three de facto standards: mainframe—IBM 360/370; minicomputer—Unix; and microcomputer—IBM PC-MS/DOS. It is argued that the customer investment in applications makes conversion to an incompatible system impractical. The billions of dollars invested in old IBM 360/370 applications is mind-boggling. The growth of plug-compatible manufacturers is seen as proof of the power of standards compatibility. The steady decline of nonstandard mainframe vendors (e.g., the BUNCH) is further reinforcement for this mind-set. Likewise, in the microcomputer market, IBM has become so dominant that it is commonly believed everyone in this market must be IBM compatible.

As we all know, however, the computer industry is in the doldrums. We have entered a period of "the great slowdown." It isn't just individual vendors who are suffering; end user consumption of computers is slowing. This is clear when you look at the IBM financial results. To take a prominent example, the growth rate of IBM's mainframe revenues has been slowing down in the past year. One explanation is that the new 3090s aren't all that much improved over the 3080s of a few years ago. At the same time, IBM didn't want to "do an Osborne" and restrain current sales by announcing a new product that all their customers would wait for.

The story in the PC world is very similar. The XT and AT are modest evolutionary improvements over the original PC. They don't offer dramatic increases in functionality. IBM has offered new functionality, such as the EGA graphics standard, but such enhancements have been constrained by the compatibility requirements.

In both of these markets, IBM has slowed down the technological growth, customer demand has slackened, compatible vendors (pcms and clones) have jumped in, and it has become a commodity market. It seems to me that the American tendency to focus on near-term financial results in both the vendor and the customer environments is backing the computer industry into a corner. If we had worried about compatibility with quills and ledger sheets, we would never have developed the plethora of data processing alternatives that we have today.

I am not urging change for change's sake. There are many applications that are well suited to the aging standards. The users of these applications are well served by evolving the standards. Capricious change will evoke the terrible wrath of the marketplace, but we must look for applications that require new functionality.

Transaction processing is an area in which none of the existing standards provide a reasonable solution. There has been a great deal of activity with new companies and new products in the transaction processing area. Tandem was founded to provide NonStop computer systems for transaction processing. Tandem has been joined by a number of vendors. Key Logic is a startup company with an operating system for IBM 370 hardware that provides very high transaction rates and entirely new functionality, including a patented security feature that exceeds the levels of security achievable with MVS and VM. The database machines from Britton Lee and Terradata provide another, significantly new approach to transaction processing.

I think that the industry must identify market needs that the current standards will not satisfy. Then we must look for new and better ways to open these markets.

Once we have ensured that we have the new functionality, we should provide some bridges to the past. This upward-migration aid requirement is certainly nice to have, but it must not dominate our product-planning process. Our obligation is to continue to move the frontier forward. There will always be settlers who will build the towns, schools, shopping centers, etc., but if our industry stops innovating we will lose our global competition with others who are willing to take the risks of innovation. Customers must focus on their long-term requirements for which current technology is inadequate and they must work with vendors to build the standard systems for the '90s.

DAVID H. BOWEN
Software Marketing
and Business Consultant
San Jose, California

Subject Index

If you would like to obtain a copy of the Subject Index to articles published in 1986, please write to the Subject Index Editor, DATAMATION, 875 Third Ave., 12th floor, New York, NY 10022.