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JULY 15, 1989

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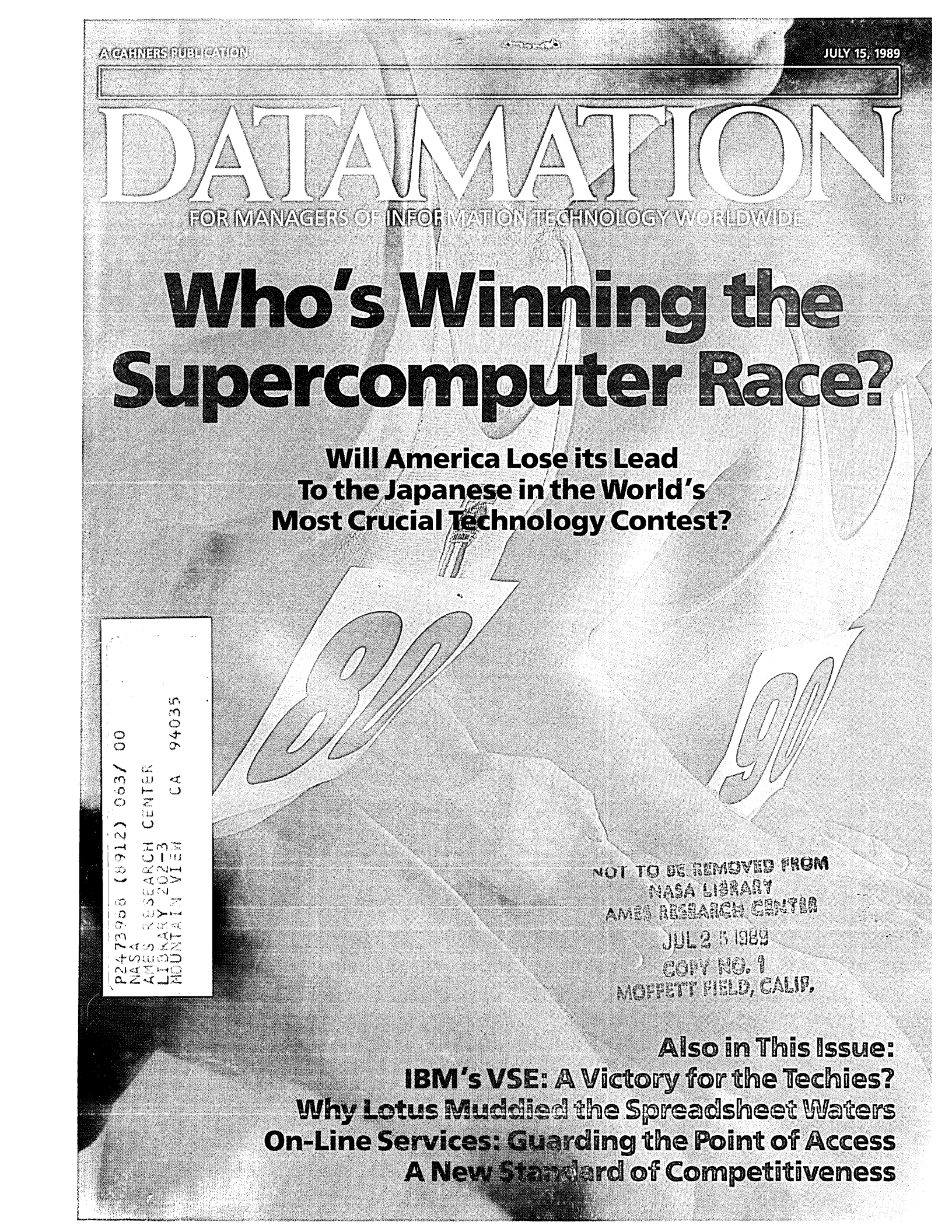
FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

Who's Winning the Supercomputer Race?

Will America Lose its Lead To the Japanese in the World's Most Crucial Technology Contest?



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Why Lotus Muddied the Spreadsheet Waters

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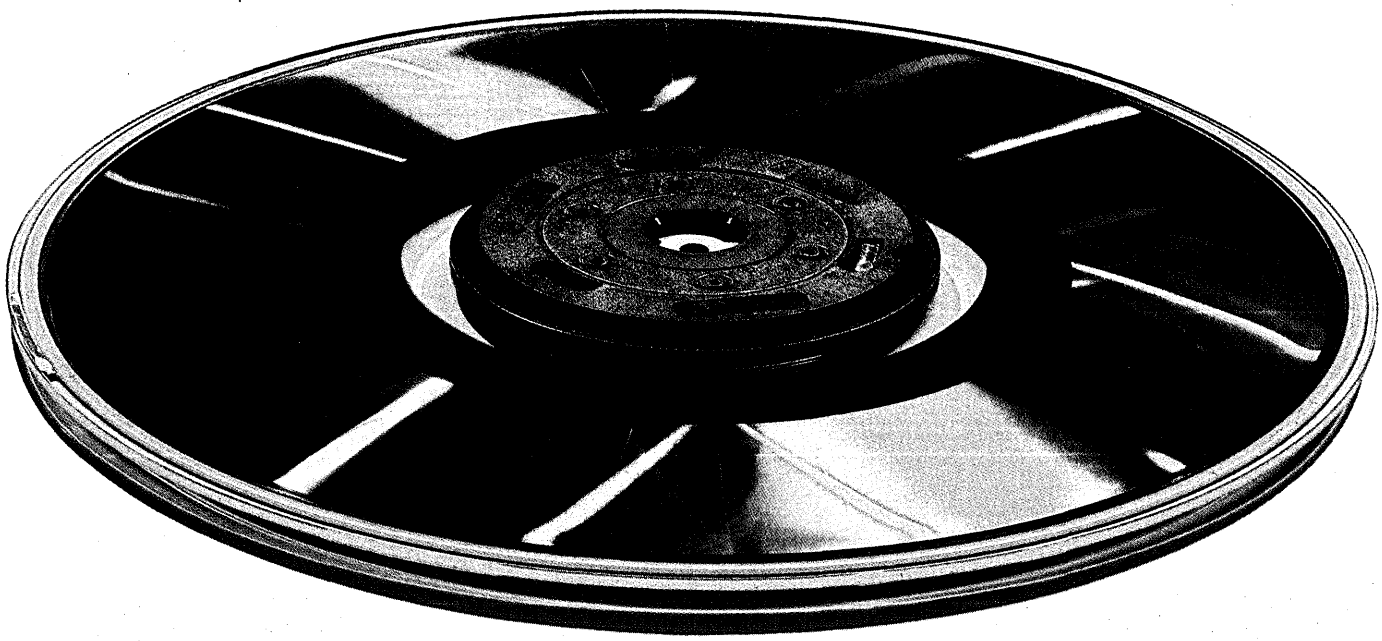

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Ontario ..... July 27*f*
Sacramento ..... July 19*k*
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Santa Clara ..... July 13*fm* August 17*fk*
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NY Albany ..... July 11*f*
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New York City ..... July 12*f* July 26
August 9*f* August 23*p*
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1:IBM Journal of SAA 2:DATAPRO survey, August 1988, companies with sales over $10 million 3:Donaldson, Lufkin & Jenrette report

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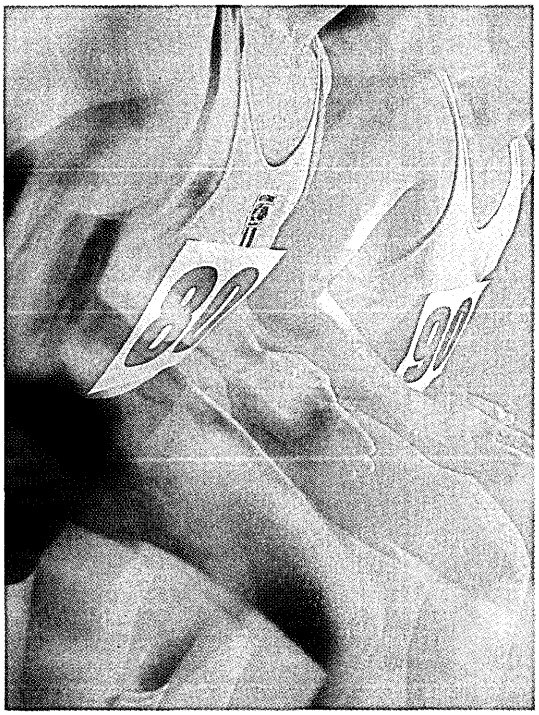
COVER STORY



Who's Winning the Supercomputer Race? 18

BY WILLIE SCHATZ Cray Research's current problems, the demise of ETA Systems and advancements in Japanese technology seem to spell doom and gloom for the U.S. supercomputer industry. The Japanese may be ahead in base technology and raw computing power, but the United States still seems to have an edge in systems and applications software.

Supercomputer Developments in the Soviet Union 20

Cover Photography by Curt Berner

DEPARTMENTS

Inside DATAMATION 4

Letters and Access 6

Look Ahead 13

A Hewlett-Packard Co. Interex user group survey of 466 HP users reveals little interest in the activities of the Open Software Foundation. Only 12% said they were planning to go with the OSF open systems standard.

New Products 67

Hyundai Electronics America rolls out several new additions to its PC product line, including AT- and XT-compatible machines, a family of dot matrix printers and a line of modems.

Career Opportunities 72

Ad Index 80

Company Index 80

SOFTWARE

MIGRATIONS

IBM's VSE: A Victory for the Techies? 25

BY RALPH EMMETT CARLYLE IBM isn't thrilled by the dogged loyalty to DOS/VSE, but Big Blue is making conciliatory moves toward the operating system diehards.

Migrations From DOS: Some Tips From the Experts 26

PC SPREADSHEETS

Muddy Waters 31

BY BOB FRANCIS Lotus Development Corp.'s decision to launch dual 1-2-3 upgrades has prompted many users to revisit their migration strategies.

SYSTEMS

ON-LINE SERVICES

Point of Access 35

BY LEILA DAVIS Having gained control of their corporations' PCs, IS managers are now faced with a resulting boom in on-line data base services that itself is crying out for IS control.

Why IS Has Become the Gateway 36

LOGIC

That Fuzzy Feeling 39

BY R. COLIN JOHNSON A mathematical technique for building applications involving imprecise data stands to gain commercial ground, as some new hardware components that employ it arrive next month.

Mapping the Future of Fuzzy Systems 42

COMMUNICATIONS

MODEMS

Serving Two Masters 47

BY ARIELLE EMMETT Choosing between dial-up or leased line networks is less an issue today thanks to dual-identity modems. These modems are spawning hybrid networks able to operate with both dial-up and leased line connections.

Shopping for V.32 Modem Manufacturers 52

MANAGEMENT

PRODUCTIVITY

Competitiveness: A New Standard 53

BY BOB FRANCIS Major corporations are investing millions of dollars to back a software standard called Product Data Exchange Specification that's at best a few years away. But they are counting on IS executives to use the standard to integrate their manufacturing and engineering operations.

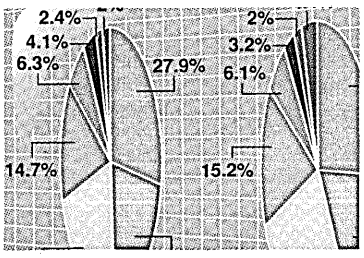
A Sequel to IGES 54

SECTORS

GOVERNMENT, FINANCIAL SERVICES

Sector-Specific Advice, Solutions, Applications 64-1

EDITED BY LINDA RUNYAN A report on products, services and methodologies for IS managers in government and financial services. Future editions will serve managers in the manufacturing sector. (Not included in all issues.)



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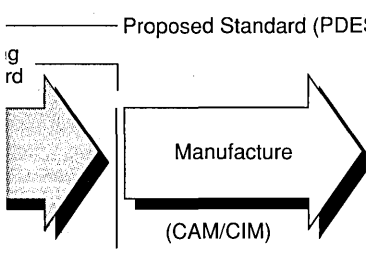

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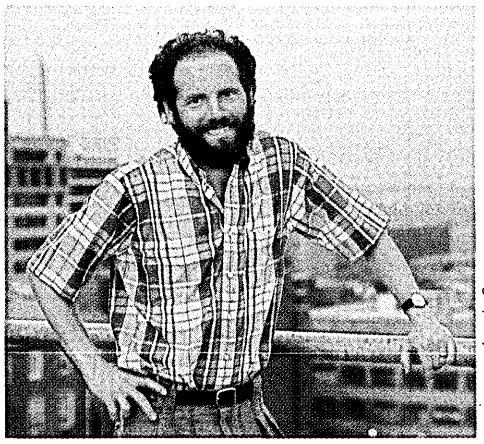
What's the Supercomputer Race About?

From all the talk and press coverage, one might surmise that the U.S. supercomputer industry is on the endangered species list. After all, the acknowledged industry leader, Cray Research Inc., is undergoing significant change. The company has transferred founder Seymour Cray to a new spinoff, Cray Computer Corp., to continue the expensive development of a supercomputer based on risky gallium arsenide technology. Meanwhile, Control Data Corp. terminated its ETA Systems supercomputer subsidiary altogether. And it seems that Tokyo-based NEC Corp.'s machines may have surpassed Cray's in computing speeds. All of these events could be construed as a rather dark picture of a leading American industry.

The predator in this case is, of course, the fearsome Japanese computer industry—in particular NEC, Fujitsu Ltd. and Hitachi Ltd. Mindful of the fact that the Japanese have dealt a deadly blow to the U.S. semiconductor industry in the area of memory chips, observers of recent events in the U.S. supercomputer industry have been given to much handwringing. Will the Japanese companies, with their longer term view and government support, be able to surpass the U.S. supercomputer industry technologically, thereby placing the U.S. military establishment and the IS industry in position of dependency on a foreign supplier? With Seymour Cray's new company not yet off the ground, and an IBM-backed start-up, Supercomputer Systems Inc., yet to produce its first product, the U.S. supercomputer industry is effectively down to one company. What will happen to the U.S. position in supercomputers now?



Photograph by M.C. Valada

POUNDING THE HIGH-PERFORMANCE computing beat is one of Schatz's chief pursuits.

There is little question about the formidable nature of the Japanese computer companies. They are large, well financed and motivated to succeed in all levels of the computer and electronics industries. But as our cover story, "Who's Winning the Supercomputer Race?" page 18, reveals, the technological facts may tell something of a different story when it comes to supercomputers. "A hard look at a technological scorecard shows that handwringing is probably justified in the areas of base technology and raw computing power," writes Washington bureau manager Willie Schatz. ". . . But in the critical areas of systems and applications software, sighs of woe may be a bit premature."

The Other End of the Spectrum

The role that Lotus Development Corp.'s 1-2-3 spreadsheet played in rocketing the personal computer to fame and fortune has become almost the stuff of legend. But now users are facing a difficult choice, says Dallas bureau manager Bob Francis. Should they migrate to the thrice-delayed release 3.0 or go to the less expensive, but only recently disclosed, release 2.2? Boot up "Muddy Waters," page 31, to help clarify your thinking.

Francis also zeros in on a new challenge facing IS managers. That challenge is the Product Data Exchange Specification, a method of digital product definition that is being touted as a replacement for the Initial Graphics Exchange Specification used in engineering and manufacturing. Changes in the way design, engineering and manufacturing information will be handled could be coming. Access "Competitiveness: A New Standard," page 53, to find out how you should handle those changes.

David R. Brousell, Executive Editor

DATAMATION

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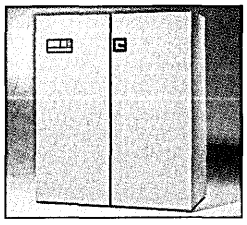

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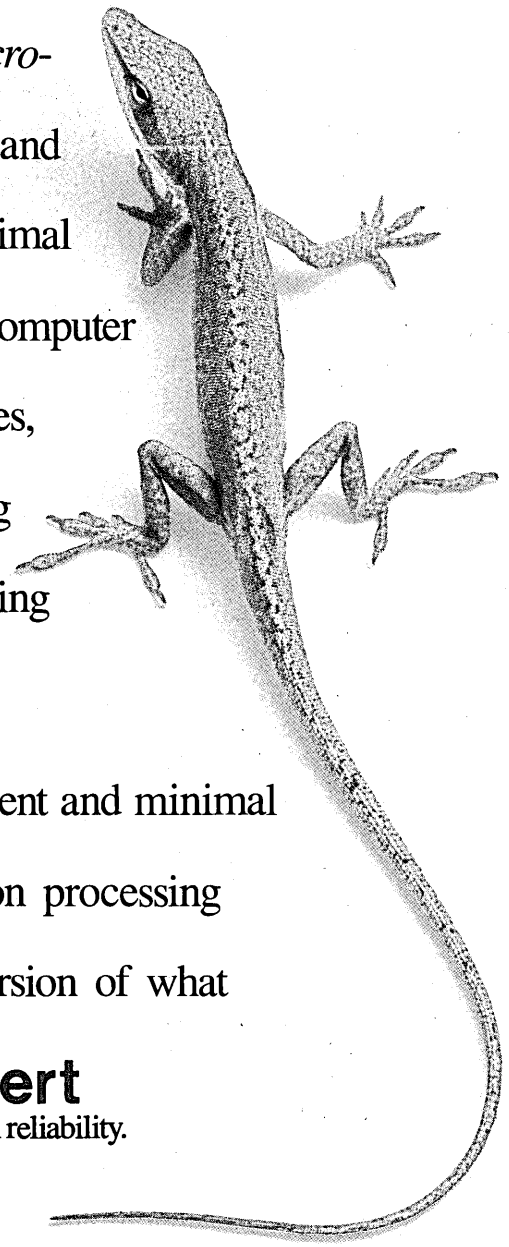

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LETTERS

The Vocational Alternative

I read the Management article [on p. 65] of your March 15 issue of DATAMATION entitled, "Can Education Meet IS Career Demands?," by Leila Davis, with great interest. I am an educator, but I do not come from one of the so-called normal sources of education espoused by the article in question.

Throughout this article I saw multiple examples of IS department heads of prestigious companies having to struggle with identifying where to get competent, educated and qualified computer programmers to staff their maintenance programming needs. Having been in this position myself, many times, I can empathize with their consternation.

Additionally, the article concentrated heavily on identifying the only source for these competent, educated and qualified computer programmers as coming from the campuses of our colleges and universities. Yet, these campuses have not been able to fill the bill, and why is quite clearly explained in the article. So, where can the IS department heads go to fulfill their maintenance programming staff needs?

I suggest the IS and personnel departments of companies in this situation send out envoys to all educational institutions, paying particularly close attention to vocational and technical institute schools. Yes, I said vocational and technical institute schools. These institutions, both public and private, do have extensive and comprehensive courses in computer programming. Curriculums in these schools can provide the technical and professional skills necessary for an entry-level computer programmer to do the required maintenance and developmental programming tasks inherent in business IS shops.

A case in point is the computer programming course which I teach at Clover Park Vocational Technical Institute in Tacoma, Washington. I have developed this course based upon my own experience as a computer programmer, a systems analyst and a manager of programming and analysis shops in a variety of functional IS support areas. My experience with graduates of various conventional schools has not been the best. Essentially, I got people who could be termed "coders." Rarely did I get programmers who could integrate themselves satisfactorily into an IS environment. All too often, they lacked the very same basic skills identified by Ms. Davis' article. So, when opportunity knocked, I took this job as a computer programming instructor at a voc-tech because I felt their philosophy of training and the environment they espoused was more conducive to allowing students to learn and practice the "real-world" of being a computer programmer—not just theory.

With the opportunity afforded by Clover Park VTI, I developed a curriculum which places heavy emphasis on the skills required by businesses—abilities to read, write, analyze, exercise interpersonal communications skills and manage themselves. These are what I term "professional" skills and I tie them to the technical skills our students need to do the work required in a business IS shop environment. And, we implement this curriculum in the manner proposed by Martha Stone Wiske of Harvard:

"We must move from the transmission approach, in which the knowledge is transmitted from teacher to student, to more of an inquiry approach, in which the teacher and student work together toward the construction of knowledge."

Your article is good. It points out a need and, to a degree, an answer. I hope my response expands on that answer and provides another avenue for employers to satisfy their personnel needs. I know it is one which will work.

Eric Chandler, CDM
Instructor for Computer Programming
Clover Park Vocational
Technical Institute
Tacoma, Wash.

Error of Omission

I am writing in reference to the article, "Spanning the DEC-IBM Worlds," by David Stamps that appeared in the March 1, 1989 issue of DATAMATION [p. 45]. The article accurately described the problems associated with linking the DEC and the IBM worlds. It also correctly assessed the strengths and weaknesses of most of the solutions currently available.

I was surprised, however, that the article did not refer to Teubner & Associates Inc., and to our software product, A-NET. A-NET allows IBM 3270 terminals to access non-IBM computer systems and networks. A-NET runs as a VTAM application on IBM computer systems with the MVS, MVS/XA, VM/CGS or DOS/VSE operating system. A-NET supports a variety of hardware and software techniques to interconnect the IBM and non-IBM environments, including channel-to-channel, Ethernet with TCP/IP, X.25 and asynchronous ASCII.

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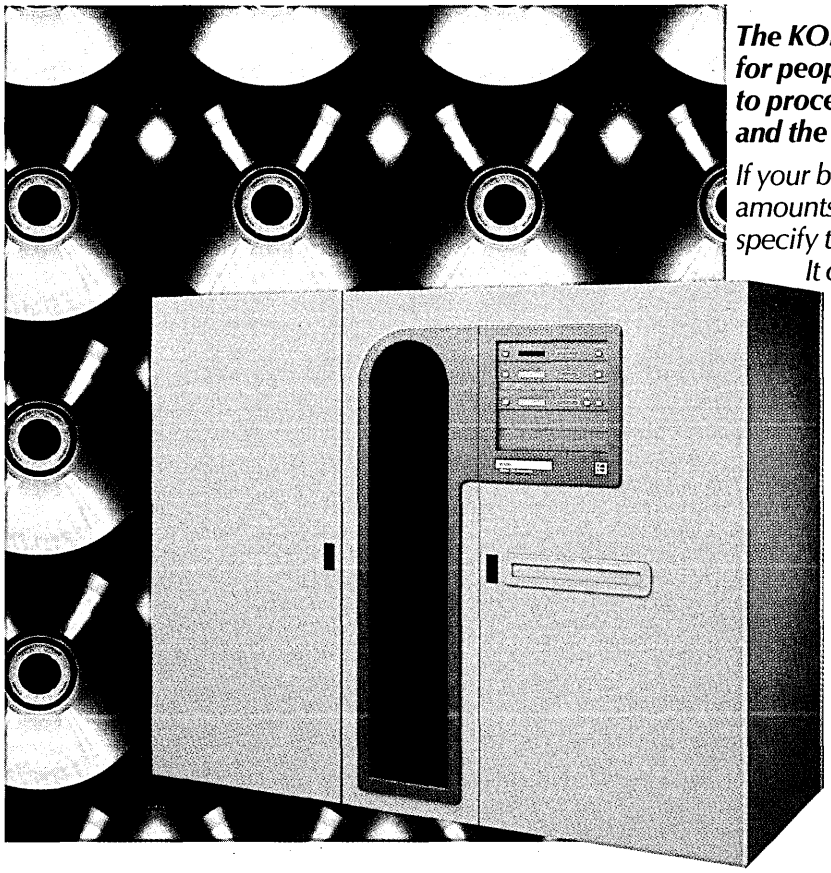

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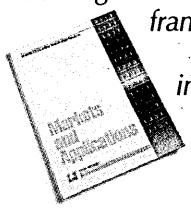

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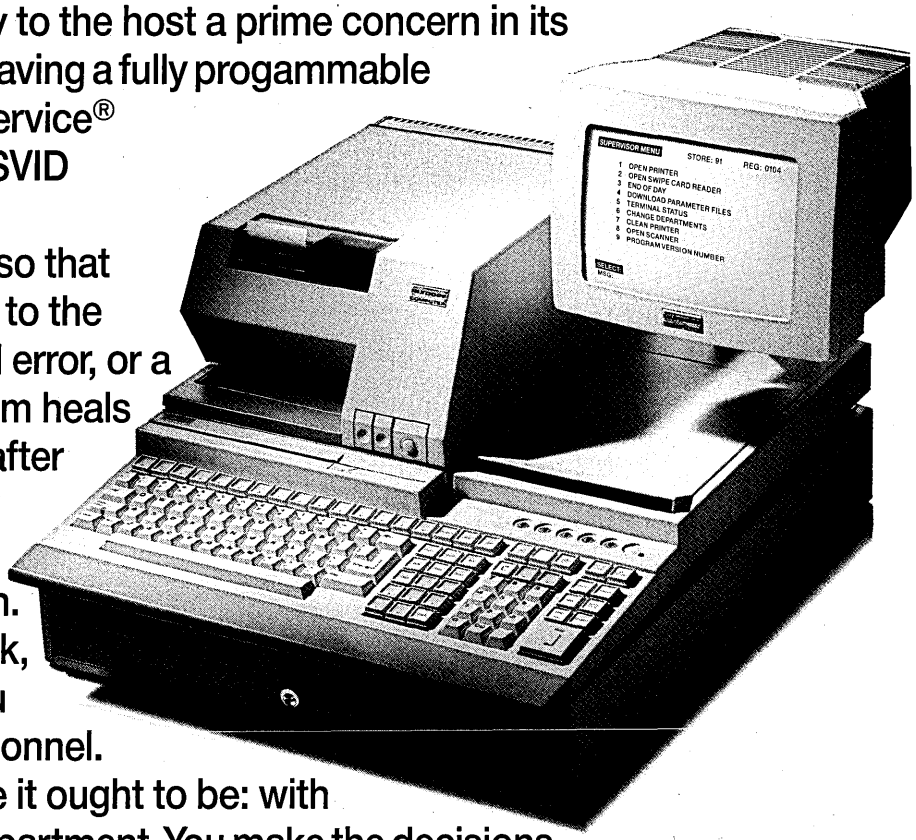

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Big HP Users Care Little For OSF

SUNNYVALE, Calif.—While vendor-dominated groups such as UNIX International and the Open Software Foundation (OSF) continue to do battle to see who will control the definition of open systems standards such as UNIX, users don't seem to be lying awake at night concerned over who will win. **Hewlett-Packard Co.** was a founding member of the OSF and has been a strong advocate for the IBM- and Digital-backed group. But a recent survey suggests that HP users are far from committed to OSF. Interex, the 15-year-old independent HP users group, recently asked 466 HP users whether they were planning to go with the OSF standard, and only 12% said yes. Twenty-one percent said no and a whopping 67% said maybe or don't know. Not a major OSF endorsement from the survey group, 63% of which represent companies with over 500 employees.

The Front Burner

RESTON, Va.—About five years ago, the West German parent of **Software AG** here developed in Germany an object-oriented, entity relationship data base management system. But the folks in Darmstadt didn't think the market was quite ready for such a technological DBMS shift, so they never released the product. Now, however, they believe the market has ripened, and they plan to formally introduce this technology sometime this year. The technology, which runs with Software AG's existing Adabas DBMS, is called, appropriately enough, Adabas Entire. Telefonica in Spain is using Adabas Entire to build a data model for the whole company, Software AG officials say. Meanwhile, Software AG already has plans to extend Adabas Entire with rule-based expert systems technology, which it is also planning to introduce later this year.

The PacBell IS Reshuffle

SAN RAMON, Calif.—If you're an IS worker here at **Pacific Bell Co.**, get those packing boxes ready. The company, which currently serves as a fine example of recentralization, is again tweaking its IS ranks. Almost one out of every 11 PacBell employees is in IS and works in either computer operations, development or planning. Planning had been a distant third (accounting for only 575 of PacBell's 5,430 IS people), but, nevertheless, the Baby Bell is in the midst of reducing that number to about 300. Those cut will be redeployed, says a company official. The reason, he adds, is that the company had reached a point where it has done enough architectural planning, which is conducted by that department.

Round Trip Ticket for IS Labor

HONG KONG—**Cathay Pacific Airways** has joined the ranks of corporations here faced with the irony of rehiring IS staff members who emigrated from Hong Kong, due to anxiety over the British territory's future after it reverts to Chinese rule in 1997. To that end, the airline recently invested several million Hong Kong dollars to open an office in Sydney. "Many of my staff have immigrated to Canada and Australia," explains IS manager Brian Haydon. "We have no trouble getting good graduates here [in Hong Kong], but the rate at which they become useful is lower than that at which experienced professionals are leaving." He emphasizes, however, that Cathay Pacific is not encouraging its employees to emigrate and is rehiring only those with particularly useful skills. He would not say how many Cathay Pacific employees have left for Australia, but so far two have been rehired for the Sydney office.

Notebook PCs On the Shelf

HOUSTON—Texans are known for doing things in a big way, but expect **COMPAQ Computer Corp.** to buck that trend later this year when it introduces a notebook-sized version of its big-selling 286-based laptop computer. Reports currently have the company preparing to introduce the machine late this year. Last fall, **NEC Information Systems Inc.** introduced a notebook-sized computer called the UltraLite. NEC's offering lacked a disk drive, diluting its usefulness. But Compaq's machine is said to incorporate a 3½-inch disk drive.

CASE ISVs On the Spot With CSP

CARY, N.C.—**IBM**'s recent and upcoming announcements of an upgrade for its Cross System Product (CSP) fourth-generation language and data repository are putting third-party computer-aided software engineering (CASE) vendors on the spot. Do they pledge compatibility with the IBM products or do they try to establish their own development environments as de facto industry standards? Industry sources say IBM has been trying to get CASE independent software vendors (ISVs) to pledge publicly their plans to support and be compatible with CSP and the repository. Apparently, those that have joined that camp are **Index Technology Corp.**, **KnowledgeWare** and **Arthur Andersen & Co.** Not all vendors, however, see the value in jumping on the bandwagon. Sources say **Texas Instruments Inc.**, for example, declined, instead merely promising support for industry standards as they emerge.

AS/400 Software For Plants

DENVER—New software for build-to-order and repetitive manufacturing applications is due out this year from AS/400 software developer **J.D. Edwards & Co.** The package covers product data management, shop floor control, master production scheduling/material requirements planning and capacity requirements planning. A late fall launch of the data dictionary-based manufacturing software is scheduled. Subsequent software plans call for an early 1990 release of a new version of software engineering programs for the System/38 RPG III language developers, says president Daniel J. Ellis.

A New Path For Harris

SAN JOSE—It may turn out that **IBM**'s recently unveiled CallPath system isn't a dead-end street—or so other vendors hope. CallPath is designed to integrate IBM host data applications and telephone call processing from ROLM PBXs. An integral part of CallPath is a program that runs on a

PS/2 personal computer and provides the Systems Network Architecture interface and communications link from the PBX to the host. Sounds pretty proprietary, huh? Well, executives from **Harris Corp.**'s Digital Telephone Systems Division are hoping to open up the product. If so, Harris can use that link in conjunction with its new product, VoiceFrame, which, with a switch and software, links computers and network services.

Is IBM In Caltech's Super Future?

PASADENA, Calif.—**The California Institute of Technology** has seen its supercomputer future, and it looks very much like an **IBM** 3090 600-S. The university has a three-year lease on a used **Cray Research Inc.** X-MP/18 for $1 million, but sources say it would gladly give that up for a 600-S, which would better suit its applications. There's just one slight problem—money. IBM's asking $10 million for a five-year deal, which is not bad considering that a similar deal on the open market would command some $35 million. Nevertheless, Caltech is having a hard time coming up with the necessary dollars.

Getting in on Ground Zero

TRUMBULL, Conn.—Groupware developer **Coordination Technology Inc.** has decided to pick three development partners to help fine-tune its initial software offering. The start-up hopes to launch its first release next March. In return for their efforts, the as-yet-unnamed partners will receive first rights to purchasing the software they help develop.

No Use For MBA Degrees

ST. LOUIS—Conventional wisdom says that IS managers with technical backgrounds can boost their careers by earning a business degree. Curt Hartog, director of the Center for Data Processing Studies at **Washington University** thought that, too, until he offered MBA courses for IS managers and was met by a response that he describes as "truly underwhelming." Hartog says there's just no substitute for specific industry know-how, whether it's in health care, petrochemicals, food processing or whatever. "The accent is now on learning the company's business," he says. So, while a business degree looks good on an IS manager's résumé and certainly won't hurt, it may be too general a qualification in these highly specialized times.

EISA PC Exams Planned

NEW YORK CITY—As PCs using the new Intel Corp. 80486 microprocessor move closer to the market, the **486 Standardization Committee** has plans to monitor the compatibility of the new 80486-based machines and their peripherals. In particular, the committee plans to monitor the Extended Industry Standard Architecture (EISA) versions, says committee chairman Brian Livingston. "We originally formed because we were concerned that the bus on 486 systems would become nonstandard, as companies tried to gain a performance advantage." The EISA coalition's announcement that the majority of PC manufacturers would use an extension of the industry standard architecture decreased that danger, he says. "So when the EISA machines come out at Fall Comdex, we will reopen the question, 'Are all the EISA machines completely compatible with each other and are component boards for different machines interchangeable among different manufacturers?'," Livingston says. The 486 committee also will advise PC manufacturers on the type of 486 PC configurations that would be useful to large corporations, he adds. The 486 Standardization Committee is made up of corporate computer purchasers who buy at least $1 million worth of PC hardware and software annually.

Opting for Fiber Optics

WASHINGTON, D.C.—Goodbye cable TV, hello fiber optics. That's the way **OPT in America**, a.k.a. the Public Interest Organization for the Information Age, sees it. The group claims it has found the answer to what it perceives to be the country's communications problems. It aims to "raise public awareness of the social and economic benefits that would accompany universal deployment of a switched fiber optic telecommunications system in America." Executive director George DeBakey, the former executive director of the Association of Data-Processing Service Organizations (ADAPSO) is leading a research, video, publications and outreach campaign to spread OPT's message.

An Object Effort Gets C++

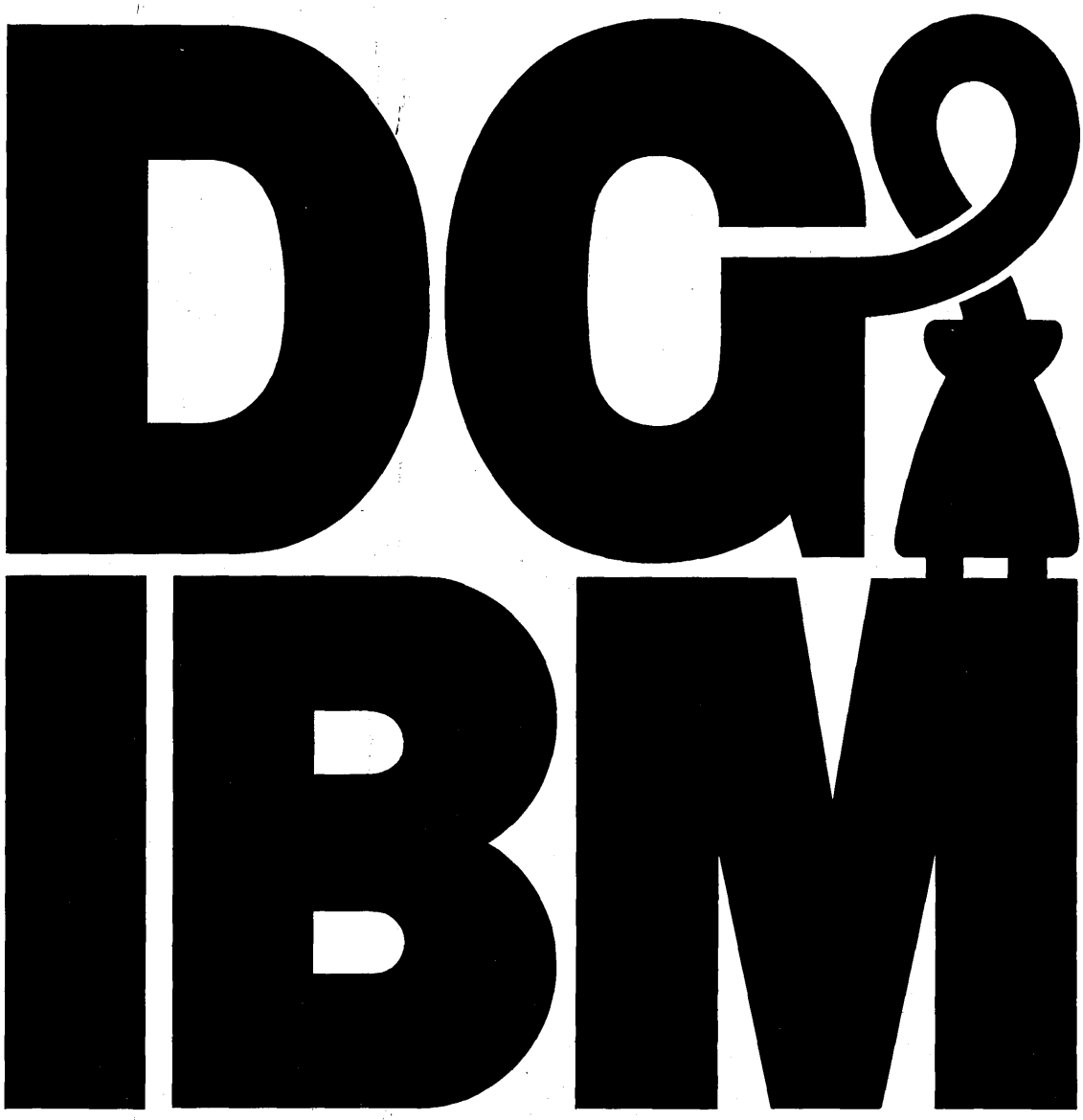
BILLERICA, Mass.—**Ontologic Inc.** has dropped its proprietary language in favor of C++ in a new object-oriented data base. The single-user version of the data base, OB2, is scheduled for release this month; a multiuser version is set for October. OB2 will run on Apollo, Sun or VAX workstations, with plans for OS/2 and VMS scheduled for the end of this year, according to Seaforth Lyle, Ontologic's chief executive officer.

Discounting On the Rise

WESTPORT, Conn.—Discounting **IBM** mainframes is increasing and not likely to peak anytime soon, says **META Group Inc.**, a research and consulting firm. Chairman Marc Butlein says that last year some 1,500 customers received IBM's Special Bid discounts, up from a mere 75 in 1980. What's more, Butlein adds, ever greater discounts can be expected as the 3090 mainframe family approaches its twilight years. The average discount increased even as IBM early this year instituted a 5% price hike to prop up mainframe price tags.

Raw, Random Data

Lockheed Corp. has added a voice capability to the indexing function of a document image-processing application from **Alpharel Inc.** of Camarillo, Calif. The system is being used routinely for purchasing and inventory control.... A **FileNet Corp.** customer is using a DEC VAX as a gateway for an image-processing application that sends bills of lading, delivery receipts and weigh bills to its various delivery sites. Ultimately, says Bob Castle, FileNet's vice president of marketing, all of the customer's delivery trucks will have a fax machine.



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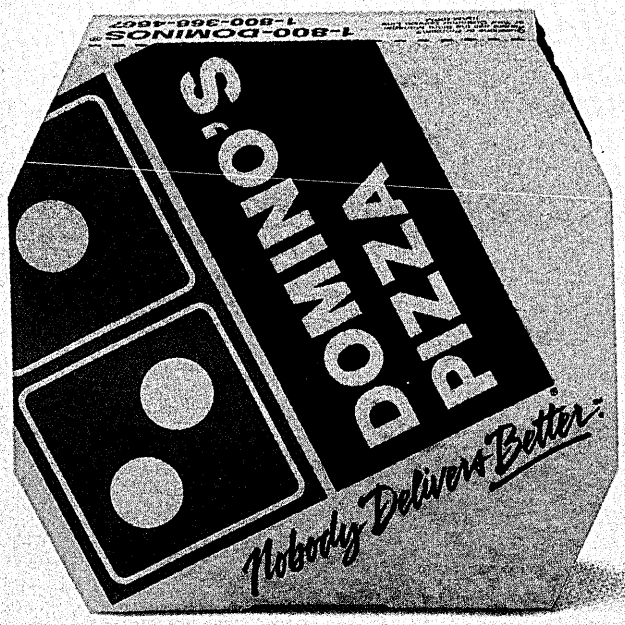

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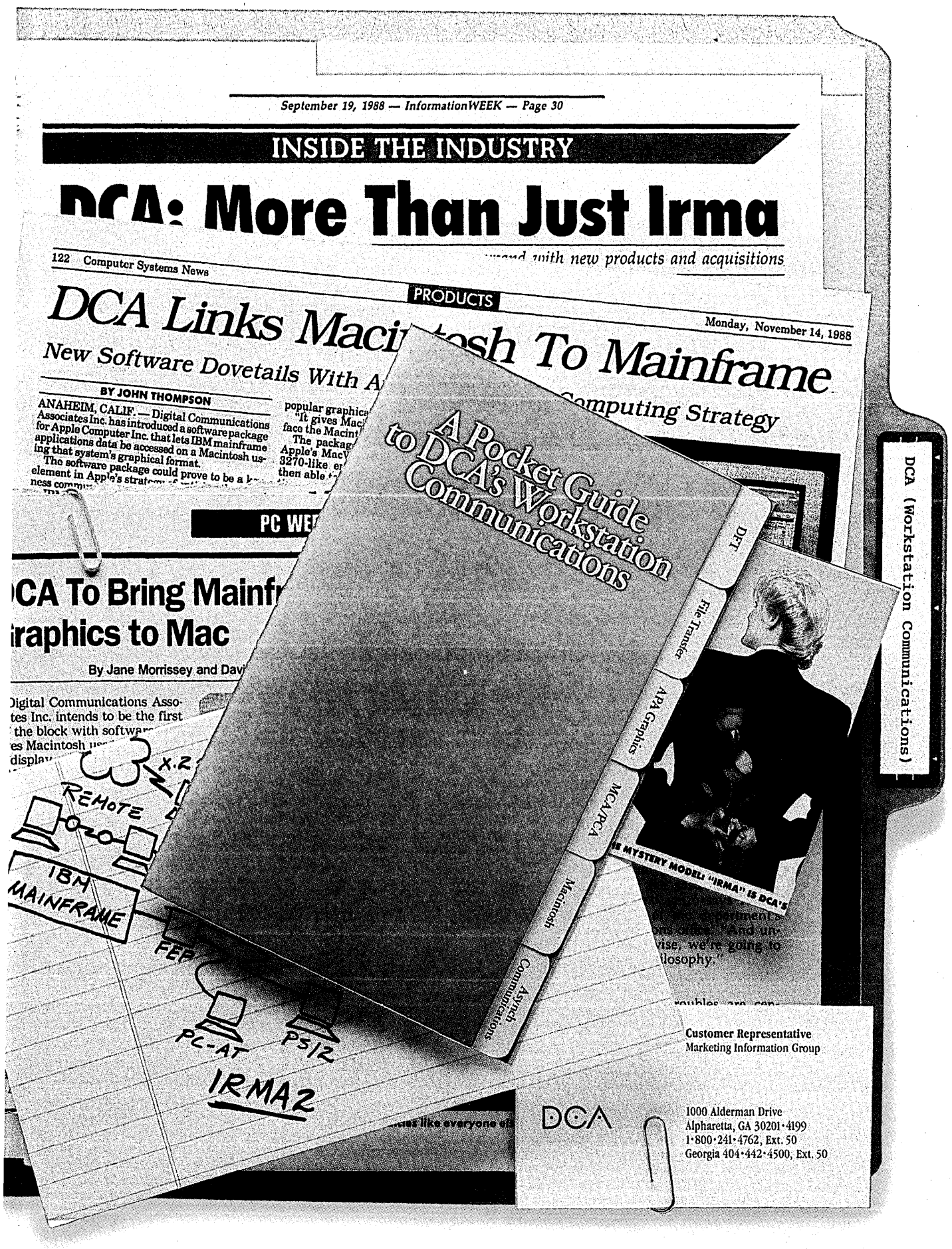

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Who's Winning the Supercomputer Race?

Cray Research's current problems, the demise of ETA Systems and the advancements in Japanese technology seem to spell doom and gloom for the U.S. supercomputer industry. But technologically, the race may not be over yet.

BY WILLIE SCHATZ

In some quarters, the handwringing has begun. Cray Research Inc., the world's foremost supercomputer maker, faltered, then split in two. Control Data Corp.'s anemic ETA Systems subsidiary expired, leaving the industry and the United States at large with only the divided Cray and an IBM-backed start-up, Supercomputer Systems Inc., that is still several years away from producing its first machine. The Japanese, meanwhile, forge ahead with ever faster supercomputers.

Could it be that the United States, the world's leader in computer technology, is losing its edge in supercomputers, perhaps strategically the most important class of computers? Could U.S. industry, particularly in its research and development efforts, be hurt as a result?

A hard look at a technological scorecard shows that handwringing is probably justified in the areas of base technology and raw computing power, if the Japanese are able to deliver the performance in their next generation of systems. But in the critical areas of systems and applications software, sighs of woe may be a bit premature.

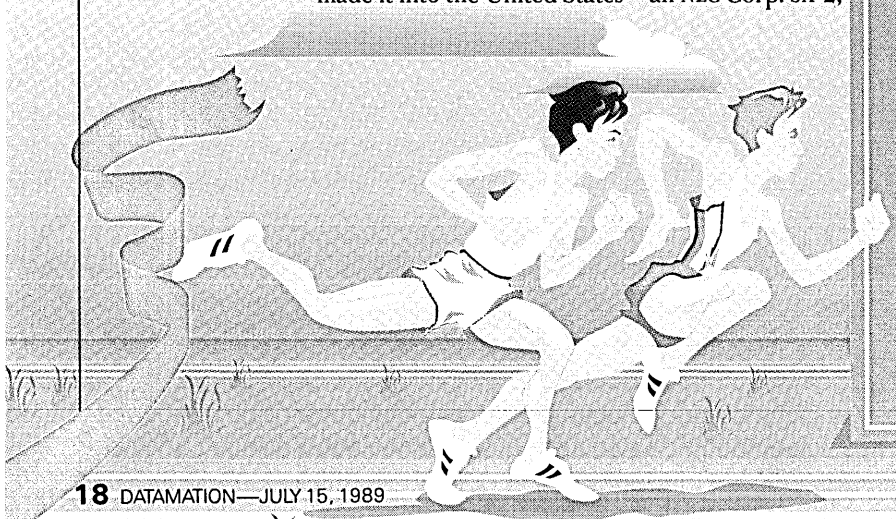
Furthermore, installation figures show considerable strength for Cray. Cray has sold 16 supercomputers in Japan, 13 of which have been installed. To date, only three Japanese supercomputers have made it into the United States—an NEC Corp. SX-2, installed at the Houston Area Research Center, and two Fujitsu Ltd. VP-100s installed at the U.S. headquarters of the Norwegian oil company, Geophysical Co.

The Japanese Edge

In terms of base technology, the Japanese seem to be in the lead. First, U.S. companies have become

The competition will char

	Cray Y-MP	Cray C-90
Base Technology	Silicon	Silicon
Clock cycle	6 nsec	4 nsec?
Memory Capacity	128 megawords	256MW
Architecture	Vector	Vector
Processors	1–8	7–16
Peak Performance	2.7GFLOPS	16GFLOPS
Operating System	UNICOS, COS, CTSS	UNICOS, COS, CTSS
Number of Applications	750	750
Availability	1988	1990
Price	$5.25 million	$5.30 milli



dependent on Japanese component suppliers. For example, Cray employs Fujitsu memory chips in its current generation X-MP and Y-MP supercomputers. Second, in terms of architecture, NEC's SX-X's silicon pipeline construction, which enables the machine to operate in parallel, beats the Y-MP's silicon vector arrangement, which does not allow for parallel processing.

In the important category of speed, the Japanese also seem to be in the lead, especially when the specifications for the coming generation of products are examined. NEC's eight-model SX-X family will first be available in the third quarter of 1990. The highest end SX-X44 supercomputer is expected to perform, theoretically at least, at 22 billion floating point operations per second. This compares with only 2.8GFLOPS for Cray's current top-of-the-line Y-MP and an expected 16GFLOPS for both the C-90 and Cray-3, due out next year.

"If performance is all that matters, I'd choose the SX-X over the Y-MP," concludes Peter Patton, director of technology assessment for the Superperformance Computing Service of the San Jose-based market research company Dataquest Inc. "For starters, it's got a clock speed more than twice as fast [as Cray's machine]. . . . Taking what's out there now, the SX-X is the most powerful machine that is deliverable the soonest." The SX-X will be marketed in the United States by the Honeywell-NEC joint venture HNSX Supercomputers Inc. of Burlington, Mass.

Cray probably wins in the software arena, but, in terms of operating systems, the lead may not last for long. Cray first came to market with a version of the UNIX operating system, UNICOS, in 1985, but NEC's HNSX may not be far behind. HNSX will make UNIX version 5.3 with 4.3 Berkeley extensions available on its first U.S. machine.

UNIX Is Key

Still, at present Cray has a head start in the form of its installed user base. Of the 220 Cray supercomputers installed in the world, 70 run UNICOS—but 120 run the proprietary Cray Operating System (COS) and 30 run the proprietary Cray Time-Sharing System (CTSS), an indication that there is much room in Cray's user base for migration to UNICOS. And currently, the three Japanese suppliers—NEC, Fujitsu and Hitachi—offer only proprietary operating systems.

And Cray may be able to capitalize further on its

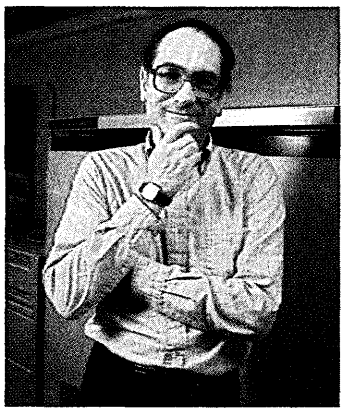
The Field of Super Contenders

considerably in the early 1990s when several new machines appear

	Cray Cray-3	SSI SS-1	NEC SX-X	IBM 3090/600S-VF	Hitachi S-820/80	Fujitsu VP-2600/20
	Gallium Arsenide	Gallium Arsenide?	Silicon	Silicon	Silicon	Silicon
	2 nsec?	1 nsec?	2.9 nsec	8 nsec	4 nsec	4 nsec
	1,024MW?	2,048MW?	256MW	32MW	64MW	256MW
	Vector	Vector	Pipeline	Vector	Vector	Vector
	2–16	16–64	1–4	1–6	1	1
	16GFLOPS?	?	22GFLOPS?	8GFLOPS	3GFLOPS	4GFLOPS
	UNICOS, COS	UNIX	UNIX	MVS, AIX, VM/CMS	Proprietary OS, HIUX	Proprietary OS, UTS/M
	500	?	50	1,250	?	?
	1990–1991	1991–1992?	1990	1988	1988	1990–1991
	$25 million?	$30–75 million?	$4–25 million	$2–20 million	?	?

Chart Illustration: Chuck Mackey

initial UNIX advantage, depending on what enhancements NEC incorporates with its UNIX offering. "If NEC brings up pure UNIX [a basic version without extensions], it's going to be a problem for people who run supercomputer centers," says Chuck Fox, assistant director of the San Diego Supercomputer Center (SDSC), citing accounting and job management problems with pure UNIX.



U.CAL.'S SUGAR says the Japanese must follow the UNIX route in the U.S.

For some users, any version of UNIX is a good version. "U.S. companies are going to UNIX rapidly, and I think the Japanese have to do the same," adds Robert Sugar, professor of physics at the University of California in Santa Barbara. "It's going to be a great day for me as a user if everyone settles on one operating system. And I don't care which one it is."

The vendors probably don't either. Having achieved considerable penetration of its user base with UNIX, Cray isn't about to stop now. That means HNSX doesn't have much choice if it's ever going to hit a U.S. home run. So the company's running native UNIX on an NEC SX-2 in Tokyo and is planning to port it to the SX-X on an arithmetic processor. HNSX is also using the SX-2 to develop UNIX extensions.

Providing the right operating system doesn't mean clearing the applications hurdle, though. Cray seems way ahead in this area, although Dataquest's Patton is not sure that strength in applications is necessarily money in the bank for Cray.

If the technological issues are complex, the political ones are downright Byzantine. The only U.S. entity barred by law from buying a Japanese supercomputer is the Department of Defense, which must purchase only U.S.-made supercomputers. But that law might as well list every other potential U.S. customer because none has violated a de facto boycott of Japanese machines.

The Political Freeze

The technological implications of such a freeze out of Japanese machines are uncertain, but some feel that users will be put at a disadvantage eventually. "To the extent that we're not importing technology from Japan—such as the Hitachi S-820 line of air-cooled supercomputers, which the U.S. doesn't have—it is to our eventual disadvantage," says Sid Karin, director of the SDSC.

So what's the United States doing about it? Not much. At press time, Japan was among the countries targeted for a "Super 301" trade sanction, the maximum penalty under the 1988 Omnibus Trade and Competitiveness Act. Having lost large chunks of the memory chip market to the Japanese, the United States isn't anxious for a supercomputer sequel, particularly as supercomputers are not only important as a market in themselves but as the means to developing other technologies and products. "It's not a good position to be dependent on your competition for real value added or product differentiation . . . something fundamental to what your customers are trying to accomplish," warned CDC chairman Robert Price at a press conference the day after ETA died.

Despite such protectionist concerns, there is some evidence that the supercomputer political climate

Supercomputer Developments in the Soviet Union

While much of the world focuses on the supercomputer competition between Japan and the United States, developments in supercomputers and related architectures are going on in other countries. And some of the most potentially significant ones, particularly in the space exploration and defense realms, are occurring in the Soviet Union.

When the Soviet space shuttle Buran lifted off last November, an Elbrus-2 supercomputer was used to manage and control the mission. Although not in the Cray class, the Elbrus-2 is just one of 10 major supercomputer developments in the Soviet Union, DATAMATION has learned.

The 10 projects are:

- Continuing research into the Elbrus family of computers at Lebedev Institute in Moscow;
- Research into Cray 1-class supercomputers at the Institute for Cybernetics Problems in Moscow;
- Development of the PS2000 and 3000 vector processors at the Control Problem Institute in Moscow;
- Work on parallel-processing at Moscow State University;
- Research into macro-pipelining architectures at the Institute of Cybernetics in Kiev;
- Development of the MARS-M supermini in Novosibirsk;
- Development of the ES2703 fine grain parallel processor at Radio Engineering Institute of Taganrog in the Ukraine;
- Development of the ES2704 fine grain parallel system at the Informatics Institute in Leningrad;
- Study of array processors, superminis and shared memory techniques, in cooperation with Bulgaria.
- Research into fault tolerant computers, thought to be continuing at the Spaceflight Control Center in Moscow.

While the West is heavily into GFLOPS, the Soviets are just starting to creep into the upper hundreds of MFLOPS. The Soviets have some basic technology problems, particularly in chip technology, that they acknowledge but are working to improve.

Soviet President Mikhail S. Gorbachev's chief scientific adviser, Soviet Academy of Sciences vice president Yevgeny Velikhov, told DATAMATION that the Soviet Union lags behind the West in its ability to mass produce very large scale integration (VLSI) processor and memory chips in the quantities needed to achieve volume production targets.

But Velikhov refuses to concede that the Soviet IS industry is dependent on the West and claims that the technology trade embargoes of the Reagan era have merely driven his country toward greater self-sufficiency.

And they are moving ahead, given the current number of Soviet projects and the Soviets' considerable technological advances since they reduced their reliance on a serviceable but obsolete class of supercomputer called the BESM-6. This ma-

Photograph by Rick Rickman

may be warming slightly. "There's been a lot of discussion about it [the wisdom of keeping out the high-end SX-X44]," says Bob Borchers, associate director for computation at Lawrence Livermore National Laboratory, which has been prevented from obtaining a Japanese machine by the Department of Energy's de facto boycott. That policy is currently under review pursuant to the DOE's commitment to conducting open procurements for its supercomputers. The Japanese will find out next summer if the DOE means what it says when the agency releases its first procurement since the SX-X announcement.

"I'm urging DOE to face the issue up front," says Borchers. "I don't want to have HNSX win the contract and then sit for two years while politics holds things up.

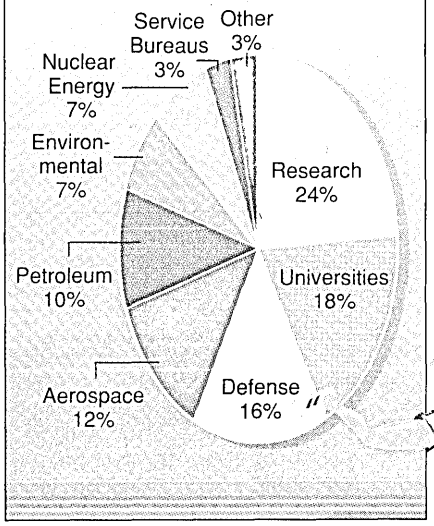
Adds Karin: "The industries that use supercomputers are far more important than [the issue of] who builds the machines. . . . How important it is to have a domestic supplier is open to debate."

Cray Against the World

Meanwhile, the debate about the health of the domestic industry also continues. ETA's death removes one competitor from the supercomputer scene. A prospective competitor on the horizon is IBM, which has invested in Supercomputer Systems Inc. of Eau Claire, Wis., started by former Cray designer Steve Chen in 1988. SSI, however, is not expected to roll out a machine until 1993.

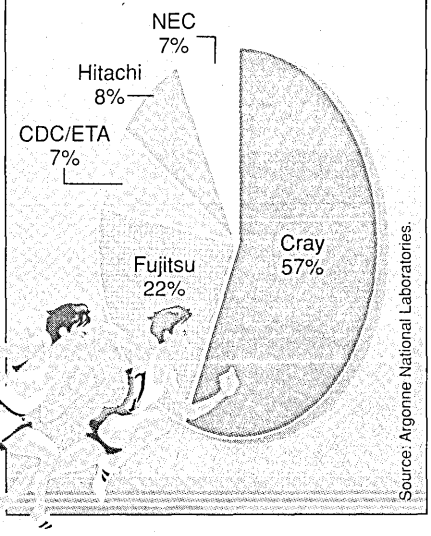
Where Supercomputers Are Used Worldwide

Research institutions are by far the biggest users of supercomputers.



Not Surprisingly, Cray Is the Market Leader

But combined market share for the Japanese adds up to 37%.



Source: Argonne National Laboratories.

That leaves Cray, which is having both financial and technical troubles. Cray reported a 94% decrease in first-quarter revenues, producing an operating loss of $1 million. On the technical side, problems with the gallium arsenide chips that will power the Cray-3 have delayed its release by about a year. The Cray-3 is now being developed by Cray Research's founder, Seymour Cray, at the company that was split off from Cray Research—Cray Computer Corp. of Colorado Springs, Colo. The Cray-3 is now expected sometime in 1990. Cray Research's upcoming C-90, which relies on silicon-based chips, is also expected next year.

So, whether Cray is considered one company or two, it remains a de facto monopoly in the United States. But perhaps not for long. NEC may be planning to start manufacturing the SX-X family at Honeywell's plant in Phoenix. According to a knowledgeable source, such a move has already been presented by HNSX president Jim Berrett to the Energy Department if the DOE would agree to accept the first SX-X off the line.

While the conclusion of the supercomputer race may still be an open question, some observers see important implications in the fact that the race has become so close.

"How did supercomputers become equivalent to the snail darter?" asks Samuel Adams, vice president of marketing at HNSX. "Because U.S. companies lost their semiconductor lead, spent nothing on R&D and were satisfied with what they had. It got to the point where critical technology wasn't practical to manufacture in the U.S."

"This is like a relay race," adds Dataquest's Patton. "Japan's won the third leg. The U.S. is going to run awfully damn fast to catch up before the finish line." ▭

chine is the computing backbone of the Soviet's successful manned spaceflight program.

In recognition of the throughput limitations of the BESM-6, development started in 1978 on a 10-multiprocessor system that would be able to offer up to 10MIPS, 10MB of main memory and a word length of 64 bits. Called the Elbrus-1, the computer encountered problems and never went into production. In 1984, the design was changed, and the machine was relaunched as the Elbrus-2. A fully configured Elbrus-2 cluster with vector processors can achieve around 200MFLOPS.

The Soviets loathe revealing production numbers, but DATAMATION's sources have learned that at least 10 Elbrus-2s, and possibly as many as 20, have been installed. One is at the Moscow Spaceflight Center, where it is currently managing the unmanned "Phobos" Mars probe. According to academician Oleg Belotserkovsky, director of the CAD Institute at the Academy of Sciences in Moscow, an Elbrus-3 will show up next year and an Elbrus-4 in 1995.

But the Soviets' most significant moves appear to be in the development of specialized processors and neural computing. Specialized processors, such as the PS2000/3000 and ES2706, can be plugged into a variety of host CPUs. Work on these parallel systems may prove to be the most fruitful of all Soviet developments. But until they cure their manufacturing and semiconductor ills, only the military and space sectors will benefit.

--By DATAMATION correspondents

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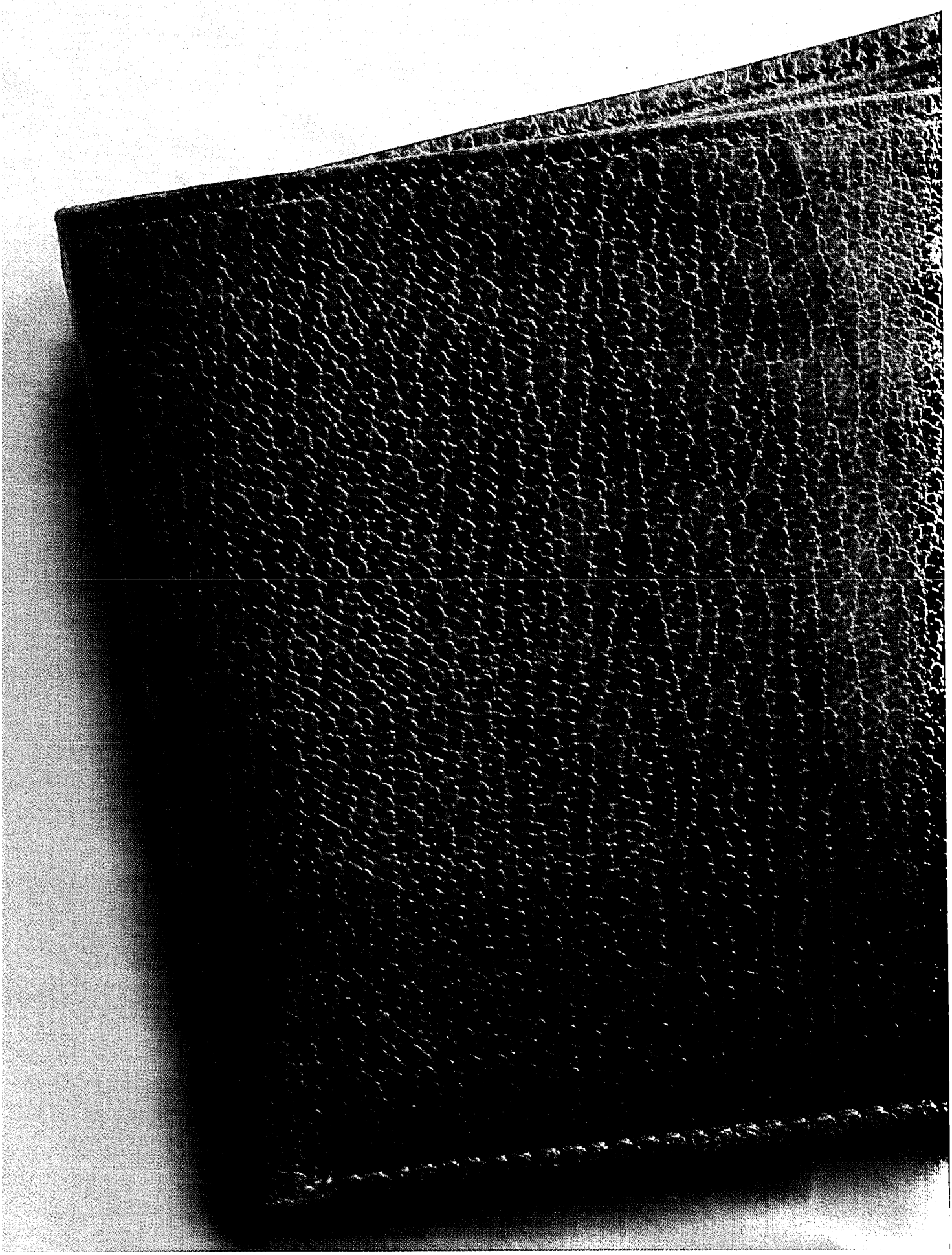

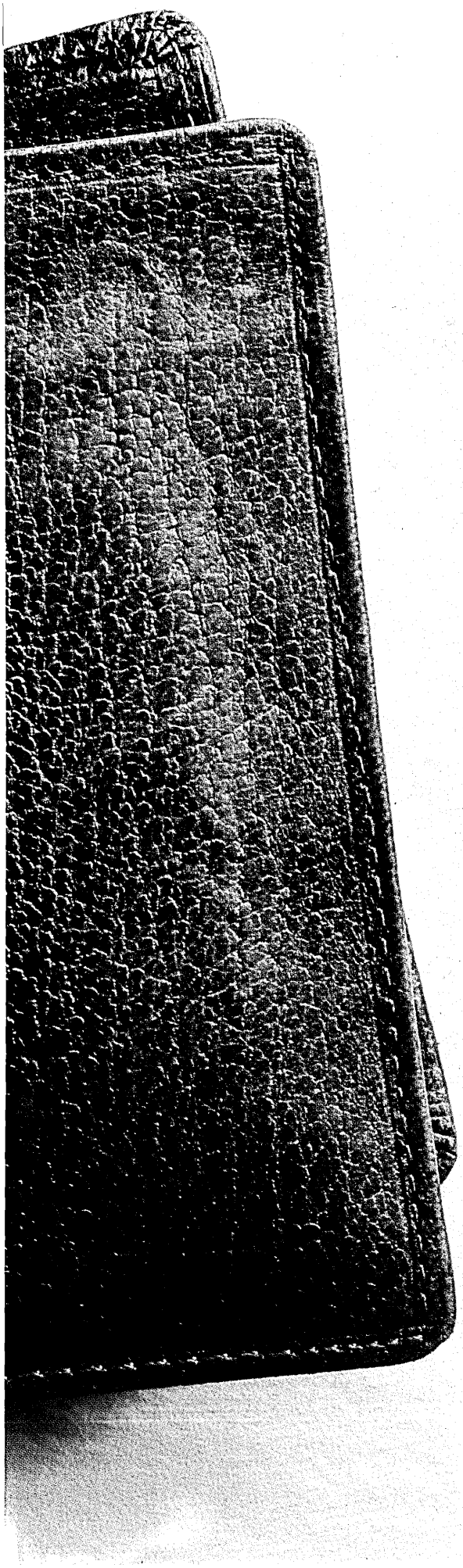

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IBM's VSE: A Victory for the Techies?

IBM isn't thrilled by the dogged loyalty earned by DOS/VSE. But Big Blue is making conciliatory moves toward DOS diehards.

BY RALPH EMMETT CARLYLE

William Gehring saw the future: machines pushed to the limit, maxed out to within an inch of snapping, patched and partitioned to death—jury-rigged systems running under an operating system that seemed to him to have no future.

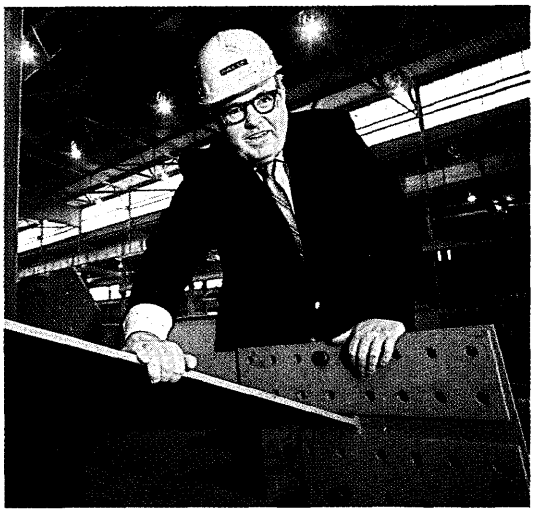
Back in 1986 it seemed obvious to Gehring, vice president of management information systems at Foster & Gallagher Inc. in Peoria, Ill., that IBM wasn't committed to his company's mainframe operating system, DOS/VSE, and was not improving it at a rate that inspired confidence. Like other high-growth companies, his direct-marketing and mail-order concern had been targeted by IBM for migration to its flagship operating system, MVS, which the computer giant liked to call the door to a bright future.

Such pressure brought on a crisis in Gehring's thinking. What was his solution to be? On the one hand, VSE extensions could be squeezed out of IBM; indeed, innovative customers constantly came up with their own, which they willingly shared at no fee. On the other hand, MVS—no jury-rigging here—was designed to get the maximum out of mainframes and make more efficient use of the larger processors that were yet to come. IBM claimed that MVS would be automated to the point that customers could run peopleless, or lights out, data centers, leaving IS executives to focus on their business.

Gehring had heard stories of how horrifyingly expensive MVS was and how its adoption would cause traumatic change in his 4381-based MIS department. Like many of his peers in the VSE community, he had an acute case of conversion fear and had been postponing a decision. He was still fearful when IBM offered his company a chance to beta test new "big bang" migration software, so called because of the intensity and short duration of the conversion process. But Gehring decided to bite the bullet. Technically, he says, it came down to either patches or props for VSE or the uncharted waters of MVS.

"But that wasn't the clincher," he remembers. "What it all boiled down to were business, not technical, considerations. Foster & Gallagher was growing at 25% a year compound, and we had to position the MIS department in such a way that it would be responsive to such growth."

Gehring figured the costs of staying with VSE (and jury-rigging) or migrating to MVS were about even. But, two years after his conversion, he admits that he was wrong. "We've had to hire more MVS specialists than we'd anticipated—seven as opposed to two, for example." Nevertheless, the IS executive is convinced he made the right move. "We have the IS avenue for growth we were searching for," he concludes. "We don't impede the business side of the house as much as we used to and can be a useful partner."



CAROLINA STEEL'S RICE: IBM isn't about to mess with 30,000 DOS/VSE customers.

IBM reached some conclusions, too. The company assumed that Gehring was representative of its DOS/VSE base. When details of the giant's designated umbrella for strategic software products, Systems Application Architecture (SAA), emerged in 1987, DOS/VSE had no part in the grand scheme. Like an ugly duckling, it was excluded from the family of SAA-based operating systems: MVS, VM, the System 3X group OS and OS/2. This strategy could only have been reinforced

Photograph by Jim Stratford

by merger mania and corporate insistence on a simpler IS operating environment and fewer operating systems.

Gripped by conversion fears, a number of large corporations had opted for horizontal growth for their installations. Using VM as the control program, they kept adding more and more DOS/VSE licenses as guests running under VM rather than leaping into the unknown. One large, New York City-based organization took jury-rigging to the point of absurdity—some 250 DOS/VSE licenses under multiple VM hypervisors, according to one source—and is just now migrating to MVS in an effort to achieve a single-image system for end users.

There are also stories from consultants about corporations with 20 or more DOS/VSE data centers now busily consolidating around a few mega-MVS centers. Such tales are doubtless comforting to IBM strategists who have relegated DOS to the status of an also-ran. But this doesn't tell the whole story.

Growing evidence suggests that IBM has been forced to re-examine its position on DOS/VSE. Highly vocal DOS diehards are surfacing all over the industry. They're refusing to allow their operating system to become an IBM sideline, and they are insisting on parity with IBM's so-called strategic offerings. Further, they've been making gains and squeezing concessions out of IBM: a prelude, the more optimistic DOS supporters believe, to the elevation of their operating system to the more Olympian heights currently enjoyed by VM.

Over the past year IBM has:

- Offered the first native mode support for DOS/VSE on a 309X class large mainframe—albeit under a hardware-based implementation of VM;
- Shipped or announced an unprecedented three new releases of the OS, adding many new functions—for example, offering as official IBM products customer-created enhancements such as a "code patch," which extends VSE's maximum virtual storage capacity from 40 to 128 megabytes (see "Orphans of the Storm," March 15, 1988, p. 69);
- Introduced an SAA programming interface for CICS under DOS/VSE, which, in essence, positions the VSE-based mainframe as a remote software development and distributed-processing node to giant MVS-based data centers;
- Dropped its tactics designed to hustle customers into VSE-to-MVS migrations and adopted a more supportive attitude toward VSE. (This, according to sources from the IBM user group GUIDE and confirmed by an informal DATAMATION poll of about a dozen VSE accounts.)

A report published in late 1987 by GUIDE listing many of IBM's shortcomings in the VSE arena and a more belligerent, united-we-stand approach from customers are two of the forces that have made IBM re-examine its position. But perhaps the greatest trigger was IBM's 9370, Big Blue's much-hyped "VAX killer," which debuted in 1987. IBM insiders had expected 70% of the machines to run VM (a number not confirmed by IBM official spokespersons), and they were amazed to find that VSE was at least as popular a choice at established accounts as the strategic VM. The upshot is that MVS customers are now demanding that their existing VSE-based 9370 nodes be provided with more SAA interfaces.

"IBM was really taken by surprise," says Michael Braude, a vice president at the Gartner Group research house in Stamford, Conn. "This unexpected show of support for VSE really threw a wrench into their plans."

Rather than shrinking, as IBM had hoped, its DOS/VSE base is actually growing. If Braude is right, the base is expanding at 12 or 13% a year. Gartner and other research companies put the base at some 28,000 licenses and 20,000 installations worldwide, just a shade behind VM, the most widespread IBM OS. IBM's senior product administrator for DOS/VSE, Bob Wilson, says he's comfortable with those numbers.

IBM must now come to terms with the (formerly) unthinkable: more customers want to get on the DOS roundabout than get off. When you consider that MVS customers spend an average of six or seven times more for the software licenses than VSE equivalents (according to GUIDE) and, in addition, require much costlier hardware, the hale and hearty condition of its venerable 23-year-old DOS and its descendants—VSE came along in 1980—is a big blow to the Big Blue exchequer. The migration of thousands of VSE customers to MVS would add billions of dollars to IBM's coffers, but apparently the best IBM can hope for is hundreds per year for the foreseeable future. Jim Byrne, conversions products manager for Computer Associates International Inc. in Garden City, N.Y., estimates that no more than 500 customers world-

Migrations From DOS: Some Tips From the Experts

If you're planning a migration from VSE to MVS, prepare for some hidden costs and a few shocks you've probably not thought about. "The cultural change is the biggest eye-opener of all when you move to MVS," says Bert Walker, president of Caterpillar Information Services. The Peoria, Ill., concern should know: it converted all but three of its 30-odd plants and all its dealers from VSE to MVS. The company's technicians got so good at making the migration that they were spun off as an independent business unit early in 1988.

"By the time they move to MVS, your MIS staffers will feel that they've had a frontal lobotomy," quips Walker, who adds that the process isn't funny when it's occurring. For technicians accustomed to the "Dumb Operating System," MVS comes as a great shock. "With DOS it's people controlling relatively low-tech technology. They create the partitions; they make the software dance to their tune. With MVS it's different," he says, noting the well-known interpretation of those three letters: "Man Versus System." Here the system takes over, does the scheduling and increasingly turns all of the people into adjuncts.

"All, that is, except a cadre of highly skilled and highly paid MVS specialists," says Walker, who notes that the best of these specialists can sometimes earn more than the MIS director, and neither training nor added salary costs are often factored into planning.

Walker warns that much attrition will occur. "After months of training, your newly created MVS staffs suddenly discover how employable they are on the outside. Many will jump ship." Look out, says Walker, if you live in popular East and West Coast locations characterized by high staff turnover. Caterpillar doesn't have that problem, since its Peoria, Ill., location in the heart of the U.S. Midwest isn't exactly high fashion.

"Always remember," says Computer Associates' conversions products manager Jim Byrne, "that conversion software is disposable software (unless, of course, you can get into business like Caterpillar). Throwaway money. Your investment is in the target environment, and you should know exactly what you're getting into."

Byrne claims that the disposable nature of conversion resources makes renting or buying a solution on the outside preferable to doing it yourself. It's ironic that if CA boss Charles Wang gets his way, and software platforms that de-emphasize the differences between operating systems take hold, Byrne could be out of a job. Such are the vagaries of the computer business.

wide migrated from DOS/VSE last year. IBM wouldn't divulge its own figures.

Is DOS's resilience a victory for the techies who refer to the software as their "Dumb Operating System" and, like so much clay, mold it to suit their will? Are they now bending IBM to suit their will, too? "We're pressuring IBM to offer us full SAA-compliance for VSE applications running under VTAM and CICS, the two interfaces programmers most see when developing applications," says Pete Clark, a veritable one-man technology group at portrait photography firm Olan Mills Inc. of Chattanooga, Tenn., where he functions as systems programming, database and data communications administrator. He believes IBM will oblige, just as it is currently doing, by working with customers to create a private address space for VTAM, freeing up more available address space to mount extra CICS applications.

Clark and other more vocal DOS advocates also expect IBM to legitimize a new 15-partition VSE design created by a customer in Sacramento, Calif. (a partition is an address space in which customers can mount a new application). IBM currently supports only a 12-partition limit.

Do these victories point to a change of strategy by IBM? Computer Associates' Byrne thinks not. "IBM is offering sops: small incremental improvements. This is the price the company must pay to keep its client base happy." IBM's Wilson says nothing to counter Bryne's view that DOS/VSE "is, and always will be, a 370 architecture for the small and midrange customer." If you want the extended addressing that supports such sophisticated applications as image, voice, video and emerging relational database technology, then as Wilson puts it, "MVS is the operating system for you."

Charles Rice, MIS director at Carolina Steel in Greensboro, N.C., has been with DOS since the late 1960s, when it was resident on a puny 64K machine and took up a mere 4K of memory. Today, his DOS/VSE takes up 512K of memory out of the 16MB of real memory available. "When we've pushed for enhancements, we've gotten them," he says simply. Rice sees no reason why IBM won't push through the current architectural limit if customers demand it. "You don't mess with a base of 30,000 customers, do you?"

Given their recent gains, the DOS techies could be capable of anything—even pushing IBM beyond the current 24-bit architectural limits supported by VSE. But as Foster & Gallagher's Gehring explains, the DOS/VSE techies may be better at fighting IBM than tackling their own management. Olan Mills' Clark concedes that top managers often buy into MVS over the objections of technical staffs and MIS directors. He cites one case, a midsized concern in the western states that produces and retails its own commodity—like Foster & Gallagher, a high-growth company targeted by IBM for migration.

"Though opposed to the idea, top officers forced the MIS director to migrate, an exercise that consumed four people, 18 months of time and some $2 million," asserts Clark. "Now at MVS, and paying almost seven times more per month for software, the company doesn't feel that the IS department's responsiveness to business needs has improved one iota."

☐ Large Users Unexpected Show Of Support For DOS/VSE On 9370 Took IBM By Surprise.

While IBM seems to have backed off its old migration pressure tactics, the company is doing nothing to dispel the notion that its upcoming relational data dictionary and repository and related SAA-based CASE tools are reserved only for its elite operating systems. IBM's Wilson wouldn't comment, but Computer Associates' Bryne anticipates the move and says it will reinforce the perception that VSE is on the outside.

Clark and his DOS peers say they will continue to carry on the fight, even though they are heartily sick of constantly having to defend the operating system. "It takes away so much time from the job we're paid to do, namely, squeezing the most work out of our production machines as we can."

Though macro trends such as consolidation and merger fever appear to be working against the DOS community, one coming trend may work to its advantage: portability. Computer Associates is intent on providing the SAA bridging and interfaces that VSE customers need. CA's plan is to provide high-level business interfaces that make academic any differences between IBM operating systems. Put another way: if IBM won't support DOS/VSE in an SAA world, CA will. Other software and DBMS companies have begun to pursue similar strategies.

Of course, such software won't be inexpensive, and as Clark notes only half in jest, "We'll all end up CA's prisoner instead of IBM's." ▭

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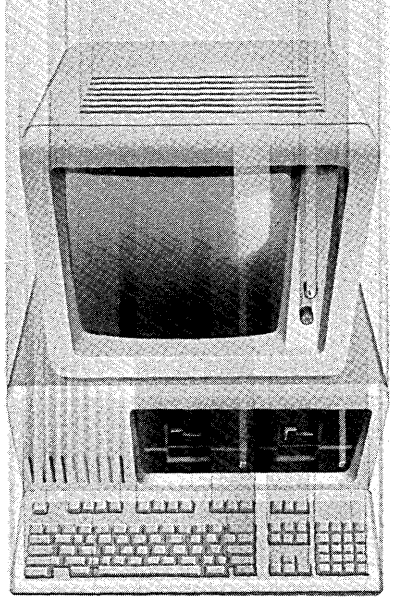

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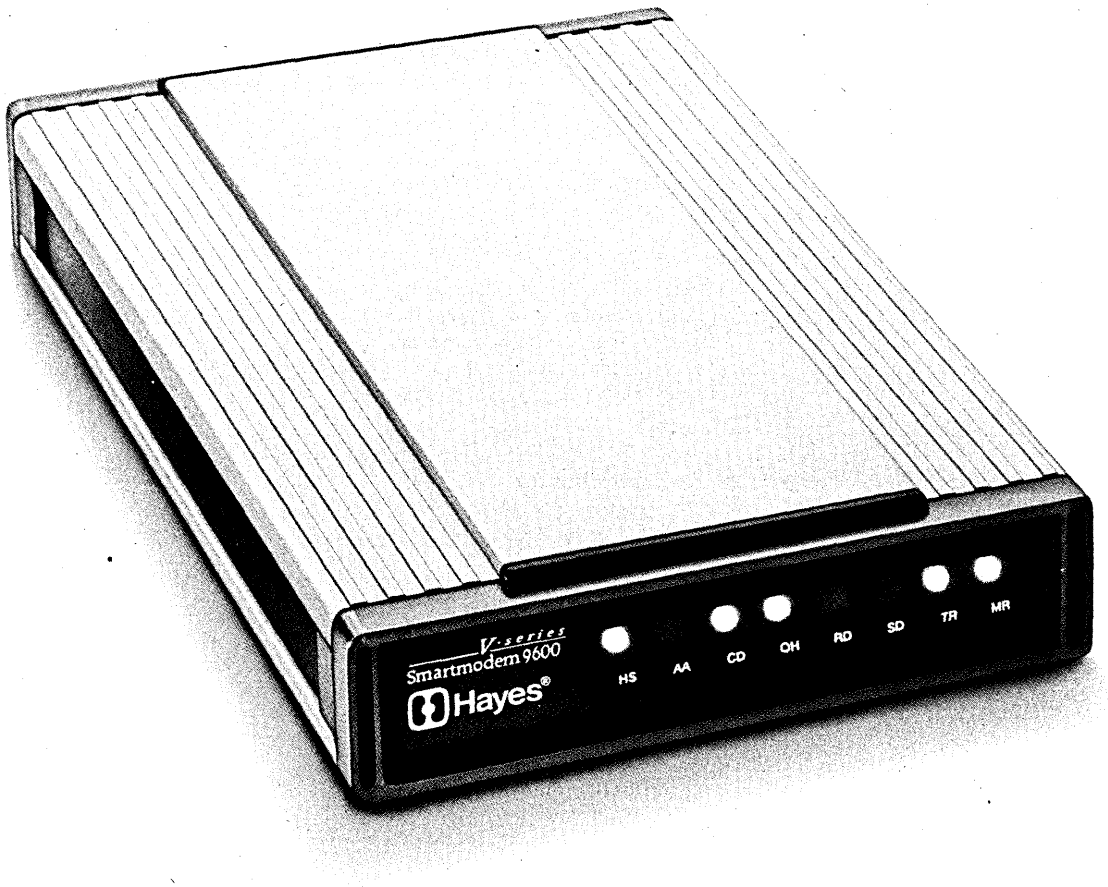

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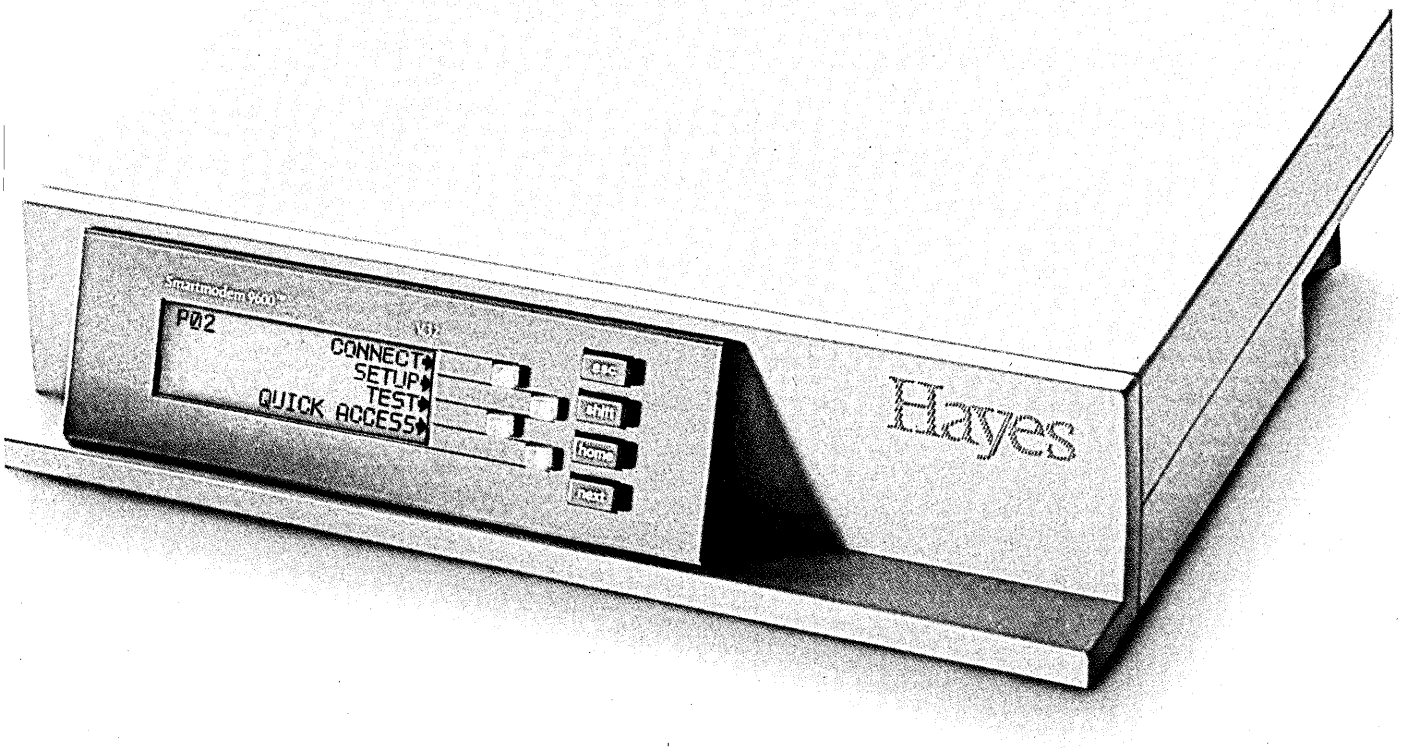

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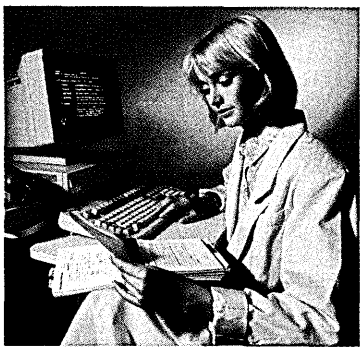

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Circle 16 on Reader Card

Muddy Waters

A surprise for Lotus users—dual 1-2-3 upgrade paths—prompts many to revisit their migration strategy. The heretofore undisclosed release 2.2 casts some plans adrift.

BY BOB FRANCIS

Richard Wonnell feels like he's waist deep in Big Muddy as he ponders the new spreadsheet choices before him. As personal computer coordinator for VF Corp.'s Wrangler Division, Wonnell is one of many now reassessing his plans in the wake of Lotus Development Corp.'s decision to launch dual 1-2-3 spreadsheet upgrades.

Wonnell—like thousands of others who waited as Lotus twice delayed upgrades of 1-2-3—is no longer so certain of his company's spreadsheet course. Two upgrades—the long-awaited release 3.0 and a surprise addition, release 2.2—wasn't exactly what anyone had expected.

Wonnell and many other longtime Lotus users say that release 2.2 is the least costly upgrade, but it won't be generally available until September. So Wonnell at the Greensboro, N.C.-based jeans maker, which waited two years for the delayed 3.0 upgrade release, now waits to compare it with release 2.2, a version tailored to the smaller memory size of first-generation PCs. And, Wonnell is by no means alone. Many of the PC and IS managers who made 1-2-3 a virtual corporate standard are midstream in their spreadsheet plans.

"It's a complex and difficult decision," says Jeff Knepper, director of advanced technology at Touche Ross & Co.'s tax division in Washington, D.C. "Before [release 2.2 was announced], it was much simpler. Then, your choices were: stay put, change to release 3.0 or go to a third product. Now, you've got four choices. It makes the decision either very complex or very easy. If all you've got is [first-generation] 8088 machines, it's pretty easy. For those who don't, it's much more complex. Most of us are in that boat," he says.

The two 1-2-3 upgrades create separate versions appropriate to different PCs, depending on the nature of their microprocessors and graphics adapter support. Lotus is targeting release 3.0 for relatively newer PCs incorporating the Intel Corp. 80286, 80386 and 80486 microprocessors. Release 2.2, which contains some new ease-of-use features and other enhancements, accommodates the smaller memory size of first-generation PCs.

File Formats Differ

But, there are other considerations. Architecturally, release 2.2 is a direct successor to the widely used version 2.01 and is compatible with the hundreds of third-party add-in packages. In contrast, release 3.0 is written largely in the portable C language. Although compatible with the 2.01 version in terms of data and functions, release 3.0 includes a new file format that prevents it from being used with existing 1-2-3 add-in packages. However, the 3.0 version has an extensive set of application interfaces called the Lotus Add-In Toolkit (formerly known as Lotus Extended Application Facility). The toolkit lets spreadsheet, data base and other packages supporting the toolkit interfaces function as unified applications.

Such differences have muddied the waters for IS managers interested in upgrading immediately. "We're asking ourselves, What features will Lotus release 3.0 have? What will release 2.2 have? You can't really tell . . . until you put them to use, play with them and see what they do. So, right now, I'm simply waiting," Wrangler's Wonnell says.

Many larger companies are putting off the choice, agrees Mary Spark, a product manager for Corporate Software Inc., a Westwood, Mass., PC software distributor. "The evaluation cycle will be somewhat delayed for the need to look at both products at the same time," she says.

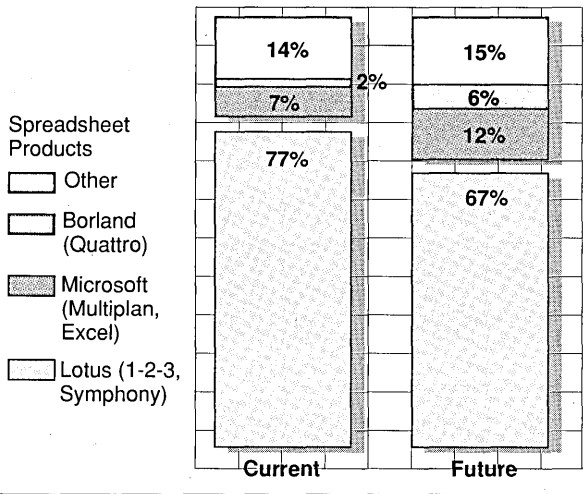
The question of add-in support and the hefty memory requirements of release 3.0 suggest that its appeal will be restrained—at least for the near future. Frank A. Ingari, Lotus vice president and general manager of the PC Spreadsheet Division, declines to comment on sales expectations for the two upgrades. However, he says: "We don't see [release] 2.2 as release 3 junior. . . . release 2 will live a long time. Those 6 million [first-generation PCs] won't go away." Furthermore, Ingari says, the new toolkit interfaces may not be permanently excluded from release 2.2. "There is the question of resource allocation," says the Lotus executive.

The parallel development of releases 2.2 and 3.0 suggests that separate upgrades may only be a temporary response to the heightened com-

In a Down Direction

Lotus 1-2-3's market share was expected to decline, according to a survey of DATAMATION readers conducted before the dual upgrade announcement.

% OF RESPONDENTS USING A PARTICULAR SPREADSHEET PRODUCT



Source: DATAMATION/Cowen & Co. 1988 Survey.

petition surrounding 1-2-3. Although Microsoft Corp.'s Excel spreadsheet already offers fancy graphics, it also requires the more expensive, second-generation hardware. And, although Bor-land International Corp.'s Quattro runs on first-generation PCs, it does not offer the same sophisticated graphics of Excel or of 1-2-3 release 3.0.

OS/2 Is Behind Two Versions

Lotus hadn't initially planned on the dual upgrade. "Really, release 3.0 was first considered as an OS/2 product. When we saw that OS/2 was not going to take off as quickly as some early projections indicated, we began preparing it for a DOS platform, as well," says Chris Randles, senior product manager for 1-2-3. Still unclear is the ease of upgrading from release 2.2 to release 3.0. For instance, Lotus expects most add-in software developers to create separate versions for 3.0. Even so, Lotus has disclosed neither a policy nor pricing for upgrading its own add-ins from 2.2 to 3.0.

Lotus currently accounts for about 77% of all PC spreadsheet installations, according to the DATAMATION/Cowen & Co. 1988 Mini/Microcomputer Survey. However, that same survey projects a decline to a 67% share by the end of this year, while predicting that Microsoft's market share will rise from 7 to 12%, and Borland's share will triple from 2 to 6%, according to the summer 1988 survey of IS managers. (See "The Purchasing Outlook," November 15, 1988, p. 18.)

Yet, for those who abandoned 1-2-3 for other spreadsheet suppliers, it's not been all wine and roses. "We're in the process of changing our spreadsheet, or at least wanting to change our spreadsheet, but it's very difficult to discard that investment in Lotus 1-2-3," says Jake Parrott, end-user computing supervisor at Food Lion Inc. of Salisbury, N.C.

Food Lion recently designated Quattro as the corporate standard for PC spreadsheets. However, not all the company's users accept the change. "Some of the people in our analytical group are not happy with some parts of Quattro. It's like Lotus is a part of their PC, not just a software package," he says.

Still, Parrott says, Quattro does not force the company to make the hardware choices associated with release 3.0. "We run a pretty tight ship here. Even though we're adding PCs all the time, we're not going to have a wholesale move to 286 or 386 machines unless it's cost justified from A to Z," he says.

Hardware Upgrades Expensive

The issue of hardware upgrades isn't confined to Lotus, says Touche Ross' Knepper. "Excel would trigger a platform change . . . due to the graphics needed. So, just like [for] Lotus [release 3.0], the decision is not just a software issue. If you've got to buy a [Video Graphics Adapter] or [Enhanced Graphics Adapter] display, a mouse and get those working, it gets to be expensive, and it gets to be complex," he says.

"You're not just going out and buying a new piece of software anymore, you've got to commit to the right hardware as well, and that kicks it up into a whole different realm," says Knepper. From his perspective, the days of standing on the river banks are long gone. ▭

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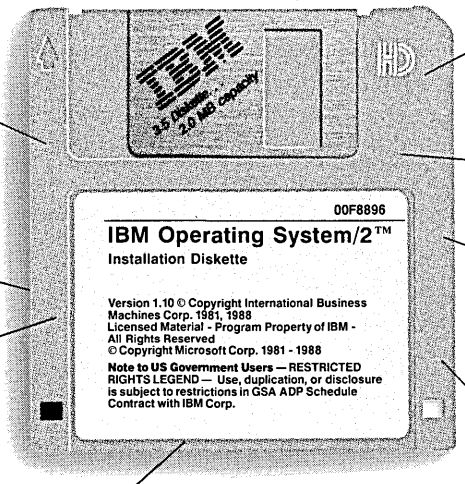

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Point of Access

Having gained control of their corporations' ubiquitous PCs, IS managers are now faced with a resulting boom in on-line data base services that itself is crying out for IS control.

BY LEILA DAVIS

To control access costs, maintain order on their networks and make sure their company is getting the best information, IS managers increasingly are thrust into the role of administrators of external on-line information services, as those services are requested by everyone from chief executives to financial analysts to secretaries.

"We are responsible for maintaining the information structure—the hardware and disks, the software, the PCs, the mainframes and the LANs. So we want to make sure that if a user is going to access an on-line data base, it works as smoothly as we would want our in-house access to work," says Chester Romaniak, vice president of IS for Teleglobe Canada Inc., the huge Montreal-based communications carrier.

"I'm not sure if we will ever take over the management of on-line data bases completely, but access must be controlled," Romaniak adds. "Just as the company doesn't give long-distance dialing capability to everyone, it shouldn't give dial-up access to everyone."

Other IS managers have reported an increase in requests for on-line services that are different from the simple hookups requested a few years ago. Frequently, they say, the user knows the kind of information he or she wants, but no longer has a specific data base service in mind. It is falling more and more to the IS staff to do that research.

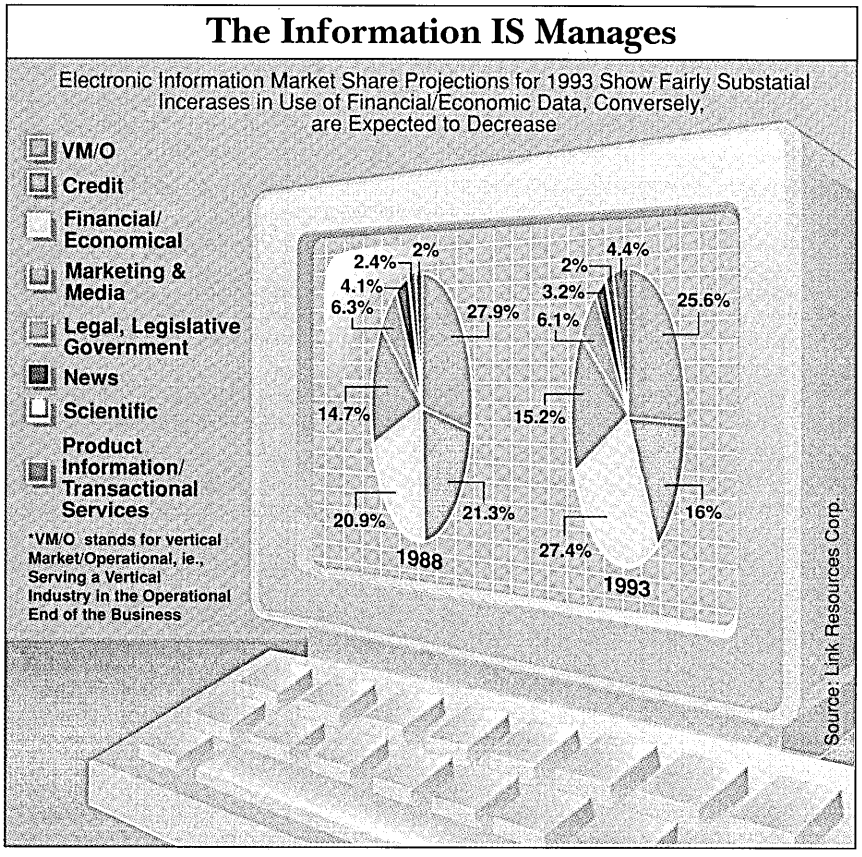
Exploring the Options

"We are a lot more involved in on-line services than we were two years ago," says an IS executive at a major securities firm who asked that his name not be used. "There is an increased need from users and increased business requirements. When the user has a need for outside data, it is up to IS to explore the options."

"We work with the user to make the selection. We would point out the technical issues—any technical shortcomings that the nontechnical person would not observe," the securities executive adds. "We look to the vendor to provide user training, but we also make sure that one IS person goes through the training for each on-line service [purchased]. That way, there is always someone in IS who knows the service, can address technical questions to the vendor and can answer user questions if there are problems."

At Central and Southwest Services Inc., an electric and gas utilities company based in Dallas, IS also serves as a clearinghouse for on-line services requests. "We don't decide on the value of the need, but our job is to go about bringing that service into the company. We identify what data bases are available, the user chooses one and we make it happen," says Dick Groff, manager of EIS planning at the utilities company.

"On-line data base services have to come under IS for any number of reasons," says Steven Sieck, vice president



of electronic services at LINK Resources Corp., a New York City-based on-line services market research firm. "A lot of external information is most valuable when combined with internal information; for example, incorporating external and internal data on one graph. The more external information is integrated into the internal information sources, the more valuable it becomes. Obviously, IS must implement the tools to enable this."

Some companies' libraries still administer on-line services, but with increasing support from IS. At Marriott Corp., based in Washington, D.C., the legal department heavily uses the services of Dayton, Ohio-based Mead Data Central Inc.'s Lexis and Nexis on-line data bases.

For five years, these services were accessible only through a dedicated Mead terminal in the law library, according to library information specialist Elizabeth Wetzel. But two years ago, with the help of Marriott's IS staff and Mead, lawyers, paralegals and administrative staff gained access to Lexis and Nexis through the Wang Laboratories Inc. terminals on their desks. The new setup provides the lawyers with information on case precedents, and provides them with a data base of U.S. state and international laws that would take up too much room in the library in book form.

To avoid overloading the already-stretched legal department network, IS has limited access to no more than three Wang users at any time. The fourth user receives an "access denied" message and can try again later or go to the library.

"Mead came to us with the option of providing access to our Wang systems, and IS installed the Mead software. Our systems people had to modify the software somewhat to accommodate our terminals," says Wetzel. "Then the systems people came up with a set of instructions for the attorneys on how to access the data bases from the Wang computers. Mead did not have any written documentation for the systems, but it did provide the initial training."

Wetzel says members of the systems staff attended the Mead training and are available for emergency questions on access and on problems related to the Wang computers. The library remains responsible for training new users, and billing for the data bases comes to the library.

☐ COORDINATING ON-LINE ACCESS CAN PROVIDE A COMPANY WITH VOLUME DISCOUNTS.

IS Can Get Discounts

As for costs, LINK Resources' Sieck points out that as individual PC users accessing numerous data bases proliferate without corporatewide coordination, companies lose opportunities for volume discounts. "The information squires really want to have one point of contact within a company. They don't want to sell information by the drink," he says.

"Coordinating the on-line accesses within a company provides the economic incentives to allow the broadest use," says Sieck. "This doesn't limit users' ability to get the information they need, it enhances it."

Fred Holahan, director of in-house computing products at Interactive Data Corp., a Lexington, Mass., subsidiary of Dun & Bradstreet Corp., agrees. "In brokerage houses, when the individual was procuring services himself, he had no leverage, no discounts for volume. Coordinating access through a company allows IS to use the corporate budget much more wisely," he says.

Indeed. Teleglobe Canada's Romaniak says IS monitors the use of the on-line services to "evaluate the value we are getting. This way, we can see what we are spending. When we look at the bills, the executives can decide clearly if Dow Jones or any other service is worth what they are paying." Cost control and the appropriate distribution of information are two of Romaniak's main concerns in monitoring on-line services, since the firm has almost as many PCs as it has people. "By the end of next year, we will have achieved almost a one-to-one ratio."

Romaniak also has more immediate technical reasons for taking on some responsibility for incoming on-line data bases. "If you have a lot of users unfamiliar with the on-line procedures sitting at PCs, looking through their instruction books while on line, trying to figure out slash commands, you are very susceptible to system errors. That user can run up a big access bill, freeze his PC and cause problems on the network."

Building Front-End Access

Romaniak's solution is one being implemented by many IS managers faced with the same problem: front-end software interfaces that make access to on-line services much easier for the nontechnical user. Implementing these tools requires the expertise of IS departments, but can make administering on-line access easier on IS in the long run.

At Teleglobe, eight top managers use a Comshare Inc. executive information system (EIS), and four more are expected to use it within two months. Romaniak's department is developing an EIS specifically on business operations and will eventually develop one for marketing, as well. The firm started out with COMPAQ Computer Corp. 386 PCs and has a few of those in use, but has standardized on the IBM-compatible Packard Bell Co. 386 PCs.

The existing corporate EIS, based on Comshare's Commander EIS software,

Why IS Has Become the Gateway

Steven Sieck of LINK Resources Corp., a New York City-based on-line services market research firm, sees three reasons why on-line services are coming under the supervision of IS managers.

For one thing, he says, "The proliferation of PC LANs means more end users work together, so it is now possible and desirable to leverage the investment in outside services—and in hardware—across those networks."

The second reason is the emergence of the general business user, he adds. Specialty data bases have proliferated and on-line services directories are as thick as dictionaries—and most new users of on-line services are nonspecialists.

Sieck points out that Dow Jones & Co. Inc. of New York City, in its recent annual report, cites a boom in the use of its on-line news service by corporate executives. In the past, such services were more frequently used by librarians or secretaries, and the news items were passed on to the executive in hard copy. With more PCs in use by top management and executive information systems (EISs) becoming more prevalent executives are going on line themselves.

The third factor Sieck cites is the changing information marketplace. Big communications companies looking for other value-added markets are discovering on-line services as new revenue outlets. Sieck predicts regional telephone operating companies will soon be forming partnerships with large on-line vendors to get a foot in the door.

delivers the Dow Jones on-line news service to Teleglobe executives via a set of interfaces readily understood by non-technical users. Comshare of Ann Arbor, Mich., already had a Dow Jones interface in place when the firm began using Commander.

"We can customize windows, depending on the type of news the executive wants—if he is just interested in specific companies, if he wants more or less detail," says Romaniak. "It makes on-line access very convenient. The executives are comfortable using it [Commander EIS] to access the data base, and it eliminates problems on our system when the user is not familiar with data base commands. The entire EIS takes about 15 minutes of training time for the executive."

A number of Teleglobe's executives have requested Infoglobe, a Canadian on-line news service. Romaniak and Infoglobe are in the process of developing an interface for the service that will be as easy to access as Comshare's Dow Jones interface.

"We have had other requests to add other on-line services too, and we will get to those as soon as we can. Right now, we are concentrating on implementing the rest of the EIS, function by function," Romaniak says. "Our legal department needs direct access to legal data bases—going through the library is too cumbersome for them—so we are considering putting them up on a system. We are getting a lot of requests at the managerial level for more on-line services."

Central and Southwest's top executives also requested more direct, and easy, access to news and stock information that their secretaries had been obtaining for them from The Source of McLean, Va. Groff chose to incorporate the request into an EIS called Easel, from Interactive Images Inc. of Woburn, Mass. Easel has a graphics interface specifically for Dow Jones, called Stockwatch, which provides the executives with the type of access they need.

No CEO Training Time

"You don't get a lot of training time with a CEO, and since we are getting more requests from executives, we are going more toward front-end software tools so they can use the on-line services themselves," says Groff. Right now, the company's top executives use Compaq 386s on a network, using Oracle's data base management system locally and the Easel EIS. Eventually, the system will link to the corporate data base on an Amdahl Corp. mainframe, also running the Oracle data base.

Easel will allow the executives to compare stock information from Dow Jones with in-house performance figures and create graphics incorporating both internal and external data, says Groff. He expects many more requests for this type of service in the future.

These requests add to the general clamor for IS services, and they frequently take priority over other requests—for critical business reasons. However, the time it takes to act on such a request depends on the scope of the request and type of data base needed, say IS managers.

☐ THE MORE A PIECE OF INFORMATION IS SHARED AMONG DIFFERENT USERS, THE MORE VALUABLE IT IS.

One of those critical business needs is using on-line data as a quality control measure for internal data. In the financial services industry, this practice has increased since the stock market nosedive of 1987, according to Holahan at Interactive Data.

The unnamed securities firm mentioned above receives five different on-line services, including Datasheet, a data base of pricing and financial data on publicly traded securities offered by Interactive Data. "We use Datasheet to provide corporate action information and foreign security pricing for those involved in the global custodianship of clients' securities," says the IS executive there.

Services Support Company Data

"The Datasheet data is used to support in-house data as a quality check; it is a second source to validate in-house information," says the executive. The hardware and software varies throughout the firm, he notes, but most users work on IBM-compatible PCs in a DOS environment.

"Before the [1987 stock market] crash, a lot of users at brokerage houses had their own PCs and their own budgets and their own individually procured on-line services. The individuals had more latitude before the crash, so they sourced their own analysis tools," says Holahan. "There was no method of standardization, no method in place to defend the investment decisions being made. One person was using one set of analysis tools, and the next person was using a whole different set.

"Management woke up after the crash and saw that standards were needed to make investment decisions. Many brokerage houses have begun to standardize through IS on the on-line services they use for investment analysis," Holahan says.

LINK's Sieck notes a move toward standardization of internal and external data in other industries, as well. "The more the same piece of information is shared among different users, the more valuable it is. This is the role that information can play in maintaining organizational learning on a consistent basis," he says.

The trend toward greater IS control of access to on-line information services is converging with a trend among vendors to become merely suppliers of raw data to their customers.

"Users are beginning to want more control over the data they access. The future trend is for data base vendors and other new information providers to broadcast the raw data to the corporate site to be filtered and organized according to the needs of the organization, rather than being maintained and organized off site," says Sieck.

Interactive Data has developed one such on-line service. Called MarketPlus, the service incorporates a wide variety of global capital-markets data for financial services firms. MarketPlus consists of data, applications and a data base management system. The information is updated as an off-site data base would be, but instead of residing at the vendor location with dial-up access, the data are sent to the user's IBM or Digital host computer for distribution and are updated remotely by the vendor.

"This was created because we saw more involvement by IS. In fact, IS departments were asking us to create it," says Holahan. "They said PCs have run amok, and they see the need to manage both the hardware and the information for it most effectively."

Sieck cites Dow Jones as another example. Dow Jones has announced a network architecture called Dowvision, which will be used to broadcast data to a corporate site in a raw form.

Sending raw on-line data to a customer site could create new opportunities for vendors to assist in packaging that data for various applications, Sieck says. No matter which company or user organization fills that user need, he adds, "One thing is clear. It has to go through IS." ▭

Leila Davis is a freelance writer based in Alexandria, Va.

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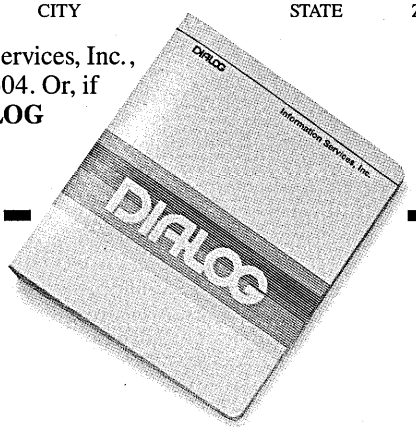

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Circle 19 on Reader Card

That Fuzzy Feeling

A mathematical technique for building applications involving imprecise data stands to gain commercial ground, as some new hardware components that employ it arrive next month.

BY R. COLIN JOHNSON

Information systems managers who have to work with uncertain or approximate information sources when building applications can take heart. A useful tool, "fuzzy logic," which has been around since 1965, is beginning to become commercially viable. Although not all of the problems have been ironed out, the tool has been successfully applied in some prototype hardware systems for applications that have proven difficult to handle with traditional logic.

Next month in Seattle at the International Workshop on Fuzzy Systems Applications, the third annual meeting of the International Fuzzy Systems Association (IFSA), three companies will show hardware products that implement fuzzy logic to solve problems involving uncertainty. While none of these is a turnkey system, all of the products have been successfully applied to expert, real-time control, information modeling/forecasting and data base organization/retrieval systems, primarily in Japan.

Fuzzy IS Applications

The technology may hold some promise for IS applications, as well. Carl Perkins, vice president of Togai Infralogic Inc. of Westlake Village, Calif., the only U.S. company exclusively devoted to developing the technology, says these applications could include:

- "Anything to do with queuing, for example, command queuing across ports;
- "Data retrieval, because fuzzy logic can make fast and accurate guesses as to where to find data;
- "Operating systems, because users often know something about their files, but not a whole lot. With fuzzy logic you don't need absolute accuracy in specifying files;
- "Stock [market] searching and sorting. Traditional search and sort algorithms use crisp criteria and will throw out a company's stock that doesn't precisely match them, but fuzzy logic allows you to use linguistic criteria and gives you a list of the most likely candidates that is much more like what a human expert would have picked.
- "Also, any sorting problem in multidimensional spaces where you don't know precisely all the information."

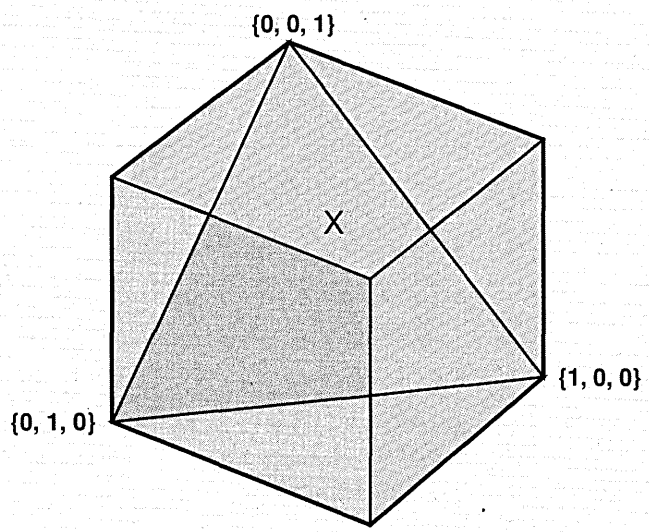
Fuzzy logic is a general calculation system that its inventor, Lofti Zadeh, claims is a superset of traditional logic, just as Newton's physics is a special case of Einstein's physics. "Fuzzy logic is the logic of approximate reasoning, with [traditional] precise reasoning as the limiting case," asserts Zadeh, a professor at the University of California at Berkeley.

Since its creation in the mid-1960s, Zadeh's theory of an alternative to traditional logic has drawn fire, largely from mathematicians, for both theoretical and empirical reasons. Nevertheless, he continued to develop the theory with a steady stream of technical papers. His work eventually piqued the interest of two researchers at AT&T's Bell Laboratories. Hiroyuki Watanabe and Masaki Togai collaborated on a fuzzy logic controller board, which was widely publicized in the early 1980s.

Togai says the technology he has helped to develop will never replace traditional logic, since precise calculations will always be necessary. "Fuzzy logic is best used at the highest level in a system to narrow down the possibilities, relegat-

Bart Kosko's Fuzzy Cubism

In traditional logic, only values at the vertices of the unit cube are allowed, but, as illustrated, fuzzy logic fills in the unit cube at plane X between three traditional logic values.



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ing traditional digital logic to working out the details," he says.

So why the renewed interest in developing fuzzy logic-based systems after all these years? Because fuzzy logic may be able to solve problems that involve controlling or modeling the real world that have proven difficult to solve with traditional logic or even with artificial intelligence-based rules.

"Most natural concepts in the world are not crisp, they are fuzzy," Zadeh explains. "The reason AI has so many unfulfilled promises is that it uses conventional logic; it's an albatross around AI's neck."

That the companies at the IFSA show are emphasizing hardware for fuzzy logic does not mean it cannot be simulated with software. But a fuzzy problem representation can be more economically exploited by special hardware. A tiny fuzzy logic board can outpace a supercomputer running a simulation of fuzzy logic, according to Wei Xu, president of Apt Instruments Corp., the Chinese maker of the first programmable fuzzy processor.

"Simulating fuzzy logic [in software] is like emptying a dump truck with a spoon; it can be done, but it is very time consuming," Xu explains.

In traditional logic, an 0 is always 0 and a 1 is always 1. In fuzzy logic the basic alphabet of bits is not limited to those 0s and 1s, but encompasses any number of continuous mathematical functions called "membership" functions. Consequently, its truth values can range continuously between 0 and 1, allowing it to handle an infinite variety of other values, such as three-valued logic.

Since fuzzy logic allows smooth gradations of truth values between 0 and 1, it matches well with many aspects of the real world. For instance, live data often come in continuous ranges rather than in discrete steps. Measures of speed, temperature, voltage, population, birth rate and more are all continuous rather than discrete. In fuzzy logic, these ranges can be represented directly. But in traditional logic these ranges can only be represented with complex numerical techniques that approximate a continuous function.

The economy of directly representing continuous functions, rather than building them up from strings of 0s and 1s, has made systems faster and easier and much smaller than equivalent systems built with traditional logic. Expert systems, for instance, have had limited success so far, partially because they require hundreds of rules to simulate real world situations. But with a single fuzzy rule representing a whole spectrum of events, the corresponding fuzzy expert system would typically require only tens of rules.

The Critics' Case

As rational and promising as fuzzy logic may sound, critics on the theoretical side, especially probability specialists, charge that it is not clearly derived from fundamental mathematical, or "first," principles. On the empirical side, critics charge that fuzzy logic provides no clear method of gathering data and combining them into membership functions.

Zadeh's theoretical case has been helped by his protégé, University of Southern California professor Bart Kosko. Kosko claims to have derived a mathematical theorem that shows how probability theory is a subset of fuzzy

Mapping the Future of Fuzzy Systems

At next month's third annual meeting of the International Fuzzy Systems Association (IFSA), one U.S. company will show the world's first commercial microprocessor based on fuzzy logic, two Japanese companies will announce the availability of their fuzzy systems in the United States and a Chinese company will show the world's first on-line programmable fuzzy processor.

SUGENO: Japan is using fuzzy systems.

Togai Infralogic Inc., which already has a C language precompiler that includes extensions for fuzzy logic, will announce its fuzzy logic microprocessor that can directly execute the fuzzy part of those extended C programs.

Togai was founded by Masaki Togai, who was an engineer AT&T Bell Laboratories with Hiroyuki Watanabe in the early 1980s when the two built the first fuzzy system in the United States.

Today, Watanabe, on the faculty of the University of North Carolina at Chapel Hill, has built the only other fuzzy microprocessor available in the States. Announced in May, it was fabricated by the Microelectronics Center of North Carolina at the nearby Research Triangle Park.

Two Japanese companies, Mycom Inc. and Omron Tateisi Electronics Co., both in Kyoto, will be offering dedicated controllers to the U.S. market through their subsidiaries here.

Mycom's system is based on a proprietary read-only memory (ROM) chip that works in conjunction with any standard microprocessor. The user specifies the rules to be used, and they are compiled into the special ROM that holds the proper fuzzy response, according to your rules, to any given input situation.

The various models of Omron's fuzzy peripheral, in contrast, use a mix of digital and analog components linked to a personal computer via a serial link.

To capitalize on fuzzy logic's inherent speed advantages, Apt Instruments Corp., which is based in Tokyo to avoid trade barriers, has designed a series of fuzzy processors that it is licensing to others for manufacture. They will be available next year.

These fuzzy products have, to date, been used in 80 successful applications in Japan, says Michio Sugeno, professor of engineering at Tokyo Institute of Technology. A subway system in Sendai is controlled by a fuzzy processor (in lieu of an engineer) and reportedly affords a smoother ride than any human conductor ever provided. Tokyo-based Yamaichi Securities Co. Ltd. is using a fuzzy system to pick stocks for a special portfolio.

Other fuzzy expert systems under construction in Japan are designed to make management-level business projections, control output from power stations, economize on automobile gas consumption and refine manufacturing process control.

Impressed by the number of these projects, Japan's Ministry of International Trade and Industry (MITI) has set up a consortium of 48 top Japanese companies to develop fuzzy systems. It is called the Laboratory for International Fuzzy Engineering (LIFE), a name coined by Sugeno, who is a consultant to the lab. Its $70-million budget is coming from member companies like Canon Inc., Fuji, Fujitsu Ltd., Hitachi Ltd., Honda, Minolta, NEC Corp., Nissan and 40 other top Japanese companies.

"Even though fuzzy logic has proven successful in numerous applications in Japan, the only U.S. applications, so far, are at NASA, where they are using it for shuttle positioning," says Carl Perkins, vice president of Togai Infralogic.

Photograph by Lisa Metzger

logic. "Fuzzy theory is a natural filling-in of set theory," Kosko says. He illustrates this with a geometrical argument that can be pictorially represented as a unit cube (see diagram, "Some Fuzzy Cubism").

The eight vertices of the cube are the crisp digital logic points (0,0,0 : 0,0,1 : 0,1,0 . . . 1,1,1). But the inside of the cube contains all of the infinitely fuzzier points (e.g.: .3, .7, .9). Various value sets for common fuzzy operations have geometric equivalents that can be easily seen, such as the triangular plane in the diagram.

Kosko provides a theoretical underpinning for his geometric interpretation by proving the cornerstone theorems that probability theory merely assumes as axioms, including the laws for adding and multiplying probabilities.

On the empirical side, Pei-zhuang Wang, a professor at Beijing University and chairman of Apt Instruments, announced this year that he has devised an empirical method for deriving the membership functions from raw data.

In a manner he says is as easy as collecting statistical data, Wang has shown how to sort data automatically into fuzzy sets. Briefly, his approach shows probability data as points along a fuzzy continuum (say, from FAST-to-SLOW). With very simple arithmetic operations, as with probability theory, he then shows how data can be collected and manipulated, producing continuous fuzzy intervals rather than individual probability points.

These large issues aside, some developers and researchers in advanced logic systems raise a further objection, saying that fuzzy rules are more difficult to debug than rules based on traditional logic.

☐ KOSKO'S MATHEMATICAL THEOREM SHOWS HOW FUZZY THEORY IS A NATURAL FILLING-IN OF SET THEORY.

"People think that by only using 0s and 1s, they can check every case and that you can't check every case with the continuous functions used by fuzzy logic," says Togai's Perkins. "But the fact is that no debugging techniques can give you a 100% guarantee. It is an NP [number of permutations]-complete problem for both fuzzy and digital logic."

In fact, Perkins asserts, "fuzzy logic-based systems are less susceptible to bugs because a single fault doesn't crash the whole system. A fuzzy system can tolerate variations because its rules weren't precise in the first place."

Fuzzy logic backers also claim that it is easier to extract these fuzzy rules from human experts than the precise rules required by conventional expert systems.

Most of the criticisms, say fuzzy logic developers, derive from a bias toward binary logic, which they call the "balls and urns" problem. "People can understand how to predict whether the next ball pulled out of an urn will be black or white," Perkins says. "But if you put balls with any shade of gray in an urn, the binary bias makes you throw up your hands and say it's impossible to predict, but it's not." ▭

R. Colin Johnson is the author of Cognizers—Neural Networks and Machines That Think *and publisher of the* Neural Network Almanac.

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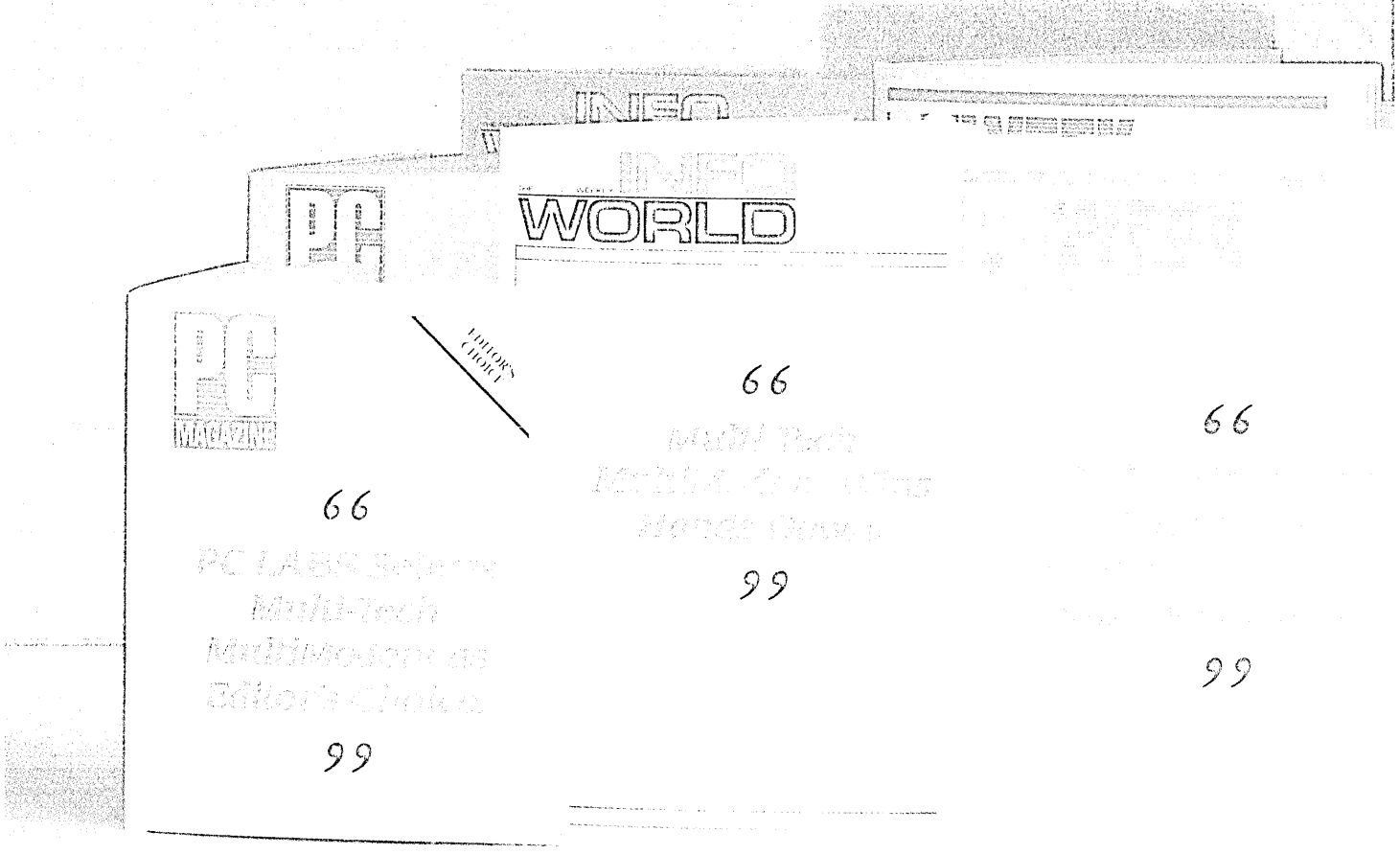

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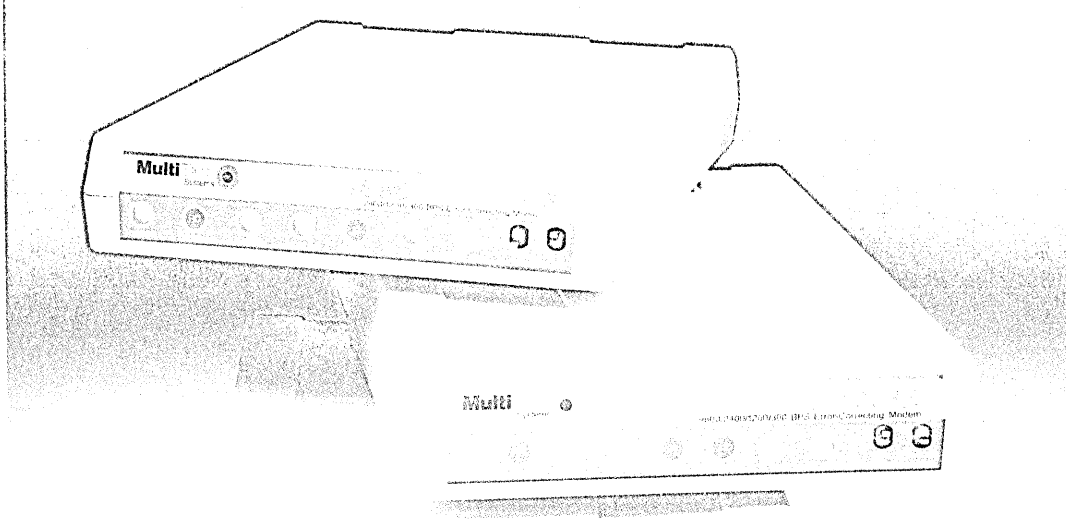

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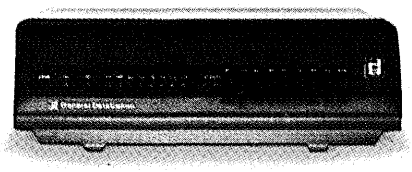

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Serving Two Masters

Choosing between dial-up or leased line networks is less an issue today thanks to dual identity modems. These modems are spawning hybrid networks able to operate with dial-up and leased line connections.

BY ARIELLE EMMETT

International Speedway Corp. had all but settled on a network to link a corporate computer with ticket terminals. The company, which owns and operates raceways in several southern states, had narrowed its choices to an X.25 dial-up network or Digital Data Service, an AT&T-provided leased line network.

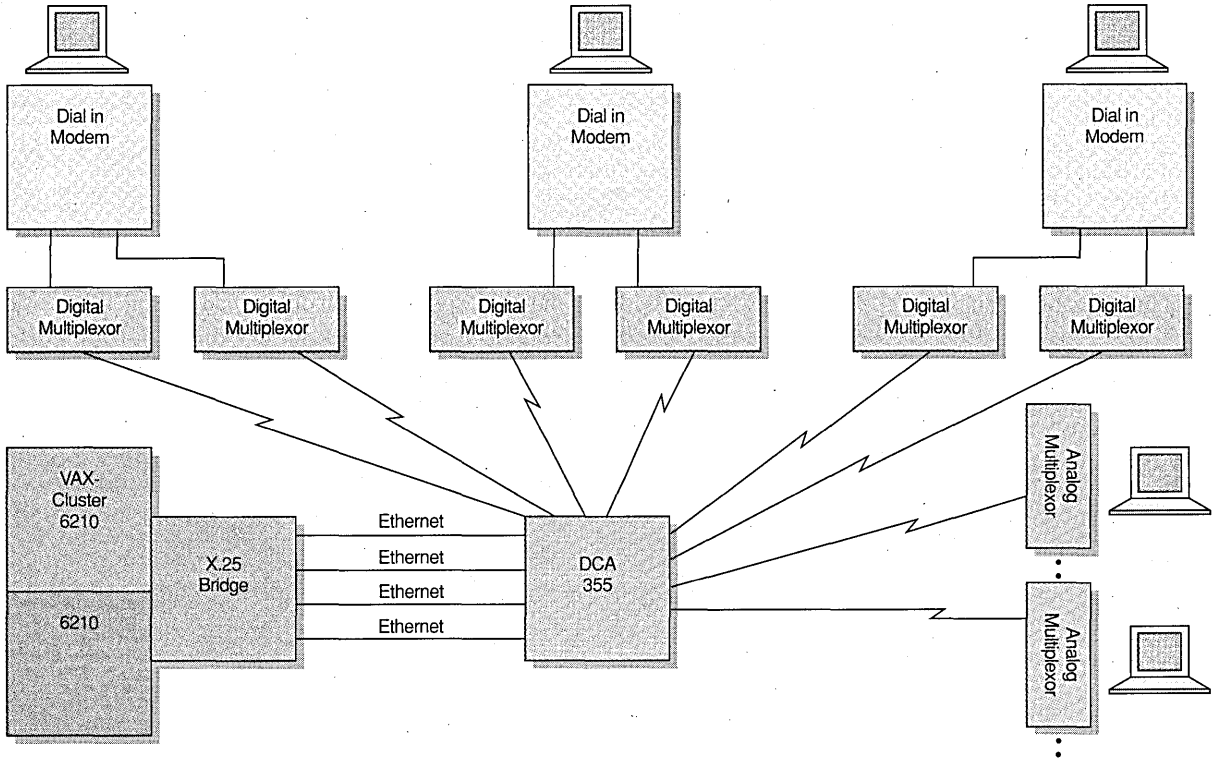
There were problems with each, recalls David Hickman, a data-processing manager who handled the evaluation for the Daytona Beach, Fla., company. "We did a lot of experimentation and found we could support our users with a modem of 19.2Kbps [kilobits per second] or less," Hickman says. "We wanted to give our users 9,600bps transmission, but at that speed, our high-volume print jobs would seriously degrade the network." Rather than accept the compromises an exclusively dial or leased line network implied, Hickman made a decision worthy of Solomon: picking modems that could function in either network type.

"Choosing a modem that could do both leased line and dial backup was an innovative twist," Hickman says. "We needed dial backup to the public telephone network" for those occasional service disruptions caused by errant construction crews. At the same time, "since all our applications are long distance, and our average transmission is a continuous 60 hours per week, leased lines were essential. So we chose a leased line modem with single phone line backup capability."

Like Hickman, telecommunications

A Hybrid Network at Work

Diagram describes the variety of dial and lease line connections used by southern California real estate agencies to access housing listings on a Multiple Listing Service regional database.



managers in large and small companies across the country are mixing and matching dial-up and leased line network communications. International Speedway implemented its network using V.32 modems from British Telecom. The chameleon-like features of V.32 modems—which support 9,600bps dial and 2- and 4-wired leased line communications—have made hybrid networks a reality at many companies.

Moreover, the flexibility and higher transmission speeds of these V.32 modems have breathed new life into dial-up networks. "Dial is becoming a viable alternative to leased line," agrees Russell Wood, senior director of marketing for Racal-Milgo Inc., a leased line modem vendor that recently merged with dial-up sister company, Racal-Vadic Inc. But, Wood cautions, "a lot of companies depend on the network to run their businesses. Network operation is crucial to them; in these cases, leased line network management is much more sophisticated and reliable than dial," he says.

Phantom Issues?

As dial-up modem speeds increase and costs drop, the choice of the network type falls more and more to issues of speed, reliability and data integrity. "The thrust is toward cheaper, more reliable dial modems," says Chuck Champine, a telecommunications manager for Moore Data Management Services, a $100 million company that designs and sells electronic data base systems to real estate associations around the country. The company is a Minneapolis-based subsidiary of Moore Business Forms Inc. Despite the push toward higher and higher speed dial modems, Champine believes that some users may be shying away from V.32 dial modems because of the international standards war over error correction. "Standardization is an issue."

"We are standardizing around a V.32 modem with the Microcom Networking Protocol [MNP] for error correction," Champine says. But a number of companies are still playing wait and see in the wake of a dual error correcting standard in CCITT's draft of V.42 (See "The Dual-Protocol Modem Duel," DATAMATION, Feb. 15, p. 81).

"We are waiting to see how [the two standards] shake out with different vendors," says Ken Yorgensen, a director of telecommunications at Baxter Health Care of Deerfield, Ill., a $6.5 billion hospital products company that has both an extensive private leased line network and a dial network for 4,000–6,000 customers around the country. "We're making a shift in the dial world toward MNP class modems," he says. But Yorgensen adds that his company had not settled on a high-speed dial modem platform because of uncertain vendor support for V.42.

Baxter Health Care is among those that have adopted a pragmatic strategy toward the leased line versus dial decision. "In most cases, decisions boil down to economics, availability and throughput, but principally economics," says Yorgensen. For example, the company maintains an extensive leased line network of 9,600bps General DataComm modems for internal use. A secondary dial network has been created to allow hospital customers to order directly from their own terminals using 2,400bps modems.

☐ DIAL MODEM SPEEDS ARE CREATING ALTERNATIVES TO TRADITIONAL LEASED LINE NETWORKS.

"Dial-up [networks] historically have been used for limited access and small amounts of data," Yorgensen says, "while leased lines are used when high throughput, availability and quick response time are the key issues." The company is considering piggybacking data transmissions onto an existing long-distance voice network. It is also weighing using the dial backup capabilities of V.32 modems to complement its private, leased line data network.

Lease Line Modems Dominate

Whether or not users will expand their use of dial-up V.32 modems is unclear. Larry Cynar, an industry analyst and modem market specialist at the market research firm Dataquest Inc. of San Jose, Calif., says leased line modems are still being sold four times as often as V.32 dial modems. While the numbers are growing rapidly—V.32 sales are double what they were in 1987—"it's still a very small number compared to the 2.4 million modems out there," he says.

Nonetheless, Cynar acknowledges that the total dial-up market has begun to overwhelm leased line sales. "Dial, including the low-end modems, now comprises three-quarters of the total modem marketplace. From a user standpoint, many have been reluctant up until now to put critical applications on dial-up. But now that higher speeds are available through V.32, with error control, users are less concerned about errors in applications where the requirement is for random—rather than constant—communications," he says.

"What we've seen is a second coming of dial modems in the last 12 months," claims Julio Siberio, access products line manager for Racal-Milgo in Ft. Lauderdale, Fla. Siberio reports that the advent of V.32 has helped push dial modem sales at his company to an equal split with leased line modems. Five years ago, the ratio was 60–40 in favor of leased lines—but the explosion of PCs and automated inventory control applications led to skyrocketing dial modem sales, he contends.

For example, dial-up is being employed increasingly for interactive and high-speed burst data traffic tying PCs into minis and mainframes at remote sites. Applications such as customer order entry, electronic mail and data base access are prime examples of this traffic.

"Mainframe to mainframe is typically a leased line choice," says Doug Antaya, a director of product marketing for Codex Corp., a Canton, Mass., producer of leased line and dial modems, including domestic and international versions of V.32. "But because you can now get 9,600bps in a dial environment you have some customers" reevaluating their leased line networks, he says.

Usage Ratios Can Vary

Quite often the choice boils down to time and cost: how many hours the company expects to use a modem and the costs of installing dedicated private circuits and of line conditioning. "Dial is not going to replace leased line," notes Gregory Pearson, vice president of technology planning at Microcom Inc. "But certainly the equation is changing. A dial modem today can go as fast as 38Kbps with data compression, and leased line [fees] have not gotten any cheaper. So if you only need to be on line a few hours a day, the phone may be just as good."

At International Speedway, for example, DP manager Hickman determined that the dividing line for cost effective 9,600bps dial service was 24 ½ hours per week. Any usage below that justified dial modems; anything above that represented a cost advantage for a leased line solution.

"Unless you're talking about three hours or more per day of continuous usage, high-speed dial-up can be an economical choice," said Dataquest's Cynar. However, he cautions that estimates of the breakpoint will vary according to phone company tariffs and the modem speeds—among other factors.

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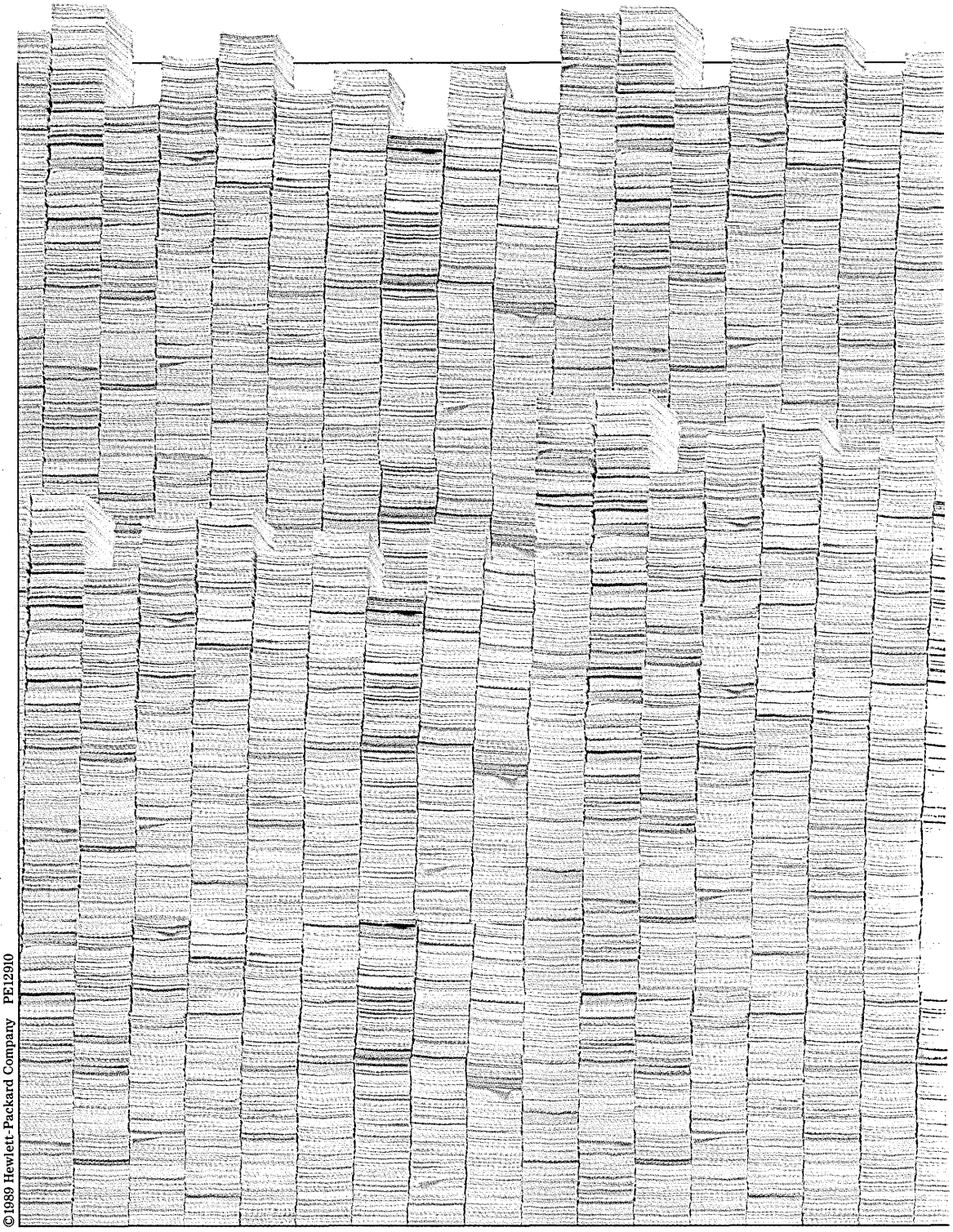

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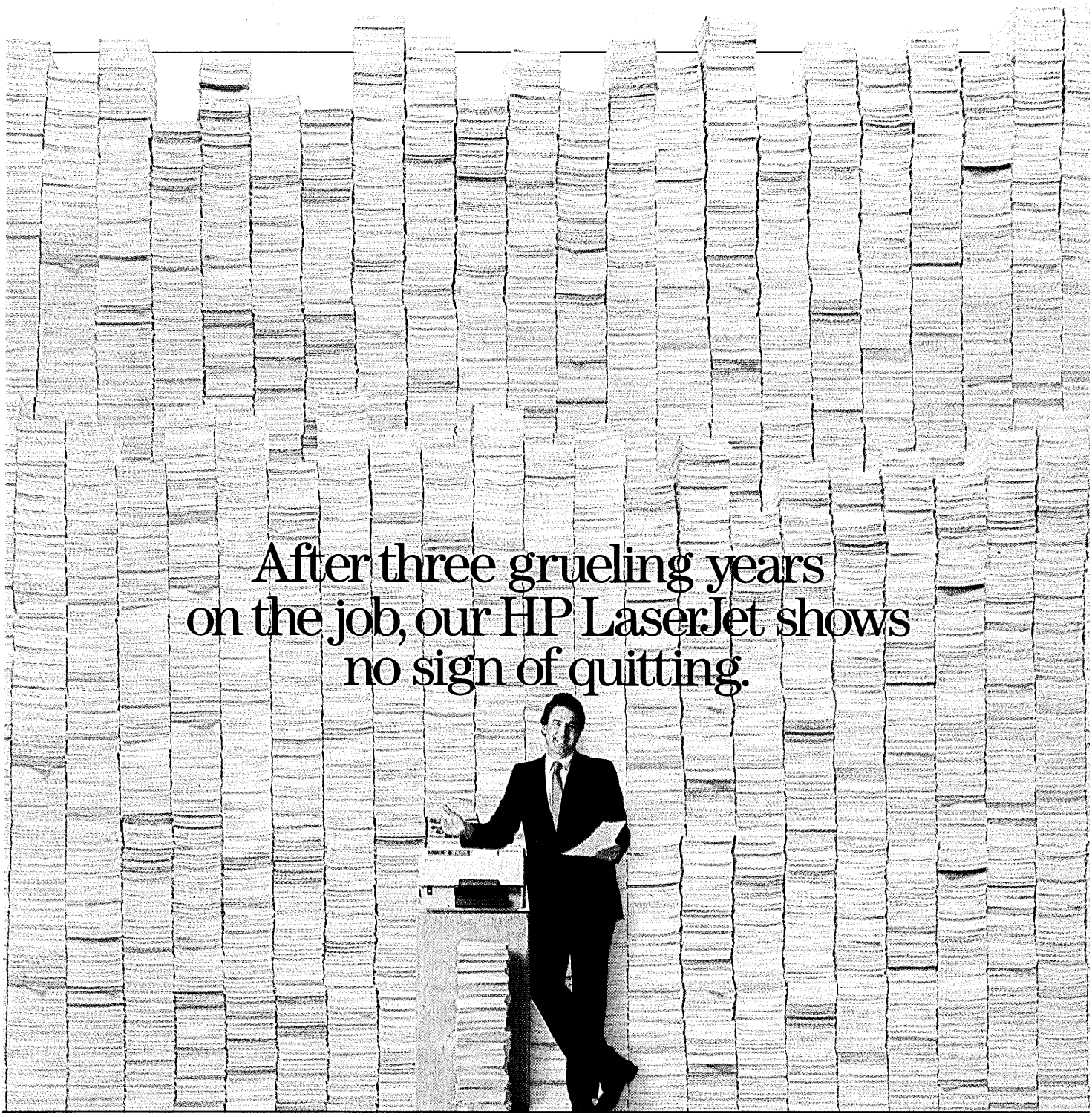

After three grueling years on the job, our HP LaserJet shows no sign of quitting.

and our high-speed dot matrix RuggedWriter printer have 20,000-hour MTBF ratings. Our large and small format plotters are guaranteed four times longer than the competition.

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HEWLETT PACKARD

Circle 24 on Reader Card

"Users are going away from leased lines for many reasons," says Garry Betty, a senior vice president at Hayes Microcomputer Products Inc. "The biggest is cost. Lease lines since divestiture have increased in price 25% a year, while the cost of long-distance [service] has gone down." In the future, conversion to integrated services digital network (ISDN) switches and terminal adapters may eventually spell the decline of the analog modem—or it will be upgraded to accommodate ISDN.

Case-by-Case Analysis

Users, however, seem more cautious in tone. "We evaluate our customer requirements on a case-by-case basis," said Champine of the Moore Data Management Services Division. As far as data networks go, "one size does not fit all."

Champine, who 11 years ago began planning telecommunications networks for real estate agent groups, originally created a system based on dial technology. "We were using slow, 300-baud modems," he says. "Multiple-listing services which bought our data base system would distribute dumb terminals to various real estate agencies within their region. The agent would dial into a central [computer] to access housing information."

Today, his networks are far more complex. Though Champine continues to use high-speed dial modem technology as a backbone, Champine also has configured networks combining dial and leased lines, cluster controllers, foreign exchange lines and, in some cases, X.25 interfaces.

"The driving force is to provide economical communications solutions," Champine says. "If, for example, the customer requires four terminals in one exchange calling the computer in another, then we'd use a foreign exchange line. If there are 40 terminals, we'd employ a multiplexer; and if it's a statewide operation, we use packet-switched technology."

One of Moore's largest regional real estate networks in southern California is a hybrid network of Multi-Tech Systems Inc. dial and Digital Communications Associates (DCA) Inc. dedicated modem technology (see illustration). Real estate associations in remote townships send and retrieve via dial-up lines while more local suburban offices transmit directly via CRTs multiplexed to leased lines.

"Dial is still the linchpin for our networks," Champine said. "The reason is cost—a leased line typically will cost $80 to $200 a month and tie up a computer port, whereas dial-up gives you contention and dynamic allocation of resources," he says.

Paul Hathaway, a systems programmer with McLane Data Systems Co. of Temple, Texas, says high-speed dial-up offers yet another advantage: backup to satellite equipment. His company, for example, replaced its leased line data network in recent years with a Contel ASC satellite network. "We asked ourselves what would happen if the bird fell out of the sky," Hathaway recalls. "We knew we needed dial backup." McLane Data Systems opted for a V.32 modem able to switch automatically from dial to lease line in conditions of line failure. "It can be dial-up, or leased 2- or 4-wire," he says. The modem is equipped with an integrated multiplexer, which enables McLane to transmit job entry data along available satellite channels without eating up too much bandwidth.

Has the satellite system equipped with dial backup saved McLane money? "It has been a substantial savings," Hathaway says. "I don't know how you compute the cost of losing customers, but that's where the dial backup has really saved us." Like many users, Hathaway believes that dial will play an increasing role in corporate networks of the future. "Dial has got to get cheaper," he said. "But for people in metropolitan areas, it's already there." ▭

Arielle Emmett is a freelance writer who specializes in communications topics.

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(a subsidiary of AT&T/Paradyne)
For nearest distributor, call
(800)-228-0914
Product: DL424

British Telecom (formerly BT Datacom)
3701 Concorde Parkway
Suite 100
Chantilly, VA 22021
(703)-818-1770
Product: TCX Family Model 4142

Data Race Inc.
12758 Cimarron Path
Suite 108
San Antonio, TX 78249
(512)-692-3909
Product: Action 32
Product: Mach 32

General Data Comm
1579 Straits Turnpike
Middlebury, CT 06762
(203)-574-1118
Product: Datacom 296B

Hayes Microcomputer Products Inc.
P.O. Box 105203
Atlanta, GA 30348
(404)-449-8791
Product: Smartmodem 9600

Microcom Inc.
500 River Ridge Drive
Norwood, MA 02062
(617)-551-1000
Product: QX/V.32C

Multi-Tech Systems Inc.
2205 Woodale Drive
Mounds View, MN 55112
(800)-328-9717
Product: MT 932EA

NEC America Inc.
110 Rio Robles
San Jose, CA 95134
(408)-433-1250
Product: N9631

Racal-Milgo Inc.
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Racal-Vadic Inc.
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Telebit Corp.
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Competitiveness: A New Standard

Major corporations are investing millions of dollars to back a software standard that's at best a few years away. And they're counting on IS execs to use the standard to integrate their engineering and manufacturing operations.

BY BOB FRANCIS

For IS managers who feel their plate is already full of standards issues, it's time to check the kitchen door again. There's another helping on the way. This one, however, carries more weight with manufacturers truly committed to staying or becoming competitive in world markets.

It's called the Product Data Exchange Specification (PDES), a method of digitally defining a given product throughout its critical design and manufacturing stages in a far more comprehensive way than the current means allow. The specification, which is actually a proposed graphical data standard to which software used to create the product must adhere, defines the physical and functional characteristics of the product in terms that computers of all types can interpret—even those used in the maintenance of the product after it has been sold to a customer. Practically speaking, PDES-based product designs will work across the heterogeneous computing environments.

"It will give you the ability to move information from one organization to another and thoroughly understand the full meaning of the product description," says George M. Kaler, director of information resource management at General Dynamics Corp. in Fort Worth. That, in turn, will help cut development time and result in a product closer to the original designer's intentions. And it also will give manufacturers greater flexibility in designing and producing a wider variety of products on short notice and in short runs—a necessity as consumer and industrial goods markets grow increasingly fragmented.

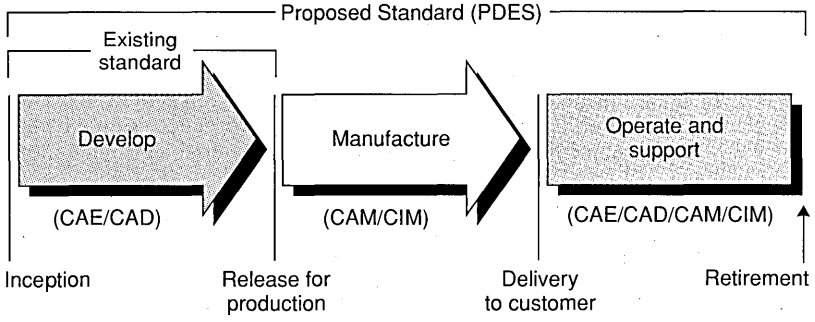
PDES also may drive integration of a different sort. It could induce IS departments to form closer bonds with their counterparts in engineering labs and on factory floors. "The IS side has the systems to bring the total enterprise together," says Larry Patrick, business development manager at D. Appleton Company Inc., a computer-integrated manufacturing (CIM) consulting firm in Bedford, Texas.

Many forward-thinking manufacturers already have bonded their IS departments with their engineering and manufacturing operations. But that's not typically the case. At the midsized manufacturers, IS managers are often not much involved with the data processing that takes place on benchtops and in work cells, according to Joseph Orr, president of Orr Associates Inc., a consulting firm in Great Falls, Va. "They [IS managers] let those guys have their VAXs, and they handle the Big Blue machine," Orr says. "[PDES] may force them to realize that they're all working in the same company."

The potential competitive benefits of PDES are regarded as so high in the United States, in fact, that backers in both government and private industry are doing everything in their power to speed approval of the standard. At the urging of the U.S. Department of Defense, 16 *Fortune* 500 industrials ranging from the Boeing Co. to Westinghouse Electric Corp. have formed and funded their own company, PDES Inc., to bring the proposed standard into reality. Two

Why the Stampede to PDES?

Manufacturers and government agencies believe the Product Data Exchange Specification will drive enterprise-wide integration, cutting costs and time in the process.



A Typical Product's Life Cycle

Source: PDES Inc.

European car makers may soon join the confederacy, as well.

Optimists believe a PDES standard may be approved as early as 1992. But realists point out that such progress will have its costs, too. There are major questions surrounding the price of fully implementing PDES-based systems that go beyond the annual dues that PDES Inc. members pay (up to $100,000 a year in some cases) and the man-hours they and hundreds of other U.S. companies working on the new standard have devoted to the cause.

The Effects of PDES

"Data capacity requirements will increase greatly because there will be quite a bit of information [being transferred] off of a paper environment into a computer environment," says Glen Ziolko, systems manager of computer-aided design and manufacturing at the Grand Prairie, Texas-based Aircraft Products Group of LTV Corp., a PDES Inc. member company. "Because of that, there will be more applications written to extract it [information] in the different forms everybody needs it in."

Another CAD/CAM director worries that implementing PDES will have a devastating effect on his existing product design data bases, which are built on a much simpler product specification standard known as the Initial Graphics Exchange Specification. Files created using software that complies with IGES, now 10 years old, may or may not be readily transferable to PDES-compliant systems. If not, users will be forced to spend considerable sums of money to rewrite IGES applications into PDES form.

☐ PDES MAY BE STRETCHING CURRENT TECHNOLOGY BEYOND ITS CAPABILITIES.

"[PDES] may be stretching current technology beyond our capabilities," says Larry Peck, manager of utilities applications for CIMLINC Inc., a vendor of CAD/CAM software and turnkey systems, in Troy, Mich. "It may take more years to establish as a standard than many people think."

Not if the U.S. government, industrial powerhouses like General Motors Corp. and key systems suppliers have their way. All in their own way are pushing for early adoption of PDES as a standard.

The Department of Defense regards PDES as a prime element of its computer-aided acquisition and logistics support program. CALS, as it's known, is an ambitious effort on the part of the U.S. government to set standards for the submission and interchange in digital form of documents from government contractors. "The government has basically said that, to do business in the future, you have to meet its CALS standard, and PDES is one piece of technology that allows a company to meet that standard," says D. Appleton's Patrick.

Government and PDES

IS managers in the defense sector are looking beyond what PDES can do for Uncle Sam. They see dividends for their own operations. "The main benefits will come from implementing its ideas internally within your organization from both the bottom and the top—from management through IS and from the factory floor to engineering," says Tony Day, CAD/CAM research specialist at the Stratford, Conn.-based Sikorsky Aircraft Division of United Technologies Corp. He's a member of the IGES/PDES organization that proposed the original PDES standard in November 1988.

The government's interest in PDES was evident earlier on. In August 1987, its defense agency convened a group of 20 of its largest suppliers to see if they could work together to hasten the specification's approval. That led to the formation of PDES Inc. in April 1988. Its charge is to accelerate the implementation of PDES by testing and integrating the standard into various manufacturing environments. The group has the backing of the two most influential standards organizations, the American National Standards Institute and the International Standards Organization. And many of its members belong to the IGES/PDES organization that first proposed a specification standard.

The Other Power Behind PDES

More important, PDES Inc.'s membership reads like a *Who's Who* of U.S. industry: Boeing Co., Ford Motor Co., General Dynamics, General Electric Co., General Motors, Grumman Corp., Lockheed Corp., McDonnell Douglas Corp., Northrop Corp., LTV, Martin Marietta Corp., Rockwell International Corp. and Westinghouse Electric Corp. Systems

A Sequel to IGES

PDES could almost be called son of IGES, the specification standard currently in use on computer-aided design and manufacturing systems.

The Initial Graphic Exchange Specification was developed in 1979 to allow the exchange of product data models in the form of 2-D and 3-D wireframe drawings, fully surfaced drawings and solid model drawings.

IGES technology has its limitations, however. Using it, for example, an engineer looking at a part designed with several holes in it couldn't distinguish those holes from the circular edges of a rod because both, under IGES, are represented by circles on a computer screen. It requires that the engineer know enough about the part to interpret the circles as signifying holes, not rods. Such interpretation would be unnecessary with PDES-compliant software which would tell the engineer much more about the part in question.

While IGES dwells mainly on the computer-aided design realm of a business, PDES technology enables the engineers and others involved in the design and production of a part to exchange such nondesign information as manufacturing features, tolerance specifications, material properties and surface finish specifications. "The idea is to communicate a complete product model," says Bradford M. Smith, chairman of the IGES/PDES organization that drafted the initial PDES standard in the fall of 1988.

PDES may require some more input on the part of the design engineer when the first model of a part is being drafted. "Users will have to put in more of the knowledge that they intuitively put into a drawing to work in the PDES form," notes Glen Ziolko, systems manager for computer-aided design and manufacturing at the Aircraft Products Group of LTV Corp. "The software will prompt them [design engineers] for more information."

The new standard is international in scope. European users and suppliers are pushing a specification known as the Standard for the Exchange of Product Model Data (STEP), which differs slightly from PDES. The International Standards Organization (ISO) is reviewing both proposals. "To many, PDES and STEP are simply two elements of an internationally coordinated effort," Smith says.

suppliers Digital, IBM and Prime Computer Inc. also belong to it.

The dues for joining PDES Inc. aren't cheap—underscoring the importance its members place on the specification. A Class I membership annually requires $100,000 and two man-years of technical effort from the company. Class II status calls for a yearly contribution of $50,000 and one man-year of technical effort. A Class III member must pay $25,000 in annual dues.

The objectives of PDES Inc. are equally high. The first phase of the group's program, validating and implementing the proposed standard, is already under way and should be completed by mid-1990. The second phase will focus on how to implement the standard in data bases—a process members hope to complete by 1992. The standard also is being tested by the National Institute of Standards and Technology in Gaithersburg, Md.

Where GM Is Driving the Standard

No one sees the benefits of PDES more clearly than the world's biggest manufacturer, $121 billion GM. The company's C4 program will use PDES as a major link among computer-aided design, engineering and manufacturing and computer-integrated manufacturing throughout a

☐ GENERAL MOTORS SEES PDES' BENEFITS AS CRITICAL TO ITS SUCCESS.

car's development—from the time the lines of its fenders are drawn on a workstation to the day a GM assembly line ships them out the door.

GM views PDES as nothing less than critical in its drive to excel in competitiveness. "When you look at how widespread we are and all our different locations, [our design and manufacturing system] has to be flexible," says Rudi Gern, network development manager for GM's C4 program and an employee of GM's subsidiary, Electronic Data Systems Corp. "We may have someone designing a product at our Opel plant in Europe, then sending the data to our CPC [Chevrolet-Pontiac-Cadillac] division in Detroit for some action and then to a manufacturing organization in Brazil to get ready for future production. There will be many different systems and environments to support, and the data must flow through all of them," Gern says.

Other companies are also preparing

SIKORSKY'S DAY: Benefits come from implementing PDES ideas though the firm.

their IS departments for the change. "We recognized a few years ago that information was not going to be locked in one area any longer," says General Dynamics' Kaler. His information resource management department was formed in late 1987 for the express purpose of integrating all the information generated by previously separate design, engineering and manufacturing systems.

Although user organizations can expect to bear the price of structural and systems changes wrought by PDES, suppliers themselves may not incur exorbitant costs in adopting the technology. "Currently, most of the differences between CAD/CAM vendors are in the applications solutions—not in the data bases themselves, and that is where PDES will reside," states M. Salahuddin Khan, director of automotive industrial marketing for Prime.

Suppliers will be seeking different avenues to take advantage of the new technology, Khan says. "From Prime's perspective, the development of technology is not as important as the building of applications to take advantage of that technology," he explains.

For users to seize such an advantage, they may have to push aside the other standards issues crowding their IS plates or at least balance them with a helping of PDES. GM and the other members of PDES Inc. have even showed a willingness to pay for this new item on the information-technology menu. And, after all, isn't what's good for General Motors good for everybody? ▭

Photograph by Peter Silvia Jr.

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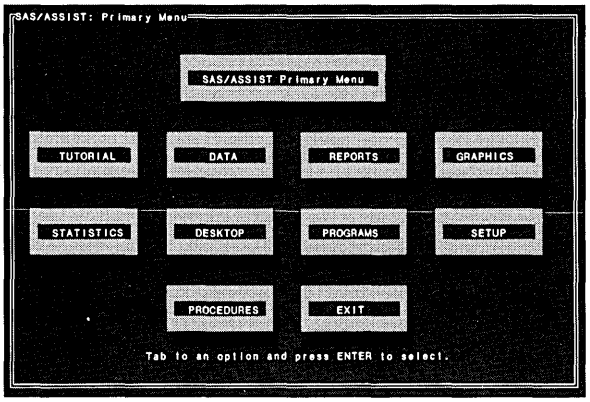

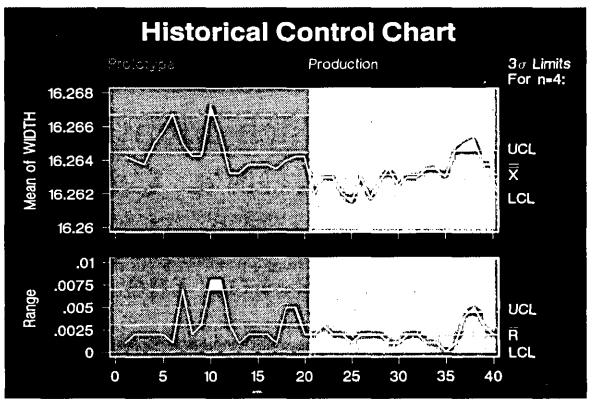

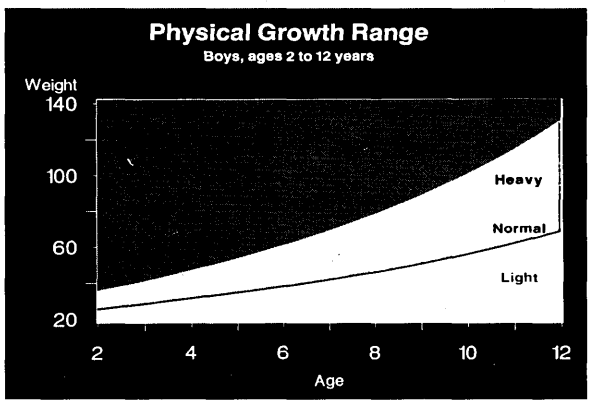

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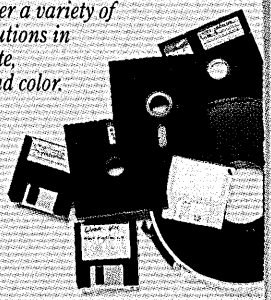

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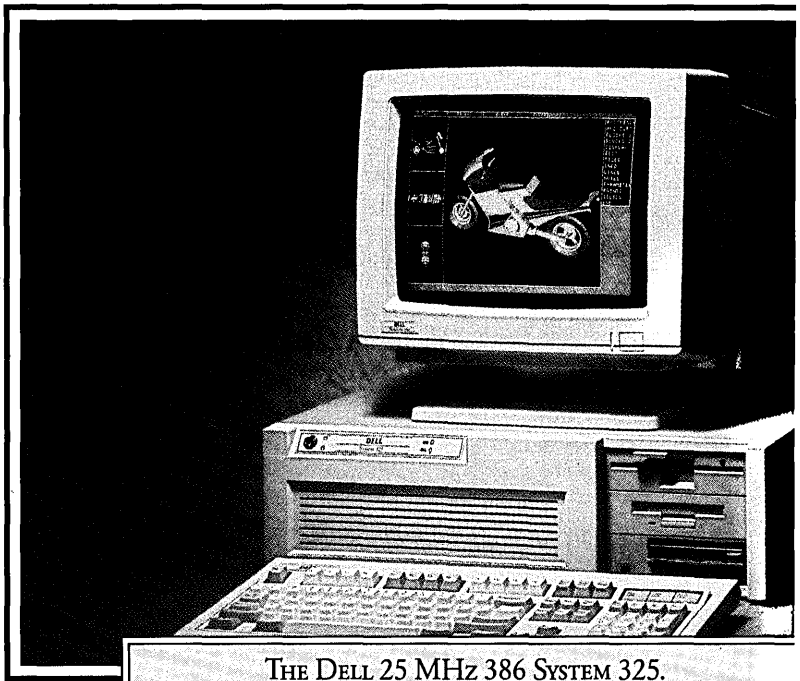

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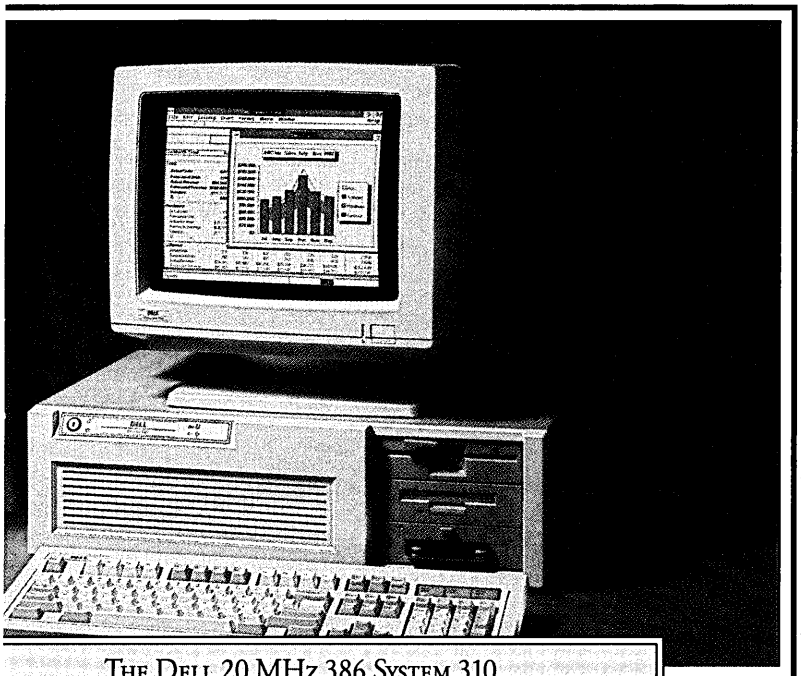

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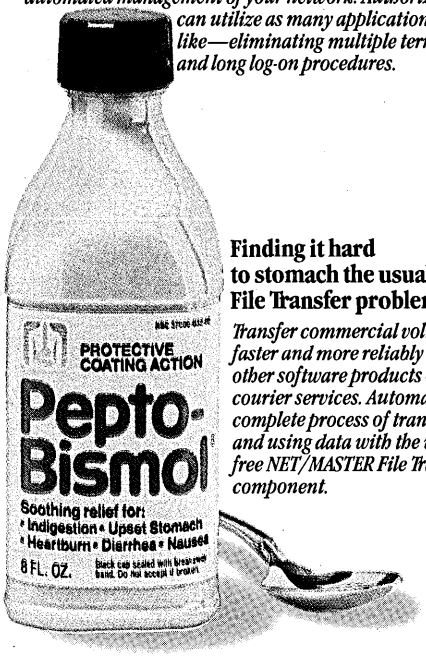

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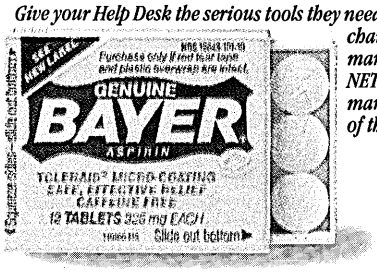

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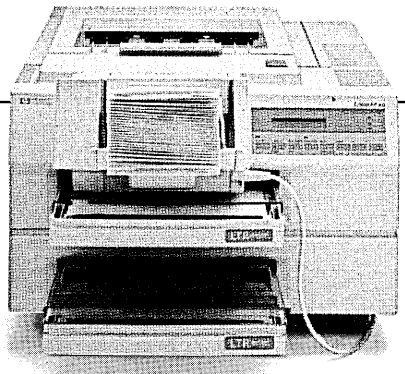
One of the most important reasons for buying our new LaserJet IID printer is on the other side of this page.



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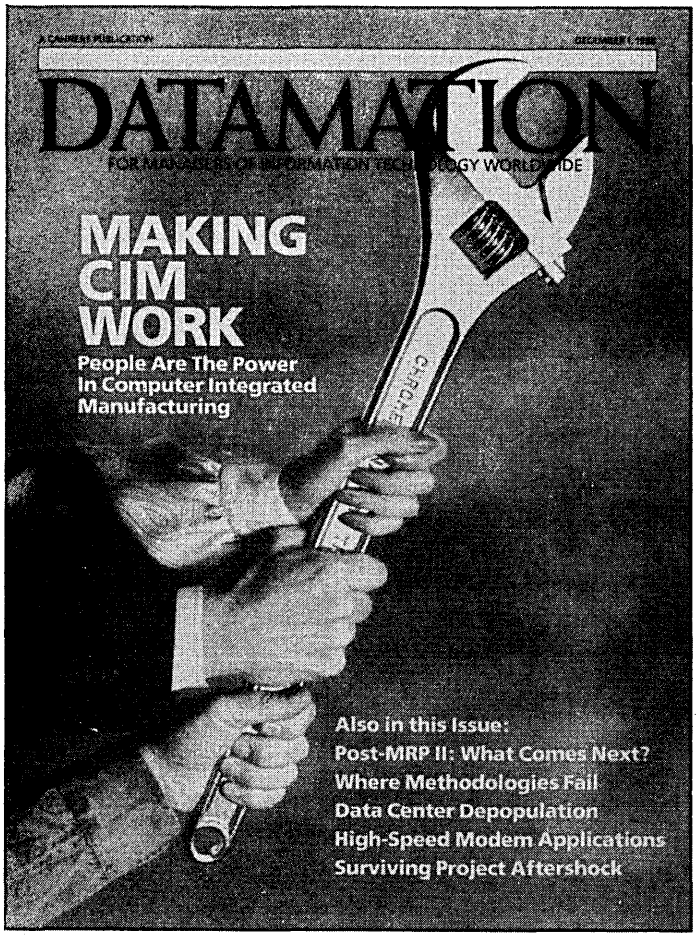

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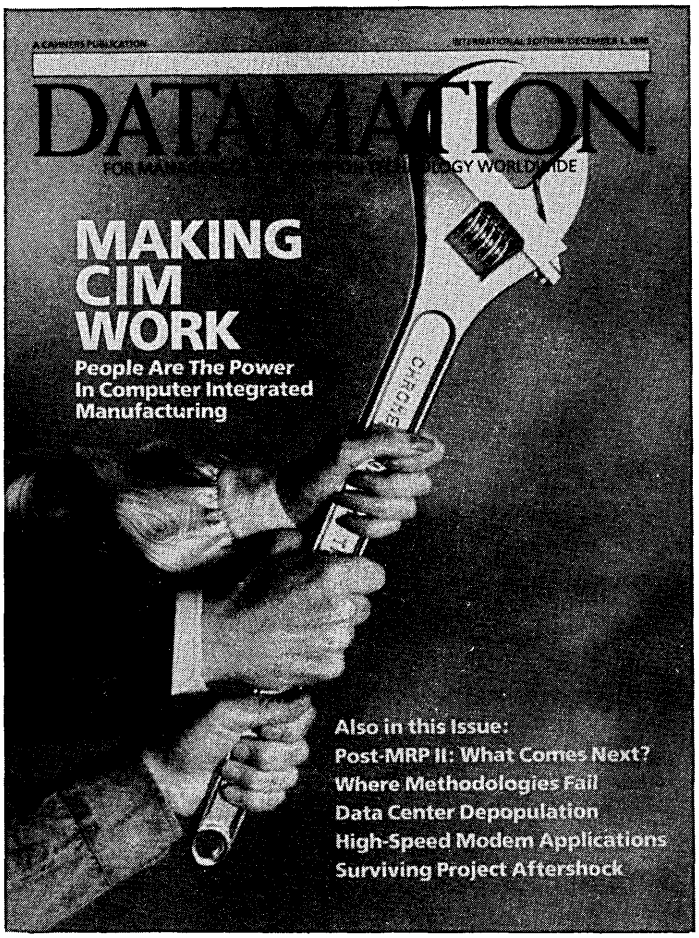

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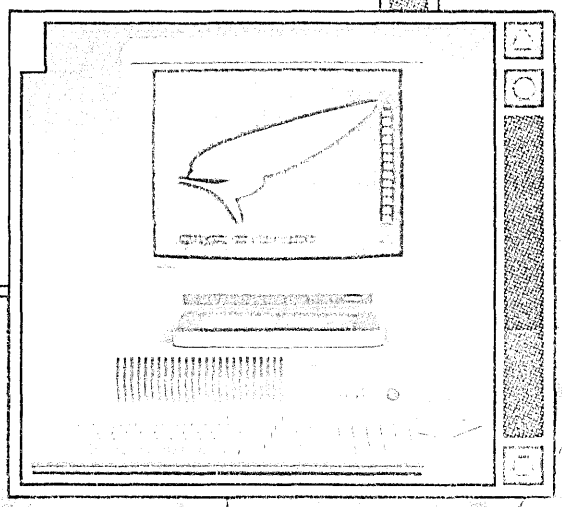

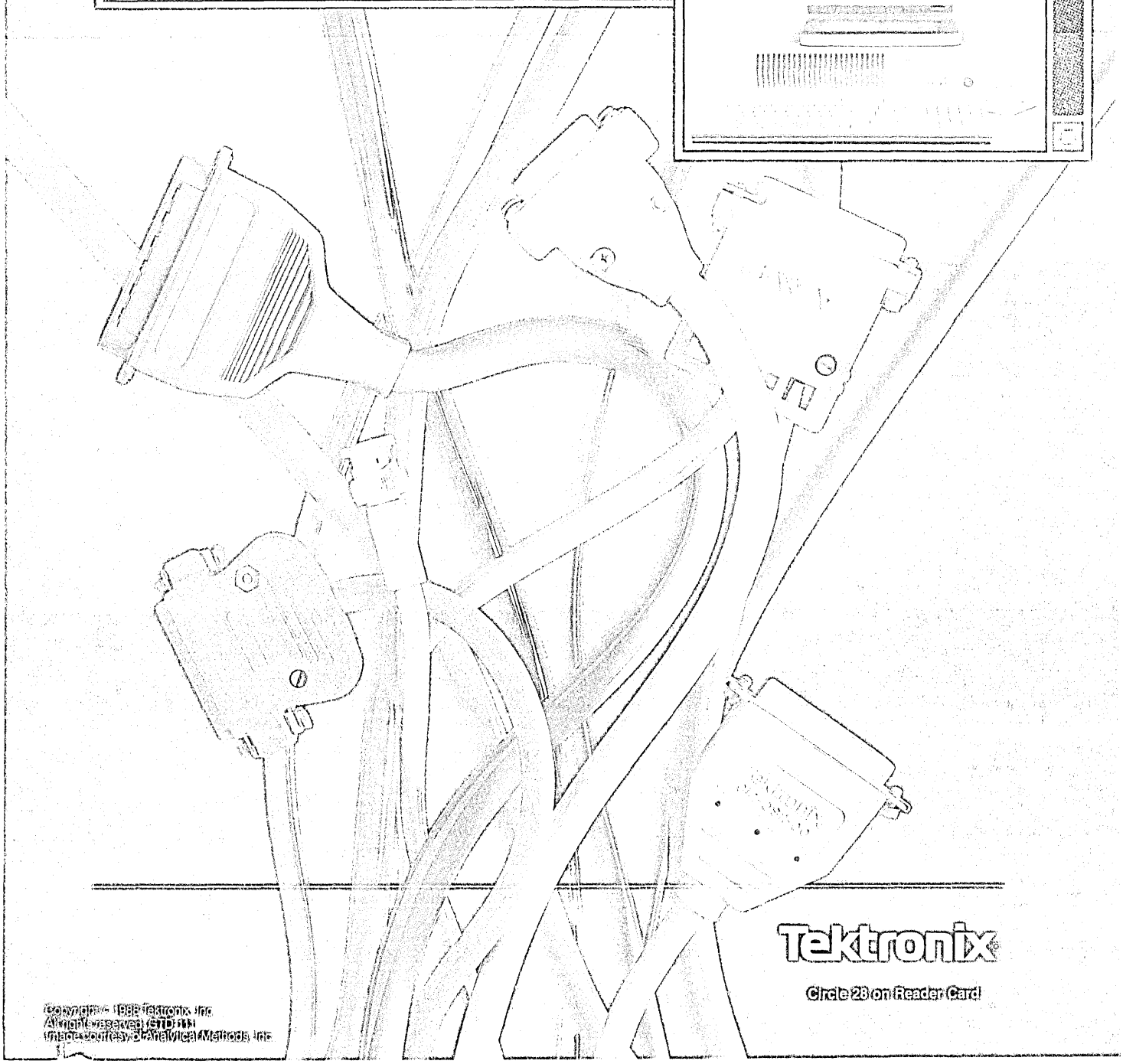

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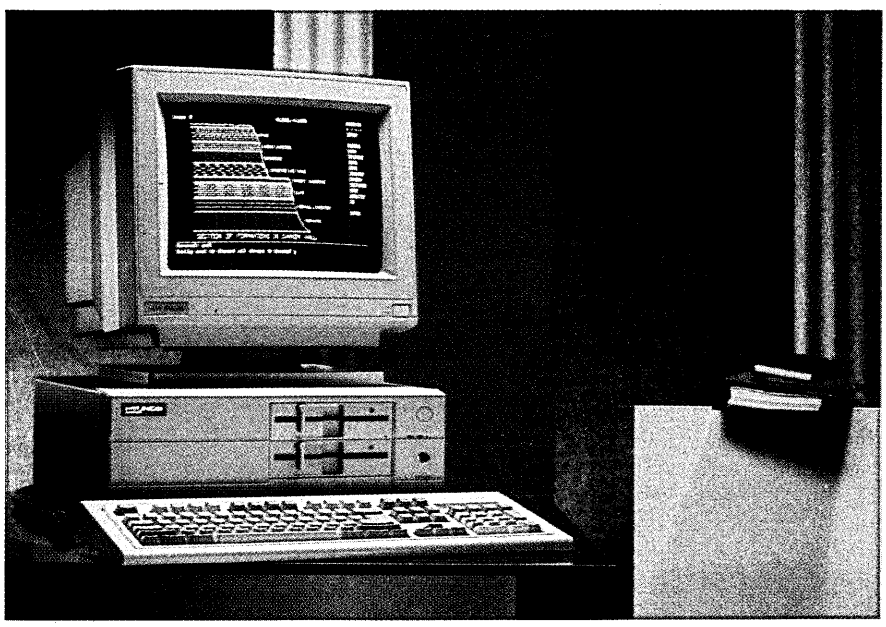
Hyundai Expands Product Line

New offerings include PCs, printers and modems.

BY JANE MAJKIEWICZ



THE SUPER-286N PC is Hyundai's new high-end AT-compatible PC.

Hyundai Electronics America has announced several additions to its PC product line, including an AT- and XT-compatible PC, a family of dot matrix printers and a line of modems.

The AT-compatible machine, named the Super-286N, runs at 6 megahertz or 12MHz and succeeds the company's previous high-end model, the 10MHz Super-286C. The computer comes standard with 64KB of ROM and 1 megabyte of RAM, expandable to 4MB. This 286-based AT system includes a standard 1.2MB, 5¼-inch floppy drive, with six expansion slots and space for four half-height disk drives. The system operates with a 200-watt power supply. The list price is $1,595 for the 1.2MB floppy drive, or $2,295 with an additional 40MB hard drive.

Hyundai says its Super-16X, an XT-compatible computer, has room for up to two 3½-inch, 720KB floppy drives and one 3½-inch hard drive. The PC was designed primarily with the first-time user in mind, but it is also suitable for educational environments, according to Hyundai. Based on the 8088-I microprocessor, the Super-16X includes as standard Microsoft Corp.'s software package, MS Works, which enables the user to run word-processing, spreadsheets and data base and communication modules. Other standard features include the ability to switch speeds between 4.77 and 10MHz; 640KB of RAM and 32KB of ROM; four expansion slots; one serial and one parallel port; and an 80-watt power supply. Prices starts at $945 for a single 720KB floppy system. Configurations with two floppy drives are priced at $1,075, and $1,445 if one 30MB 3½-inch hard drive is added.

A four-model family of printers and four new modems make up Hyundai's most recent peripherals offerings. The new HDP dot matrix printers include two 9-pin and two 18-pin models with an output of 180 characters per second (cps) and 200 cps in draft mode, respectively. Hyundai says that the printers produce near letter quality printing at speeds of 34 cps for 9-pin printers and 100 cps for 18-pin printers. The 9-and-18 pin printers come with either a narrow or wide carriage. Pica, Elite and Italic typefaces are available for use with several paper sizes and forms. List prices range from $259 to $519.

Hyundai's two new external, stand-alone modems and two internal PC add-in card modems are Hayes-compatible. The four modems, called the HMD series, provide auto-dial, auto-answer and auto-speed features. The external modems, for RS 232C connections, support 300 to 2,400 bits per second (bps) for asynchronous and synchronous communications. The IBM PC-compatible, half-height add-in card modems also run at 300 to 2,400bps, for asynchronous communications. All of the modems have either half- or full-duplex transmission capabilities. List prices range between $59 and $159. HYUNDAI ELECTRONICS AMERICA, San Jose, Calif.

Circle 150

SYSTEMS

Texas Instruments Offers Enhanced PCs

Texas Instruments Inc. has boosted the memory capacity of its microExplorer line of Macintosh-based personal computers. The enhanced memory enables the machines to better accommodate storage-intensive artificial intelligence applications such as intelligent CAD, defense research systems and large knowledge-based applications.

The new systems, based on the Macintosh IIx, are available now and replace TI's microExplorer computer family based on the Macintosh II. Users can upgrade from the Macintosh II-based machine to the new Macintosh IIx-based machine. The new microExplorers offer 2MB more of Macintosh RAM than earlier microExplorer models and now provide 4MB of microExplorer RAM and 4MB of Macintosh RAM as a standard feature. Memory capacity can be expanded up to 20MB.

The systems are available with either a 40-, 80- or 160MB internal hard disk drive or a 330MB external drive. The systems also employ a microExplorer processor, based on industry standard NuBus architecture, which runs on all Apple NuBus platforms, including the recently introduced Macintosh IIcx.

A microExplorer system that includes 8MB RAM, a 40MB hard disk, a monochrome monitor and application software lists for $16,645. A complete "de-

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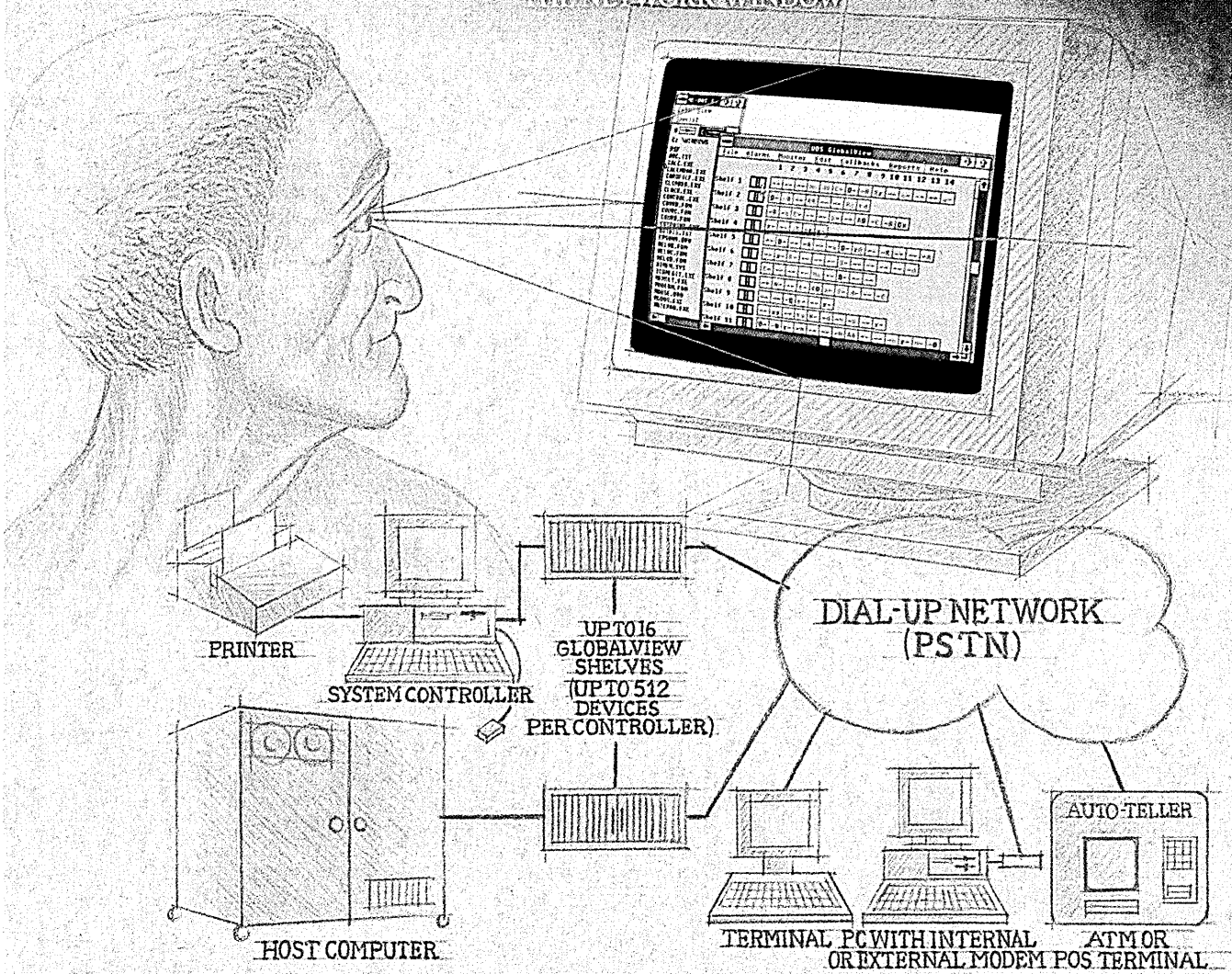

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Universal Data Systems

MOTOROLA INC.

Created by Dayner/Hall, Inc., Winter Park, Florida

Circle 36 on Reader Card

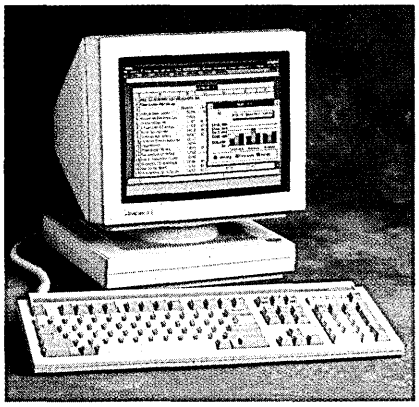
velopment" system, which allows users to develop their own applications by writing their own code, is available with larger amounts of disk space. A sample development system, with 12MB of microExplorer RAM; 4MB of Macintosh RAM; a 330MB disk; a high-resolution, 19-inch monitor; and development software, is priced at $32,240. An optional networking software package is also available. TEXAS INSTRUMENTS INC., Data Systems Group, Austin, Texas.

Circle 151

Amdek Unveils Diskless Workstation

Amdek Corp., a subsidiary of Wyse Technology, announced a diskless local area network workstation meant to enable business users throughout a corporation to share resources over either an Ethernet or Token Ring local area network.

The Amdek System/286N was first made available last month and offers the processing power and graphics capability



THE AMDEK SYSTEM/286N enables business users to share resources.

of a 12.5MHz 286-based PC, according to Amdek. The workstation comes with 1MB of RAM, and its 14-inch display supports IBM's Video Graphics Array (VGA) standard. In addition, the system is compatible with other graphics display standards, including the Monochrome Display Adapter (MDA); Enhanced Graphic Adapter (EGA); Color Graphics Adapter (CGA); and the Hercules Graphics Card (HGC).

The suggested list price for the Amdek System/286N, including an integrated monitor, is $1,999. AMDEK CORP., a subsidiary of Wyse Technology, San Jose, Calif.

Circle 152

SOFTWARE

CA's Graphics Support DECwindows

Computer Associates International Inc. has unveiled a graphic editing and drawing system for the VAX/VMS environment.

The product, named CA-SuperImage/VAX, enables graphic artists or graphics application developers to create illustrations in many ways. These include freehand drawing; digitizing objects (using the mouse to copy an object on paper to the screen); and importing graphics images, industry-based clip art or backdrops. Editing features allow the user to mirror objects, copy images repeatedly through step-and-repeat functions, fit images to a grid through grid snapping and utilize object and point editing. The software runs on Digital VAX 2xxx, VAX 3xxx and GPX workstations and operates with Digital's DECwindows interface.

CA claims that CA-SuperImage/VAX works with approximately 300 graphic output devices including terminals, plotters, laser printers and film recorders. The product is available for early release this month, and general distribution will begin in August. The price starts at $2,800. COMPUTER ASSOCIATES INTERNATIONAL INC., Garden City, N.Y.

Circle 153

Digital Debuts Enhanced Software

Digital Equipment Corp. has introduced version 4.0 of its real-time application software, VAXELN.

The new version has added support for DECwindows, Digital's implementation of the industry standard X Window user interface. In addition, a new "set host" facility has been incorporated to enable real-time VAX systems to connect users via the windows with other VAX computers on a network, according to Digital. The software runs on a range of VAX computers, from the KA620 microcomputer to the rtVAX 6340 system. Digital says typical applications for its VAXELN

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OS/2 NEWS

Volume 1, No. 5.

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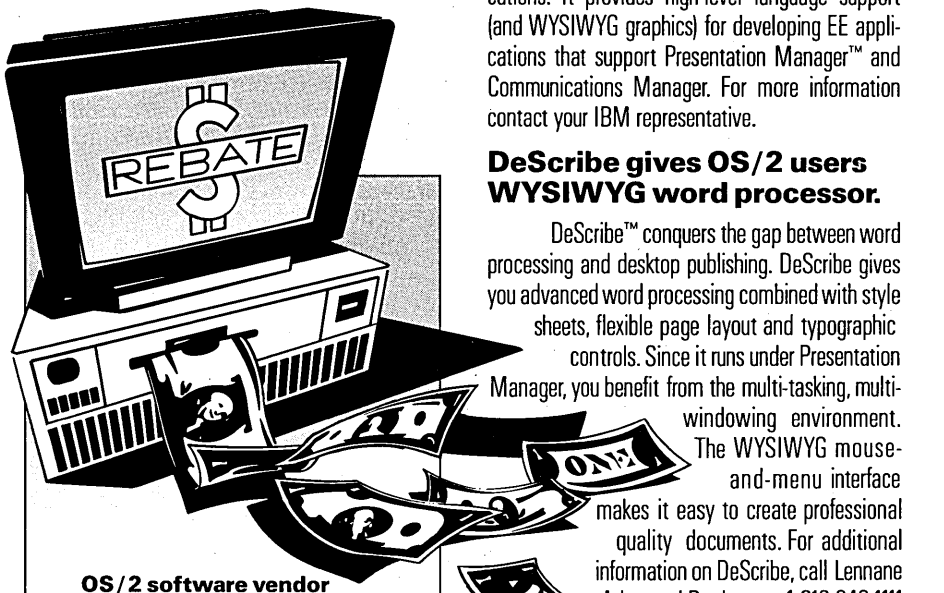

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software include process control, medical monitoring and display.

License fees range from $1,071 to $25,833 for the basic development toolkit and from $428 to $32,340 for each runtime license for rtVAX systems. DIGITAL EQUIPMENT CORP., Maynard, Mass.

Circle 154

COMMUNICATIONS

PC-to-VAX Connection

Alphatronix Inc. has announced that it will make available during the third quarter this year a software utility to connect VAX workstations and PCs.

Alphatronix says its new product, called Bypass, is a data bridge or "dialect" that achieves connectivity through use of optical disks. The product enables a user to store data on a VAX, running under VMS, and write it to a removable, erasable optical disk in a DOS file format.

Bypass on the VAX is priced at $1,100 per dialect and is distributed on optical disk. PC users can purchase the product for $1,000 per dialect on optical disk or $750 per floppy disk. ALPHATRONIX INC., Research Triangle Park, N.C.

Circle 155

Networking Flexibility

Network Software Associates Inc. (NSA) recently introduced a communications software package intended to combine the networking capabilities of three separate System Network Architecture (SNA) emulators.

The new product, designated the AdaptSNA SuperPak, works with NSA's AdaptSNA LAN product, a gateway for NETBIOS and Token Ring local area networks (LANs). AdaptSNA SuperPak enables PC and PS/2 workstation users who are attached to a NETBIOS LAN to communicate with a mainframe via one of three protocols. The user may select either the cooperative-processing LU6.2/APPC protocol (Logical Unit 6.2 Advanced Program-to-Program Communications); the interactive 3270 protocol; or the batch 3770/RJE (Remote Job Entry) protocol.

The AdaptSNA LAN product, which supports two workstations, is priced at $995 and includes the AdaptSNA SuperPak. AdaptSNA LAN is also available in versions supporting up to 128 workstations, with prices up to $5,995. NETWORK SOFTWARE ASSOCIATES INC., Laguna Hills, Calif.

Circle 156

PERIPHERALS

Sharp Boasts Compact Printer

Sharp Electronics Corp. has unveiled a new laser printer intended to take up less space on the desktop.

Sharp's new laser printer, named the JX-9500, has footprint dimensions of 13.4×14.2×10.5 inches. Sharp claims the product addresses the need for laser quality printing on the desktop. The JX-9500 features include a resolution of 300 dots per inch and a printing speed of six pages per minute. The printer comes standard with a 250-sheet input and output tray and a manual feed slot. Available this month, the suggested price is $1,995. SHARP ELECTRONICS CORP., Mahwah, N.J.

Circle 157

BRIEFS

On-Line Software International Inc. of Fort Lee, N.J., has brought out a new release of its **system repair and diagnostic tool** for IBM's Customer Information Control System (CICS) with several new features. STABILIZE Release 3.0 is available immediately with prices ranging from $19,000 to $44,000 for a permanent license.

Circle 158

Multi-Tech Systems Inc. of Mounds View, Minn., has introduced a 32-channel version of its MultiMux line of statistical multiplexers and additional standards support for its data compression modems. The **MultiMux32 multiplexers** are priced between $3,495 and $10,295. In addition, the company announced that its MultiModem224EH7, priced at $649, will include MNP Class 7 Data Compression, CCITT V.25bis dialing and V.42 error correction.

Circle 159

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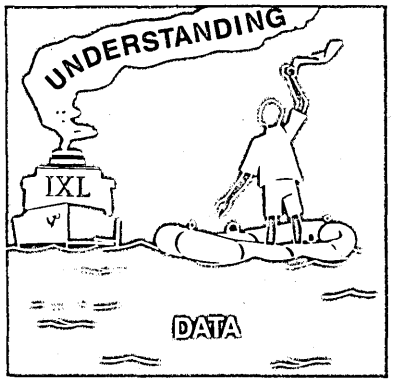

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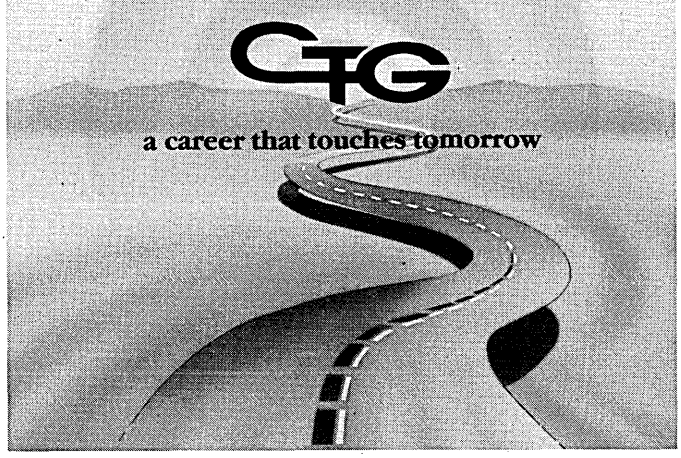

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Career Opportunities

DATAMATION

1989 Editorial Calendar and Planning Guide

Issue Date	Recruitment Deadline	Editorial Emphasis
Apr. 1	Mar. 9	Budget Survey
Apr. 15	Mar. 23	Expert System Integration
May 1	Apr. 7	Companies to Watch
May 15	Apr. 21	Large Scale Systems Survey
May 22	May 1	
June 1	May 8	Object Oriented Programming
June 15	May 18	Application Software Survey
June 21	May 22	DATAMATION 100
July 1	June 8	Non-IBM Operating Systems
July 15	June 21	On-Line Information Services
Aug. 1	July 10	Graphical User Interfaces
Aug. 15	July 25	High-Level Languages
Sept. 1	Aug. 9	User Role in Standard Setting
Sept. 15	Aug. 23	Best Computer Science Universities
Sept. 21	Aug. 31	
Oct. 1	Sept. 7	Salary Survey
Oct. 15	Sept. 22	
Nov. 1	Oct. 9	Managing Your Vendor-Part I
Nov. 15	Oct. 19	(Mini-Micro Spending Survey)

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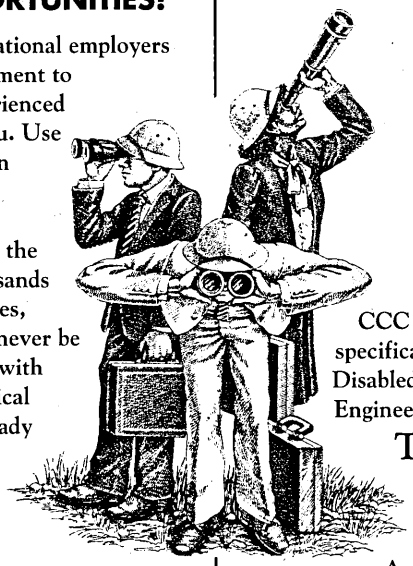

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September 19-20, Washington, DC
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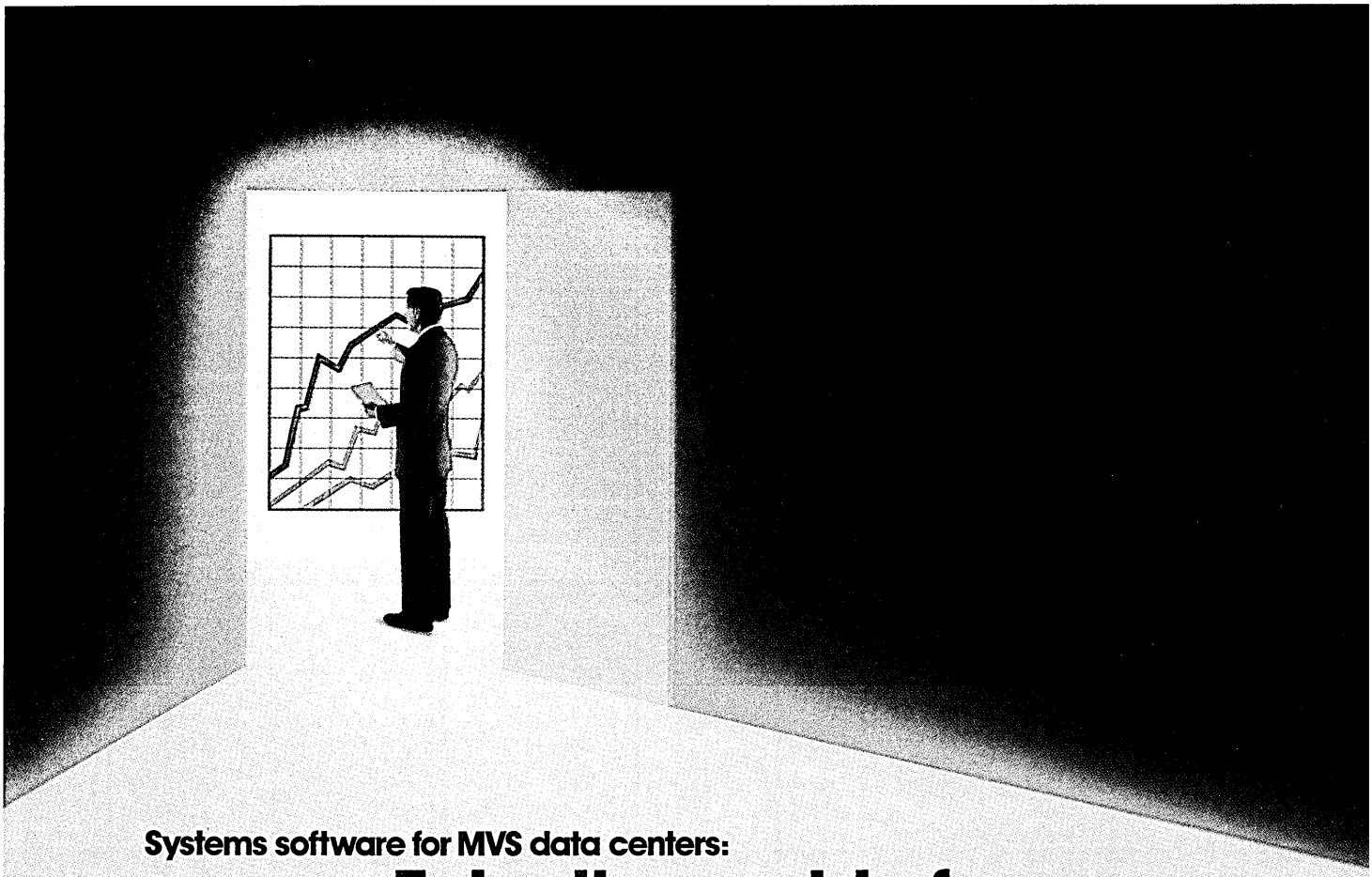

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COMPANY INDEX

This index lists vendors, user groups and industrial associations mentioned in DATAMATION this issue, excluding those mentioned only in passing. Page numbers refer to the first page of articles.

A
Alpharel Inc. . . . 13
Alphatronix Inc. . . . 67
Amdahl Corp. . . . 35
Amdek Corp. . . . 67
American Federation of Government Employees. 64-5
Apt Instruments Corp. . . . 39
ARK Electronic Products Inc. . . . 47
Arthur Andersen & Co. . . . 13
AT&T's Bell Laboratories. . . . 39

B
Banyan Systems Inc. . . . 64-9
Baxter Health Care. . . . 47
Beijing University. . . . 39
Boeing Co. . . . 53
Borland International Inc. . . . 31
British Telecom. . . . 47

C
Canon Inc. . . . 39
Carolina Steel. . . . 25
Caterpillar Information Services. . . . 25
Cathay Pacific Airways. . . . 13
Central and Southwest Services Inc. . . . 35
CIMLINC Inc. . . . 53
Codex Corp. . . . 47
COMPAQ Computer Corp. . . . 13
Computer Associates International Inc. . . . 25, 67
Comshare Inc. . . . 35
Control Data Corp. . . . 18
Coordination Technology Inc. . . . 13
Corporate Software Inc. . . . 31
Cray Computer Corp. . . . 13, 18
Cray Research Inc. . . . 13

D
D. Appleton Co. . . . 53
Data Race Inc. . . . 47
Dataprobe Inc. . . . 67
Dataquest Inc. . . . 18, 47
Department of the Treasury. . . . 64-4
Digital Communications Assocs. Inc. . . . 47
Digital Equipment Corp. . . . 35, 53, 67
DOME Software Corp. . . . 67
Dow Jones & Co. Inc. . . . 35

F
FileNet Corp. . . . 13
Food Lion Inc. . . . 31
Ford Motor Co. . . . 53
Foster & Gallagher Inc. . . . 25
Fujitsu Ltd. . . . 18, 39

G
Gartner Group. . . . 25
General DataComm. . . . 47
General Dynamics Corp. . . . 53
General Electric Co. . . . 53
General Motors Corp. . . . 53
General Parametrics Corp. . . . 67

H
Harris Corp. . . . 13
Hayes Microcomputer Products Inc. . . . 47
Hewlett-Packard Co. . . . 13
Hitachi Ltd. . . . 18, 39
Honda Motor Co. Ltd. . . . 39
Hyundai Electronics America. . . . 67

I
IBM. . . . 13, 18, 25, 35, 53, 64-4, 64-5
Index Technology Corp. . . . 13
Intel Corp. . . . 13
Interactive Data Corp. . . . 35
Interactive Images Inc. . . . 35
International Fuzzy Systems Assoc. . . . 39
International Speedway Corp. . . . 47

J
J.D. Edward & Co. . . . 13

K
KnowledgeWare Inc. . . . 13

L
Laboratory for International Fuzzy Engineering (LIFE). 39
LINK Resources Corp. . . . 35
Lockheed Corp. . . . 53
Lotus Development Corp. . . . 31
LTV Corp. . . . 53

M
Marriott Corp. . . . 35
Martin Marietta Corp. . . . 53
McDonnell Douglas Corp. . . . 53
McLane Data Systems Co. . . . 47
Mead Data Central Inc. . . . 35
META Group Inc. . . . 13
Microcom Inc. . . . 47
Microelectronic Center of North Carolina. . . . 39
Microsoft Corp. . . . 31
Ministry of International Trade and Industry. . . . 39
Minolta. . . . 39
Moore Business Forms Inc. . . . 47
Moore Data Management Services. . . . 47
Multi-Tech Systems Inc. . . . 47, 67
Mycom Inc. . . . 39

N
National Assoc. of Government Employees. . . . 64-5
NEC America Inc. . . . 47
NEC Corp. . . . 18
NEC Information Systems Inc. . . . 13
Network Software Associates Inc. . . . 67
Nissan Motor Co. Ltd. . . . 39
Northrop Corp. . . . 53

O
Olan Mills Inc. . . . 25
Omron Tateisi Electronics Co. . . . 39
On-Line Software International. . . . 67
Ontologic Inc. . . . 13
Oracle Corp. . . . 35
Orr & Associates. . . . 53

P
Pacific Bell Co. . . . 13
Prime Computer Inc. . . . 53

R
Racal-Milgo Inc. . . . 47
Racal-Vadic Inc. . . . 47
Rockwell International Corp. . . . 53

S
San Diego Supercomputer Center. . . . 18
Seiko Instruments U.S.A. Inc. . . . 67
Sharp Electronics Corp. . . . 67
Sikorsky Aircraft. . . . 53
Social Security Administration. . . . 64-4
Software AG. . . . 13
Software Originals Inc. . . . 67
Supercomputer Systems Inc. . . . 18

T
Telebit Corp. . . . 47
Telefonica. . . . 13
Teleglobe Canada. . . . 35
Texas Instruments Inc. . . . 13, 67
The California Institute of Technology. . . . 13
Togai Infralogic Inc. . . . 39
Tokyo Institute of Technology. . . . 39
Toltran Ltd. . . . 67
Touche Ross & Co. . . . 31

U
U.S. Robotics Inc. . . . 47
Union Labor Life Insurance Co. . . . 64-5
University of California at Berkeley. . . . 39
University of California at Santa Barbara. . . . 18
University of North Carolina at Chapel Hill. . . . 39
University of Southern California. . . . 39

V
VF Corp. . . . 31

W
Wang Laboratories Inc. . . . 35
Washington University. . . . 13
Westinghouse Electric Corp. . . . 53

Y
Yamaichi Securities Co. Ltd. . . . 39

Z
ZSoft Corp. . . . 67

ADVERTISERS INDEX

This index lists advertisers in this issue of DATAMATION

	Page	Circle
Adobe	58-59	26
Alsys	64-3	30
Banyan Systems Inc.	C4	3
Bell Atlantic*	41	21
Bull Peripherals Corp.	64-7	31
Cincom Systems, Inc.	62	25
Computer Associates	C2, 12, 22-23, 66, 79	1, 9, 12, 33, 37
Computer Power Inc.	27	14
Data General Corp.	15	10
Data/Ware Development Inc.	1	4
Dell Computer Corp.	60-61	27
Dialog	38	19
Digital Comm — PCCG	16-17	11
Eastman Kodak	7	6
General DataComm	46	23
Hayes Microcomputer	28-29	15
Hewlett-Packard Peripherals	49-51, 63-64	24, 29
IBM Corp.	34, 70	18, 38
Intelligence Ware Inc.	69, 71	34, 35
Liebert Corp.	5	5
Manpower Inc.	30	16
Multitech Systems, Inc.	44-45	22
Must Software Intl.	24	13
Nixdorf Computer AG	10-11	8
Oracle Corp.	2	—
Phoenix Software Co.	33	17
SAS Institute Inc.	56	—
Tektronix	65	28
Unisys Corp.	8-9	7
Universal Data Systems	68	36
US West Comm.*	40-41	20
Wang Laboratories	64-3	32
Washington University	C3	2
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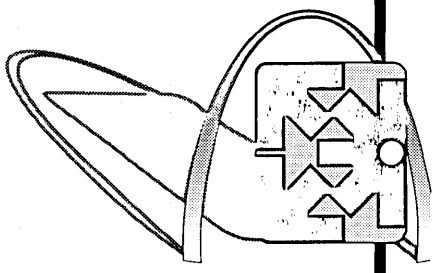

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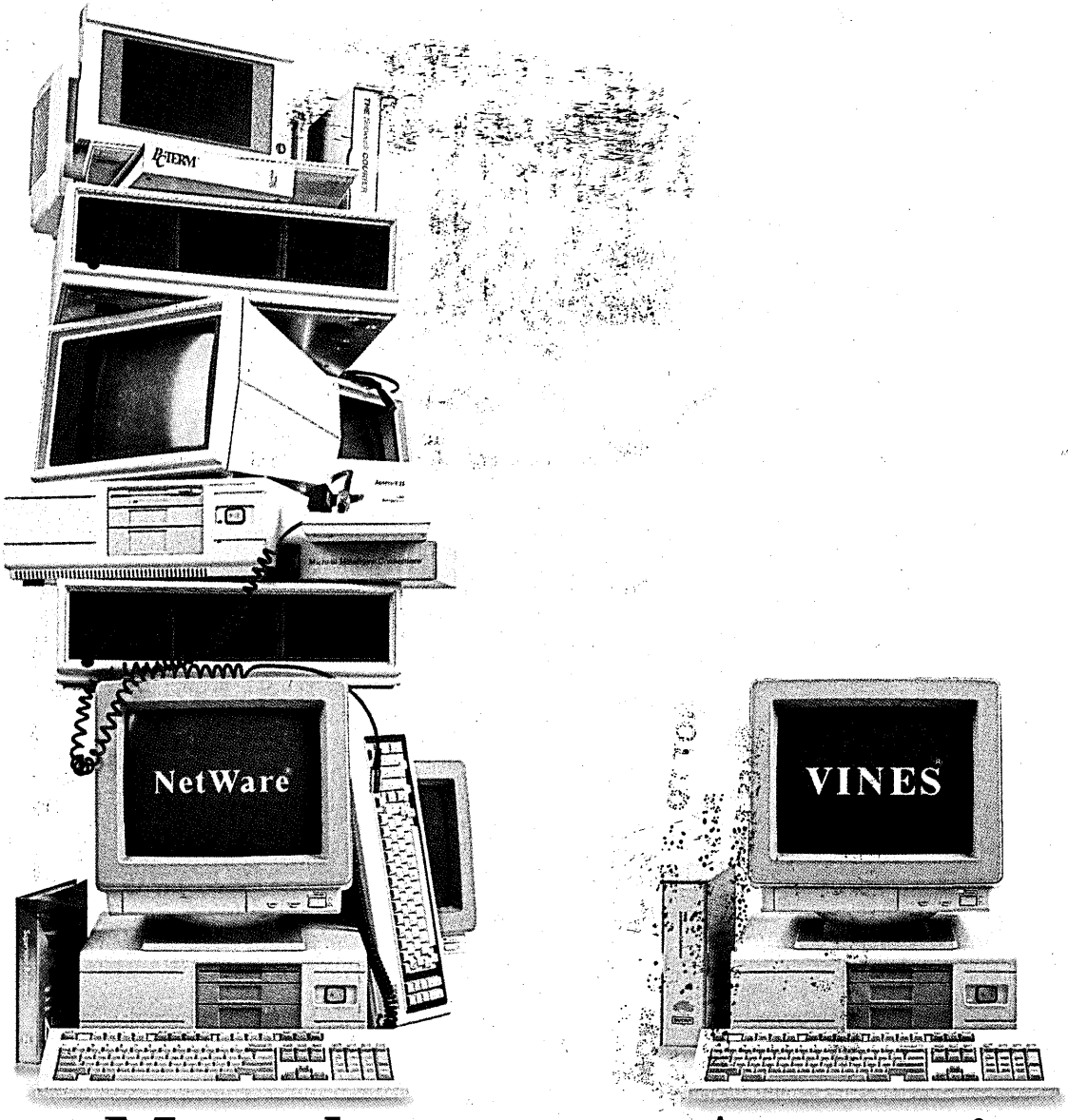

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