DATAMATION®
APRIL 15, 1987
A CAHNERS PUBLICATION

Scientific Computing

WITH:
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CORPORATE DOLLARS ON CAMPUS

SUPERCOMPUTER FUNDING SQUEEZE

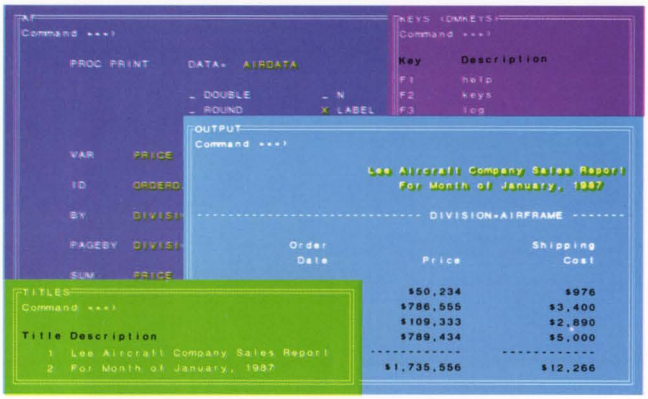
PLUS:
INFORMATION RESOURCE MANAGEMENT

HOW TO TAKE A TECHNOLOGY SNAPSHOT

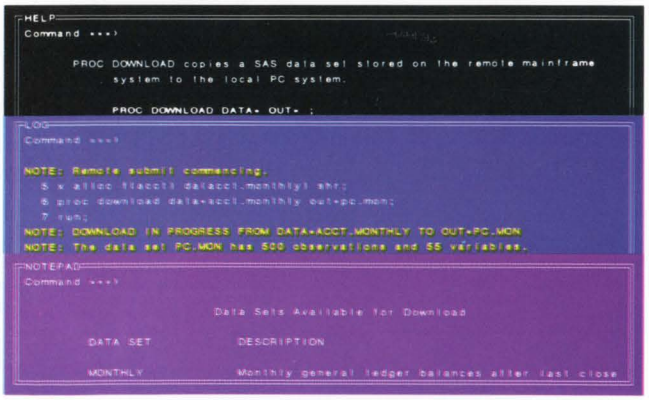
The SAS® System

Power Behind Every Window.

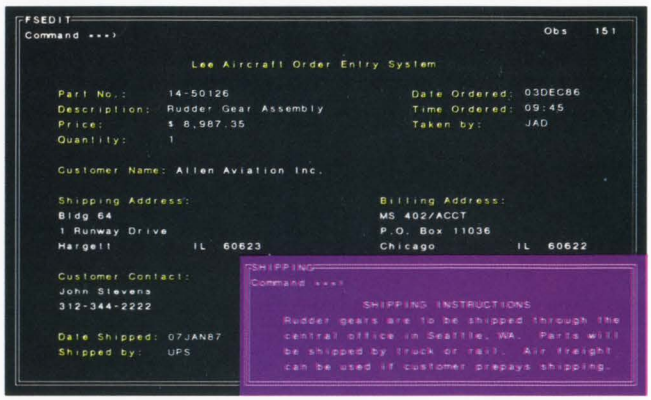
If you've been "window shopping" for software that's both powerful and easy to use, take a look at the SAS® System for Personal Computers. It's got everything you're looking for...and more.



1 Ease of use. The SAS System has ready-to-use procedures for every kind of analysis and report—from simple to advanced, preformatted to customized. A built-in menu system and on-line help guide you through the procedures. Special windows let you define titles and footnotes for reports, check the characteristics of your data, change function key definitions, and keep notes.



2 Connectivity. With the SAS System for personal computers, you get a built-in link to your host SAS System. You can download corporate data; develop, test, and run applications on your PC; or move data and applications back to the host for execution. Plus the SAS System reads data from any kind of file, including dBASEII,® dBASEIII,® and Lotus® 1-2-3.®



3 Integration. The SAS System runs on mainframes, minicomputers, and personal computers so you only have to learn one software system no matter what hardware your company has installed. And as your needs grow, the SAS System grows with you. We're committed to supporting all the capabilities of our mainframe software system for your PC. Whether you license one product or several, you'll enjoy the same high-quality software, training, documentation, and support we've offered for 10 years. It's all part of our site licensing plan.

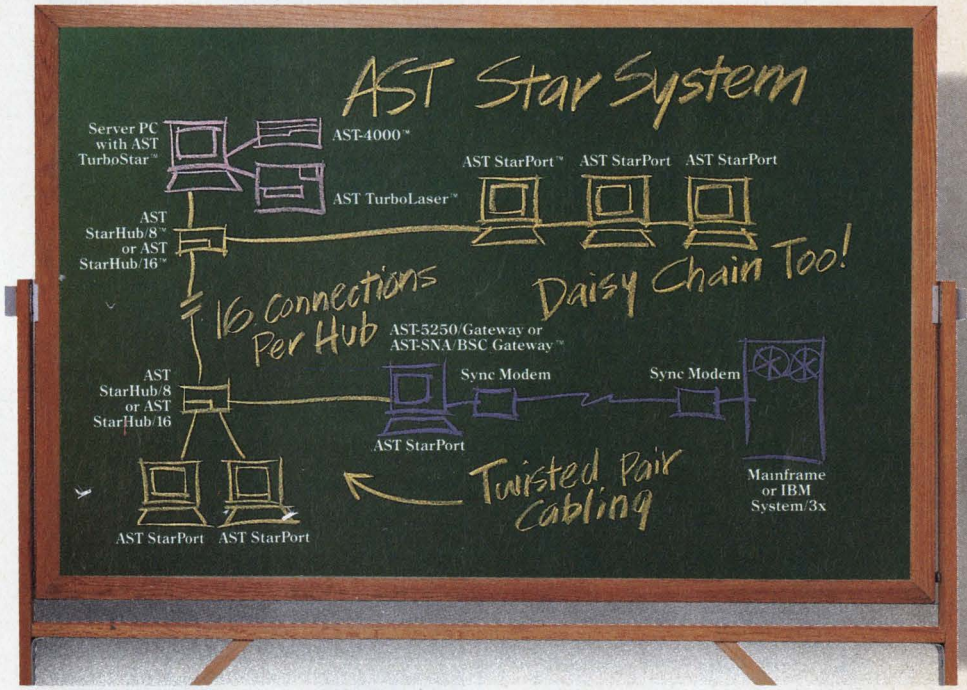
Call or write us today.

SAS Institute Inc.
Box 8000 ☐ SAS Circle
Cary, NC 27511-8000
Phone (919) 467-8000
Fax (919) 469-3737

The SAS System runs on the IBM PC XT and AT, IBM 370/30xx/43xx and compatible machines, Digital Equipment Corporation's VAX™ and MicroVAX II,™ Data General Corporation's ECLIPSE® MV series, and Prime Computer, Inc.'s 50 series. Not all products are available for all operating systems.

Now With NetWare™

Introducing AST's All-Star LAN Lineup.



Kick off a winning season with AST's all-star solution for networking your IBM® PC/XT/AT and compatibles. The AST Star System™ gives first-time LAN buyers, as well as seasoned players, a reliable, industry-standard (IEEE 802.3) network solution for a minimal cost. Whether you need to link just a few PCs to share resources and information, or want to open the lines of communication among all the PC users in your department, you can find everything you need from the pros at AST.

Designed to Last. With so many LANs on the sidelines today, it's important to buy a network that you can continue to use and expand tomorrow. AST provides a complete LAN solution, one that provides room for growth to support your changing business. And AST offers other resources you'll share in your local area network—such as our laser printer, storage subsystem and gateways—to ensure total system compatibility.

Industry-Standard Protection. Designed to meet the IEEE 802.3 StarLAN specification, AST Star System

protects your investment by ensuring continued compatibility with future LAN products. And complete NETBIOS emulation allows you to take full advantage of the growing league of application software packages designed for the IBM-NETBIOS interface.

Versatile Starting Formations. The AST Star System utilizes both bus (daisy chain) and star topologies to give you greater flexibility in designing your network gameplan. For the most efficient, yet economical way to link small groups of up to 10 users, we recommend our Work Group Configuration. This daisy chain layout enables users located within a 400-foot distance to share high-speed laser printers, hard disk subsystems and multiuser applications, such as the AST-5250/ Gateways™. Our Departmental Configuration connects up to 64 users spread across one or more departments, up to 8000 feet end-to-end. Daisy chains may also be connected to network expansion units (hubs) within the configuration; thereby, allowing you to maintain previously configured work groups.

AST Network Program™'s Easy-to-Use Menu Interface.

Simple Start-Up. You don't have to fumble with a tangled jumble of hardware to get your network up and running. The AST Star System consists of easy-to-install adapter cards and hubs, and uses telephone-type twisted pair cabling for simple installation. To start off, purchase the AST Star System Starter Kit. Even a rookie can quickly connect two PCs using this complete hardware/software solution.

For more information on how you can quarterback your own all-star LAN, call our Product Information Center at **(714) 863-1480.** Or send the coupon below to AST Research, Inc., 2121 Alton Avenue, Irvine, California 92714-4992.

AST RESEARCH INC.

Yes, I want to learn more about how AST can get everyone on my team sharing the same equipment.

Name _____

Title _____

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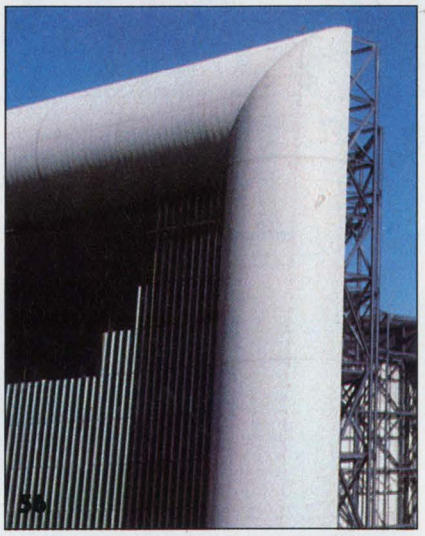
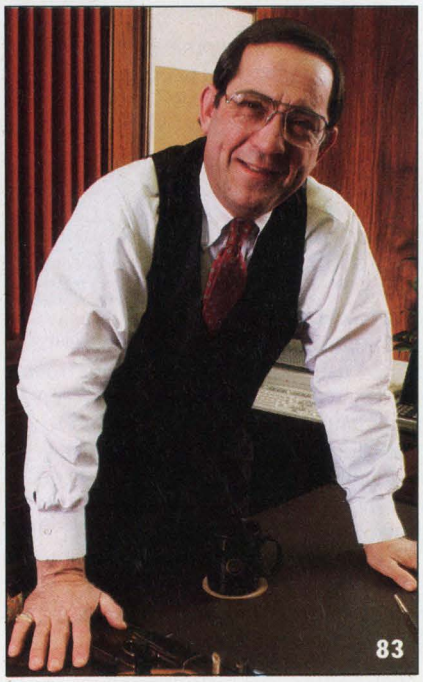
AST Research, Inc. 2121 Alton Ave., Irvine, CA 92714-4992. Attn: M.C. 4/15/87

DATAMATION

NEWS

FEATURES





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REAL TIME

OEM EDITION 52-1

Does not appear in all copies

Cover art by Richard F. Voss/IBM Research. High-resolution rendering of a fragment of the Mandelbrot set for complex quadratic iteration (B.B. Mandelbrot, *The Fractal Geometry of Nature*, 1982). Copyright 1987 R.F. Voss.

OEM EDITION

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1987 JESSE H. NEAL AWARD

Editorial

An Officer, a Gentleman, and an MIS Specialist

Many a vendor has proclaimed this the "year of the customer." But in courting the customer, many a vendor has failed to adopt a new marketing and sales approach to what is indeed a new MIS environment.

Today's top MIS executives are businessmen first and information processing specialists second. They know that technology and product are not in themselves a solution.

We heard this loud and clear as we sat with six top MIS managers two weeks ago in our New York offices. While we'll share much of that discussion with you in an upcoming issue, the message they hammered home signals a major change within leading MIS management. It was best said by Rear Admiral Harry T. Quast, director of the information systems division in the Office of the Chief of Naval Operations: "I am first and foremost an officer of the U.S. Navy. My 'bottom line' or 'P&L' mission is fleet readiness. My specialty toward meeting that mission happens to be information systems."

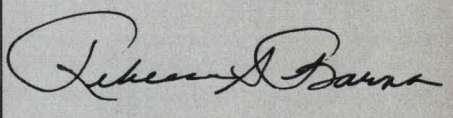
Admiral Quast sets the specs. Vendors vie to meet his needs. But fleet readiness is his first and foremost goal.

High-minded missions are being set in corporate MIS shops as well. John Singleton, chairman and president of Security Pacific Automation Co., Los Angeles, has heady goals for his MIS team: "We're not just cutting costs; we're generating profits."

When MIS can be brought to bear on the bottom line, or on a mission as critical as a nation's fleet readiness, there's no room in that sphere of responsibility for pointing fingers at vendors. The solution must be yours, and must be driven by your organizational mission.

The savvy MIS customer's search is no longer for a computer solution, it's for a business solution in which computers may play a part.

To succeed in making this the year of the customer, vendors must provide at least as great an understanding of the mission as of the machines. It's easier getting a network to work than it is getting a network to work towards accomplishing a mission. ■



REBECCA S. BARNA
EDITOR

DATAMATION HONORS THE TEAM THAT GOES BEYOND BUSINESS AS USUAL.

In our technology driven society, DP plays a vital role in virtually every critical issue. Twice each month, a unique editorial team at *Datamation* covers these global, industry and professional topics in our *Behind The News* column.

In the business press, going beyond "business as usual" involves careful planning, hard work, an innate knowledge of your industry and some degree of risk. But the reward is the unmatched involvement of *Datamation* readers with their magazine.

Now added to this unmatched readership is the "Pulitzer Prize of the business press." *The 1987 Jesse H. Neal Award for Best Department,Section or Column.* This is an award given to only a small handful of outstanding editors each year.

We're proud. Congratulations, team, for a job well done:

David R. Brousell ☐ Ralph Emmett Carlyle
Karen Gullo ☐ Parker Hodges
Willie Schatz ☐ Kenneth Surabian

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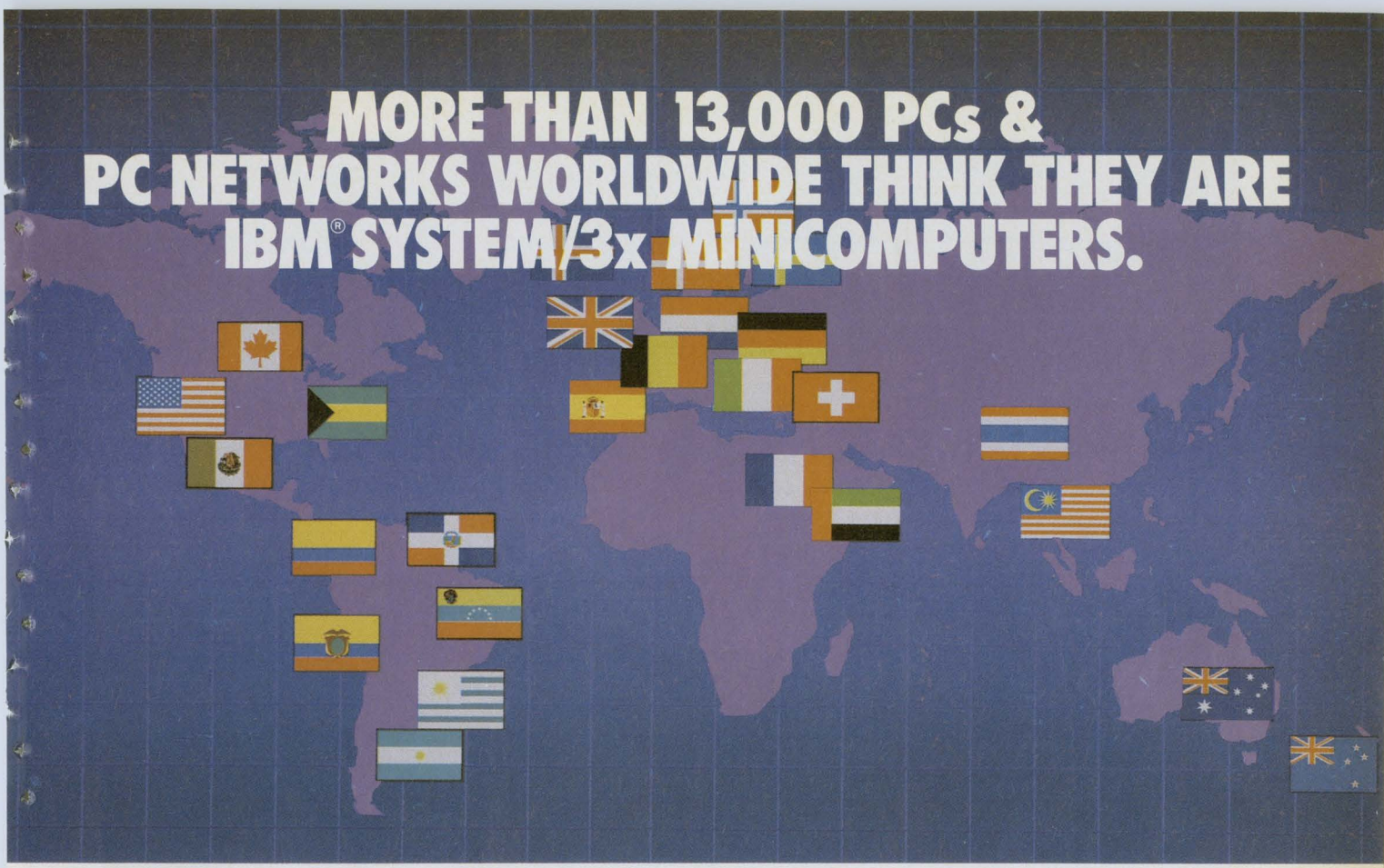
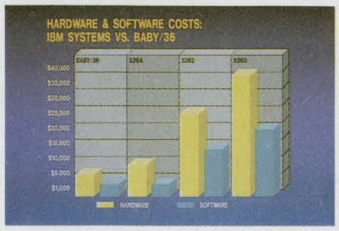
ABP ABC BPA

MORE THAN 13,000 PCs & PC NETWORKS WORLDWIDE THINK THEY ARE IBM® SYSTEM/3x MINICOMPUTERS.



These inexpensive PCs are running the same RPG II software as expensive System/36s & System/34s. They have all the compilers and attendant modules to replicate the RPG II minicomputer environment.

They are *not* minicomputers, and they are *not* necessarily connected to minicomputers. They *are* stand-alone PCs and PC networks running BABY/36® and BABY/34®, software packages that make a personal computer think it's an IBM System/3x minicomputer.



RPG II WITHOUT THE EXPENSE OF A SYSTEM/3x.

More than 13,000 BABY/36 and BABY/34 Software packages have been installed on IBM-compatible PCs and PC networks from IBM and Novell. Users all over the world have discovered that they can still run their RPG II software without the expense of a System/3x. They don't need to spend the time and money rewriting in a PC language. Plus, they have gained ready-access to the more than 4,000 RPG II business applications presently on the market.

SUPPORT REMOTE SITES AND OFF-LINE DEVELOPMENT.

Others are using the PC and BABY/36 or BABY/34 combination to virtually eliminate on-line processing and communication costs at remote sites. Some are doing all of their software development on PCs, to free their minicomputers for production work. And still others are using this combination as an entry point into RPG II programming, then upgrading to a minicomputer or PC network as their needs grow.

Now you know just a few of the benefits you will realize when your PC starts thinking like a minicomputer. Call California Software Products, Inc. for further details about BABY/36 and BABY/34 Software. We'll make your PC think like a System/3x.

Distributor inquiries welcome.

CALIFORNIA SOFTWARE PRODUCTS, INC.

525 North Cabrillo Park Drive
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714/973-0440 • TLX 685645

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Shirley Lodge, 470 London Road
Slough, Berkshire SL3 8QY
0753 41278 • TLX 847185

CIRCLE 6 ON READER CARD

Think Globally.

As a MIS executive, corporate network control is the most important issue facing you and your organization. Integrating personal computers into an overall corporate strategy that supports and enhances your mainframe, databases and application software investment— while still providing services to end users—has been a difficult and, at times, impossible task. Until now.

Introducing The Harris 9300

The Harris 9300 is a powerful communication system combining the best of PC-based local-area networks (LANs) with access to mainframe resources. The system is ideal for professionals and departments that operate in a mixed systems environment of PCs and 3270 and RJE terminals.

Control And Protect

The Harris 9300 is designed to provide network control and management without abandoning your existing equipment.

Up to four mainframe connections may be running at once using any of five different protocols, including 3270 SNA and Bisync, RJE SNA and Bisync, and SNA LU6.2. This means any PC or workstation on a Harris 9300 can have mainframe access, easily and inexpensively.

The Harris 9300 consolidates as many as 16 personal computers and 16 3270 terminals on a single, direct line to the host. And, by networking multiple Harris 9300s together, that direct line can support more than a hundred PCs and terminals, providing an elegant solution for bridging the stand-alone world of individual PCs with your

Act Locally.

major investment in centralized databases and applications.

Get The Lay Of The LAN

The Harris 9300 is also a powerful PC LAN and file server, supporting NETBIOS applications, and is compatible with IBM's PC network and token-ring architecture. What's more, MS-DOS 3.1 programs are supported on the network. The Harris 9300 also allows you to share resources such as laser printers, high-speed band printers, modems, terminals and PCs, maximizing your investment in existing systems and peripherals.

To help you plan and manage networks on a corporate and departmental basis, without sacrificing individual PC application productivity, call Harris at 1-800-4-HARRIS, ext. 5001.

We're Ready To Communicate

We'll send you free in-depth product, application and technical information concerning how the Harris 9300 can help you control your corporate and PC networks before they control you. We'll also provide you with information concerning our unique, nationwide network maintenance, service and support programs—all backed by Harris Corporation, a $2.2 billion leading supplier of information-technology equipment and systems.

If this all sounds good to you, think and act today by calling 1-800-4-HARRIS, ext. 5001 or by writing to Harris Corporation, National Accounts Division, 16001 Dallas Parkway, Dallas, Texas 75380-9022.

HARRIS

CIRCLE 7 ON READER CARD

ACCESS IDMS/ARCHITECT. AEROSPACE CONTRACTORS DO.

Designing and building sophisticated military aircraft requires the rapid development of specialized information systems. So a leading aerospace contractor has shortened the system development cycle dramatically with the IDMS/ARCHITECT family of easy-to-use computer-aided software engineering (CASE) tools from Cullinet.

Using AUTO-MATE PLUS, one of the IDMS/ARCHITECT CASE tools, this aerospace corporation developed a manpower forecast system with 30% fewer man-years than it would have taken with conventional system design methods. It allowed them to reduce project delivery time and MIS resource requirements through the automatic generation of design documentation and real-time verification of design before coding. The savings on this one project alone were in excess of $150,000.

Of course, you don't have to manufacture fighter planes to take advantage of IDMS/ARCHITECT. Cullinet makes a strong case for every organization to broaden its information systems design and documentation capabilities with these easy-to-use tools.

For more information on how your company can access Cullinet IDMS/ARCHITECT and use it to enhance the three-level integration of database management, fourth-generation business applications and decision support, call Cullinet at (800) 551-4555. In Massachusetts, call 617-329-7700. Or write to Cullinet Software, Inc., 400 Blue Hill Drive, Westwood, MA 02090-2198. *Your* success story could be next.

Cullinet

An Information Technology Integrator
For The 80s, 90s And Beyond.

CIRCLE 8 ON READER CARD

Look Ahead

IBM MEASURES THE 9370

ATLANTA -- The results are in. IBM claims to have benchmarked the performance of its new 9370 midrange system and that of its competitors, including DEC's VAX. In a memo being circulated to customers, the company claims the high-end 9370 model 90 beat all but the VAX 8800 in floating point arithmetic computing. In I/O-intensive applications, the 9370 model 90 finished ahead of the VAX 8500 but behind the 8550, 8650, and 8700. IBM says the 9370 Model 90 measured .78MFLOPS compared with .70MFLOPS for the VAX 8650 and .99MFLOPS for the VAX 8800. At the low end, the 9370 model 20 came in at .137MFLOPS. In I/O-intensive applications, as measured by an IBM-designed RAMP-C benchmark, the 9370 model 90 came in at 425 transactions per minute compared with 540tpm for the VAX 8550, 8650, and 8700, and 300tpm for the VAX 8500. The 9370 model 20 registered 83 transactions per minute, beating out the MicroVAX II, which had 65.

TELECOM SERVICE REGS DISPUTED

GENEVA, SWITZERLAND -- West Germany and the U.S. are at loggerheads over how tightly the Geneva-based International Telecommunications Union (ITU) should regulate international telecom services. At stake is the open market for value-added network services and a wide range of datacom applications. The U.S. wants the formal legislation limited to basic telephone services. The West German Bundespost--and to a lesser extent the French telephone authority--want to maintain some monopoly in advanced services. With the first implementations of the ISDN already being tested, a General Agreement on Tariffs and Trade committee investigating such services, and the World Administrative Telecommunications Conference in Sydney just over a year away, the legislative battle is on.

PRICING, SPECS DUE IN JUNE ON SPECTRUM

VIENNA, AUSTRIA -- Hewlett-Packard senior vice president Doug Chance told potential customers at the company's international users' conference here that Spectrum 930 and 950 pricing and performance ratings will be announced in June. HP is due to host an analysts' meeting on the first of that month. Last September, shipments of the 930 RISC-based processors were pushed back to late 1987 because of software problems. Recent improvements to the offending MPE XL operating system include a 70% reduction in path lengths.

HOWDY, NEIGHBOR!

NATICK, MASS. -- As part of an emerging Unix strategy, Prime Computer Inc. is holding talks with neighboring VMark Computer Inc. on sales rights to VMark's uniVerse software. The package enables applications

written in Prime's Pick-like Prime Information package to run on Unix-based computers. The talks are seen as a prelude to Prime's introduction later this year of an up-to-32-user system developed using the Intel 80386 microprocessor and Unix System V.

IS ROGER SMITH LISTENING?

BOSTON -- Expanding on comments in London's Financial Times on the lack of need for the General Motors-backed Manufacturing Automation Protocol (MAP), Digital Equipment Corp. president Kenneth H. Olsen confides to DATAMATION that the financial resources needed to make MAP work are not behind it. "When we say we support MAP, we mean its goals," says Olsen. "If our friends want to do it, we'll support them. When we say we don't support it, we are saying we don't think it'll work." The concept won't work, he says, because no one is willing to make the investment in development and testing for all to benefit equally.

HARRIS READIES SUPERMINIS

FORT LAUDERDALE, FLA. -- Harris Corp. will be introducing two high-end H-Series superminicomputers in May for the real-time and technical markets. Both machines will be in the 15MIPS range and will support a new Harris real-time OS. Harris claims two customers --one in aerospace, the other the DOD--will be implementing the systems using the Harris Ada environment, introduced early this year.

ANOTHER MINISUPER IS DUE

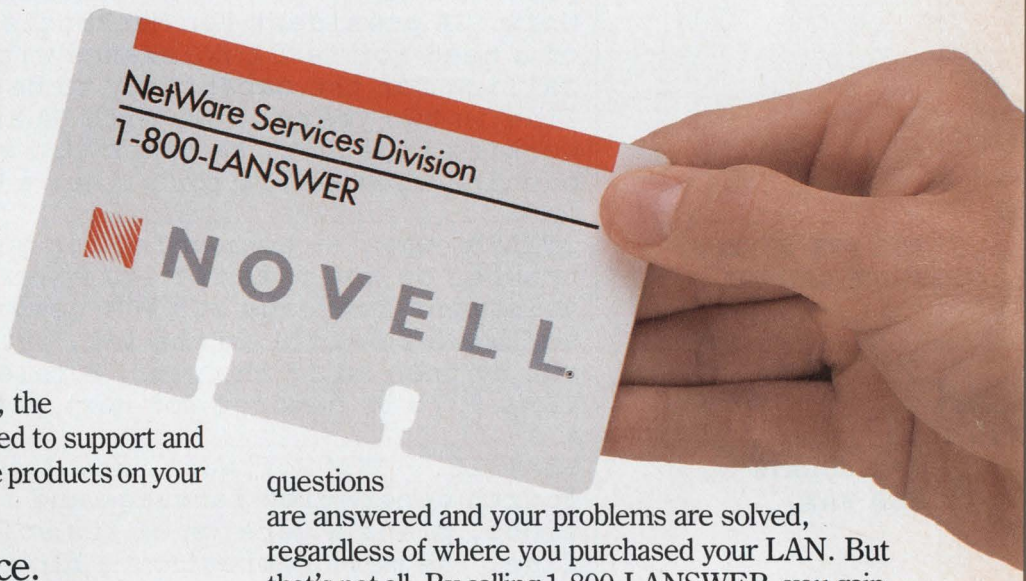
MILPITAS, CALIF. -- Cydrome Inc., after a three-year, $20 million development effort, early next month will introduce its first product, the latest entry in the sub-Cray supercomputer race. The Cydrome system is said to be based on a "massively parallel" architecture with a numeric engine featuring four pipelined parallel units and wide word addressing. A separate front end using six 68020 microprocessors handles I/O functions. The Unix-based system is said to feature an advanced FORTRAN compiler as well. The system also will be marketed by Prime, which helped finance the development and owns a piece of Cydrome.

A CASE OF RELIGIOUS ZEAL

SACRAMENTO, CALIF. -- Is the world ready for another portable operating system? Jim Lennane, founder and president of System Integrators Inc., developer of computer aided publishing systems, hopes so. He has come up with an OS called RING. He says it is more like Apollo's Domain than like Unix, but without the Apollo product's dependence on proprietary hardware. It is written in the Optimized Programming Language (OPL).

(continued on p. 12)

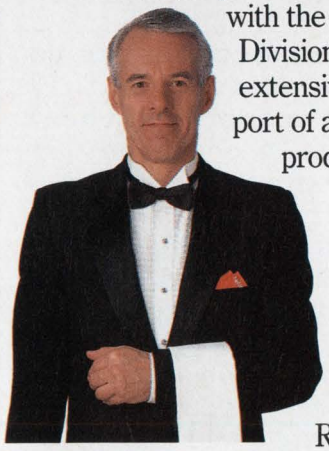
Novell Has A New Calling Card For LAN Service.



Our new calling card has one aim—to help you call on us when you have a question or problem with a LAN product. One phone call will put you in touch with our NetWare® Services Division, the branch of Novell expressly created to support and service all hardware and software products on your NetWare LAN.

At Your Service.

Novell dedicated years of hard work to the development of the networking industry's most innovative, high-performance LAN products. And with the NetWare Services Division, Novell has dedicated extensive resources to the support of all hardware and software products on NetWare LANs.



First-class service for your first-class LAN.

Always on Call.

When you call 1-800-LANSWER, anytime, day or night, you'll reach a NetWare Service Representative. The Service Representative will see to it that your questions are answered and your problems are solved, regardless of where you purchased your LAN. But that's not all. By calling 1-800-LANSWER, you gain access to the full range of services provided by the NetWare Services Division. Services like our 24-hour toll-free number, technical telephone support, on-site technical support and attractive service agreements.

The Call To Action.

The NetWare Services Division has been called into action to meet the service and support needs of NetWare users everywhere. So if you have a question or problem concerning products for your NetWare LAN, contact the NetWare Services Division at 1-800-LANSWER. The number is staffed around the clock. And remember, the call's on us.

NOVELL®

Milestones Ahead.

Lennane says he hopes to sell it to "the 386 people." SI has spun off RING Computers Inc. to market the operating system for "a range of business applications." Lennane's immediate plans are not specific: "We're still in the religious phase," he says.

GA'S FAULT TOLERANCE PLANS

SANTA CRUZ, CALIF. -- Fault tolerance should hit the Pick operating system world within 14 to 18 months, thanks to General Automation's acquisition early this year of Parallel Computers Inc., Santa Cruz, Calif., producer of 32-bit fault tolerant systems based on Unix. GA president Len Mackenzie says his firm, aware of a need for fault tolerance with Pick, had plans calling for the capability to be added to its Zebra line in two years. Now, with GA and Parallel engineers working together, he hints at a single fault tolerant machine with a slot for either a Unix or a Pick board.

4GL FOR MICROS FROM CANADA

OTTAWA, ONT. -- Cognos Inc. is putting the finishing touches on a version of its PowerHouse application development language for IBM-compatible micros. The software is still in the lab, but is scheduled to be out by the end of the year. A release of the 4GL for IBM's 9370 is rumored for next year.

TOM COURTS THE VAX

SEATTLE -- TOM Software, developer of the Speed2 fourth generation language and financial applications, plans a version of its software for the VAX line. The move represents a blow to financially troubled Wang Laboratories Inc., whose VS computers have been the exclusive Speed2 host since its unveiling. The VAX version of Speed2 and financial applications are expected in November.

RUMORS AND RAW RANDOM DATA

The chances for a sale of a U.S.-made supercomputer to the Japanese government are looking better. Almost lost in the flurry over semiconductor trade with the U.S. were comments by some MITI officials that they would encourage government agencies to buy American supercomputers to help smooth trade friction. . . . Integraph Corp., Huntsville, Ala., is readying for October release an addition to its Distributed Publishing family of products. It is a product to prepare presentation visuals, which will sell for $3,000. . . . Two-year-old Expert Technologies Inc., Pittsburgh, a developer of expert systems for the print/publishing industries, this summer will install the first copy of a new rule-based expert system it is developing for magazine layout. The first installations will be for telephone yellow pages.

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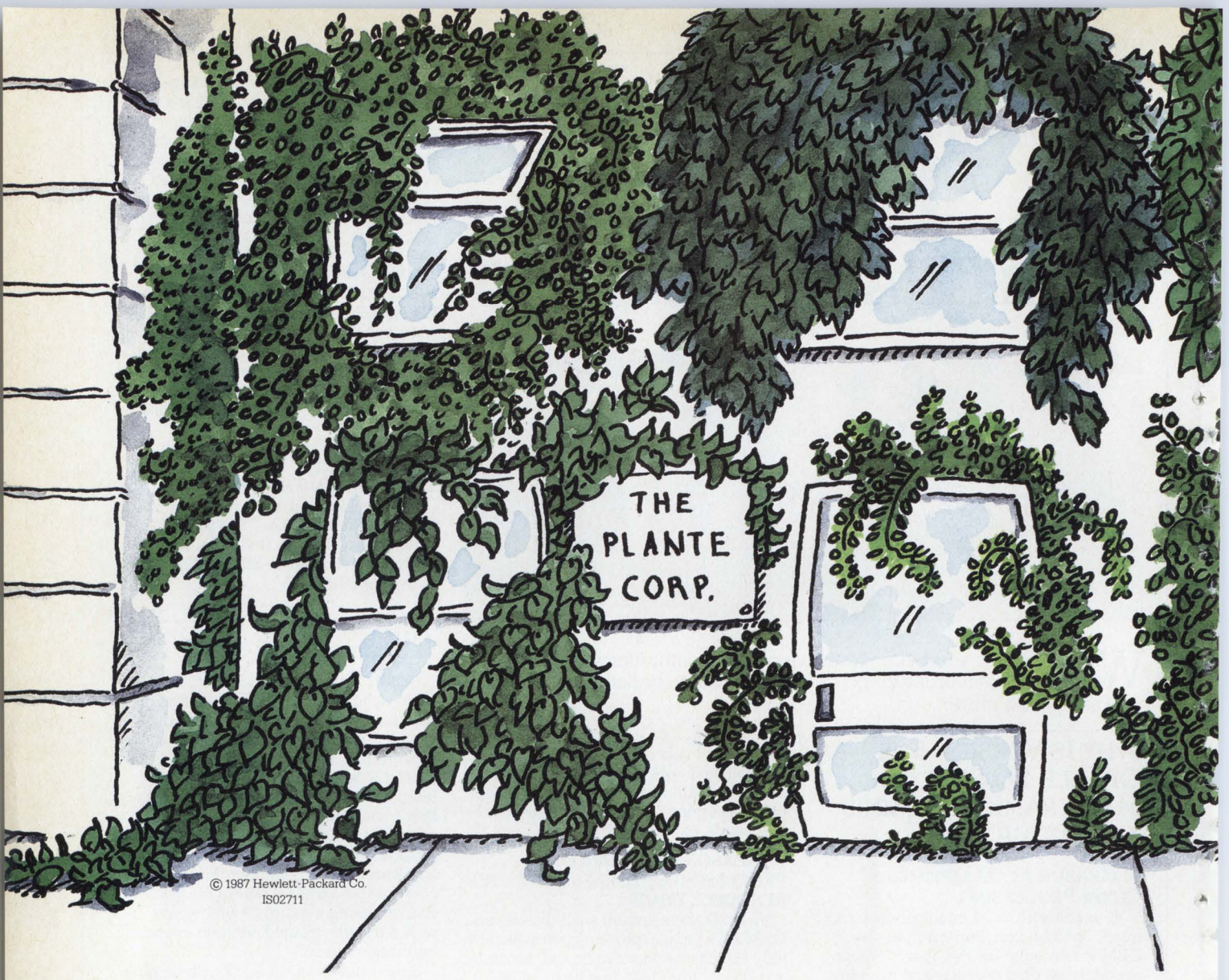

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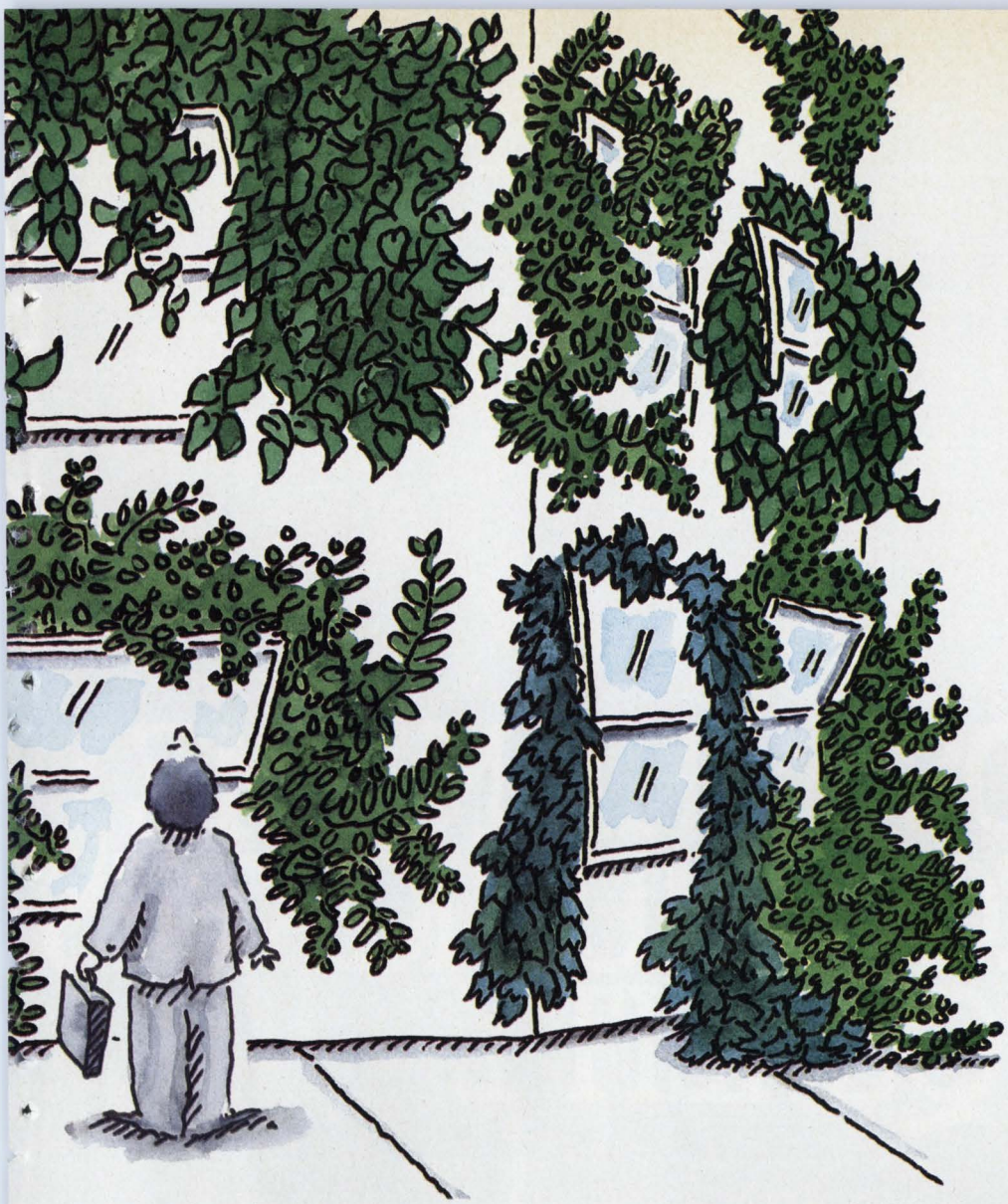

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CIRCLE 12 ON READER CARD

SUPERCOMPUTERS

The Thrill Is Gone

A series of setbacks has clouded ETA's ambitious attempt to enter the supercomputer arena.

BY WILLIE SCHATZ

Beset by software troubles, allegations that it will be merged back into its parent, and missed internal production deadlines, ETA Systems, the supercomputer spinoff of Control Data Corp., is under some heavy scrutiny these days.

The St. Paul-based ETA Systems has attracted a lot of attention over the last year as it readies its first product, the ETA-10, for market. The company hit some snags in the technology, which resulted in a slower clock speed for the product's first release (see "Not a Paper Tiger," July 15, 1986, p. 26).

Now a report in the business pages of the *Minneapolis Star and Tribune* alleging that ETA will not become independent of CDC and the subsequent postponing of the ETA-10's March 30 coming-out party at its first customer site, Florida State University, has intensified the scrutiny not a few degrees.

ETA was born with CDC owning 89% and the employees 11% of the company. CDC has since increased its share through the conversion sale last December of ETA's debt for equity. CDC has also contributed $100 million to $150 million to keep ETA alive. The subsidiary has had no revenue of its own.

Officials at both ETA and CDC deny that ETA will lose its independence. Thomas Roberts, executive vice president at CDC and president of its computer systems and services group, which oversees ETA, says the supercomputer company will not be merged with CDC. "ETA is not going to be merged back," he told DATAMATION. "Our mission this year is changing ETA from an R&D effort into a business." Roberts says, however, that as far as the future goes, CDC will do what makes the most business sense. "Who knows what will happen a year from now?" He says CDC has looked at taking ETA public, and will "probably look at that again."

ETA delivered a one-processor version of the ETA-10 to FSU in late December. The machine presently consists of one cpu in its liquid nitrogen cryostat, half the shared memory, all the disk drives, a buffer, and the Apollo workstation allowing access to local users. The first cpu was returned to St. Paul for updates. It's expected back in Tallahassee shortly. And according to both ETA and John Nall, FSU's deputy director of computer and information resources, the machine, even in its primitive state, is working.

"ETA IS NOT GOING TO BE MERGED BACK."

Okay, it's not getting four-star reviews yet. But it's a great deal more than most people have seen. So what happened? Why did ETA postpone the coming-out affair?

Roberts says the party was postponed because ETA is very close to completing its work on the delayed systems software and delivering the second cpu. "We figured why not wait until we can deliver the whole package, since we're so close," Roberts says. He admits, however, that the story in the *Star and Tribune* played a part in the decision to delay the event.

Roberts says the ceremony is being rescheduled for either before or after CDC's May board of directors meeting, but he wouldn't be more specific.

What the ETA-10 will be and exactly what it will do has been the cause of considerable speculation in supercomputing circles. The company was always committed to using the same VSOS (Virtual Storage Operating System) as the Cyber 205, the better to ease the migration for 205 users. But lurking behind the VSOS was Unix, to which ETA would move as soon as possible. That's going to be much later than sooner, however. Persistent software problems have caused ETA to retrench from its plan to substitute Unix for VSOS. For the present and foreseeable future, ETA will simply put a Unix shell over VSOS.

The same software difficulties are responsible for the National Science Foundation's John von Neumann Center (JVNC) at Princeton having second thoughts about taking delivery when ETA says the machine is ready. The two parties will now "jointly agree" when the ETA-10 will be delivered to Princeton.

"By substituting solid-state memory, ETA goes a long way toward overcoming the 205's difficulties with virtual storage," says a supercomputer user in a major government lab. "But it's still not going to be more than a warmed over 205.

THORNDIKE: "Shipping when we did is a marvelous feat, not something we should be tarred and feathered for."

Photograph by Steve Leonard

ETA's reputation as a challenger to crosstown rival Cray Research Inc. and its role as innovator of supercomputer technology are the subjects of much speculation among supercomputer aficionados.

"Their window of opportunity is closing rapidly," warned Jack Worlton at a recent analysts meeting in New York. Worlton is president of his own consultant group, Worlton and Associates, Los Alamos, N. Mex., and a laboratory fellow at Los Alamos National Laboratory.

Production Delays Hurt

Says Gary Smaby, an analyst with Piper, Jaffray and Hopwood, Minneapolis, "All these delays have definitely hurt ETA. It's a significant accomplishment for them to do what they did in the time period they did it. But they missed filling the top end of the window. They fell short on the machine's performance objectives. They didn't demonstrate the price/performance difference they hoped to display."

ETA thinks it is getting more than its share of grief for missed deadlines.

"We said we were going to deliver a supercomputer in the fourth quarter of 1986 and we did," says ETA president Lloyd Thorndyke. True. But boy, was it close. The cpu and a few accoutrements arrived at FSU on Dec. 30. "We're not trying to be paranoid. But no one else has achieved what we've achieved. Shipping when we did is a marvelous feat, not something we should be tarred and feathered for."

Things aren't that sticky yet. But ETA hasn't exactly helped its cause. It missed a recent analysts meeting in New York, purportedly because Thorndyke was out of town and he was the only person capable of making a presentation to the 75 attendees. An analyst who was there says ETA was conspicuous by its absence and it hurt considerably the company's claim to be a viable player in the supercomputer market.

According to a member of the board of directors of the Consortium for Scientific Computing, which governs the JVNC, ETA has been less than forthcoming with information about the ETA-10. The company will talk about the machine's clock speed—reportedly about 10nsec—and its software troubles. But it hasn't given out an instruction manual, which, a source says, "we would have from Cray."

With orders from FSU, the JVNC, the University of Minnesota, and the West German weather bureau, ETA is struggling to evolve from simply a manufacturing entity to a full-fledged computer company. That means marketing, support, customer service, and all the other headaches associated with the business. Some question whether ETA has the capability to do it.

So, like any concerned parent, CDC is trying to ease the growing pains. Current plans call for ETA to leverage CDC's strength by using CDC's sales and marketing force in ETA's attempts to carve out pieces of Cray's territory. Some ETA sales personnel will work out of CDC's district sales offices. And CDC's new Cyber 930 is designed to provide linkup capability from desktop micros to the ETA-10.

Some observers speculate that the relationship between parent and subsidiary will extend beyond sales and marketing into technology. Says a source familiar with the ETA-10, "I think [CDC] is thinking how it can work the ETA architecture into the CDC line. There's a pretty good chance they'll revamp around the ETA-10. That's what I'd do. One line, with everything compatible from a workstation to the supercomputer. ETA can be left alone to make supercomputers, but there's no need to leave them alone to market them."

From ETA's angle, the view is just fine, thanks, despite some personnel turmoil. The company has been looking for almost a year for a chief executive officer to, as Thorndyke puts it, "take the financial and marketing burden off me."

That person may also supplant former vice president of finance and chief financial officer W. Glen Winchell, whom the *Star and Tribune* says was told in January he wasn't needed because ETA wasn't going to become independent of CDC. According to Thorndyke, CDC said it would supply ETA's financing, making a cfo superfluous.

Meanwhile, CDC has cut ETA's budget. A CDC spokesman had no comment when asked by how much CDC had reduced ETA's budget, saying CDC does not reveal financial figures for separate businesses within the company. Tom Roberts says that no technology budgets have been cut at the subsidiary. "In some cases, expenditures are going to take place in June instead of January" because ETA is late with the systems software for the ETA-10, Roberts says.

"THERE'S MORE BAD NEWS THAN GOOD."

Thorndyke at first denies that CDC had cut ETA's budget, then says he was trying to hold down costs, will cut wherever he has to, and that doing so is "not a major sin." Asked if that meant reducing ETA's employees from the current 550, he indicates that the company would contract with third parties wherever possible.

Won't Expand Company

"We are expanding our systems, software, and applications services, but we will not expand the company," Thorndyke says. "We will not have a customer service group of employees. We can delay incremental spending where we can buy services through a third party. You can save money by doing some things smarter when you get closer to the problem."

But sometimes you can travel 10,000 miles and still stay where you are. The order for the University of Minnesota's Supercomputer Center is in dire straits, through no fault of ETA's. That puts in jeopardy the company's prediction of 10 to 14 orders this year. It is now aiming for the lower end of that range, and Thorndyke says hitting it would make the year successful.

Minnesota's predicament underscores just how vulnerable ETA is to outside forces. The university contracted for an ETA-10 when it was under the financial umbrella of the National Science Foundation's Phase I program (see "Render Unto Caesar," March 1, p. 19.) But since NSF has pulled the plug, the university is scrounging around for money.

"We don't know where the money's going to come from," says Peter Patton, the supercomputer center's director. "Other things may have to suffer to pay our Cray-2 debt, which we haven't done yet. The supercomputer center has five people out trying to sell cycle time.

"The NSF did a real job on us and all the other Phase I centers. We feel jilted by this fickle suitor."

ETA hasn't got time for

that pain. Think how it's going to feel if Minnesota comes up empty. One quarter of your committed orders down the tubes doesn't do much for a company's image.

"We're concerned about the enthusiasm of NSF about supporting supercomputers," says L.F. Kremer, vice president, customer and sales support. "When we see what happened to Phase I, it worries us. They're pulling away support from Cyber users. They represent potential users for us. We wish they hadn't done that."

But NSF did. That makes all the more difficult ETA's entry into the governmental marketplace, where it's got to score heavily to survive. NSF stuck with the company through tough times with the Consortium for Scientific Computing, but apparently decided it's time to let ETA make or break it on its own.

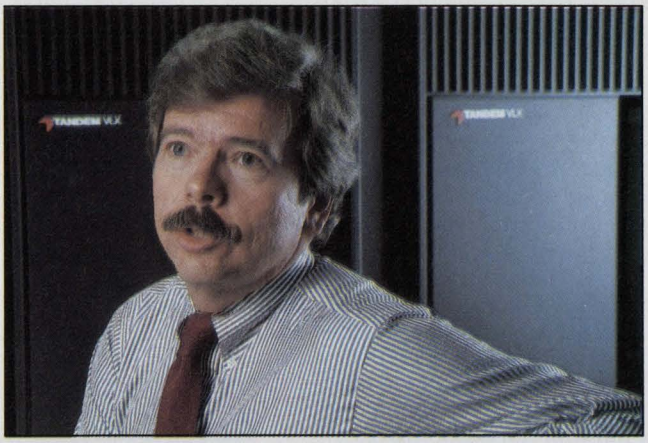
"ETA probably is viewed and treated more harshly than the average startup," says a user at a government laboratory who requested anonymity. "The in group thinks these guys have struck out two or three times. They've been freeloading off the government's inclination to support a second vendor. As long as they continue to be the only second supplier, they can continue in their current mode. The ETA-10 could end up for the persistent reasonable expert user as a supplier of cheap cycles."

"There's more bad news than good," says Patton. "They need someone like Darth Vader to speed up the manufacture of the new death star."

Maybe that person is out there somewhere. But so far the force has not exactly been with ETA. ■

Also contributing to the reporting of this article was associate news editor Karen Gullo.

Photograph by Sharon Hall



PETERSON: The Tandem executive doesn't want to give away low-end business to competitors.

Protecting the Flank

Tandem's new low-end NonStop computers are designed to fend off the likes of NCR and IBM.

BY JEFF MOAD

You couldn't tell by looking at its financial results for the last year, but Tandem Computers Inc. has a problem.

It's not that the 12-year-old Cupertino, Calif.-based vendor is having trouble keeping up in what has always been its key markets for medium and large on-line transaction processing systems. In fact, in the last year, Tandem has ridden a new high-end product line—the 16-processor NonStop VLX—and an explosion in the market for on-line applications to record sales and earnings. While less- focused systems vendors have been bemoaning the ongoing computer industry slump, by the end of 1986 Tandem increased its earnings by 76% and was poised to surpass the $1 billion mark in annual sales in 1987.

Forced to Walk Away

The problem is that while Tandem has been focusing successfully on the high-end products, it has been forced to walk away from large chunks of business in the increasingly important distributed departmental low end of the OLTP market. That's because it has not had an under-$100,000 version of its NonStop fault tolerant system to market against the likes of NCR's 9800 and Tower product lines or IBM's Series/1.

All that is about to change, however, as Tandem plans to unveil a long-awaited pair of low-end computers next week that will both cut the entry price of the NonStop product line in half and give Tandem a $20,000 multiuser Unix-based system using standard, off-the-shelf technology. Tandem officials hope the new systems, coupled with a recently introduced distributed SQL-based relational database management system, will give it a compelling story to tell to large manufacturing, financial, and retail users ready to distribute on-line processing power to branch locations.

"That's where most of our customers' transactions start and end, and that's where most of them want to put the computing power," says Tandem's marketing vice president Gerald L. Peterson. "We'd just as soon not give that business away to our competitors."

The Result of Hard Thinking

Of course, this isn't the first time Tandem's reliance on proprietary hardware and resulting lack of a low-end product has caused observers to predict trouble for the company. In the early 1980s, after Tandem had pioneered and proven the existence of an OLTP market, a slew of venture capital-financed competitors emerged, threatening to use lower-cost off-the-shelf microprocessor technology to bring to market on-line-oriented systems priced at a fraction of Tandem's NonStop. Tandem, however, managed to protect its seven-year lead over the startups by improving its connectivity to IBM communications protocols and by boosting high-end performance of its 16-bit multiprocessor architecture with custom ECL logic technology on its VLX and TXP systems.

This time around, the threat to Tandem is very real, and it's not coming from a competitor whose principal asset is a well-written business plan. It's clear that IBM, like NCR, has discovered OLTP in a big way. Digital Equipment Corp. has also taken steps to improve its position in the OLTP market (see "On the Beach for an OLTP Entry," April 1, p. 19). IBM has begun supporting such fault tolerant features as dual communications and disk controller ports on its mainframe computers, and has included a transaction processing protocol in the key LU 6.2 portion of its SNA blueprint. "More and more, IBM is chinking away at Tandem's OLTP lead," says Tom

Banks, a former Tandem manager and now director of marketing at Tandem competitor Tolerant Systems, San Jose.

While its 48MIPS VLX system goes up against IBM at the high end, Tandem would like to replace IBM and other vendors at the distributed departmental low end of the on-line chain where systems like the Series/1 are making gains among some Tandem customers. One example is the May Company, a North Hollywood, Calif.-based apparel retailing chain and long-time Tandem customer, which recently started shopping for ways to make data collected at its 35 stores more accessible to its 10 Tandem TXP on-line systems. Since Tandem didn't have a low-end offering, May Company decided to install a Series/1 system in each store and to develop software that would allow the IBM systems to feed sales data to the central Tandem systems continuously rather than once at the end of the day.

"Tandem didn't have a product at that end of the market, so we didn't even look at them," says May MIS director Mike King.

Tandem also has lost out on plenty of federal government business because it lacked both low-end systems and systems running Unix, a feature required by many agencies. Tandem has won some federal government business, but the company has seen much more business go to competitors—such as NCR, Tolerant, and Unisys—that were able to ship Unix-based systems.

Filling the Gaps

Tandem hopes to fill both gaps in its product line with its two new offerings. One, code-named Comet, is a multiuser Unix system using the Motorola 68000 microprocessor and based on a system bought by Tandem from Altos Computer Systems of San Jose on an oem basis. The second and more important system, code-named Falcon, is a CMOS version of Tandem's NonStop architecture and is compatible with its Guardian 90 operating system.

While sources say the Comet Unix machine will be priced at around $20,000, the Falcon system is expected to be priced at about $50,000, about half the price of the eight-month-old EXT10. The Comet is not fault tolerant, but does offer data protection features such as disk mirroring, while the Falcon is said to be fully fault tolerant. It is expected to offer between two and four transactions per second compared with the EXT10 that offers from 4.3 to 8.6 transactions per second. The Falcon will be differentiated from the EXT10 by a new, microprocessor-based controller design. Sources say Tandem has at least one other smaller CMOS-based Guardian-compatible system under development.

A key to Tandem's low-end push is its NonStop SQL distributed relational database management system. Although the new DBMS won't be available until next quarter, Tandem claims it will offer performance at least equal to its less relational Encompass DBMS. It will also include Tandem's current transaction control program and transaction monitoring facility, which, unlike other so-called distributed RDBMSs, supports distributed updates and queries. Tandem says its users will be willing to build distributed on-line systems around NonStop SQL.

"With NonStop SQL we're giving users the ability to access 200 transactions per second, and with the low-end products we're giving them the ability to put that power anywhere they want it," says Terry Retford, Tandem manager of systems products. "Some of our users want to put two transactions per second in 100 locations. Now they can do it."

Tandem already has attracted some interest in its low-end distributed push among resellers and systems integrators as well as users. Earlier this year, the company signed a memorandum of understanding with Boeing Computer Services, Seattle, which has been studying the feasibility of adapting its PMF manufacturing software to the NonStop hardware for marketing to distributed shop floor, CAD/CAM, and cell control applications.

THE THREAT AT THE LOW END IS VERY REAL.

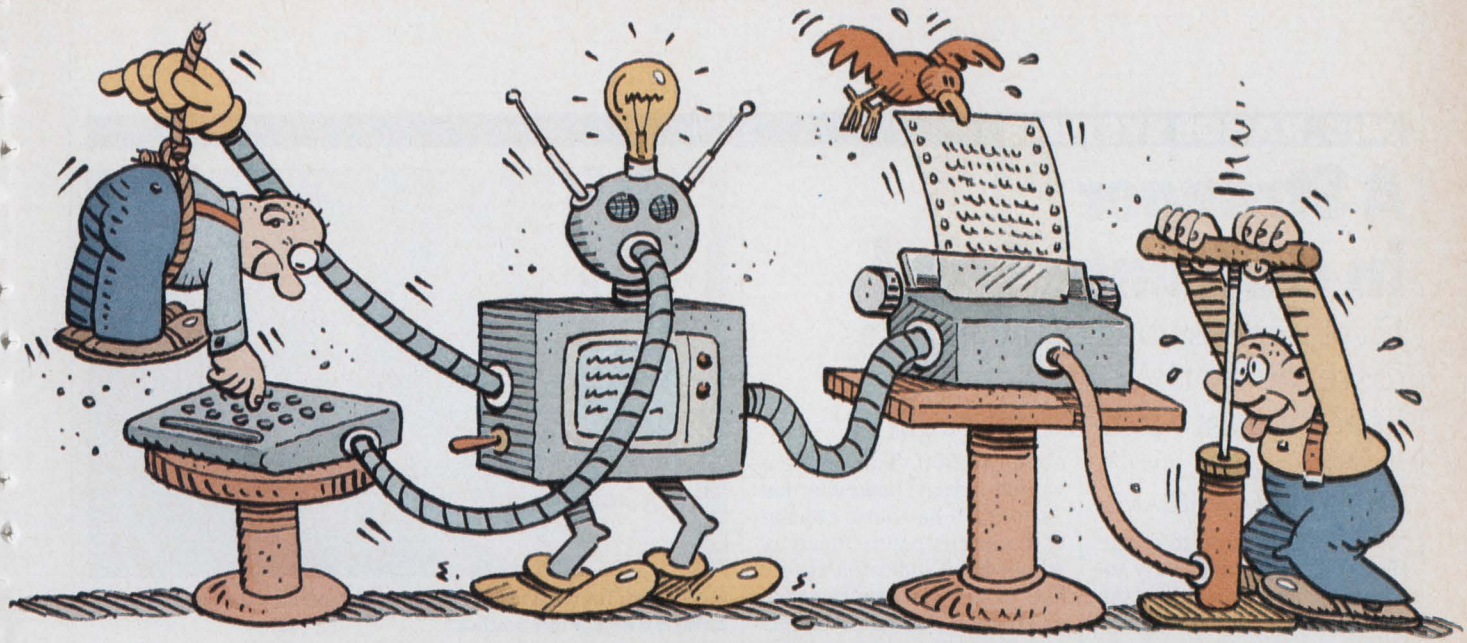
Boeing has been encouraged by what it has seen of Tandem's low-end products and the NonStop SQL offering, according to Boeing's manager of strategic alliances Sanford Vanderhyde, who says the two companies could have a systems integration agreement signed by the middle of this month. According to Vanderhyde, "BCS is beginning to believe that there is a need to distribute data easier and to manage it [in a way] that is not easily accomplished on large mainframes today. Tandem seems to see the same need and to have a solution for it."

Of course, Tandem still has plenty to prove. For one thing, although it has had NonStop SQL performance figures verified by the Codd & Date Consulting Group of San Jose, competitors say they doubt the company's claim that the product is as fast as any nonrelational DBMS. Tandem officials also acknowledge that, with increased shipments of networked distributed systems, the company will have to improve its network management software offerings. "Significant work is going into that right now," says Tandem software vice president Dennis L. McEvoy. And integration of the Unix system into the Tandem distributed architecture isn't yet complete. Initially, the Unix system accesses the new DBMS by emulating a Tandem terminal. What the company calls "seamless" integration of Unix into the Tandem network won't come for 18 months.

Tandem also will face a new set of economics and some fierce competition at the low end. To compensate for the lower average selling price of the new products, Tandem says it will focus on selling quantities of the systems to large end users and will offer more complete remote support, programming, and operation software and services.

Not easy for Tandem

It won't be easy for Tandem to compete with IBM or NCR at the shop or on the retail floor, but company officials say that if its low-end strategy works, Tandem has a chance to take another step toward being a broad-based systems vendor rather than a niche purveyor of fault tolerant systems. According to marketing vp Peterson, "We've grown well by tying into fast-growing areas like ATMs and electronic funds transfer. Now, areas like distributed retailing and CIM are becoming very big. Those new areas are more complex because the systems must be networked together. But we've got to get involved now. Any player not involved now will have a hard time catching up." ■



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CIRCLE 13 ON READER CARD

MID RANGE SYSTEMS

A Stranger in a Strange Land

First impressions of the 9370, as fostered by IBM, are running headlong into a different reality.

BY JEFF MOAD
AND GARY McWILLIAMS

IBM is working hard to create the impression that early interest in and orders for the 9370 have exceeded expectations, and that the company has already gained some momentum in its midrange struggle with Digital Equipment Corp.

Indications of the 9370's initial acceptance, however, may be exaggerated. Few early 9370 orders seem to be coming from outside IBM's traditionally strong large corporate MIS customer base to which the system has been marketed aggressively. The 9370 doesn't seem to have attracted any interest from current DEC VAX users, and some large IBM users have chosen Digital for midrange systems despite the 9370.

What's more, although IBM has taken steps to include the 9370 in its value-added remarketer and marketing assistance programs and has made those programs more attractive to resellers and software developers since the first of the year, there is little to suggest that IBM has been able to win significant new resellers and applications developers outside those already handling its 4300 series computers.

IBM has indicated it is happy with initial interest in the 9370. A spokeswoman says the company has taken "tens of thousands" of 9370 orders since the system was announced Oct. 7, 1986. IBM won't confirm widespread reports that orders number about 45,000. The spokeswoman did say, however, that "The 9370 has been popular with our customers, many of whom have indicated they'd like to get systems installed as soon as possible. We feel we've got a winner on our hands."

Just how firm those orders may be is raising questions. According to Brian Jeffery, an analyst who has surveyed early 9370 customers for the Los Altos, Calif.-based International Technology Group, "A lot of those orders have been preemptive, just to get users a preferred delivery schedule. I'd be surprised if more than 10% of those orders today were firm orders."

He isn't the only one to challenge the reports of high early order levels. A vice president at a large financial company who asked not to be identified says, "IBM came in and said we had to sign up for hundreds of them [9370s] if we were going to get in the queue at all. They said under the new volume purchase agreement it made sense to order hundreds even if you really only wanted a few. The new discounts now are higher, and the penalties for not meeting volume commitments are lower."

"WE FEEL WE'VE GOT A WINNER ON OUR HANDS."

McQUILKEN: The former IBMer says earlier-than-projected product availability is a vintage IBM practice.

Cancellations Not Unusual

The IBM spokeswoman concedes there are always some cancellations among customer orders, noting: "Obviously, not every order will be converted into a firm installation." But, she adds, IBM expects the percentage of early 9370 orders resulting in actual shipments to be "in line with any other new product."

The new IBM volume purchase agreement allows for 9370 discounts of up to 30% and allows buyers to aggregate System/36, S/38, 4300, and 9370 purchases.

In late March, IBM accelerated the 9370 U.S. and Canada shipment schedule to what it says is up to two months earlier than previously planned. The 9370 models 20 and 60 with a "selected set of features" will be available starting in July. Other models will be available starting in October. Shipments to early support program customers were to have begun in March. Development system shipments to vars are to begin this month.

George McQuilken, a former IBM employee and now president of Software Productivity Research, Cambridge, Mass., says the earlier-than-projected availability is vintage IBM. Rather than risk late delivery, IBM often tries to project an image of achievement by first creating ample lead times, then moving deliveries up.

While many of the early 9370 orders may prove mere window dressing, some large IBM users such as Ford Motor Co. and United Airlines have based ambitious new applications around the 9370. United, for example, has ordered an undisclosed number of 9370s for a new travel agent service enterprise it will call Apollo. Now in beta test, the program will place 9370s in travel agencies where they will be linked to terminals on IBM token ring networks and to United's 3090 host mainframes. United chose the 9370 after IBM promised to "work with us to assure we would have the connectivity software we would need to go from the LAN to the mainframe," says MIS vice president Donald Karmazin.

Aetna Shied Away

Not all potential 9370 users can be promised special IBM help with connectivity, however, and some say they won't buy the 9370 until critical connectivity features are available. While IBM has said its new version of the VM/SP

Photograph by Rick Friedman/Black Star

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CIRCLE 14 ON READER CARD

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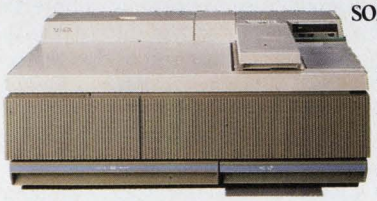

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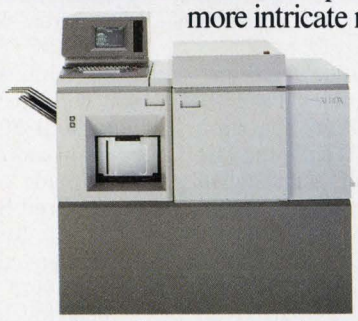

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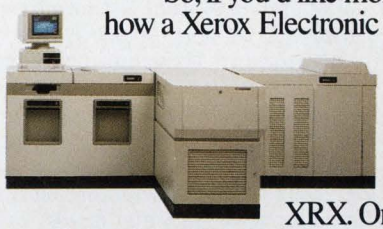

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CIRCLE 15 ON READER CARD

And Still a Stranger to Vars, Software Makers

If IBM can be criticized for being slow in getting information to small users, it's finding value-added remarketers and software developers equally slow to jump on the 9370 bandwagon. Never a mainstay of 4300 sales, third parties are crucial to the 9370's future because of the need for applications to compete against Digital.

Just how important such relationships are becoming is reflected in its customers' changing attitudes. "We've been developing our own software," says William McPherson, a data processing manager at Affiliated Catholic Hospitals, Boston. "I'm changing my philosophy and looking at purchasing software outside. I don't want to reinvent the wheel."

Although IBM in January liberalized its var and Marketing Assistance Program (MAP) plans in order to encourage 9370 purchases, most current IBM resellers don't seem to be ready to provide the needed applications by rewriting their System/36 and System/38 applications for the line. And the 9370 doesn't seem to have brought many new resellers to the IBM fold. One large Digital and HP reseller, Los Altos, Calif.-based Ask Computer Systems Inc., evaluated the 9370 but decided not to move its manufacturing software to the new system.

Ask research and development vice president Marty Browne explains: "The problem was that the 9370 did not provide a consistent operating system platform to which we could move our software. It supports MVS, DOS, and VM. With HP and DEC we only have to worry about one operating system on each system."

Cliff Illig, vice president of finance at Kansas City, Missouri-based Cerner Corp., a Digital reseller, lauds the IBM entry as a boon to competition but sees little incentive to add the line today. "We are feeling very good with the ability [of Digital] to address a broad range of customer needs," says Illig. "We think IBM's move into markets that historically have been Digital strongholds will only tend to benefit the end user. We like seeing pressure on manufacturers of computer equipment to provide more technology at lower cost."

Among existing IBM 4300 resellers, the 9370's better price/performance ratio is spurring some interest but not new software. Applicon Inc., Ann Arbor, Mich., is one of a handful of 4300 resellers planning to add 9370s to its line. Director of industry marketing Alan Dirk says the company is preparing to sell 9370s with existing VM manufacturing software under a pending oem agreement. He lauds 9370 discounts as "the most aggressive I have ever seen from IBM" and "better than DEC's." Dirk says, however, that moving VAX-based applications to VM is not a certainty. "It is being looked at but I don't know the time frame on it." Were IBM to migrate its Unix-based AIX operating system to the line, Applicon would be more inclined to migrate Unix-based CAE applications to the system. Right now neither is certain, he says.

Among major VAX resellers, the 9370 has been embraced by Applicon and McDonnell-Douglas Information Systems Co., St. Louis—both of which supplied software for or marketed the 4300. Another company with existing IBM 4300 applications that is reportedly evaluating the system is Computervision Corp., Bedford, Mass.

Those resellers that express interest in the 9370 say they've been encouraged by reports that IBM will introduce a System/38-to-9370 swing machine—code named Silverlake—and begin to implement what has been called System Application Architecture, reportedly an interface that would allow applications to run across different IBM architectures and operating systems. Until the bridge feature is available, however, "I don't intend to go into a development project specifically for that machine [the 9370]" says one reseller, Bruce Woodard, development vice president at S/3X var Executive Technology, Dallas.

Other 4300 resellers and users cite operating system and performance reasons for not committing to the line. SMS Inc., which remarkets IBM 4381s and 30XXs, doesn't yet see a place for the 9370. Even though it has a separate set of applications for smaller hospitals running on the VAX, SMS "won't be picking up [the 9370] unless IBM makes it more powerful," explains Scott Holmes, executive vice president of the Malvern, Pa., reseller. There are no plans to migrate its VAX applications to the comparable performance 9370.

Executives at Digital say they see no signs of end users or resellers being lured away by the 9370. "We're having a tough time finding end users with 9370s, never mind resellers," says Harvey L. Weiss, Digital's vice president of U.S. sales operations. As for 9370 discounts outpacing the schedule established for the VAX, it can hardly be termed a selling point yet, Weiss says. "I have a hard time comparing something on a piece of paper to ours [discounts] when we're shipping in volume."

John MacKeen, who handles Digital's reseller activities as vice president of channels marketing, also says support for the IBM line among Digital resellers appears restricted to those "who already have an IBM investment. [Support] is not happening on a wide scale that we're aware of," he says.

operating system will support connections to Ethernet and the token ring network and VM-to-VM via what it calls a Transparent Services Access Facility, users say connectivity to other operating systems and support for key features such as SQL-DS is still up in the air. One large IBM shop, Aetna Life & Casualty Co., Hartford, Conn., recently decided to go with DEC VAXs rather than 9370s as departmental machines in its commercial insurance division. The reason: concern over connectivity, Aetna officials say.

Such concerns have kept DEC VAX users away from the 9370 in droves. According to analyst Jeffery, his survey of 9370 customers failed to turn up one VAX user switching to IBM. The vast majority in fact—two thirds—were current users of older IBM 4331 and 4341 systems migrating to the 9370. "That's the last large chunk of old installed base that IBM hasn't turned over in recent years, and it's ripe," says Jeffery. "Most of them like it [the 9370] because it doesn't have to be run in a computer room."

One longtime Digital user, Los Angeles-based Tiger International, has decided to stay with the VAX after evaluating the 9370. "In a word, the reason was connectivity," says director of information systems Fred Sutton. "IBM's promised a lot, but all the needed connectivity software isn't there yet," he says.

That much of IBM's efforts to date are directed at large corporate MIS customers isn't lost on smaller users.

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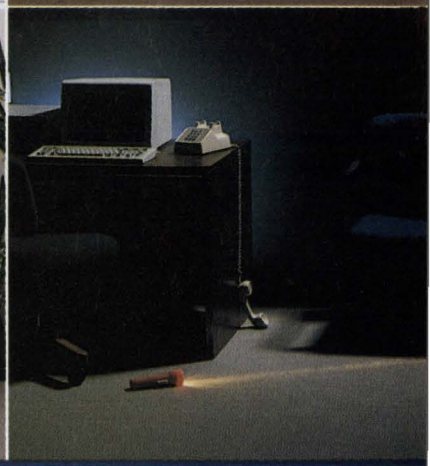

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CIRCLE 16 ON READER CARD

Such sites are finding information about the systems not readily available. In November, SPR's McQuilken decided to purchase a 9370 and a MicroVAX II. He notes that the MicroVAX II is installed but so far he's been unable to connect with his IBM rep to place an order. William McPherson, a data processing manager at Associated Catholic Hospitals, Boston, says he is dismayed at the lack of detail IBM was able to provide at a recent 9370 demonstration. "To say anyone there was versed on the capabilities . . . I didn't see it."

Other Hurdles Remain

There are other issues that won't be resolved soon. Richard J. Stuckey, a partner in the technical services organization at Arthur Andersen & Co., Chicago, predicts even the entry version of VM is a problem for traditional minicomputer users. "There is a reluctance to support 370-style equipment . . . because of the effort required to handle the systems software. It's a recognition that the 370 software family is more complex than the corresponding VAX software," says Stuckey.

Now planning a June manufacturing exhibit with IBM 9370, 4300, and DEC VAX computers, Stuckey says onlycentralized 4300 users and resellers will see the 9370's ability to run VM, DOS, and MVS operating systems as major selling points.

"More often than not, people start with a new set of software. They don't just move the centralized software out," he argues.

"Whether it's for a distributed system or manufacturing system, people are looking at IBM's offerings, even with the 9370 in there, and at the VAX. And they are more impressed with the VAX today. The 9370 is very new and a lot hasn't been filled out and exploited yet." ■

NETWORKS

On the Road for a Title Shot

Once a standard and the right chips are out, FDDI may be the next heavyweight LAN contender.

BY GARY McWILLIAMS

The Bank of Boston looks to a fiber-optic networking technology to provide a campus-style network connecting four office buildings. Minnesota Supercomputer Center Inc. sees the same technology satisfying its needs for high-speed communications among supercomputers and mainframes.

Both are planning for and anticipating a network that is eyed as a means to connect systems miles apart at the high speeds required for mainframe and supercomputer applications. The fiber digital data interface (FDDI) is a technology touted as the second generation in local area network technology.

What most impresses the users watching the proposed standard are the potential applications for the technology. FDDI promises 100Mbps communications speeds over a network able to span up to a 60-mile (100 kilometer) radius. Moreover, it is designed to support existing applications that conform to the IEEE 802 series of protocols.

"We feel it's a very viable technology to use for backbone networks, particularly in campus and industrial park areas where you will see a lot of emphasis being placed on paperless offices," says Bill Kassemos, a research and development engineering manager who monitors FDDI developments for General Motors Corp.'s Electronic Data Systems, Plano, Texas.

Kassemos says applications using bit-mapped engineering workstations are creating demands for higher speeds and greater bandwidth than is commonly available today. "If it was available today at a moderate price we probably would consider putting it in GM at several locations with heavy duty CAD/CAM operations," Kassemos points out.

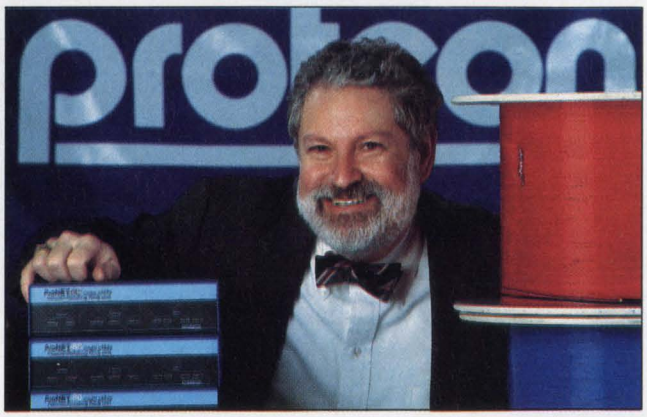
Others look to the technology to satisfy critical needs for faster communications. "We have to have communications that address the timeliness of information," says Thomas G. Courtney, assistant director and manager of network planning and design for the Bank of Boston. "We put in 56Kb [lines] between our mainframes and minis and it's still not enough."

At the Minneapolis Supercomputer Center, even higher-speed networks available today aren't sufficient. "Among supercomputer centers there is a very, very strong movement to FDDI," says Thomas C. Jacobson, director of network communications at the center, a for-profit affiliate of the University of Minnesota. Such support eventually could lead FDDI to replace Minneapolis-based Network Systems Corp.'s Hyperchannel as the preferred supercomputer link. "The fact that it is a standard is very attractive," says Jacobson.

The Key Issues

Despite the potentially broad application, there are also plenty of worries surrounding the topic. FDDI, according to some supporters, appears particularly vulnerable on the issue of vendor compatibility. For one thing, there is no single company or coalition driving the standard in the way IBM did with IEEE 802.5 token ring or the Xerox-Intel-Digital Equipment Corp. triad behind IEEE 802.3 Ethernet. "It's so spread out we're a little disturbed," says Howard C. Salwen, chairman of LAN vendor Proteon Inc., Westborough, Mass. "We're worried about interoperability. If there's no interoperability, there's no standard."

Another worry facing users and vendors is the present lack of semiconductors implementing the technology. Discrete versions now making their way to market cost between $50,000 and $100,000



SALWEN: He's worried about interoperability and says that without it there's no standard.

Photograph by Rick Friedman/Black Star

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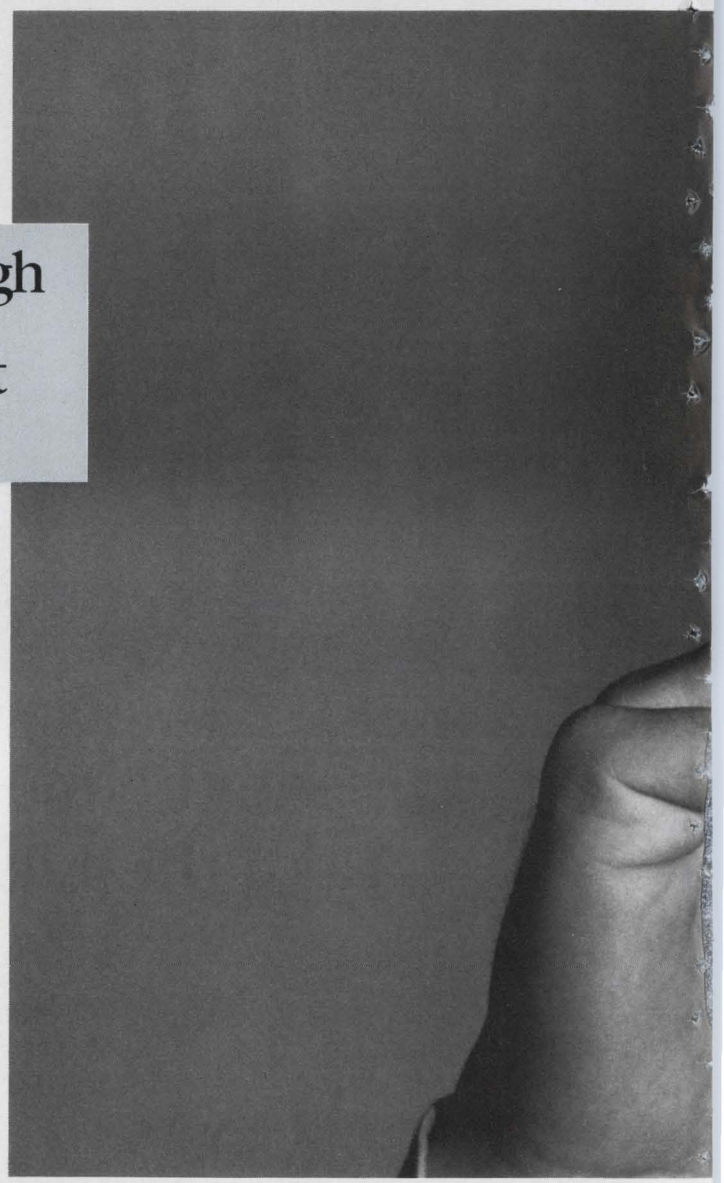

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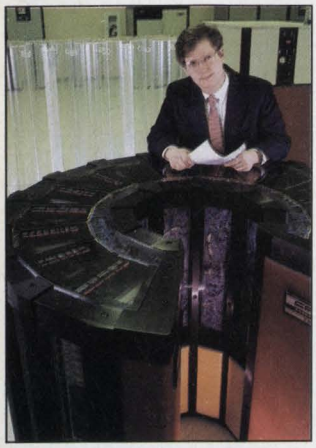


JACOBSON: There's a strong movement to FDDI among supercomputer centers.

per connection compared with the price tag of about $40,000 for a Hyperchannel link. Under development at Advanced Micro Devices Inc., Sunnyvale, Calif., the first FDDI chip set implementation isn't expected until autumn.

"We're planning on using it because we have a machine that can consume data in no time at all," says Ian R.G. Edmonds, vice president of marketing at Stellar Computer Inc., Newton, Mass., a high-performance workstation startup. Edmonds says although the company's initial workstation is to be released this fall, it won't incorporate FDDI: "At least until the special chips are available, the cost per node is too high."

Many LAN vendors such as Proteon that are planning FDDI implementations say they won't attempt a commercial release until the chips are widely available and working. "The entry item for us is the availability of semiconductor components," says Judy Estrin, executive vice president at Bridge Communications Inc., Mountain View, Calif. "We're very interested in the technology and feel it fills an important role in backbone networks and work groups of high-end workstations dealing with large amounts of data."

Both Proteon and Network Systems, which offer high-speed campus and computer-room networks, say the lack of working chips should convince users it's too early to consider the technology viable. "I call FDDI the phantom competitor," says Salwen. "We're committed to [implementing] FDDI; the problem is that it's a long way off." Digital's assembling of engineering teams dedicated to the technology is one of the few hopeful signs he sees. "We're looking forward to someone coming in and being a monarch. It's always the big companies that make the investment, do the homework, then the committee can round the corners and dot the i's."

Gary Christensen, vice president of advanced product development at Network Systems, acknowledges FDDI's broad-based support "could make it the high-speed Ethernet," but cautions there isn't any practical experience to back the boast. Even when chips become available, machine interfaces, conversion of various character types, and floating point formats are issues that will have to be addressed, he notes. "We spent, with Hyperchannel, an order of magnitude more developing the interfaces than we did developing the trunk," says Christensen.

Commitments from Vendors

Despite the concerns, vendors are pouring money into building the technology. The release early this year of a discrete implementation of FDDI specifications by Fibronics International Inc., Hyannis, Mass., is pushing others to act. "The Fibronics announcement of a working FDDI screwed the activity up a notch at a lot of vendors. They aren't happy to be behind," says John Rovner, an EDS network engineer who sits on the ANSI standards committee.

Those racing to develop the technology include AT&T; Apollo Computer Inc., Chelmsford, Mass.; Digital; and Sun Microsystems Inc., Mountain View, Calif. Unisys' forerunners Sperry Corp. and Burroughs were early advocates of the technology and IBM is a regular standards committee attendee. "We're looking at [FDDI] as a major portion of our high-speed backbone LAN; it will be an alternative to our [mainframe] CP LAN," says James M. Babcock, vice president and program general manager for communications and networks. Because the proposed design provides interfaces to IEEE 802 LANs, Babcock and others say applications now running on slower-speed LANs could be moved over to run on top of FDDI.

Different Technology Needed

"I would expect to see TCP/IP running on FDDI networks," says R. Bruce McClure, director of network research and development at Apollo Computer. "The only thing that companies would have to keep in mind is since it is much faster, a different technology might have to be employed to make the other layers run faster."

Digital, which has not had public comment on its work to date, may be taking a leading role in implementing the technology. Observers say Digital plans to use FDDI as the centerpiece of a network management strategy enabling its DECNet protocols to become a manager of others' networks. With FDDI serving as a master network tying together IBM token rings, TCP/IP, Ethernet, or others, the company that operates the network would also control the subnetworks.

ESTRIN: Availability of semiconductor components is the starting point for Bridge.

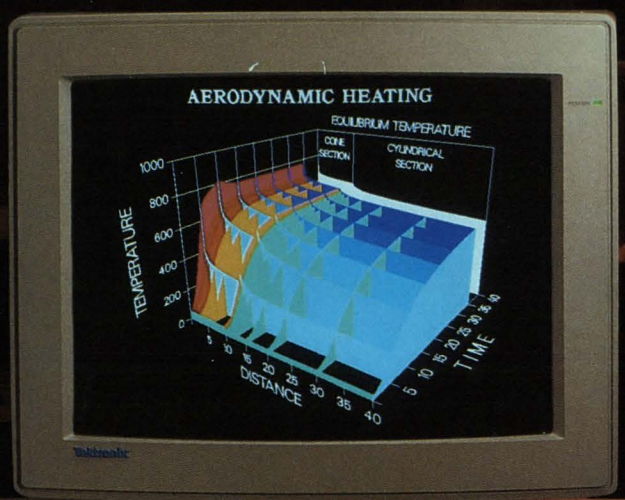
THERE IS NO SINGLE COALITION DRIVING THE STANDARD.

"We see Ethernet being very appropriate for the next three or four years and the bulk of industry applications. After that, we'll need higher-speed stuff," says Frederick M. Balfour, manager of LAN product marketing at Digital. He identifies today's applications requiring such speeds as medical imaging, computer aided design, seismic, and geophysical.

Among those planning implementations, Fibronics followed up its release of FDDI-styled System Finex with an agreement early this month to supply an as yet unidentified company with the prototype FDDI network. J. Morris Weinberg, Fibronics chairman, predicts the company this year will market System Finex to vendors developing their own networks and will begin selling to end users in 1988. He sees the growing use of networks quickly pushing FDDI to the forefront.

Photograph by Milton Kezar

TEKTRONIX NEW ADVANCED PC GRAPHICS STANDS ALONE.



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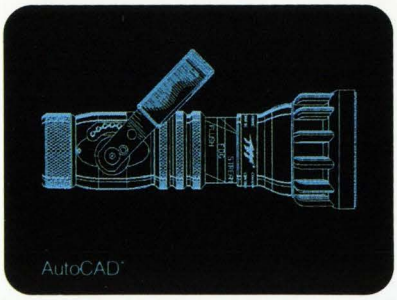

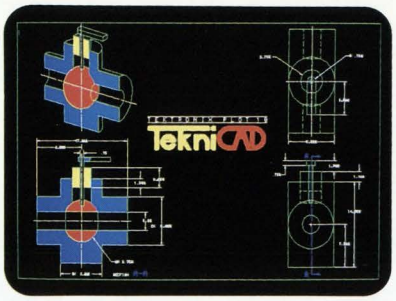

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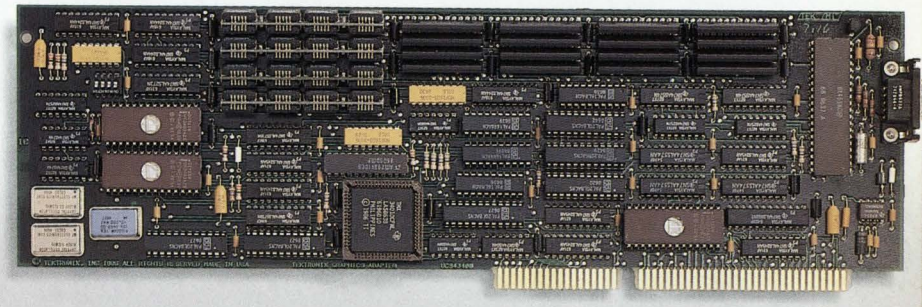

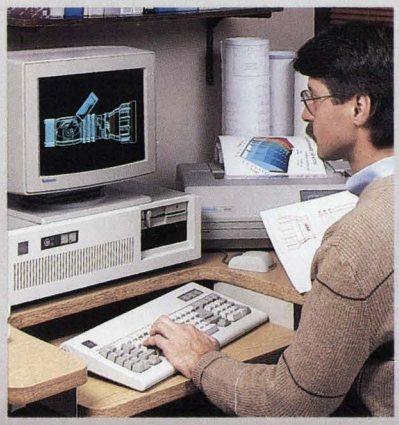

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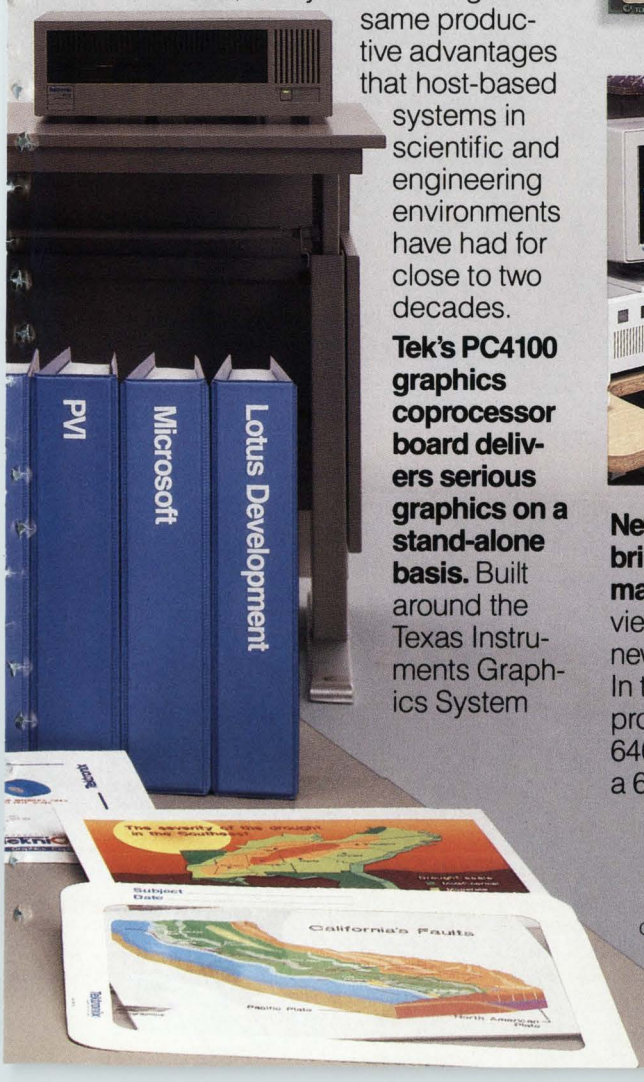

AND SETS YOU APART.

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Which means you can quickly access the power of Tek graphics—including 4107 segments, true zoom and pan, rubberbanding, definition of up to 64 viewports and more. You can use these highly productive features with a wide range of well-known designer software packages such as ISSCO's DISSPLA® and TELL-A-GRAF,® MCS's ANVIL-5000,™ SAS Institute Inc.'s SAS/GRAPH, Precision Visuals' DI-3000,® Swanson Analysis Systems' ANSYS® and McNeal-Schwendler's NASTRAN.

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All the key tools for software development, right from the outset. The new Tektronix Graphics Interface™ (TGI) for the PC provides the basics of Tek graphics functionality to application programs running under MS-DOS. What's more, in-circuit emulator, C-compiler, assembler and linker are all available from Texas Instruments to help software developers write applications packages for the PC4100 graphics coprocessor board.

To enable sufficient workspace for custom interfaces or specific application programs, the PC4100 graphics coprocessor board comes standard with a full megabyte of program memory.

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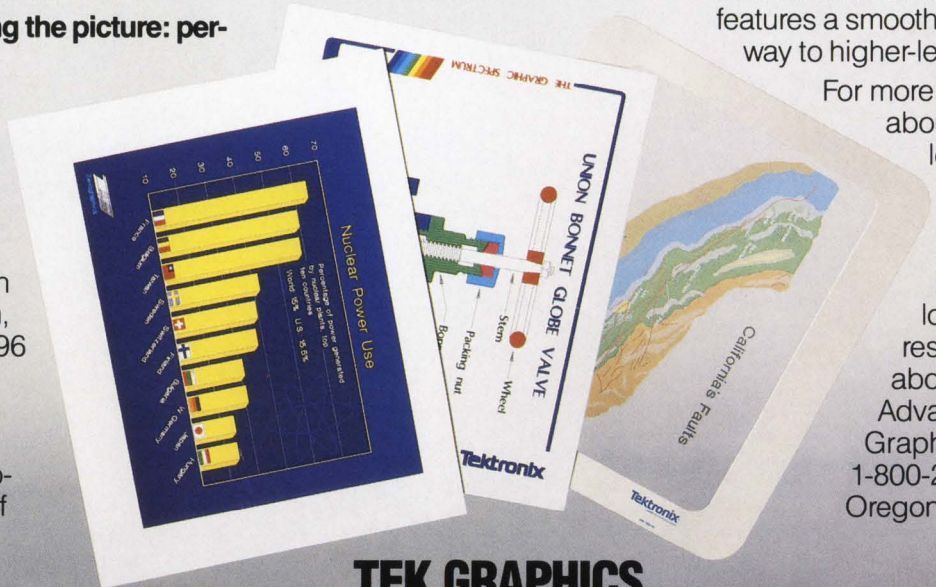

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"Ethernet's maximum streaming capacity is 10Mbps and no one doubts it realistically operates at 3Mbps. At that rate and with the number of systems now being connected, throughput is starting to suffer." Weinberg also says there is some validity to worries about incompatible versions, but such arguments miss the larger role of standards making. Incompatibility "isn't unique to FDDI; it's empirically evident in the marketplace today with T1 and Ethernet. If you took the five leading T1 mux [multiplexor] vendors or five leading Ethernet vendors and tried to make a heterogeneous network you couldn't. I don't see that as an impediment. The reality of the situation is no committee gives you design blueprints."

While none of the vendors would confirm it, there have been rumors of behind-the-scenes talks on group addressing schemes and other facets that aren't in the standards proposal. Notes Apollo's McClure, "What's happening in the standards committee is a continual drive to guarantee interoperability. There is debate on how high to take interoperability, but what's being done is to assure the channel is being shared."

Heterogeneous Net Still Ahead

Based on an early evaluation of FDDI, Bank of Boston's Courtney says he accepts the fact that it will take time to create truly heterogeneous networks. "No one protocol, media, or topology is going to solve our problem. We feel confident in an approach that calls for creating an architecture based on international standards. Rather than build 14 or 15 interfaces, we can build one integrated interface able to communicate with all devices." Still, Courtney concedes, "the goal of true interoperable networks is five to six years away, and so is FDDI." ■

STRATEGIES

Waiting Impatiently at the Gates of the MIS Kingdom

Apple hopes its new Macs will be well received in the heartland, but will users rush out and buy?

BY EDITH D. MYERS

With a pizzazz appropriate to the Universal Amphitheatre in the Hollywood Hills, Apple Computer last month introduced the two newest members of its Macintosh computer family.

There was a clear message to corporate MIS departments in all the hoopla: Apple wants in. Toward this end, Apple, with its new Macintosh II and the Macintosh SE, has embraced MS/DOS, Unix, Ethernet, token ring, and all else dear to the heart of the corporate pc user. Though these things were not touted, "We have it if you want it," said Apple chairman and ceo John Sculley.

At a session for national accounts representatives, William V. Campbell, Apple Computer executive vice president of U.S. sales and marketing, made an appeal to business users. "We've been dragged to our mission kicking and screaming. We've put together a business advisory panel. No longer do we put out technology for technology's sake."

Campbell views the SE (for System Expansion) as becoming "Apple's cornerstone in the business community." This machine has the same design as a predecessor, the Mac Plus, but is equipped with an internal slot for add-in cards and with two internal disks, one of which can be a 20MB SCSI (Small Computer Systems Interface) hard drive.

For the most part, the Macintosh II impressed more than the SE did, though the future for both in corporate MIS remains unclear.

"I think it's the finest personal computer on the market today," says Mike Coleman, coordinator of technical research and development for Aluminum Corp. of America (Alcoa), Pittsburgh. Part of Coleman's job is to evaluate new technology, including pcs, to see how they fit into his corporation. "I'll have one here for evaluation," he says of the Mac II.

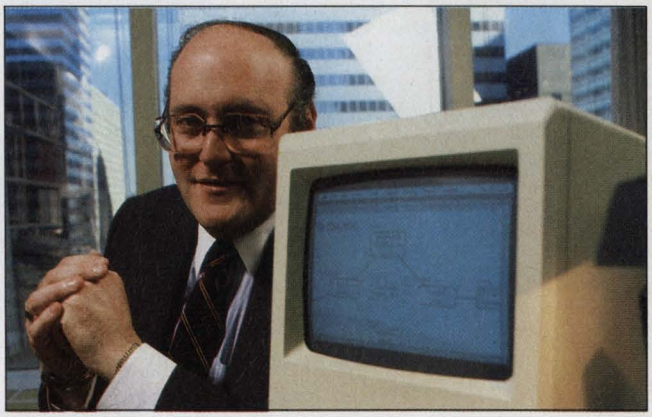
He's confident the new computer will fit in at Alcoa and he isn't too worried about resistance from potential users. "People resist any change, but when people feel comfortable with it, when they realize what the Mac could do, it'll spread like wildfire."

The new Mac moves into the MS/DOS world via two products announced at AppleWorld by AST Research, Irvine, Calif., and Dayna Communications Inc., Salt Lake City. The AST Mac286, co-developed by AST and Apple, is a self-contained 80286-based microcomputer. It allows a Mac user to run MS/DOS applications without modification at IBM AT speed.

Dayna's DaynaFile is a disk drive that connects directly to the Mac via an SCSI port and acts as an external 5¼-inch drive. It makes possible access of such IBM compatible files as Lotus 1-2-3, dBase III, or WordPerfect as though they had been created on a Macintosh disk.

Larry Magid, senior analyst at the Seybold Group, San Jose, says, "There no longer is an excuse for not buying a Mac. Now it's a matter of which machine is more suited to your application, to your environment. The Mac II is a credible second standard computer in the corporate arena."

Chris Veal, general partner, computer services division, Arthur Young & Co., San Jose, says that the MS/DOS capability gives the Mac credibility, but he wonders, "Who would want to cripple a Mac



PHILLIPS: He doesn't see the new Mac making an immediate splash in MIS waters, but it will eventually penetrate.

photograph by Bill Kelly

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and make it think it's a pc? But they've made it clear that if that's what you want to do, you can do it. There's no reason not to use a Mac anymore."

Ken Phillips, chairman of the Committee of Corporate Telecommunications Users and a professor at New York University, says of the Mac's new MS/DOS capability, "They should have done that long ago to indeed enable the best of two worlds to come together." He describes the committee as a nine-year-old association of 30 of the largest telecommunications users in the country.

He does not think the new Mac is going to make an immediate splash in the corporate MIS waters, however. "I don't think you're going to see MIS managers rushing to place large orders. I think it'll be more of a seeding process. I do think the Mac II will penetrate to a deeper level than the original Mac ever did.

"Apple falls down in the kind of corporate support needed for it to make inroads right now into the corporate world," Phillips says. Apple's "lack of corporate support makes it difficult for corporations to buy from them and is why they buy IBM. I'm confident, though, that they [Apple] will eventually get their act together."

Maybe they will. Apple's Campbell told the national accounts group at AppleWorld, "We're evaluating our support structure. There will be a marked change by the end of 1987."

Phillips sees local area networks as the "next bottleneck" for Apple in the corporate world. "AppleTalk is fine for small groups of eight machines but what if you want to connect hundreds of machines?" he asks. "IBM is not in much better shape. Nobody has really addressed that problem."

An Apple value-added reseller that does is Lutzky-Baird Associates, Calabasas, Calif. Its product, Ultra-Office, is a network connecting both Macs and pcs and a Unix-based host, usually a Sun Workstation or an IBM AT. It uses both AppleTalk and Ethernet.

But Jon Simonds, president of Lutzky-Baird, is concerned about Apple's treatment of vars. "It's too discouraging to sell a system, then have a customer come back and tell us he could have picked up the Macs cheaper at his local computer store," he says. Apple has been working on this area. The var program

"WE HAVE IT IF YOU WANT IT."

has been revamped and vars are now getting a sliding discount equivalent to that offered to dealers. A marketing support program has been promised, as has consideration of a rebate program for vars like those dealers get.

Whatever the sales channel, the original Mac's success is undeniable. Apple today says some 1 million Macs have been sold, "nearly two thirds" of those in the business marketplace. The company says 27% of these are used in companies with fewer than 100 employees, 37% in companies with 100 to 999 employees, and 36% in companies with more than 1,000 employees. Obviously, Apple would like to see that last share grow and hopes the new machines will be the catalyst. Veal of Arthur Young thinks they could be, but adds, "Mac is still Mac. What they have addressed is perception."

BENCHMARKS

Closing In

IBM has moved one step further in controlling the fortunes of its Rolm Corp. subsidiary, which it acquired in 1984. Approximately 6,000 Rolm salespeople have been absorbed into a telecommunications marketing and service organization run by IBM's U.S. marketing group. Under the new arrangement, Rolm's top marketing executive vice president Jack Blumenstein now reports to IBM vice president Edward Lucente. Previously, Blumenstein answered to Rolm president Dennis Paboojian.

Sale

Unysis agreed to sell its 13% stake in disk drive venture Magnetic Peripherals Inc. to Control Data Corp., which is a majority holder in the venture. Unysis became part owner in MPI when it acquired Sperry Corp. Under a letter of intent to sell its interest for an undisclosed amount, Unysis agreed to remain a customer of Winchester drive maker MPI for at least two years following the deal's closing. MPI's other partners, Honeywell and Groupe Bull, are also planning to divest their 20% total interest in the operation, according to published reports. CDC has managed MPI since it was founded in 1975. If all partners divest, it would bring all Winchester drive development and sales in-house at CDC.

Fujitsu-GTE Pact

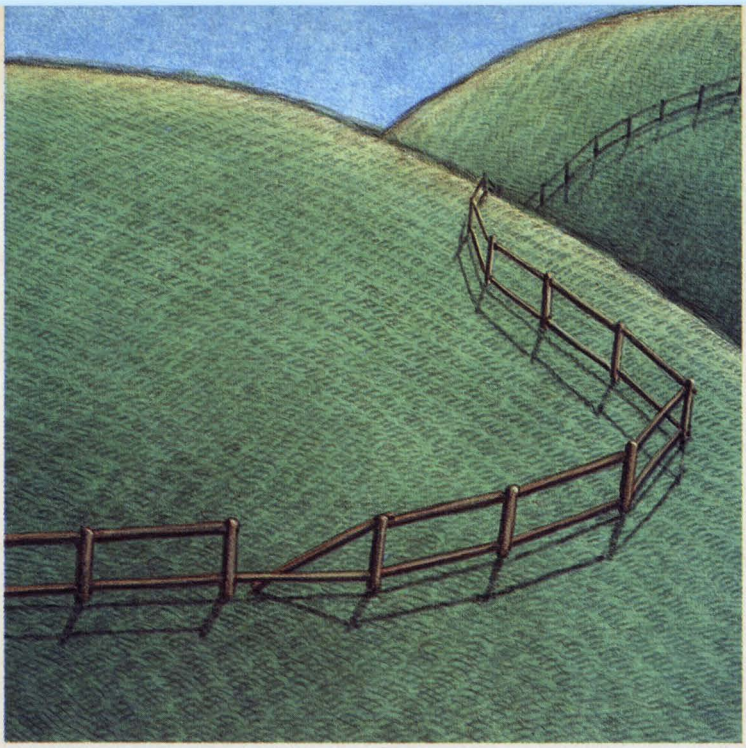
GTE agreed to sell its PBX operations to Fujitsu in exchange for a 20% interest in a new joint venture. The Omni line of PBXs from GTE is to become the central offering of the new venture's product line. Under the terms of an agreement between the two companies, however, GTE will divest its manufacturing operations; thus the new company, called Fujitsu-GTE Business Systems Inc., will eventually carry only Fujitsu-made equipment. The Japanese firm has already agreed to redesign the oldest switches in GTE's line. The GTE PBX operation reportedly did more than $100 million in business last year. John W. Toomey, who headed the business, will be president of Fujitsu-GTE.

Meet Sematech

With hardware and software consortia all the rage these days, it was only a matter of time before the semiconductor industry joined the crowd. Say hello to the Semiconductor Manufacturing Technology Institute, AKA Sematech. Such a meeting of minds among the nation's semiconductor manufacturers indicates just how seriously the industry views its fight for life against the Japanese. Now, the consortium needs to sort out a few issues, such as how much the venture will cost ($300 million to $400 million annually is the going estimate) and establishing with the Justice Department that it won't run afoul of the antitrust laws. The Defense Science Board, an independent body that recommends policy to the Department of Defense, has recommended that the government contribute $200 million a year for chip manufacturing development but the Pentagon's FY '88 budget has earmarked only $50 million. Sematech hopes to resolve these questions before it starts operating June 1.

Ford Contract

Ford Motor Co. awarded an office automation contract that may be worth up to $400 million to IBM. Ford says that IBM beat DEC and Wang to supply the company with as many as 30,000 workstations and peripherals. The contract is for three years with options to renew for two years. The equipment will be used in Ford's North American facilities. ■



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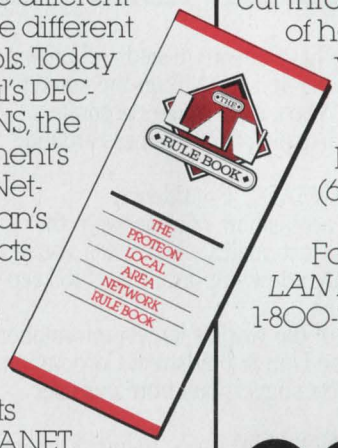

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Behind the News

SUPERCOMPUTERS

Illustration by Rob Colvin

A Test Of Endurance

NSF supercomputer centers are facing funding pressures while users worry about the future.

BY WILLIE SCHATZ

Two years ago, the National Science Foundation (NSF) fathers brought forth unto the supercomputer scene a new program, conceived in equality and dedicated to the proposition that all unfortunate scientists at U.S. universities who couldn't get a second of cycle time would soon have hours.

Now they are engaged in a great budgetary war, testing whether that program and its five supercomputer center offspring shall long endure.

It could be close.

"The plan of the original NSF Congressional initiative was to fully fund leading-edge, state-of-the-art computational facilities for researchers in this country," says Larry Smarr, director of the National Center for Supercomputing Applications (NCSA) at the University of Illinois. "The genius of that was that it switched individual grantsmanship to excellence in peer review for who got time at nationally funded centers. It takes money out of the loop. That's extremely important. It's as close as the U.S. has to a merit system. It's a far cry from the days when you had to pay money to get time on your campus machine."

Smarr, one of the prime movers behind the NSF supercomputer center program, was able to obtain time here, but only by getting clearance from the Department of Energy to use supercomputers in nuclear weapons laboratories at Los Alamos, N.Mex., or Lawrence Livermore Labs in Berkeley, Calif. Since that was no way to run an astrophysics project, he spent three summers at the Max Planck Institute for Physics and Astrophysics in Munich.

"I wasn't worried about me as much as I was about the scientific community in general," Smarr says. "There is a sort of scientific citizenship, and it became clear to me that not everybody was going to get the same clearance and supercomputer access I had. Germany had an open science lab for chemists, physicists, and other scientists. That gave you an ability to share time with some of the best minds in the business. There was absolutely nothing like that here."

Bob Sugar will second that emotion. A physics professor at the University of California, Santa Barbara, he and several colleagues were involved in large-scale calculation of the properties of nuclear matter. Part of the work had to be performed on a Control Data Cyber 205. They couldn't get the time of day in the U.S., so it was off to the University of Karlsruhe in West Germany. And that was made available to them only because they had a West German collaborator.

Providing Long-Needed Power

Sugar, now a remote user of the San Diego Supercomputer Center (SDSC), told members of the House Subcommittee on Science, Research, and Technology at a recent hearing, "Adequate supercomputer time was simply not available to most research workers at American universities. The establishment of the NSF centers has dramatically changed the computing landscape. They are providing experienced supercomputer users with the computing power that they have long needed, and they are opening up new lines of research to those who have not previously used supercomputers."

Absolutely. As usual, the stats don't

lie. The NCSA's Cray X-MP/48 is running at about 90% of capacity, and Smarr says he's comfortable at that level. When the machine reaches 95% of capacity, then Smarr says he may start to worry.

Other Computers Reaching Capacity

The SDSC's Cray X-MP/48 doesn't have much room left on its cpu, either. The third quarter of 1986 ended with 81% utilization of the machine by 435 users. There are 85 institutions that have had allocated projects and there are 1,694 user accounts on the system.

They're approaching standing room only at the 13-member Consortium for Scientific Computing's John von Neumann Center (JVNC) at Princeton University, too. That center filled up its first Cyber 205, although some of that was due to an overflow from users at the phased-out NSF Phase I centers (see "Render Unto Caesar," March 1, p. 19). A second Cyber, which sources say was a gift from Control Data and about which JVNC president Joseph Traub says he won't comment, is now taking up its usual considerable space on the computer room floor. That's eased the overcrowding for JVNC's 1,300 users from 99 institutions. They should have considerably more breathing room when ETA Systems' ETA-10 becomes available (see "Not a Paper Tiger," July 15, 1986, p. 26). A two-processor version at ETA's headquarters in St. Paul is supposed to be remotely accessible sometime this spring.

Despite overcrowding and machines running at capacity, the effect the NSF centers have had on university research cannot be denied. "The program has had a tremendous effect on my ability to do research," Sugar says. "It's significantly broadened what my colleagues and I can do. The situation is very different than it was two years ago."

For sure. There were no centers then. Now, in addition to the SDSC, the NCSA, and the JVNC, there's the Center for Theory and Simulation in Science and Engineering (Theory Center to its friends) at Cornell University and the Pittsburgh Center for Advanced Computing in Engineering and the Sciences, a joint effort by Carnegie-Mellon University, Westinghouse Corp., and the University of Pittsburgh. It's a relative babe in the woods, having begun a year later than the original quartet.

As the times changed in the last two years, so they will in the next two. Most important, how the centers will continue to be funded is changing. Having survived a rigorous procurement process, each center is funded for about $20 million annually for the next five years under cooperative agreements between the NSF and the individual centers. That doesn't mean the NSF gives every center a $20 million check. The centers are encouraged to seek additional funding through the states, the universities in which they're located, and the private sector. The buzzword here is leveraging, which is just a high-tech version of "If you scratch my back, I'll scratch yours." In Exxon's agreement with the JVNC, for example, it provides money in return for the von Neumann Center's staff teaching and training Exxon's scientists. It was not for free that Kodak obtained X-MP time at NCSA to develop a new capillary film process.

"THE NSF CENTERS HAVE CHANGED THE COMPUTING LANDSCAPE."

But while corporations may have exceptionally deep pockets, the NSF doesn't. Therein lies the danger, according to many of the centers' proponents.

"If the centers are forced to seek funds from industry to maintain essential aspects of their mission, then the long-range implications are bleak," says William Lester, a professor of chemistry at the University of California and chair of the Program Advisory Committee to the NSF's Division of Advanced Scientific Computing (DASC). The Program Advisory Committee has final jurisdiction over the local peer review committees that allocate cycles at the supercomputer centers.

Concerns Over Funding Levels

"Funds expected on the basis of [the NSF cooperative] agreements have not been fulfilled and as a consequence various aspects of different centers' programs have had to grow more slowly," Lester told the subcommittee. "A critical issue for the continued development and role of the centers, if they are to have a unique role in the development of supercomputing in this country, is that they be maintained at the cutting edge of technology and at state of the art. It is important that the budgets for the coming year and successive years be established at least at the levels presented in the cooperative agreements and that previous unfulfilled commitments be met."

So it's back to where it always is: money.

Although the NSF as an entity did comparatively well with its budget for FY '87, which began Oct. 1, the supercomputer centers took a disproportionate hit. Forget about getting what they wanted. They didn't even get what they needed.

"Staffing levels at three of the centers [Princeton, Cornell, and Pittsburgh] are below that needed to provide a reasonable range of services," wrote Paul Rotar, the NSF's director of the supercomputer center program, in a memo to Gordon Bell, assistant director of the NSF's Computer and Information Science and Engineering (CISE) directorate.

"Our number one bitch is staff. We've got 55% of the NSFNet traffic," says Brian Gould, systems manager at the JVNC, referring to the high-speed network that links the five centers with each other, "but the other centers have five times as many people. We all knew it would be supercomputing on a shoestring, but this is getting ridiculous."

It may stay that way for awhile.

"Funding is below adequate levels and the centers feel that NSF has reneged on the cooperative agreements," said Rotar's memo to Bell.

Not everyone agrees with Rotar. "The DASC and the centers are in perfect step with each other," says Larry Smarr of the NCSA. "As long no one touches the cooperative agreements, it will stay that way, and they haven't reneged on mine yet. Are we underfunded? It's very hard to tell. Are we at the margin? Yes. We're providing good cycle time. Can we stay state of the art under our current funding? No. We don't have the funds for remote services. We're definitely underfunded for what we have to do."

"I wouldn't go so far as to say NSF has reneged on the cooperative agreement," says Sid Karin, director of the SDSC. "We're getting funded as we expected. We're quibbling about the details. NSF has indicated they want to keep

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A story worth repeating.

Dun's Business Month/December 1986

Digital's High-Tech Coup

As the leader and guiding spirit of Digital Equipment Corp., the computer company he founded 29 years ago, President Kenneth H. Olsen has remained committed to his vision of a business driven by technology. That commitment, which long ago made Digital a leader in minicomputers, has now propelled the company into undisputed leadership of the industry's most vital new technology: networking. Churning out an impressive array of sophisticated compatible computers and communications software, it has emerged as the only computer vendor that can efficiently tie together all elements of the [illegible] office. "It comes down

tal has won $2 billion worth of orders that would otherwise have gone to Big Blue. Even IBM positions its products against Digital's these days. "Our strategy was not to compete with IBM," Olsen insists. "It was to introduce into the commercial area those things that worked so well in the technical area."

That it has done. Pouring billions into R&D, Digital has introduced computers and communications software over the past two years that are the envy of the industry. Most successful of all: the MicroVAX II, a line of pow[illegible] ful small computers, which r[illegible] sales of $1 billion in fiscal [illegible] full year on the ma[illegible]

cal strategy of designing an entire line of computers around a single unifying architecture, called the VAX, which would allow every computer to run the same software, use the same data bases and be hooked up to the same communications equipment.

The common architecture greatly simplified the enormously complex task of devising a com[illegible] scheme that co[illegible] togeth[illegible] f[illegible]

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us at the leading edge. I haven't seen any signs that they don't mean it."

Not on paper, at least. The NSF is requesting for FY '88 a total of $1.9 billion, an increase of $270 million, or almost 17% over FY '87. If all goes according to plan, which it most assuredly won't, CISE's budget would rise 22.7% to $143 million from $116.5 million. The advanced scientific computing budget would jump 18.6% to $46.6 million from the current $39.29 million. The Reagan administration has proposed to double the total NSF budget by 1992.

Users Worried About Budgets

"I'm worried a little bit about the funding problem," Bell admits.

"The budget picture is not at all clear," Rotar says. "The centers have expressed some nervousness. JVNC and Cornell did take those cuts [of $3 million and $1 million, respectively, for FY '87]. And when you see money coming out of budgets, you have to wonder what's next."

Perhaps it means you won't be able to upgrade your communications network from 56KB to T1. Or maybe it means remaining more crowded for a longer time than you or your users would like, or putting on hold research on new architectures and software packages. And that consultant you were hoping to hire? He'll have to wait a while, too.

"I don't expect the exact level of funding to affect our overall users," says Ken Wilson, the Nobel laureate who directs the Theory Center. "It means you do in '88 what you would have done in '87."

"Part of the problem," Smarr says, "is that when the cooperative agreements were signed, expectations were much lower than they are now."

Try ground level. All anyone knew was that there was a vast multitude crying out for supercomputer time. Their projects were incredibly large, incredibly complex, and would have taken months on a VAX. Competition at the available centers, such as the University of Minnesota, Purdue University in Indiana, and Colorado State University, was so intense that many potential users simply bagged the whole thing.

That was just among the researchers who knew supercomputers existed. There was a much greater mass who didn't know about such machines, never mind using them to solve their most vexing scientific problems.

So much for ignorance being bliss. The centers have raised by several orders of magnitude the supercomputer literacy and awareness levels among scientists and engineers. That visibility has led to an exponentially increasing demand for cycle time. The centers have handled it so far, but the saturation point is approaching rapidly.

"We're close to demand outstripping the ability to provide services," Rotar admits. "I think it's going to happen this year. I'm not sure we're going to be able to solve it, because we can't spend our money that well in FY '87."

Of course, every center, no matter how far it is from the saturation point, would kill for another machine immediately. But the JVNC's ETA is the only scheduled upgrade this year.

So if you're the budget man, do you pay to bring in another X-MP to San Diego? Or do you run a delay pattern to get what you hope to be a higher payoff with a Y-MP, the next generation machine, when it shows up, perhaps next year? The former is a short-term solution for a long-term problem. The latter is the long-term solution, but it risks going with a saturated environment for longer than is optimal for either users or the center.

"CAN WE STAY STATE OF THE ART UNDER OUR CURRENT FUNDING? NO."

"You probably should remain below 85% usage," Rotar says.

"I don't think that's necessary," counters Smarr. "If your hours are too low, you're not running a full, healthy machine. If you allocate too much, then the crisis comes when everybody tries to use it at once. There's a happy medium, and I think we've hit it."

"I've consistently underestimated the desire for cycle time at the center," JVNC's Traub says. "There's an endless hunger for more high-end computing. The history of computing is like gas in a vacuum. It expands to fill the space.

"Even after all the additional user capacity generated by the supercomputer program, only 5% of scientists and engineers have access to big-time computing. So we're still clearly at the stage where no matter how much capacity you bring in, you get saturated."

No New Centers Down the Road

So then what? Are the NSF centers supposed to swell indefinitely to take care of what may be an infinite demand? These five are it for the foreseeable future. There aren't any other centers down the road.

The centers have already done what they were supposed to do by feeding raw power to a starving segment of the computer community. As Bell told the Program Advisory Committee, "I believe the NSF centers should exist with the largest peak power forever." He wouldn't mind building a gigantic network for the entire research community, either. That's why networking is now a separate division within CISE and has its own budget request. It was formerly a part of the Office of Advanced Scientific Computing, DASC's predecessor.

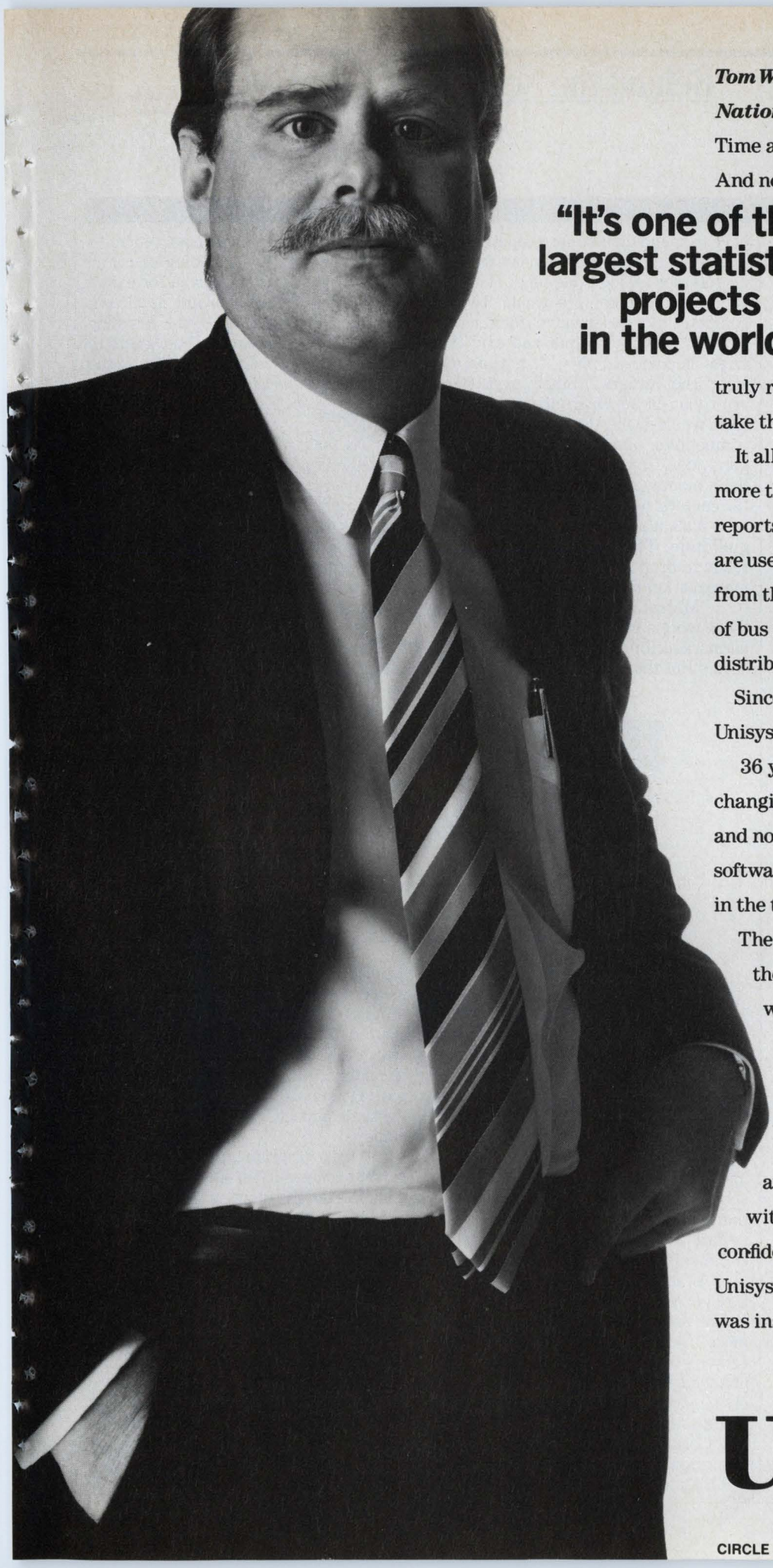
"The biggest impediment to this program isn't money," Bell says. "It's use and training. The machines are still very finicky when it comes to vector processing.

"The centers per se are really on target. Their role is the supplying of cycles, and they're going to continue to do that. We're going to continue to provide them at the maximum power. We'll use the peer review process just the way we've been doing. But the NSF can't supply supercomputer power for the whole world."

So who can? Other universities, that's who.

The competition generated by the Phase II program in 1984 created supercomputer visibility on campuses where they couldn't have differentiated a Cray from a Cyber. The three Phase I centers—Minnesota, Purdue, and Colorado State—were already in the business with some help from the NSF.

While the Phase I centers have been dumped by the NSF, other universities have rushed to fill the void. Suddenly, it's in to have a supercomputer on campus. Ohio State University and the Universities of Alabama, Texas, and Georgia either have one or are working on one. Florida State, utilizing financial



Tom Wilson,
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The system did stop, though, for a major water leak that flooded three mainframes. Tom Wilson did the only gentlemanly thing.

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aid from the Department of Energy and the considerable political power of former Congressman Don Fuqua, will beat the Consortium for Scientific Computing to an installed ETA-10. The machine was scheduled for a March 30 coming-out party on the Tallahassee campus.

In fact, Bell expects that universities shortly will have considerably more power than the NSF centers. Using a Cray-1 as one power unit, Bell predicts 371 units in universities and 132 units for the NSF centers by 1990.

"The role of encouraging other universities to get supercomputers wasn't envisioned as part of the NSF program, but it's what's happening," Bell says. "They will continue to get supercomputers that may or may not be on the same level as the ones at the centers."

No sweat. The more the merrier, right? If a user's got 10 choices instead of five, he's in fat city.

The Role of Non-NSF Centers

Observers point out one problem in that happy picture. Given the NSF's financial restraints, what's to prevent a university from putting together a consortium that can afford a better supercomputer than is available at an NSF center? The better the supercomputer, the more hotshot researchers will want time on it.

"What this brings to the fore is what's the proper relationship between those universities that have their own supercomputers and the national centers," Smarr says. "Why should Ohio State pay for it while those fat cats at Illinois get NSF money for it?"

Smarr provides the answer to his own question. "Because we have a national constituency and we're doing some unique things. That's what justifies our existence. But when I see our funding being spread too thin, I have to ask whether the scientific community will allow a tax to be put on itself to keep us unique. And if the caliber of research is the same or worse than that at a university, why have national centers?"

Funny, that's just what the NSF seems to be asking. The supercomputer centers may be none too thrilled at the answers.

For starters, free market mechanisms loom very large. As proposed to Bell by Frederick Brooks Jr., a member of the National Science Board, which sets policy for the NSF, free market mechanisms would dictate that researchers with NSF grants wouldn't necessarily have to spend their supercomputer money at NSF centers. They could go to other universities selling cycle time. Thus, the supercomputer centers would have to compete among themselves for dollars.

"If there's no hue and cry, that might become a policy that would destroy the centers," Smarr says. "You can't plan in an environment like that. That would make the five centers very competitive, and I'm not sure that's a good idea. If researchers could spend their money anywhere, that would cut the centers' heads off."

Well, it's not quite time to face the guillotine. The powers that be aren't ready to drop it. They need to do some more market research.

"Market mechanisms could work if there were a big pile of money that was earmarked for this kind of thing," Bell says. "But then, everybody would compete for it, and it would lower every center's supercomputing level. Besides, market mechanisms didn't work to get the centers started in the first place. The free market hasn't solved the problem of getting maximum power to the users."

"SUPERCOMPUTING ON A SHOESTRING, YES, BUT THIS IS RIDICULOUS."

This only means the idea is dormant, not dead. But the NSF hasn't quite solved the maximum power problem either, although it's obviously working on it. Part of the answer may come through evolution.

Although the centers are not mature yet, each is naturally developing different strengths and weaknesses. As more users tap into the network, each center's traits will become more pronounced. In the not too distant future, users might go to the JVNC for data archival, the SDSC for oceanography and astronomy, Cornell for experimental computation, and Illinois for graphics.

"I'd like some services done at one center and be able to transport them to another," Rotar says. "I don't expect all centers to have data archival, for example, but it would be available at all centers. But the higher-ups are resisting specialization. They want the centers to serve the entire community. But all the centers can't do everything."

Future Plans

Yet that's what the plan calls for. As Phase II progresses, we're talking much more than cycle time. For the next few years, Bell's goals include graphical I/O via workstations and the inauguration of a "standard" environment for operating systems, languages, and graphics across workstations, supercomputers, and minisupers.

By 1990, Bell hopes to provide the leading-edge environments at the NSF centers with visualization, whereby users can compute at any machine in a fully compatible hierarchy depending on cost, performance, and geographic needs. Bell also wants to initiate a Computational Science and Engineering program. He'd like the entire research community interconnected on a research network based on fiber optics packet switching operating at 45Mbps to 140Mbps. Local universities will be entirely networked for campus workstations.

Not too tall an order, right? All it's going to take is money.

"This is a very visible program but it's also very young," Smarr says. "People tend to forget that. I'm worried the program will be stopped at too early a stage to be sustainable. They're funding us at the level of a national center for a specialized discipline. Yet we're supposed to support all disciplines and have the same impact? Fine. Then give us the money."

"This program has been tremendously successful," SDSC's Karin says. "I think we've got more universities with supercomputers than any place in the world. Two years ago, we weren't even on the map. But I don't think it will continue if no one puts effort into it. You can declare it a success, but you have to keep up the effort and the stimulus."

"The number of pressures on the supercomputer initiative is building," Cornell's Wilson says. "All these pressures reflect themselves in terms of funding. We're coming to the end of the startup phase. What happens next?"

No one knows. But stay tuned. The show's just beginning. ■

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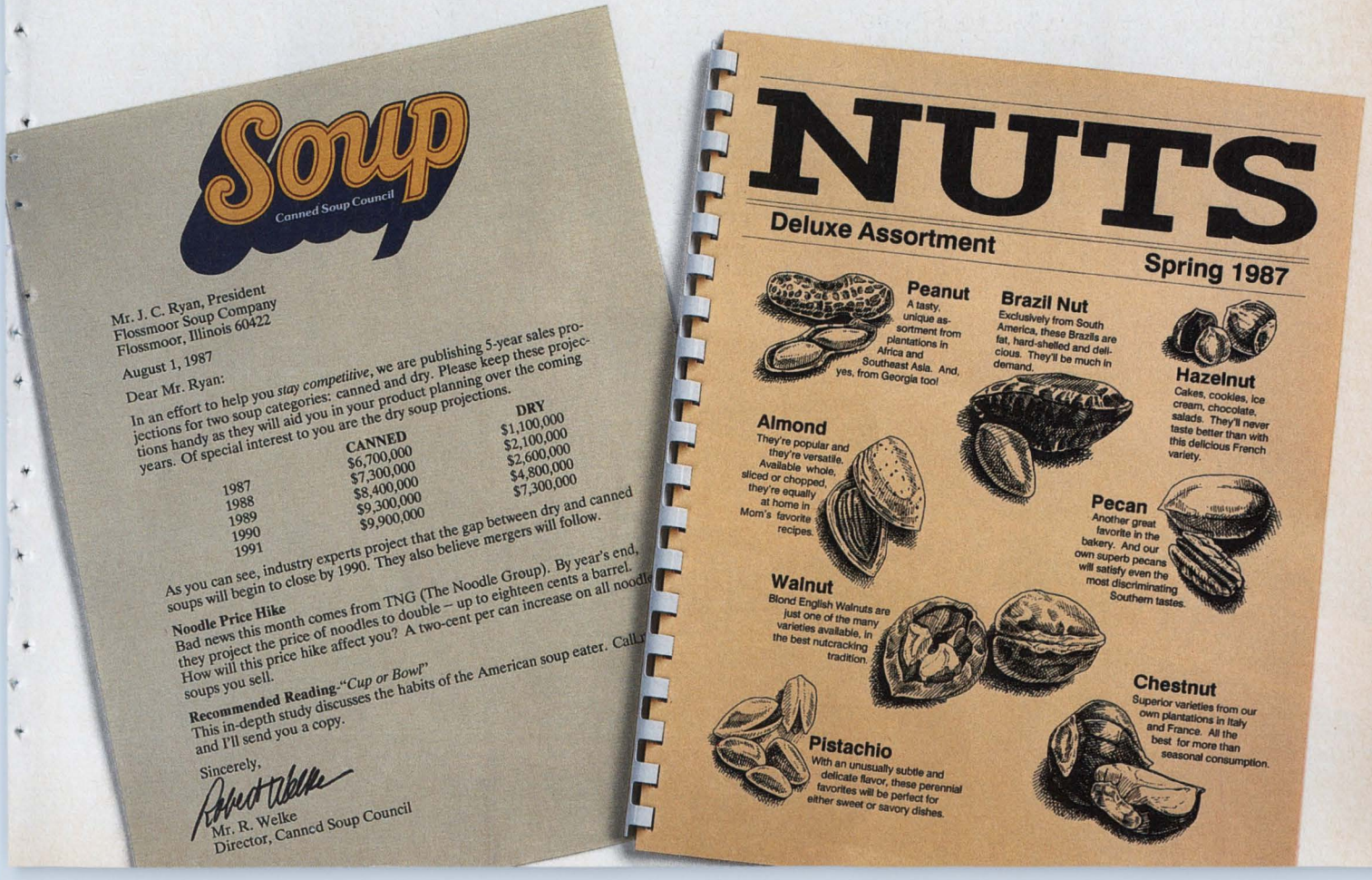

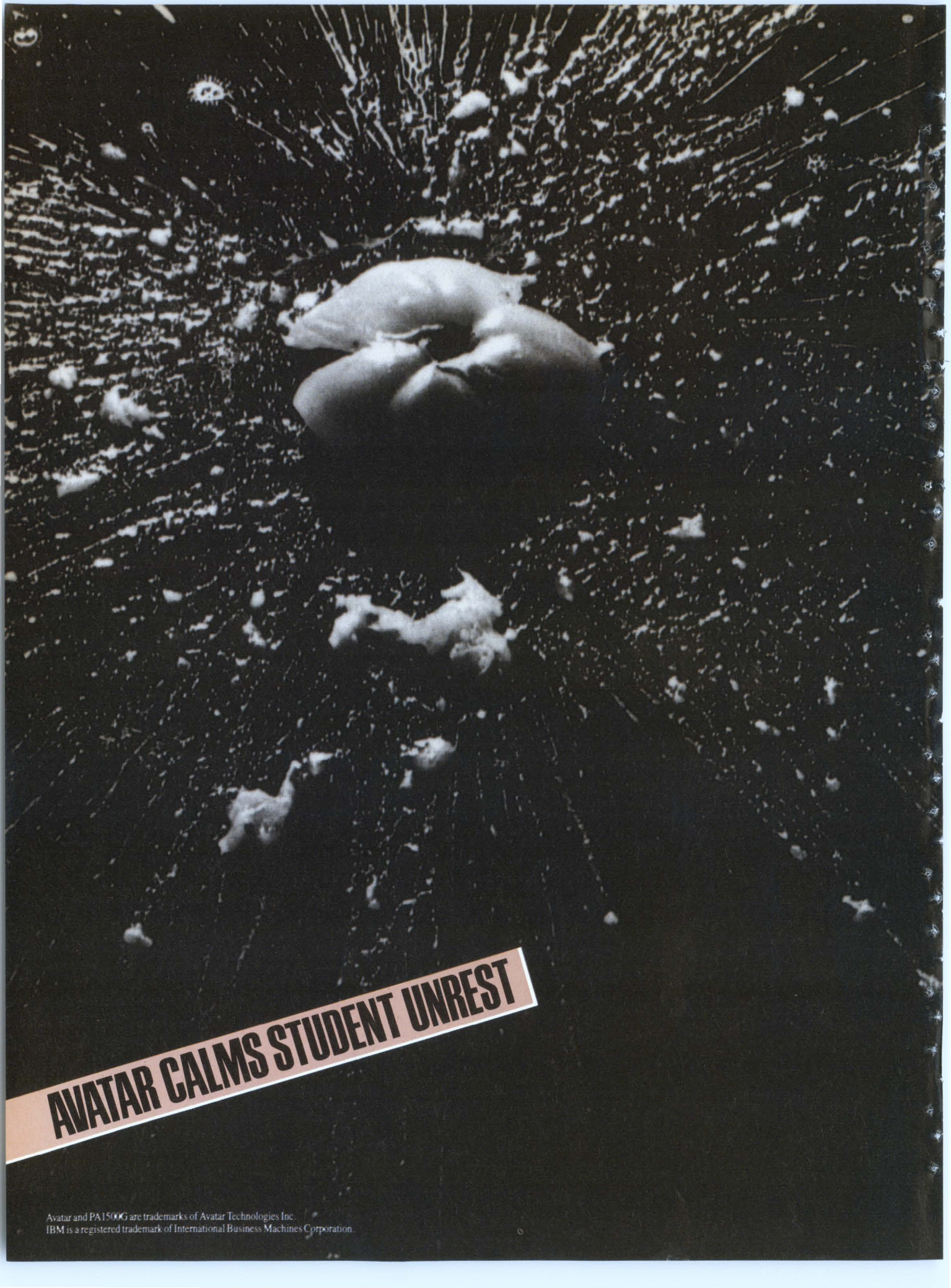

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Researchers at NASA's Ames Research Center, Moffett Field, Calif., have put the mightiest machines that high tech has to offer to work on the aerospace vehicle design problem—a complex application that stretches their supercomputers to the limits of outer space. But computational fluid dynamics, an integral part of this design process, demands computational capabilities that are several orders of magnitude greater than what today's supercomputers can deliver.

BY KENNETH G. STEVENS JR.

In spite of the advances made in supercomputer technology, the scientific computing power available today is still inadequate to address all of the requirements of users in government, industry, and academic laboratories. This is certainly the case for us at NASA's Ames Research Center at Moffett Field, Calif., where researchers put technology to work in the aerospace vehicle design process.

An integral part of that design process is computational fluid dynamics—an application area that needs computational capabilities several orders of magnitude greater than today's supercomputers can deliver.

While the unsteady, compressible Navier-Stokes equations adequately describe aerodynamic flows,

current computer technology does not permit numerical solution of these equations. It cannot come up with suitable resolution for the wide range of length scales—from multiples of the aircraft length to molecular motion—found in the turbulent flows that are encountered in actual flight situations. (These turbulent flows carry what's known as a high Reynolds number.) Lacking machine power, researchers have had to approximate these equations and apply them to simplified geometries.

Figure 1 summarizes the levels of approximation to the Navier-Stokes equations, the number of grid points used to resolve the geometry, and the computational speed needed to produce solutions in approximately 15 minutes of computing time. The maximum run time of 15 minutes was chosen because it would permit the use of the code not just in the research mode, but in the aerospace design cycle as well.

The first level of approximation is the linearized inviscid form of the equations. Developed in the 1950s, the numerical methods and computer programs to solve this form found their way into real aerodynamic design use in the '60s. This first level permits calculation of pressure distributions and vortex drag in subsonic and supersonic flow conditions.

Down-to-Earth Supercomputing at NASA Ames

Cray X-MP/48 at NASA's Ames Research Center, Moffett Field, Calif., is used in aerospace vehicle design.

Photographs by Christopher Springmann

Supercomputing at NASA Ames

Supercomputers using this first level of approximation can simulate the flow over the complete aircraft configurations in a matter of minutes.

At the second level of approximation are the nonlinear inviscid equations. The numerical methods and computer programs to solve this form that were developed in the '60s were used extensively in aerodynamic design applications in the '70s. The nonlinear, inviscid equations permit the calculation of the effects of wave drag and pressure loads at transonic speeds. Using this second level of approximation, today's supercomputers can simulate the flow over simple wing-body configurations in a few minutes of cpu time.

Reynolds-averaged Navier-Stokes equations are at the third level of approximation. These equations were developed in the '70s using supercomputers such as the Illiac IV, the Cray-1, and Control Data's Star 100. These equations permit the calculation of total drag, separation, and reattachment as well as the calculation of stall, buffet, and flutter. In recent years these equations have been put to work in the aircraft design process, thanks to the Cray-class computers acquired by the aircraft companies in the '80s. Using this level of approximation, supercomputers need only a few minutes for simple aerodynamic shapes, while hours are sometimes needed for complex shapes.

Fourth Level in R&D Phase

The fourth level, large eddy simulation with models for subgrid scale turbulence, has been in the R&D phase since the '70s. The method, which permits the study of turbulence structures and aerodynamic noise, has yet to be used on any actual applications. Researchers are anticipating those applications, since it can take tens of hours to simulate simple problems such as the flow through a channel, even with the most advanced computers.

At the fifth and final level of approximation are exact full Navier-Stokes equations that will calculate laminar/turbulent transition and turbulence dissipation. Still in the research realm, these equations, which have tremendous computational requirements, are far from ready for use in aerodynamic applications.

It's important to remember that computational fluid dynamics is only one part of aerospace vehicle design. There are other application areas in this design process that also will take massive amounts of processing power. In projects such as the National Aerospace Plane, the actual flight situation is determined by the interaction of aerodynamics, structures, propulsion, heating, radiation, and chemical reactions. The goal, therefore, should be to model all of these interacting phenomena in the design cycle. This goal, however, increases the computational requirements by additional orders of magnitude.

The Numerical Aerodynamic Simulation (NAS) facility and the Central Computer Facility (CCF) at NASA's Ames Research Center are two of the leading supercomputer centers for advanced computational fluid dynamics. The NAS facility has the first large-memory (256-megaword) Cray-2 delivered and the CCF has a Cray X-MP/48 with a 128-megaword Secondary Storage Device. Both machines are common-memory multiprocessors with four cpus. Each Cray-2 processor has a 4.1nsec clock. The Cray X-MP/48 has a 9.5nsec clock and can handle more than one instruction per clock, per cpu. So when all four processors are used, these computers can execute hundreds of millions of floating point calculations per second on the computational fluid dynamics applications previously described.

MORE PERFORMANCE IS NEEDED TO MAKE MODELING ATTRACTIVE.

These machines' speed and memory size allow level-three approximations to be used in the aerospace design cycle for the first time. Systems like these will begin to permit research with the level-five approximation, although tens of hours of cpu time will be required for simple cases.

Even more computational performance is needed to make computational modeling attractive, cost-effective, and useful in the aerospace design cycle. This performance could come from the raw horsepower of tomorrow's supercomputers, but it's more likely to come from a combination of improved algorithms and more powerful supercomputers.

Advances in numerical solution techniques offer prospects for increasing computational modeling capabilities. Using these techniques, Terry Holst, chief of the Applied Computational Fluids Branch at NASA Ames Research Center, solved a problem in five seconds that had taken more than 12 minutes to crack 13 years ago. The problem was the computation of the inviscid full-potential transonic flow about the ONERA (the French aeronautical agency) M-6 wing at mach .84 and with an angle of attack of 3.

Problem solved by Jameson

This problem had been solved in 1974 by Tony Jameson, who was then a professor at the Courant Institute at New York University. Using a code called FLO-28, which is applied on full-potential equations in conservation-law form, Jameson's solution required 742 seconds on a CDC 7600. Eight years later, Holst, using an improved implicit factorization algorithm to solve the same governing equation, achieved the same convergence in just 64 seconds on a CDC 7600.

Later that same year, Holst was able to do the calculation on a Cray-1S in under five seconds after vectorizing the code. The 150-factor improvement was accomplished thanks to advances that had been made both in computers and algorithms.

One algorithmic area currently receiving a great deal of attention is zonal methods. This solution methodology numerically simulates a complete flow region by using different equation sets and associated algorithms in the applicable flow areas.

A simple example that demonstrates a zonal procedure would be flow about an airfoil. In this case, the flow region could be divided into three zones: a thin, viscous region near the body; an intervening, larger inviscid rotational area; and an inviscid irrotational sector that extends to the outer boundary.

In the innermost section, the thin-layer Navier-Stokes equations are used. These equations, which place heavy demands on computing and storage resources, are needed to account for the viscous effects. In the middle segment, Euler equations are used because they offer the best compromise between com-

Aerodynamic Applications Take Off in Japan

Scientists at Japan's National Aerospace Laboratory (NAL) think they may have the world's best system for Navier-Stokes numerical aerodynamic simulation of transport-type aircraft. Their confidence is based on the fact that Boeing chose them to run simulations of the flow field around the advanced passenger plane it's developing called the 7J7. Susumu Takanashi, chief of NAL's aerodynamic section is obviously proud of the Boeing assignment. "If U.S. companies had excellent Navier-Stokes code," he contends, "then perhaps Boeing would have asked them to do the computing."

The system doing that computing is called the Numerical Wind Tunnel (NWT). It consists of several programs including a Navier-Stokes solver, a grid generation code, preprocessing and postprocessing codes, and other dynamic subroutines—all running on a Fujitsu VP-400 supercomputer. NAL hopes to present the system and the results of its 7J7 simulations at the Applied Aerodynamics Conference in Monterey, Calif., this August.

Asuka plane simulation based on Euler equations.

One of the NWT's major advantages is consistency. The system is able to simulate speeds from mach 0.1 to mach 10 using the same code. Current high-speed simulators use different codes from the ones used by their low-speed counterparts. In addition, actual wind tunnel testing requires three tunnels (subsonic, ultrasonic, and supersonic), the results from which do not form an uninterrupted curve when plotted.

Postprocessing capability is also important, since numerical simulation, unlike wind tunnel testing, gathers data not only from the surface of the body being tested, but also from the space surrounding it. Postprocessing permits usable information to be gleaned from the resulting mass of raw data.

The Numerical Wind Tunnel is based on several earlier NAL aerodynamic simulation projects. One of the more notable was the Navier-Stokes simulation of the ONERA (the French aeronautical agency) M-5 standard test model. Since the model has a relatively simple shape, including a circular fuselage cross-section, the full configuration could be simulated. NAL has also simulated the full configuration of a much more complex design, the experimental Asuka, a quiet, short-takeoff-and-landing (QSTOL) plane first flown in late 1985. Programming used in that case, however, was based on Euler equations, which are less complex and less accurate than the Navier-Stokes type.

NAL still has some more code to write before it can run the full 7J7 configuration in its NWT. So far, it has simulated a wing-fuselage combination without the tail assembly, a task that involves approximately 1 million grid points. The full plane, however, will require 1.8 million points. Results to date have been encouraging. "The correlation between our data and Boeing's wind tunnel tests," says NAL's Takanashi, "has been surprisingly good." When the 7J7 is done, NAL's aerodynamic chief has an even more ambitious goal—the Navier-Stokes simulation of the full Asuka configuration.

BY ROBERT POE

putational requirements and the physics to be simulated. Full-potential equations are for the outermost region. While they are the least computationally intensive set of equations to solve, they're still sufficient to resolve the physics.

Zonal methods are being developed to reduce the computation speed and the memory space needed to simulate complex aerodynamic flow fields numerically. In fact, researchers at NASA Ames are currently creating such a code to model the flow over a complete F16 configuration on the NAS Cray-2.

For scientific-computing users, finding the appropriate algorithm that can handle the physics is only half the battle. Next comes the challenge of developing a computer program. Although supercomputers are costly—between $5 million and $20 million—the major expense is not in the hardware. It's in the labor involved in the development and use of the applications programs.

To develop a supercomputer application, a programming language must be used. In the case of numerical applications, FORTRAN remains the dominant language. FORTRAN has come a long way in 30 years, but it still lags behind the advances in supercomputers. In the '70s, supercomputers with vector processing hit the market, but it wasn't until the '80s that FORTRAN compilers did a good job exploiting this hardware feature. And the multiprocessor architectures of the '80s are still not being used efficiently by FORTRAN and its compilers. While some supercomputer manufacturers, such as Cray Research, provide nonstandard language extensions for this, they are not simple to use.

Users must be aware of the hardware architecture and the manufacturer-specific software constructs. They must know which portions of the program are safe to run concurrently and what can be safely shared. They must also devise the control structure for this concurrent execution from low-level constructs provided by the manufacturer.

All of this takes time and a highly skilled programmer, but it is crucial if the program is to extract all the speed available from today's supercomputers. Compilers are needed that can detect and schedule those portions of the program that can safely be executed concurrently.

If you have a "smart" compiler or if you've taken the time to explicitly program the use of the multiple processors, then the debugging process can begin. The current state of the art is represented by symbolic debuggers that were developed for single-instruction stream execution. The user is able to set breakpoints in the program and observe and change variables by name.

Symbolic Debuggers Inadequate

While symbolic debuggers were fine for the synchronous execution of uniprocessor systems, they are inadequate for the asynchronous execution of today's multiprocessor supercomputers. Where, for example, should the execution be terminated if a breakpoint is inserted in the code and multiple versions of that portion of code are executed concurrently? If it terminates when the first of the concurrent tasks reaches the breakpoint, then the other tasks may not always stop at the same place because they are executing asynchronously.

One of the most common errors in programming multiple processors comes from incorrectly synchronizing the processors. This is the type of error, however, that cannot be found easily using today's debuggers. So, to fully exploit the speed of the multiprocessors, new debugging techniques must be devised.

Once a program is debugged, it's time to make long, large production runs on the supercomputer. At present, operating systems like Cray's COS schedule the cpus without considering whether the tasks being scheduled are cooperating on a single job.

It is important to schedule simultaneously cooperating tasks that access very large portions of memory. This minimizes the overhead associated with swapping tens of millions of words of memory. In the worst case—where a job requires all of main memory—if the cooperating tasks are not scheduled concurrently, some cpus would be idle because of a lack of memory.

An Unresolved Problem

How to best schedule multiple cpus remains an unresolved problem. Much work will be needed in order to come up with operating systems that schedule multiple cpus as efficiently as they now schedule resources on the single cpu machine. That optimum scheduling will be necessary if users are to fully exploit future supercomputers.

Once you have debugged and executed the application on the supercomputer, you must analyze the results. But if the result is a typical, unsteady aerodynamic flow field, this analysis cannot be done simply by using a table of numbers. For a typical, unsteady aerodynamic flow field calculation there are five dependent variables at each of the grid points in a 100 by 100 by 100 grid: velocities in each of the three directions, pressure, and density. Because the flow field is unsteady, roughly 100 snapshots of the flow field are needed to capture the physics. That translates into a total of 500 million words of output. The way to understand this massive amount of data is usually through computer graphics.

Supercomputing at NASA Ames

NASA Ames' NAS facility has one of the best computer graphics capabilities in use today. We use Iris 2500 Turbo workstations from Silicon Graphics Inc., Mountain View, Calif., connected to a Cray-2 supercomputer via Hyperchannels from Network Systems Co., Minneapolis. The Iris workstation, which has a 1,024 by 1,024 pixel display with 24 bits of color, contains custom hardware that enables dynamic translation and rotation of the color images. Unfortunately, this system does not always provide all the capabilities needed by the user to understandthe complex flow field that has been calculated.

New hardware and software techniques are required to improve the quality of the image and the speed at which it can be transmitted. In the context of our application, a user would like to be able to view a "movie" of the flow field. Such a movie calls for a bandwidth of approximately 750Mbps (1,024 by 1,024 pixels by 24 bits for color by 30 frames per second). The Hyperchannel we're now using has a hardware-limited transfer rate of 50Mbps. The observed transfer rates in a typical supercomputer installation are only a few million bits per second, which is far short of what is neeeded to view the type of movie we're talking about.

In addition to increased local area network speed, improved visualization methods are also required. Better techniques for image rendering, windowing, and depth queueing are needed. Examples of things that would improve visualization are fast ray-tracing hardware for image rendering, stereoscopic viewing techniques, and software that would enable the viewer to "walk around" inside the flow field.

Example of Storage Hierarchy

Once the application has executed successfully, the results must be stored for future use. A good example of a storage hierarchy for a supercomputer system can be found at the Los Alamos National Laboratory. This hierarchy is composed of IBM 3850 cartridge storage units, IBM 3380 high-density disks, and Cray DD49 high-speed disks. This storage setup, which maintains 500GB on-line and another 4,000GB off-line, handles about 50GB of traffic a day.

As impressive as this storage system is, it still needs to be improved. The IBM 3850 is an old technology and must be upgraded to an automated tape library of 3480-tape cartridge units or some form of read/write, fast optical disks. While the Cray DD49 high-speed disk drives are the fastest on the market, they still take about 200 seconds to accept a 2GB memory dump from a Cray-2. Improved high-speed disks will be needed to buffer the massive amounts of data entering and leaving a supercomputer.

Because of their expense, supercomputers cannot be doled out to every local site that needs one. That means that supercomputer resources have to be shared, a process that requires fast communications. However, the T1 long-haul communications standard's transfer rate of a little over 1 megabit per second is not adequate for the massive amounts of data created by today's supercomputers. New long-haul communications networks that operate at hundreds of megabits per second are desirable. Without these networks, supercomputers could end up as devices that turn a computation-bound problem into an I/O-bound problem.

It is clear that today's supercomputers permit scientific calculations that could not be done otherwise, but it is also clear that systems and graphics software and storage, LAN, and long-haul communications technologies have not kept pace with supercomputer hardware. The expanding market for these large machines will be able, it is hoped, to stimulate development of these lagging technologies and speed improvements in performance and memory size for supercomputers. ■

Kenneth Stevens Jr. is chief of the Computational Research Branch at NASA's Ames Research Center at Moffett Field, Calif.

Scientific Computing Needs for 1990

- A supercomputer capable of 10GFLOPS and a billion words of memory.
- Software that eases the problem of programming multiprocessor supercomputers efficiently.
- Local area networks with gigabit transfer rates.
- Graphics hardware and software that can display complex three-dimensional physical phenomena.
- Mass storage hierarchies with thousands of gigabits on-line and transfer rates to the supercomputers that are in the gigabit per second range.
- Long-haul communications networks that operate at hundreds of gigabits per second.

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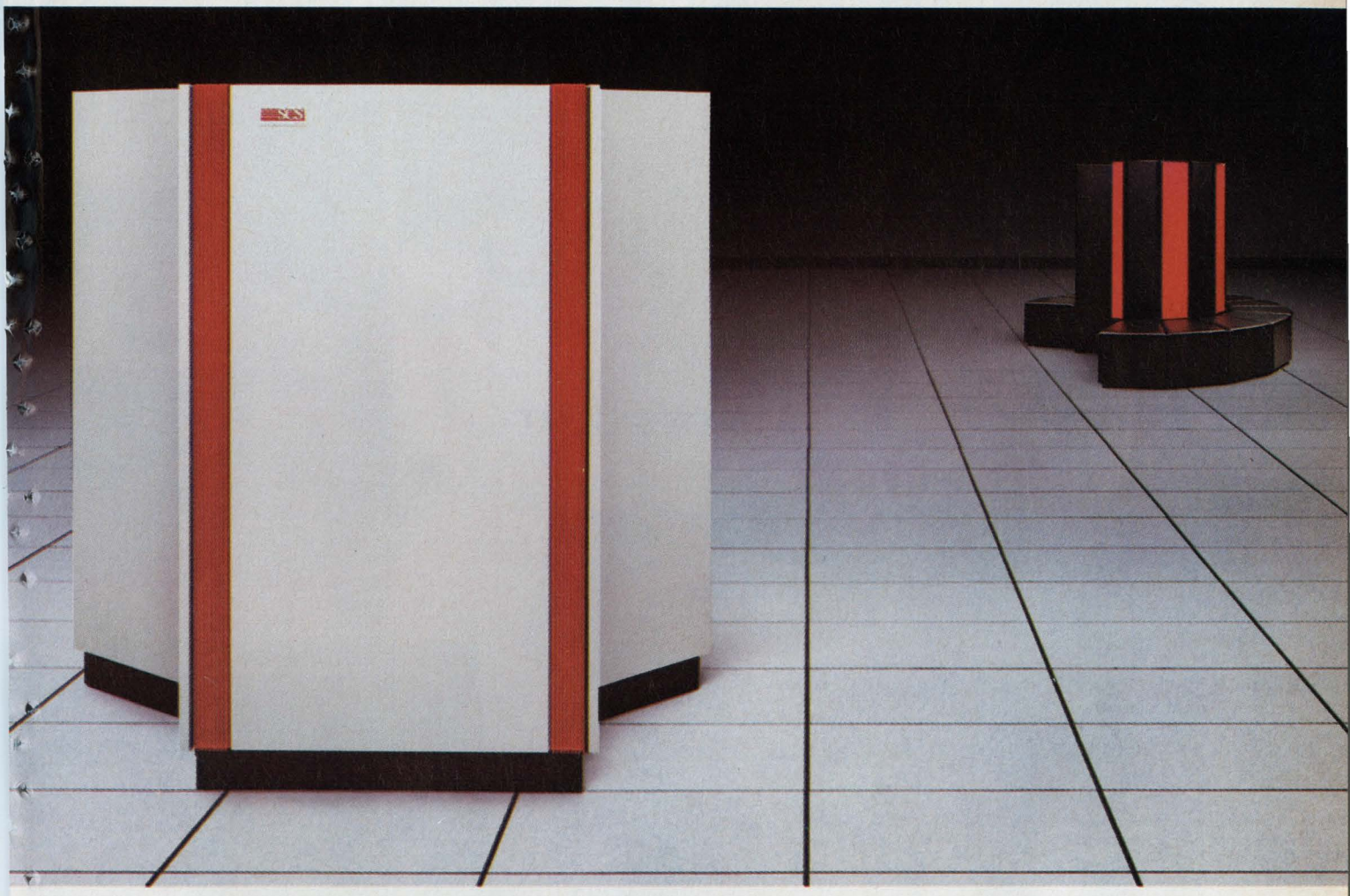

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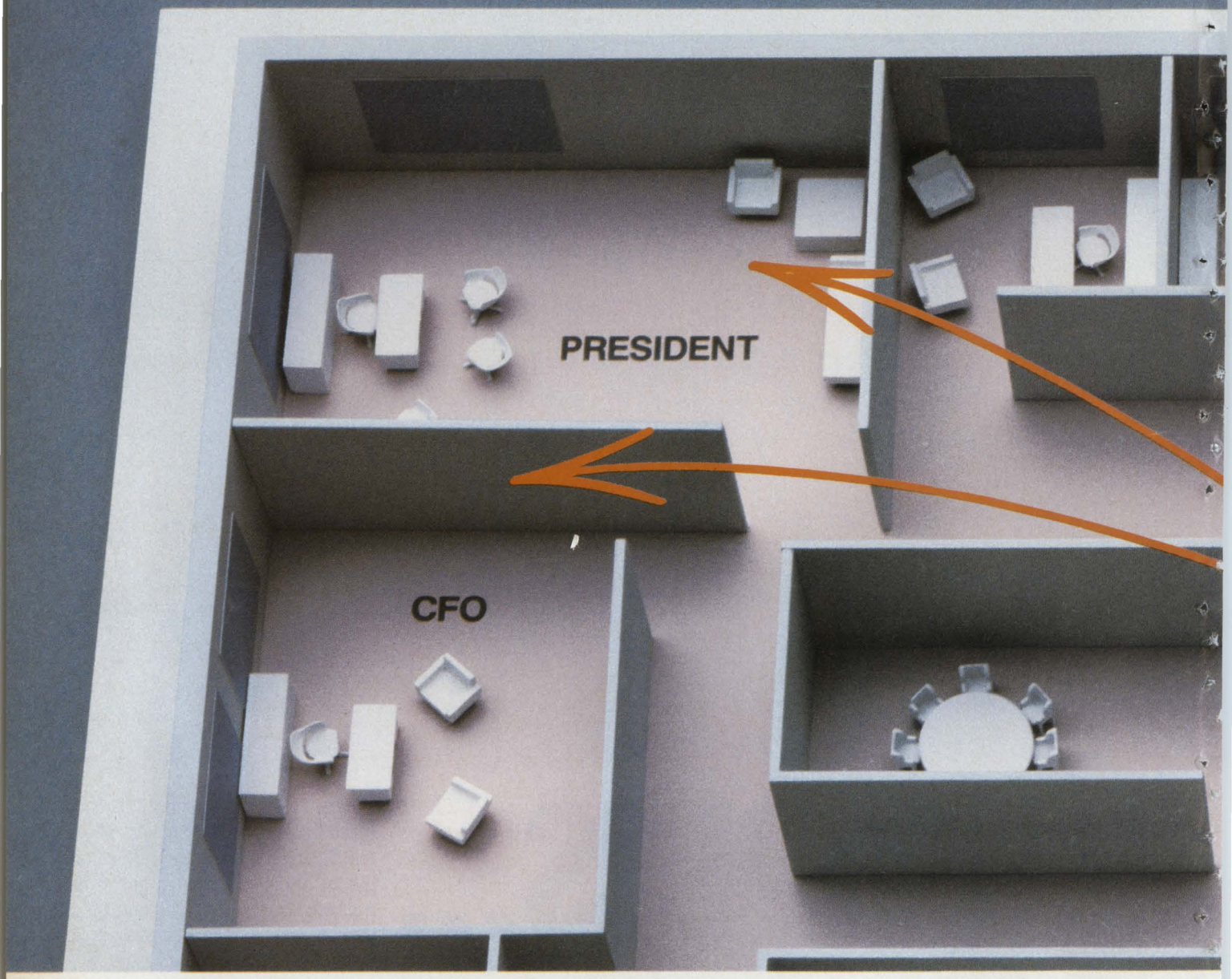

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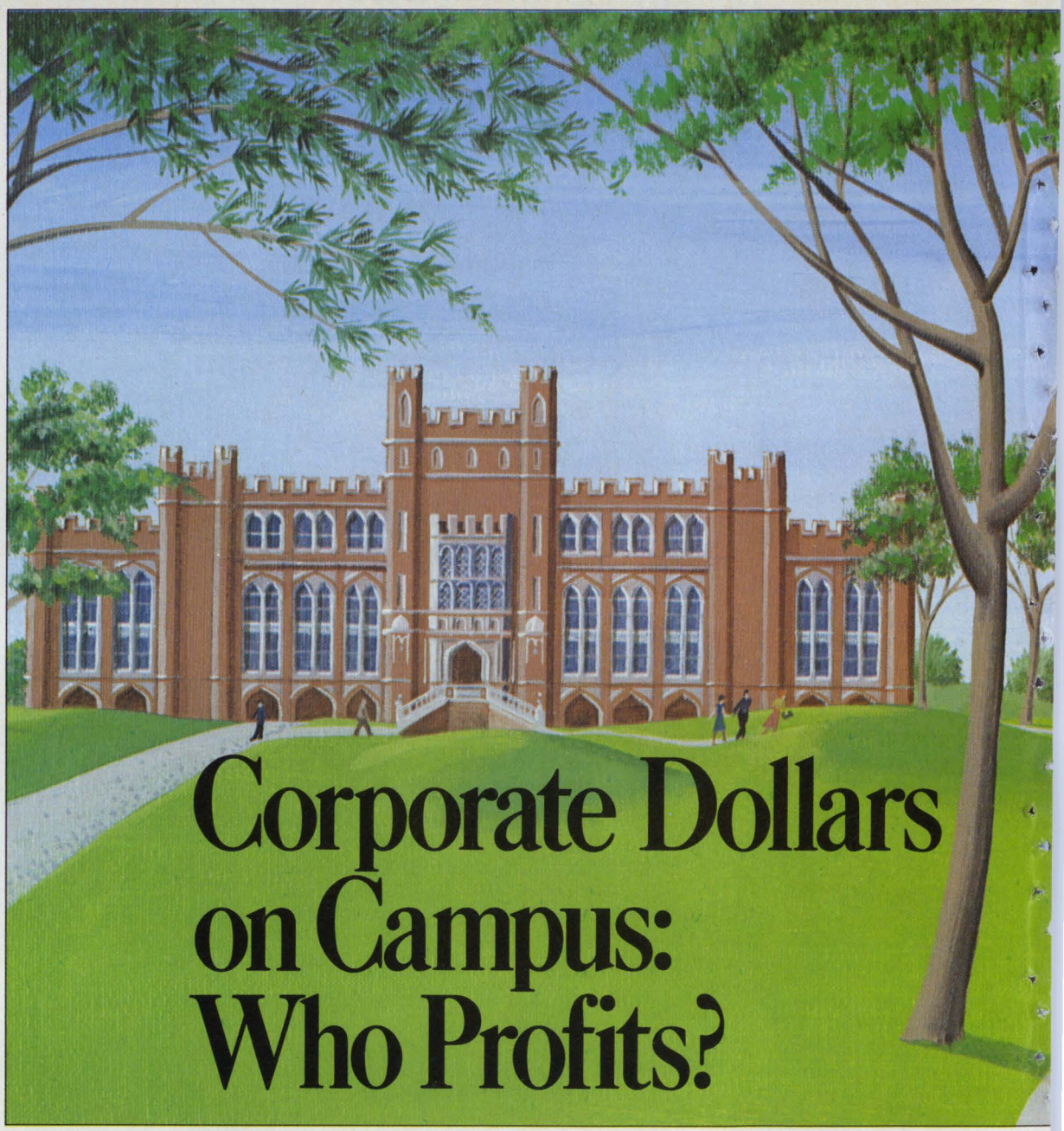


Corporate Dollars on Campus: Who Profits?

In an era of declining profits and tight budgets, the amount of money spent by computer companies on university campuses in the name of both research and philanthropy continues to grow. While many firms regard these efforts as part of their regular research and development programs, others see them as a partial substitute for in-house research. Companies doling out donations generally expect to gain access to leading-edge development and researchers, enhance their own employee recruitment, and wean future customers on their products. Although it's true that some corporate spending on campuses contributes no measurable return to a company's bottom line, most businessmen and academics claim that expectations of mutual benefits are justified.

BY ED JOYCE

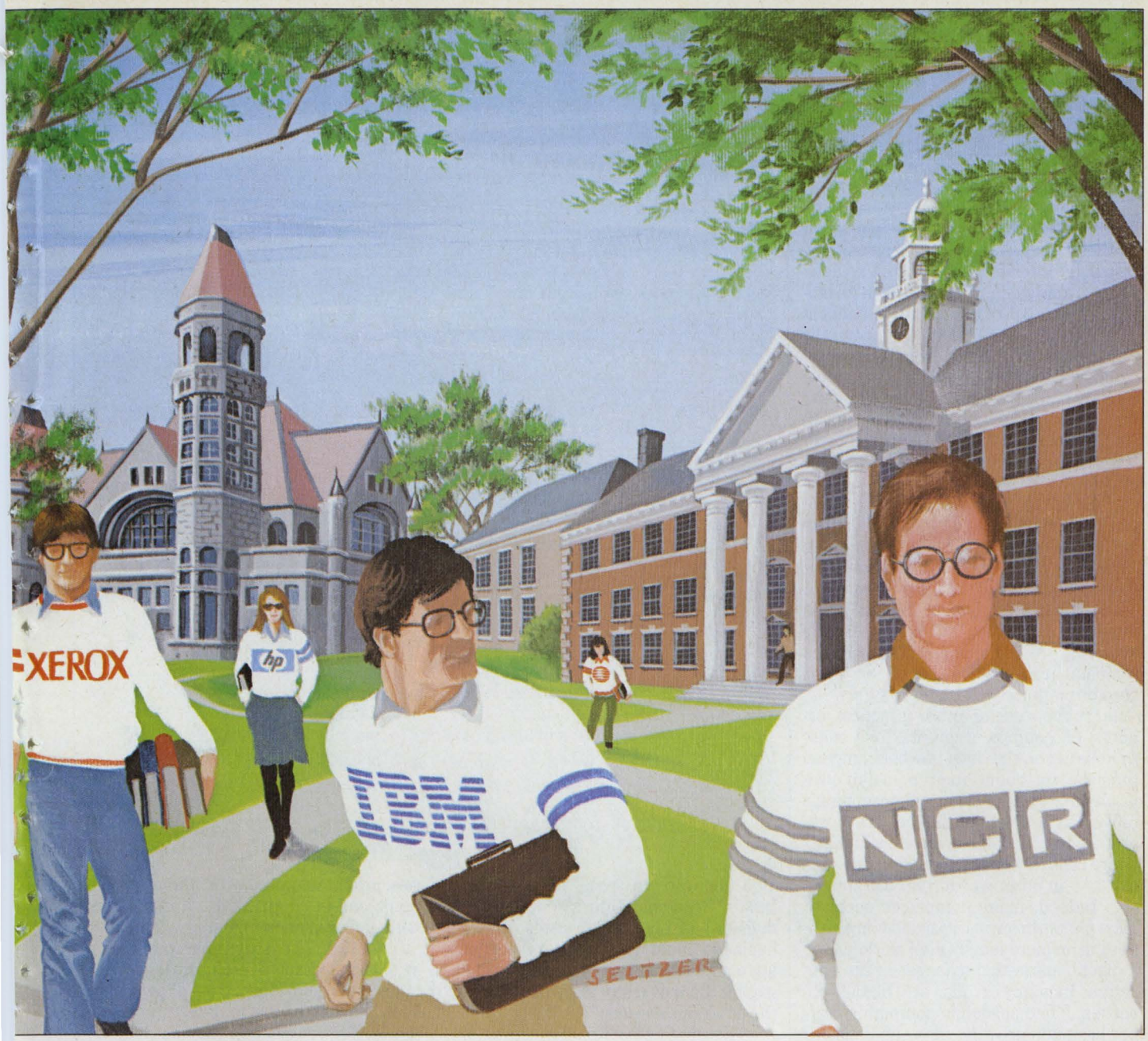
At first glance, it seems to be an unlikely match—AT&T providing support for genetic research at the University of Virginia (UVA). But the communications giant is doing just that through a multimillion-dollar donation of computer equipment to UVA's School of Medicine. The situation typifies much university computing today—if you're using a computer on campus, chances are you're benefiting from hardware and software donated, funded, or at least sold at a generous discount by a computer company.

The advantages of free mainframes and software for the academic community—whose beneficiaries range from elementary and secondary schools to universities and teaching hospitals—are largely self-evident, but what are the corporate sponsors getting out of these deals? Can they expect anything more than a major tax deduction and the noble feeling of supporting higher education?

Consider AT&T's donation to UVA: a $4.5 million gift of computer equipment and services, including an AT&T 3B5 minicomputer for the School of Medicine. Malcolm "Mitch" Smith, an assistant professor of microbiology at the Charlottesville, Va., university, relies on the 3B5 machine to research the regulation of gene expression and the recombination of DNA molecules. Smith freely admits that AT&T stands to gain nothing of direct value from his research.

Angie McGuire, AT&T's manager of university programs, explains that the company made the donation as part of a "philanthropic program to support higher education." The budget for AT&T's

Illustration by Isadore Seltzer



computer donation program has doubled since 1984, according to McGuire, and last year over 120 institutions benefited. Last year, when AT&T decided to eliminate 24,000 jobs from its Information Systems Division in a cost-cutting measure, the computer donation program gave away $68 million.

AT&T's program is by no means unique. "The interaction between high-technology companies and universities is growing dramatically," proclaims former IBM vice president Lewis Branscomb. IBM invested $71 million to support educational institutions in 1985, according to Branscomb. Until he retired a few months ago, Branscomb was responsible for guiding the company's scientific and technical programs, including philanthropic and research relationships with universities. In 1985, Big Blue had committed another $127.5 million in multiyear cooperative research contracts with 205 universities worldwide. At the start of this decade, IBM's university contracts amounted to less than $5 million.

"THERE'S NO SUBSTITUTE FOR BEING PART OF THE DESIGN PROCESS."

A survey of other computer firms shows corresponding levels of support for education. Digital Equipment Corp. donated about $5 million worth of equipment during its fiscal year 1986. Its contracts for university research in various multiyear projects currently total $20 million. Hewlett-Packard awarded $50 million in grants to universities and teaching hospitals in 1986. NCR doled out $3.9 million in equipment and cash grants in 1986, and allocated another $2 million for sponsored research. Thirty-two schools have received grants from Xerox, part of a three-year program established in 1984 with a $30 million budget.

Prime Computer Inc. handed out $9 million in university grants in 1986, while CDC spent $2 million.

The fact that university handouts survive and even thrive despite tight budgets suggests that the philanthropists have ulterior motives. For example, AT&T acknowledges a tax angle in its university giving program; the equipment at UVA was donated under the Economic Recovery Tax Act of 1981, which precludes it from being used for cooperative development projects between AT&T and the university. Furthermore, to qualify for the tax deduction, the donated hardware cannot be tied to marketing or sales efforts.

Even so, donated hardware itself can represent a sort of indirect marketing effort. As UVA's Smith points out, "When students leave the university for the working world, they may or may not demand AT&T equipment, but they will expect to find Unix [the 3B5's operating system]." As it happens, AT&T chooses recipient universities based on their commitment to Unix-based systems.

To appreciate other practical aspects of equipment grants, one must read between the lines of what company officials say about their donation programs. Part of the criteria determining a university's selection in the AT&T program, for example, involves what McGuire calls its "existing relationship with AT&T"—in other words, big customers.

Indeed, many companies seem to view philanthropy as a part of doing business in an increasingly vital market. Bob Trocchi, marketing manager of the education industry group at Digital, observes, "The academic computing market has been growing three times faster than the industry as a whole." If a school is willing to develop instructional software on DEC machines for a particular subject, such as chemistry, and make it generally available, then, Trocchi says, Digital will supply hardware through a donation or generous discount just to encourage that effort.

For their part, academic beneficiaries seem equally forthright about the motives behind corporate philanthropy. At Carnegie-Mellon University (CMU), Pittsburgh, IBM is funding $32 million worth of network development under Project Andrew, which CMU officials call "the most ambitious campus computerization project in the country." Project coordinator James Morris, the director of CMU's Information Technology Center, recognizes pragmatism in IBM's donations. "IBM sees the university market as a high-growth area," he says. "ACIS [IBM's Academic Information Systems division] is one of its fastest-growing business units. The policy of contributing equipment is part of a strategy of engaging the university to gain insight into the academic market."

Earning tax write-offs, getting students hooked on operating systems, and sweetening big customer orders with possible future donations of equipment may be sound business practice, but most companies defend their programs in more exalted—and hopeful—terms. "It's well known in this industry that you must spend a large percentage of your earnings on R&D," explains John McCredie, who directs external research programs in Digital's engineering division. "At DEC that figure was close to 11% in the last fiscal year, which ranks us tenth largest in R&D spending among the nation's corporations." McCredie oversees about 100 projects at 50 different universities where, in his words, "DEC barters equipment for research."

DEC's research activity, according to McCredie, is conducted in three main areas: in the company's internal laboratories; in joint ventures with other corporations; and in cooperative arrangements with university scientists.

"University programs comprise a small part of our overall strategy," admits McCredie, "but they allow us to keep abreast of the long-term horizon, the breakthroughs that may be five, 10, or 20 years away from the market." In his opinion, a development organization is "almost being irresponsible" if its research program excludes academia.

Taking the long view, then, the question remains, what do corporate sponsors really get out of funding campus research? Steven Lerman of MIT directs Project Athena, a joint venture begun in 1983 between his institution, IBM, and Digital. Lerman emphasizes that the support of IBM and Digital, which includes five salaried employees and $25 million in equipment and services over five years from each firm, is regarded as a gift to MIT. The corporate sponsors have no exclusive commercial rights to Athena. (By contrast, IBM's agreement with CMU on Project Andrew gives the company an exclusive option to develop and market a product; in fact, IBM antici-

The Cost of Sponsoring Research

Besides IBM and GM, the 30 sponsors of Carnegie-Mellon's Robotics Institute include Oberg Manufacturing, a Pittsburgh tool and die maker with just 300 employees. All R&D spending, says Oberg's director of engineering, Harry Walters, is like "casting bread on the water" to attract fish. "You can't see fish underwater. In reality there may not be any there, and your bread may just sink to the bottom, but you'll never know unless you try."

How much do companies have to pay to try? Here's the rundown on a few currently established university research centers that have attracted corporate sponsors.

INSTITUTION	CENTER NAME	ANNUAL DUES	MEMBERS
University of Virginia	Center for Computer Aided Engineering	$10,000	11
Pennsylvania State University	Center for Electronic and Acoustic Materials	$30,000	15
Stanford University	Center for Integrated Systems	$120,000 (plus initial fee of $750,000 for building construction)	20
Rensselaer Polytechnic Institute	Center for Manufacturing Productivity and Technology Transfer	$40,000 (annual fee waived for "founding" companies that initially invested $300,000 or more)	21
Carnegie-Mellon University	Robotics Institute	$15,000 to $50,000 depending on company size	30

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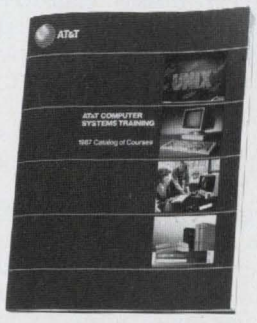

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pates distributing Andrew as an official product in the second half of this year.)

"Athena serves as a window into the future of computing," Lerman asserts, "a laboratory where you can come and observe a large-scale network in action. Our corporate affiliates want to know what types of products fit in this environment. For example, what are the best strategies for printers and displays?" Athena now ties together 300 workstations. The network is expected to grow to 1,500 workstations in 1988 and may eventually link 10,000 stations.

MIT researchers are expected to publish much of what they learn from Athena in technical papers. Since Athena will eventually be well documented in public sources, what do IBM and Digital stand to gain from their massive contributions? "Although people will learn about the project by reading publications and visiting the campus," states Lerman, "there's no substitute for being here every day and being part of the design process. That's the primary benefit for IBM and Digital."

Bottom-Line Benefits

Digital's McCredie suggests that having access to research results "two or three years before they get into the public domain" can bring bottom-line benefits to Athena's corporate sponsors. Digital already has tapped Athena technology for one product. The X-windowing system pioneered in Athena has been incorporated in the DEC VAXstation II/GPX Color Graphics Processor, which was announced in January 1986.

Since corporations can participate in university research centers for as little as a few thousand dollars a year, McCredie believes it is "a good business investment even for small companies." Compared with in-house R&D, contracted research incurs no significant startup costs in building construction or personnel staffing, and if business slows down, a company can immediately curtail research activity simply by cutting back on the funding, an alternative that, McCredie notes, is "far less painful than laying off a staff of research scientists."

How does a small company participate in such research, and what are the chances of payback? Needless to say, dozens of universities would be delighted to help potential sponsors answer the first question. According to the American Society of Engineering Educators, MIT—to pick one example—attracted about $10 million dollars in private-sector engineering support for the academic year 1984-85. Industry pays for 15% of all the research conducted at MIT, up from 5% a decade ago.

A Close Look at Some Centers

As for determining likely payback, it's instructive to take a close look at some "centers"—center being the form of organization that many universities have successfully used to court corporate funding. Take the case of Stanford University's Center for Integrated Systems (CIS). Established in 1983 with 20 leading industrial firms in microelectronics pledging to contribute $750,000 each for the construction of a building to house CIS, the center aims to "advance the state of knowledge by orders of magnitude." Additionally, the consortium members pay $120,000 annual dues for an inside track on CIS discoveries.

For their financial support, the corporate sponsors receive newsletters, reports, seminars, workshops, and consulting arrangements. The center has an open-door policy for its sponsors, even encouraging them to place employees on-site to participate in CIS research. "Perhaps most important," says Stanford's president Donald Kennedy, "the sponsors have a chance to become acquainted with bright students, whose education we also hope to enrich through the center."

"IF YOU HAD TO JUSTIFY THE RETURN, YOU'D NEVER SPEND THE MONEY."

IBM's former vp Branscomb seconds that conviction. "Universities are invaluable to industry as a source of new knowledge, but the strongest ties result from the universities' roles as the sources of industry's future employees."

While CIS's membership roster resembles a ranking of the top 20 chip manufacturers in the country, other centers reflect a mix of large and small companies. The 30 sponsors of CMU's Robotics Institute, for example, range from IBM, Westinghouse, and General Motors to Pittsburgh tool and die maker Oberg Manufacturing Co., which boasts about 300 employees. The annual dues run from $15,000 to $50,000 depending on the size of the company. A sponsor will pay more to fund a project of particular interest.

In describing his firm's interest in the Robotics Institute, Harry Walters, director of engineering at Oberg, says, "The industrywide emphasis on automation and robotics motivated us to join the institute in 1982." He concedes that the investment in the Robotics Institute, like any R&D endeavor, can't be measured on a balance sheet. "If you had to justify the return on investment, you'd never spend the money," he declares.

Both academia and industry seem interested in justifying their partnership nonetheless. Last November, IBM convened a four-day "University Study" conference that attracted hundreds of university faculty members.

Typical of the conference's generally positive view on corporate-sponsored research was a talk given by Gary Kozak of IBM's Technical Personnel Development department. Kozak outlined the results of a study IBM commissioned on university-contracted research, which revealed that over 95% of the professors and 90% of the IBM employees sampled viewed their projects as being successful. More than 60% of the projects yielded results directly applicable or useful to IBM.

Despite such rosy pictures, some objections have surfaced as corporate funding has grown. Former IBM vp Branscomb acknowledges that "some critics of the university-industry connection are fearful of turning U.S. universities into product development laboratories," but, he says, "generally, we expect to see the work peer-reviewed and put into the public domain. IBM prides itself on its respect for academic freedom."

Overall, ties between industry and academia appear destined to grow. Experts believe such cooperation can aid the domestic economy by replenishing the reservoirs of basic discovery from which technological development flows. Still, U.S. companies may find the best indication of the value of industrial-academic cooperation by studying a familiar overseas competitor. Nearly every major Japanese corporation now sponsors research on one or more American campuses. ■

Ed Joyce is a writer based in Charlottesville, Va.

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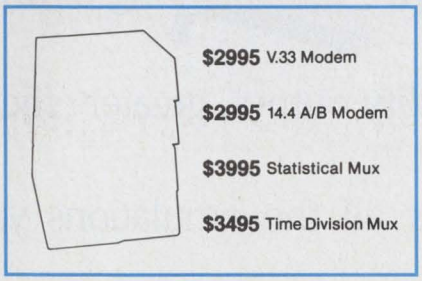

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Valuable insight into how automation equipment is being used in a company can be obtained through a technology scan. The results are analyzed by comparing ratios of employees to technology tools for various units within an organization. Together, a scan and ratio analysis can considerably enhance MIS strategic planning. A description of a complete scan and analysis conducted at Hallmark Cards in Kansas City breaks the process down into eight basic steps.

Taking a Technology Snapshot

BY JAMES R. JOHNSON

A technology scan produces a snapshot of a corporation's technology resources. This snapshot may take the form of a matrix in which organizational entities are cross-referenced with types of technology. Its premise is that a corporation's MIS resources and needs may be better understood by comparing relative counts of "things" such as pcs, crts, and word processors, to the number of "knowledge workers," a subset of all employees.

At Hallmark Cards in Kansas City, Mo., we conducted a technology scan that required minimal effort—our data gathering took 200 hours and two elapsed months. The subsequent analysis, a comparison of ratios of various knowledge workers to available technology for major business divisions, has considerably enhanced our MIS strategic planning.

CHOOSING THE RIGHT TECHNOLOGY IS DIFFICULT.

Companies seeking to scan and analyze their technology resources should follow eight basic steps.

The first step is to decide on the types of technology you're interested in. For us, these were MIS corporate systems, end-user computing on host mainframes, office automation, and departmental computers (see Figure 1).

We excluded some forms of technology that others may judge critical to their scan, such as programmable process controllers, numerically controlled machines, and other specialized machines in which a computer is purely an internal component. We decided to exclude physical automation equipment mainly because in our company the engineering department has sole responsibility in this area. This approach helped us keep the scan simple. Using similar logic, we eliminated CAD/CAM devices, because they are of specialized use and not managed by MIS.

The second step is to decide which items within each area to include—crts, pcs, etc. Keep in mind that all base data is in counts or numbers of items—no dollars are assigned at this time. Thus, complex calculations that consider the timing of purchase, equipment leases, software expenses, etc., are avoided. Later, average costs will be assigned when technology types are compared.

In our scan, the data recorded for host (mainframe) end-user computing consisted of the number of sign-ons, prime time cpu service-level agreements (hours per month) for on-line decision support activities, and batch cpu service-level agreements (hours per month).

Office technology covers many areas, e.g., pcs, word processing, business graphics, and other communication-related functions such as facsimile. Our data included only the first two categories—pcs, standalone word processors (Displaywriter, IBM's discontinued model), and clustered word processors (IBM's 5520).

The third step in the process is to complete a technology scan matrix for equivalent organizational levels. The result is analogous to a corporate balance sheet of technology. Organizational levels in our case were business groups and divisions.

Employees' potential for utilizing technology is the basis for comparing all

scan data. Since not all employees have equivalent potential, the technology scan must also count knowledge workers—that is, employees who use, or have the potential to use, a form of computer technology to improve individual effectiveness. For our scan, the knowledge workers held four generic job titles: manager, professional, technician, and marketing representative. This definition did not consider manufacturing workers, office and clerical positions, or sales support. In numbers, the knowledge workers represented about 25% of the total employees (3,955 of 16,157).

Ratio Varies by Industry

The ratio of knowledge workers to the total employees obviously varies by industry. We identified knowledge workers with the help of our computerized personnel system, which classifies positions in generic job families. We requested a printout of the job families by group and division and then decided what positions to include as knowledge workers.

With the technology scan complete, ratio analysis—the fourth step in our process—can begin.

After experimenting with presentation approaches, we chose to compare relative percentages (see Figure 2, which is calculated directly from the data shown in Figure 1). In our scan, for example, we found that Group I has 59% of the knowledge workers; we would therefore expect its percentage share of all technology resources to be close to 59%.

It wasn't. Such discrepancies must have an explanation; the fifth step in our process is to investigate them.

By itself, ratio analysis does not provide answers; it only identifies potential problems or opportunities. Ratios are mechanical tools, not intended as arbitrary standards of performance or a substitute for judgment. Deviations from "normal" indicate a different mode of operation, not necessarily a less-effective operation. It's important to note that no industry guidelines for ratio analysis have been developed. In practice, with any type of ratio analysis, one question often leads to another and the search for a thorough understanding may take a significant amount of time.

To illustrate, consider how the crt analysis breaks down in Figure 2. Group I, for example, with 59% of the total knowledge workers, has only 11% of the crts in our scan. Groups II and III, which together represent 33% of the total knowledge workers, account for 88% of the crts.

FIGURE 1 Technology Scan Sample Results

GROUP SUMMARY CHART FOR HALLMARK

	GROUP I	GROUP II	GROUP III	GROUP IV	GRAND TOTAL
A. MIS SYSTEMS					
Support staff	34	28	49	5	116
Development staff	42	27	29	2	100
Programs on-line	265	304	865	15	1,449
Programs batch	1,843	1,818	3,218	183	7,062
Crts	176	524	926	19	1,645
B. END-USER COMPUTING					
TSO sign-ons	140	75	397	14	626
On-line cpu S.L.A.(hrs/mo)*	14.5	9.5	8	4	36
Batch cpu S.L.A.(hrs/mo)*	30.5	17.5	13	3.5	64.5
C. OFFICE TECHNOLOGY					
Pc	79	54	44	23	200
Word processor	9	7	20	17	53
Clustered word proc.	9	0	2	1	12
D. DEPARTMENT COMPUTERS	3	9	6	1	19
KNOWLEDGE WORKERS	2,348	614	653	340	3,955

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FIGURE 2 Hallmark's Group-Level Ratio Analysis

(PERCENT OF CORPORATEWIDE TOTALS)

	GROUP I	GROUP II	GROUP III	GROUP IV
A. MIS RATIOS				
Support staff	29	24	42	4
Development staff	42	27	29	2
Programs on-line	18	21	60	1
Programs batch	26	26	46	3
Crts	11	32	56	1
B. END-USER COMPUTING RATIOS				
TSO sign-ons	22	12	63	2
On-line cpu S.L.A.(hrs/mo)*	41	27	23	9
Batch cpu S.L.A.(hrs/mo)*	47	27	20	5
C. OFFICE TECHNOLOGY RATIOS				
Pc	37	26	21	16
Word processor	17	13	38	32
Clustered word proc.	75	0	17	8
D. DEPARTMENT COMPUTERS RATIOS				
Computers	16	47	32	5
KNOWLEDGE WORKERS	59	16	17	9

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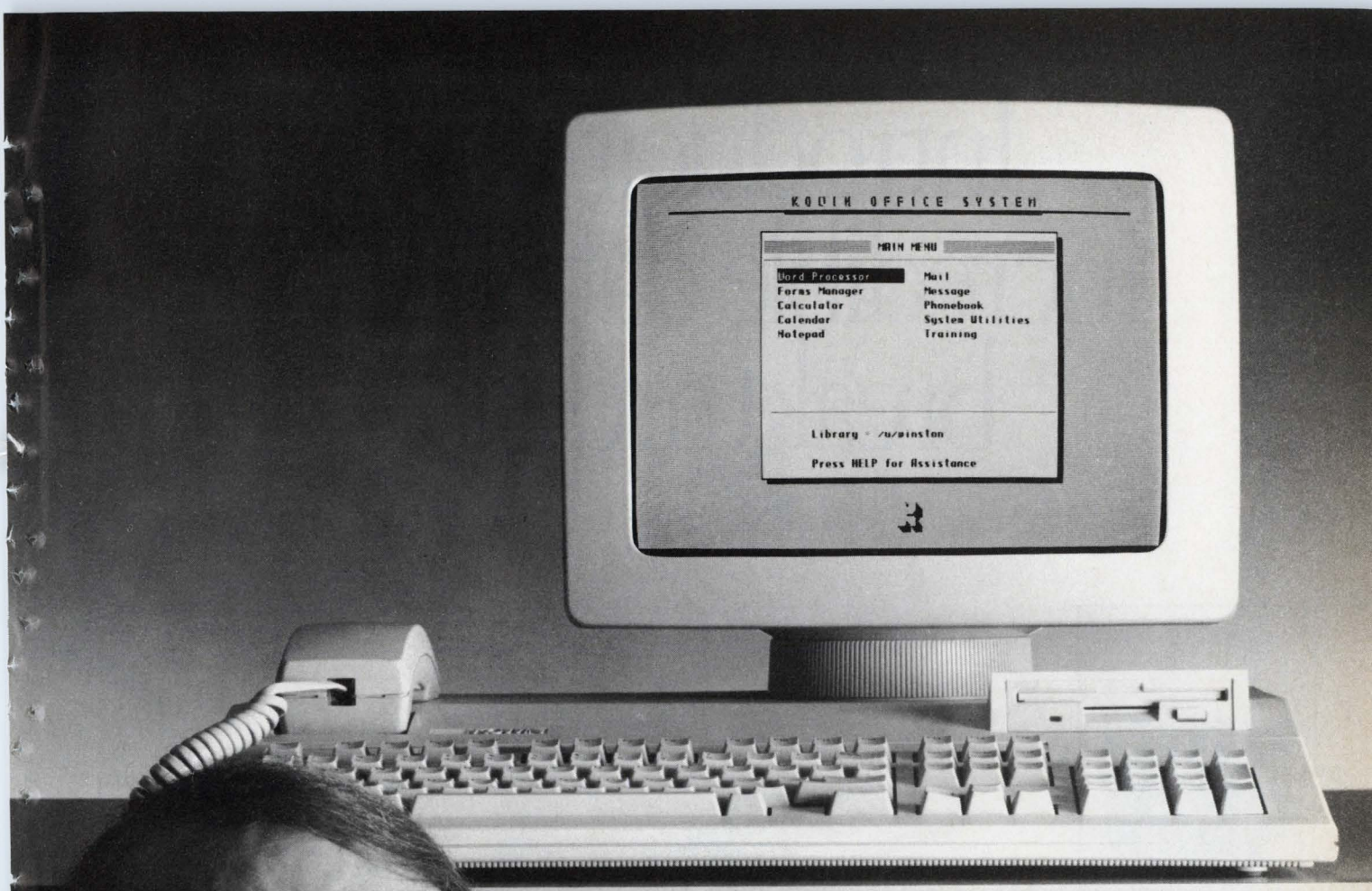

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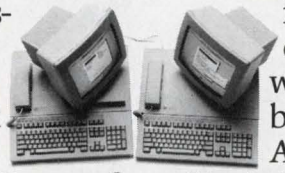

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FIGURE 3 Scan Results in Dollars

TYPE OF TECHNOLOGY	NUMBER TIMES COST ($)	TOTALS ($)	%
A. MIS DIVISION			
Support	116 x 50,000	5,800,000	
Development	100 x 50,000	5,000,000	
Batch production			
On-line production		9,797,612	
Crts	1,645 x 350	575,750	
	Subtotal=	21,173,362	88.7
B. END-USER COMPUTING			
On-line cpu TSO	35/mo. x 12 x 900/hr.	378,000	
Batch cpu	64.5/mo. x 12 x 900/hr.	696,600	
	Subtotal =	1,074,600	4.5
C. OFFICE TECHNOLOGY			
Pc	211 x 1,080	227,880	
Word processor	53 x 2,800	148,400	
Clustered word proc.	12 x 23,000	276,000	
	Subtotal =	652,280	2.7
D. DEPARTMENT COMPUTERS	19 x 51,605*	980,495	
	Subtotal =	980,495	4.1
	Grand Total =	23,880,737	100.0

*Equipment costs are depreciation: purchase price divided by 5. Also, department computer is average for 19 machines.

Why such a disparity? A look at business functions provides partial explanation. In our case, Group I (with less crts than expected) contains such relatively light users as the field-marketing organization and the "creative" division (including the staff artists who produce many of Hallmark's greeting cards). Groups II and III (more crts than expected) include divisions heavily dependent on corporate systems: manufacturing, finance, and distribution.

Certain "distortions" based on organizational idiosyncracies also must be considered in the analysis. For example, assuming crts are heavily used in the MIS division, the group including the MIS division will reflect the better numbers.

How valuable is this high-level analysis? Primarily by explaining the imbalances, it forces an understanding of business functions and implementation of technology. Unfortunately, what is right, the most effective allocation, is still subjective interpretation. In our ratio analysis at the relatively high (group) level, the most important observation was that with the exception of clustered word processors, Group I had less than average utilization in all areas. Pursuing a full explanation required ratio analysis at a more detailed level.

We obtained more detail by analyzing ratios of division-level data (in our organization, division vps report to group vps). Analysis of some divisions produced no action items but rather provided confirmation that technology was being applied at a level we regarded appropriate. In other cases, however, division-level analysis led to many specific recommendations. For example, one division—Division C—that we considered critical to one of our primary corporate objectives, controlling nonproduct costs, was found to be underutilizing technology.

The most pertinent ratio in our analysis of Division C was the percentage of crts and on-line systems (7%) compared with the percentage of knowledge workers (21%). After the initial numbers were understood, a major effort was initiated to identify and better understand the opportunities in this division. A series of meetings was held with middle managers and an analyst was assigned for follow-up interviews, all with the objective of defining an aggressive five-year plan to make Division C competitive with other major divisions.

NO INDUSTRY GUIDELINES FOR RATIO ANALYSIS HAVE BEEN DEVELOPED.

The sixth step in our process is to link scan results to existing MIS planning activities, proposing additional support for appropriate technology areas.

Proposing the Types of Technology

The most difficult aspect of the analysis is that of proposing the types of technology that will improve the effectiveness of a given organization. In our analysis of Division C, placing production databases on-line, increasing resources for end-user computing, and installing other enhancements to simplify the manual processing resulted as immediate action items.

The seventh step—recommended only for the advanced practitioner—is to calculate costs and make relative dollar comparisons of technology.

Having reviewed the raw data and the ratio analysis as expressed in percentages, we followed up by converting our results into dollars. To avoid complexity, average yearly depreciation costs were developed for the hardware; in our calculations, a crt cost $350 per year, a pc $1,080 per year, and a cpu was charged out at $900 per hour.

The relative costs of the four forms of technology analyzed are shown in Figure 3: MIS division, end-user computing, office technology, and departmental computers. It was somewhat surprising that end-user computing and office technology were only 4.5% and 2.7%, respectively, of the total spent per year. Almost 90% of all expenses were associated with major corporate systems. This may not be typical for the majority of companies, but we are highly centralized and the comparison places end-user computing and office technology in perspective based solely on dollars. For example, if we double the number of pcs, the overall expense to the corporation goes up less than 1%. Some inconsistencies exist in the number since staff is included in the MIS system category but excluded in the other technology areas. Another interesting observation: $10.8 million is used to develop and support systems, which

on the average generated another $3.5 million in hardware expense every year (reflecting a 35% annual growth).

The remaining step, the eighth, is to compare trends in subsequent years.

Although significant value was derived from this eight-step process, the methodology discussed has a number of limitations. Some of the obvious data item limitations follow:

- The description of the knowledge worker was at a macro level, causing some inconsistencies. Since many of the crts and a large number of the production systems were not utilized by knowledge workers (per our definition), the analysis had to explain the discrepancies.
- Decentralized programming personnel not part of the MIS staff must be included if they are significant. In our case, they represented a small fraction of the total and were excluded.
- There is a hidden cost beyond hardware for both crts and personal computers: control units, installation, training, consulting, etc.
- The distinction between pcs as management tools and pcs as word processors was not noted. Clarification adds to the value of the office automation ratios.

The technology scan method might be criticized as a backward approach to defining corporate opportunities: rather than starting with information needs and working forward to system requirements, the methodology snapshots the existing corporation. This is a valid criticism because the scan is a reverse process; this "weakness," however, is also a strength since all divisions receive an unbiased assessment. ■

The Eight Steps of Scan and Analysis

Step 1: Decide on technological "types" of interest.
Step 2: Decide on which "things" within each area to include: crts, personal computers, etc.
Step 3: Complete a technology scan matrix for equivalent organizational levels.
Step 4: Using relative percentages, compare the number of knowledge workers to areas of technology.
Step 5: When imbalances cannot be explained (based on function, future projects, etc.), do more detective work.
Step 6: Link results to existing MIS planning activities, proposing additional support for appropriate technology areas.
Step 7: For the advanced practitioner, costs may be included for relative dollar comparisons of technology.
Step 8: In subsequent years, compare trends.

James R. Johnson is director of systems development at Hallmark Cards Inc., Kansas City, Mo., and author of Managing for Productivity in Dp *(Q.E.D. Information Sciences, Wellesley, Mass., 1980). His last* DATAMATION *article on MIS planning was "Enterprise Analysis" (Dec. 15, 1984, p. 96).*

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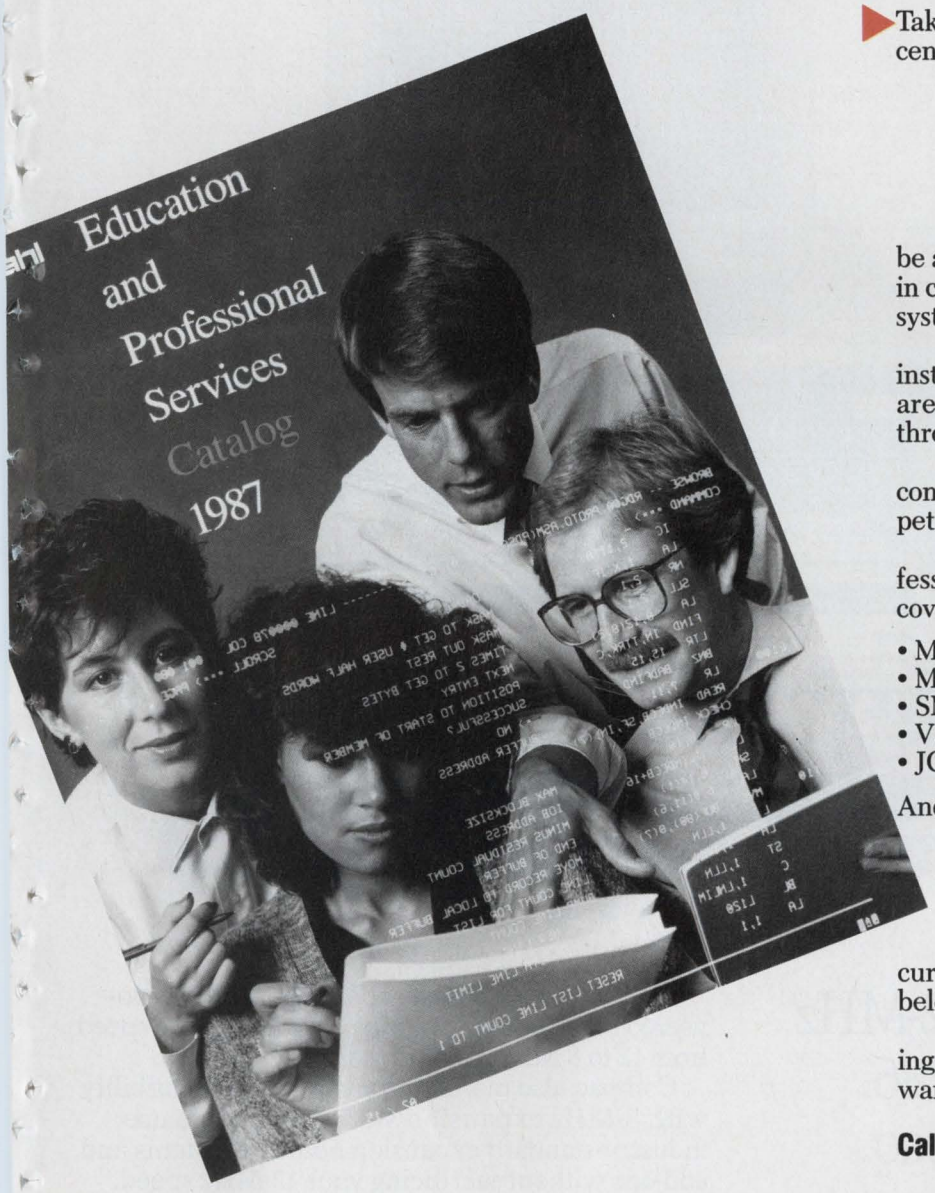

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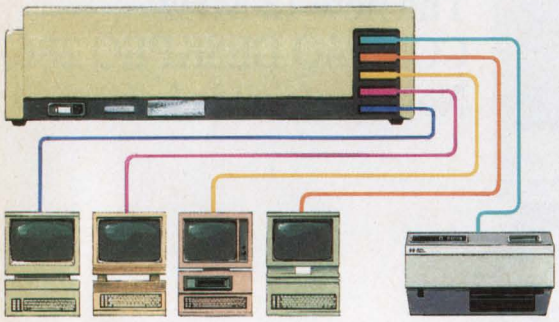

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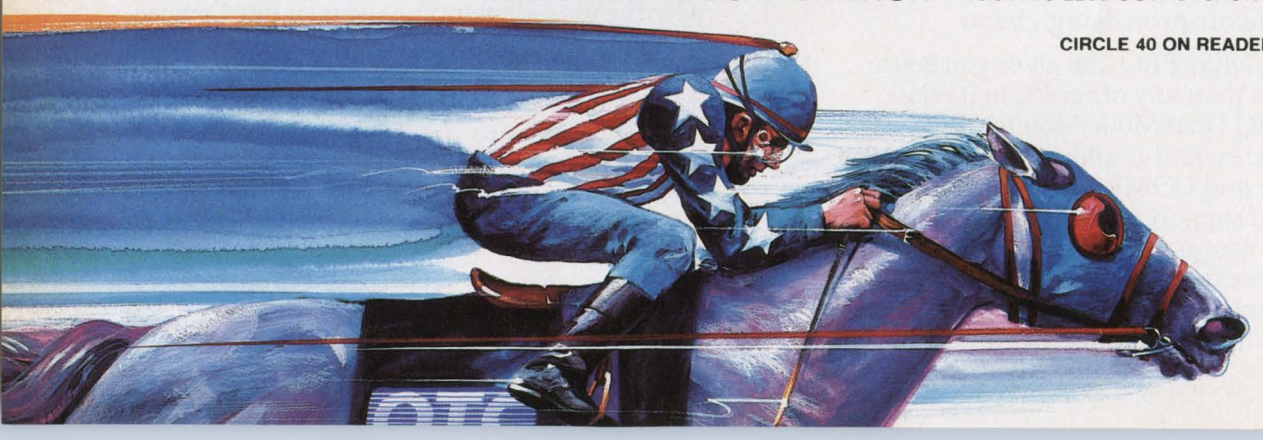

As audacious as he is autocratic, Mellon Bank data processing chief George DiNardo has scored victory after victory in his centralist computer campaigns. A staunch advocate of big iron and Big Blue, DiNardo sees software as the key to IBM's next generation mainframe. Flexibility on the software side will also be crucial to the Pittsburgh bank, which has poured money and staff into homegrown programs. Now, the bank has to pursue a different processing battle plan.

Banking on Software

BY RALPH EMMETT CARLYLE

After 25 years of uninterrupted success in data processing, George P. DiNardo's biggest battle has yet to be fought. After years of squeezing more efficiency out of his hardware and writing virtually all his own software, Mellon Bank's dp chief believes that he must find a new formula. Woven into the fabric of that formula will be software.

"With IBM's next mainframe family [the so-called Summit, due in 1990]," DiNardo predicts, "it's software, not hardware, that will determine the overall cost of computing." That software will have to be flexible to cope with the banking industry's ongoing deregulation drive and its current "merge or die" mood. In this fast and fluid scenario, Mellon's homegrown software could prove too inflexible.

Another downside to DiNardo's homegrown software philosophy is escalating programming overhead. About half of his 1,000 dp employees are programmers. He likes to hire Pittsburgh natives freshly graduated from the region's small colleges and universities. "They've been instilled with the Pittsburgh ethic by their mining forefathers, and are very loyal," declares the Mellon executive vp with a paternal gleam in his eye. "They've become experts at adapting our homegrown software to each new IBM hardware generation. But the more programmers I use for this task, the less I have for new applications."

The bank's programming staff is growing by 25% a year, which fuels DiNardo's biggest fear that this portion of his budget will soon get out of control. "We use every programmer productivity technique there is—reusable code, restructured COBOL code—you name it, we've tried it," says DiNardo, who is annoyed that IBM has failed to see the need for new productivity software.

The Mellon dp boss, on the other hand, has always seen the need for something new. Back in 1970, when expert opinion said you couldn't create a highly integrated banking system on a single mainframe, Mellon Bank's feisty dp chief went ahead and did it anyway. The system ran for a decade. A few years later,

Illustration by Tom Barr

when banks couldn't move to the promised land of branch automation without the help of high technology, DiNardo and his programming team created a teleprocessing monitor that could handle thousands of on-line terminals in that sprawling branchscape. The monitor, an inspiration for IBM's future CICS standard, once again helped the Pittsburgh bank gain a competitive edge.

Other "firsts" followed through the '70s, each defying the conventional wisdom of the time and each an audacious combination of homegrown software and centralized big iron. The price of failure on each of the pioneering projects was high. DiNardo "bet his job," as he puts it. He won big.

At 49, this son of the former chief engineer for Otis Elevator Co. is at the pinnacle of his profession, courted by other top banks with name-your-own-figure salaries and attended by a squad of 25 full-time IBMers who are dedicated to satisfying his every dp need.

Those needs can be considerable, as considerable as the $36 billion in assets that Mellon has accumulated, making it the eleventh largest banking concern in the nation. Although the decline of smokestack America and bad loans in the oil and energy sectors have hurt Mellon Bank, DiNardo's data processing operation has thrived.

Just how well it has thrived can be seen from the numbers gathered by Big Eight accounting and consulting firm Peat, Marwick, Mitchell & Co., which recently surveyed 99 of the leading U.S. banks, each of which forked over $30,000 for the privilege of being probed. Peat, Marwick wanted to know which of these big-league banks pumped through the most transactions for the dollar. Mellon won handily, adding further weight to the view that DiNardo's 20-year-old love affair with big IBM mainframes has produced, arguably, the top bank computer operation in the industry.

Dubbed General George

Leading the Mellon dpers ever onward to that goal was DiNardo, who has been dubbed General George by his subordinates because of his autocratic style. "He never pleads," says one colleague, "he states." Telling DiNardo that something can't be done is like waving a red flag in front of a bull.

That same audacious and autocratic style led DiNardo to create a separate empire, one built by selling banking programs to other financial institutions. More than half of the customers of Mellon's centralized IBM complex of five large mainframes, his "suction pump" as he likes to call it, come from outside the bank. That business, which pulls in $400 million annually, will grow at more than 20% this year, according to DiNardo.

Despite these achievements, trouble may be brewing in processing paradise. The sore spot may be software. The bank's biggest asset could turn into its greatest liability.

"It's funny," reflects DiNardo, sitting in his plush wood-paneled office in downtown Pittsburgh, "our chairman likes to say that it's the pioneers who always get the arrows in their backs." He sucks on his ever-present pipe, and continues: "Maybe we'll have to pay a price for being ahead of our time."

It could be that Mellon has already started paying. During its 1984 takeover of the $5 billion Girard Bank in Philadelphia, DiNardo was painted as the heavy. He was accused of dumping Girard's leading-edge retail banking technology in favor of a more conservative systems approach. Since the Philadelphia bank's programs couldn't run under Mellon's proprietary software and teleprocessing monitor—the Mellon Inquiry Monitor (MIM)—DiNardo was faced with two choices. He could either convert the programs or throw them out. While many Girard programs were indeed converted, Mellon's dp chief concedes, much good software was undoubtedly thrown out.

"SOFTWARE, NOT HARDWARE, WILL DETERMINE THE COST."

Since most on-line banking programs today run under IBM's standard teleprocessing software, CICS—which borrowed from Mellon's original software—DiNardo can expect further painful merger experiences unless he changes his ways. So, even though he describes CICS as only "half the performer that MIM is," he still went out and bought the teleprocessing software from IBM. "We're not replacing MIM," he maintains. "We're using CICS in addition to it."

DiNardo believes that CICS makes it easier not only to merge with other banks, but to find out if their programs are worth acquiring in the first place. "We and our [service bureau] customers can also run the banking packages that are beginning to emerge from IBM and the independent software companies without the heavy costs of tailoring them to run in our software environment." He sees a day when many of the programs that run under MIM will be converted to run under CICS, "but that will take a few years," he explains.

During Mellon's controversial acquisition of Girard, DiNardo was often accused of arrogance, of trampling over people's feelings to achieve his conversion goals, goals that he conscientiously met with machinelike regularity. DiNardo has often said that Mellon's dp operation is a by-product of his own personality and his absolute belief in the benefits of big iron.

Too Blunt and Direct

DiNardo's manner is too blunt and direct to suit most tastes. This stocky, former Navy destroyer officer is the kind of man you can admire and respect, but not necessarily like. Armed with two engineering degrees and a master's in operations research, DiNardo can be intimidating. In fact, he has been known to throw vendors out of his elegantly appointed office.

Though he prizes the World War I kaiser helmet his staff gave him, DiNardo doesn't beleive it's a true reflection of his personality today. "I think I've become more of a Gentle George than a General George," he says. "I'm a changed man."

Back in 1982, DiNardo was Bank of America's alternative choice for the top MIS spot should American Airlines's Max Hopper fail to take the job (he didn't). More recently, he was offered a fortune, $2 million a year, to run a New York investment bank's MIS operation. "I said I'd consider coming to them for $1 million a year and the title of managing director, but they balked at this," reports DiNardo. "For me, control is more important than money."

That statement goes a long way toward summing up what George P. DiNardo is all about. "I wasn't always confident and articulate. I choked while giving my master's presentation and asked for time out while I smoked a cigarette and regained my composure. Somehow, I managed to get through it and I vowed then," he says with characteristic bullishness, "that I would never lose control like that again." ■

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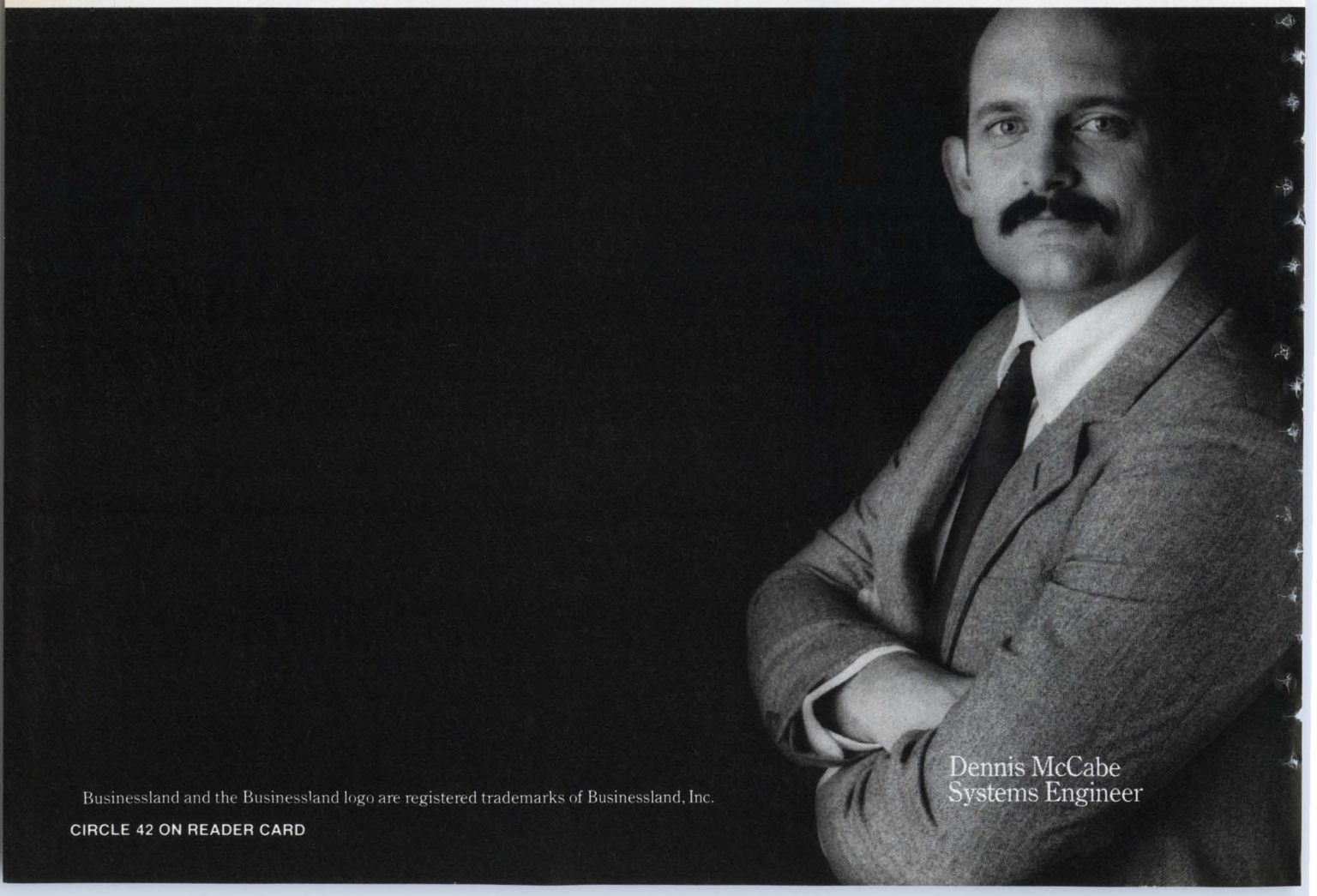

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Information Resource Management (IRM) seeks to boost productivity by focusing on how information that serves a business or functional need is created within an organization. A key feature of IRM is centralized control of information resources, which include data, people, and processes. In the IRM view, each of these categories has a logical and physical dimension. Implementing IRM is quickly and most effectively handled by creating a dedicated IRM group.

The IRM Idea

BY MILT BRYCE

For the past several years, information systems chiefs have been trying to figure out how best to manage corporate information resources. Unfortunately, the vast majority still have not realized the value of explicitly managing information—the essence of an idea that's at least 10 years old and called, appropriately enough, Information Resource Management (IRM).

IRM is the management of the data, people, and processes that produce information that serves a business or functional need. IRM focuses on enhancing productivity within a corporation by taking a comprehensive view of systems development. A key feature of IRM is centralized control of information resources. The hardware and software used to implement information systems are secondary to the primary task of defining what information is required.

THE LOGICAL VIEW SHOULD DRIVE THE SYSTEM DESIGN.

Instead of developing a disciplined approach to IRM, dp managers have tried to solve information management problems by using more techniques like structured programming and dataflow diagrams or tools such as fourth generation languages, program generators, and DBMSs. When properly applied, these techniques can improve the implementation process but they are not very relevant to the larger issue of addressing users' information needs.

The primary objective of information systems professionals should be to create systems that produce meaningful and timely information to users who can then use this intelligence to carry out their company's purposes, objectives, and responsibilities in a cost-effective manner. The process of achieving this goal and the choice of the equipment that is ultimately used to implement the system are secondary considerations. In fact, information systems can be designed logically and without reference to the physical means of implementation. The natural fallout from logical systems design is the specifications for physical design, which are contained in the details of the data, people, and processes used to produce information.

Data, People, and Processes

Information resources in organizations fall into three categories: data, people, and processes. Each of these categories also has a logical and physical dimension. In a diagram, the resources would make up the base of a pyramid and the information would be at the top. The information is cross-referenced with the organizational functions such as the people who use it and the data and processes used to produce it. The other resources are similarly cross-referenced.

By interrelating the resources in this manner, one can produce a model of the business processes of an organization. Submodels for data, people, and processes can also be created, both logically and physically. The data resource consists of such data components as data, records, files, and groupings of inputs and outputs. Data components are divided into logical and physical types. The logical type is the users' or system's view of data entities. For example, a reel of tape can be seen as a logical type, or as a collection of purchase orders, transactions, and customer addresses.

Logical components are identified by systems analysts during design and analysis. The systems analyst is only concerned with the information requirements, logical processing of data, and timing. For example, how quickly should the information be produced when requested? During logical design, systems analysts are not concerned with how data required to meet information needs will be physically stored or retrieved; physical implementation is the responsibility of a data manager.

Because of this separation of logical and physical, corresponding components of information will not necessarily share a one-to-one relationship. It is possible that two logical records can be satisfied by one physical record. This applies to all data components. The logical and physical data components are cross-referenced to each other.

Logically, data components have both a hierarchical and network relationship to each other (see Figure 1). For example, records consist of data elements, and the same data element can be used in many records. Likewise, since files consist of records, the same records can be used in several files. A database is a collection of files.

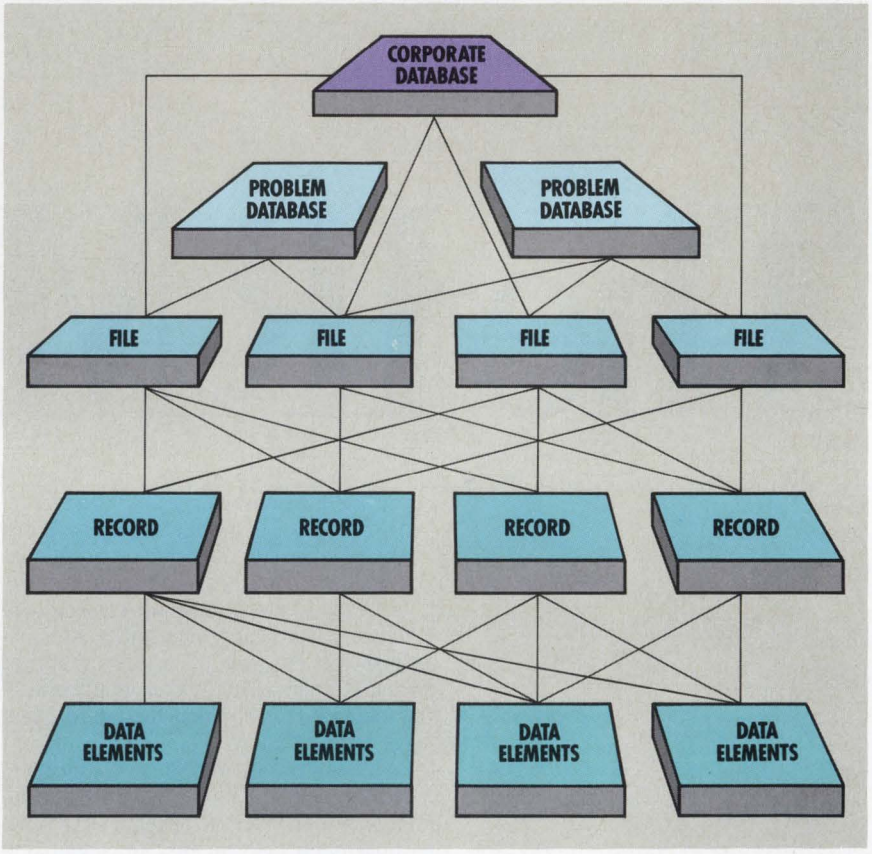
The physical representation of the data components depends on the type of physical storage devices available and what file management software is used for processing. Accessing requirements have a great deal to do with how data are physically organized.

Regardless of the physical organization, however, the logical view—what the data represent as a logical type—should drive the system design process. This approach allows the physical storage to be reorganized as often as necessary without affecting the logical processing scheme.

The people resource is also divided into a logical and a physical dimension. The logical dimension encompasses the basic functions performed in an organization, such as marketing, purchasing, or manufacturing. While the specific nature and type of these functions may vary depending on the type of business or industry, employees at different companies within the same industry will generally perform the same logical functions.

In practice, the physical implementation of the functions will vary from company to company even though they are logically the same. More often than not, a given company's logical organization will differ from its physical organization. From an information systems point of view, it is important to design the systems to serve the logical view with a cross-reference to the physical. This makes it easy to implement and revise systems to comply with organizational changes. Too often, systems become obsolete because they were designed to fit idiosyncratic needs that later changed.

FIGURE 1 System/Data Relationship



The Processes Resource

The processes resource consists of a standard set of components that exist generically for all systems. In manufacturing, this resource might be defined as a five-level "bill of material," a reference to a document that breaks down a system into various levels of components. At the first level is the system component. At the second are the subsystems. At the third are the procedures, both automated and administrative. At the fourth are programs in a computer procedure or operational steps in an administrative procedure. Finally, at the fifth level are the modules that are used to create programs. These systems components have a hierarchical relationship to each other. The one exception is modules, which can be used in many programs.

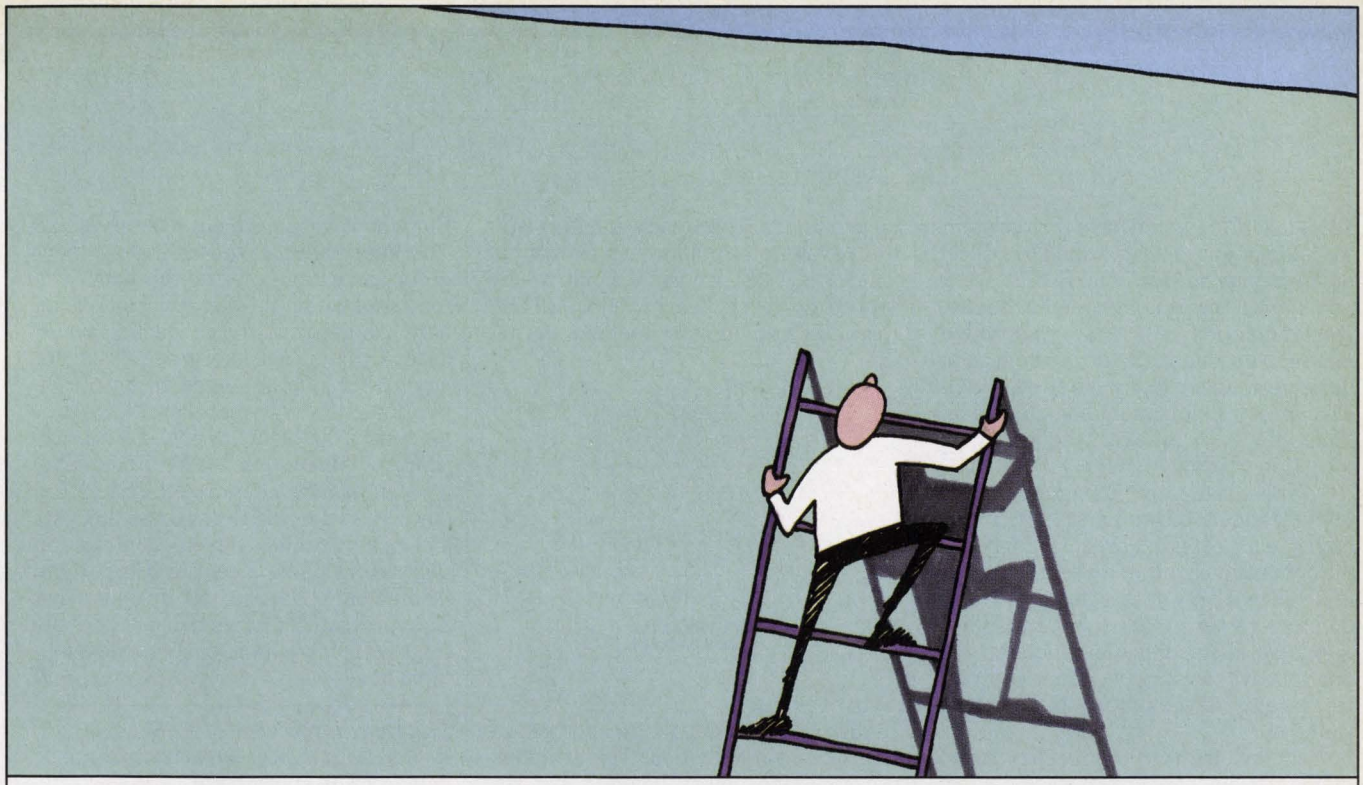
The only way components in a system communicate with each other is through exchange of data. Systems talk with other systems through data. Thus, the concept of the integrated database.

Systems differ in the number of logical components each contains. This is the concept of structured systems, not structured programming.

The physical aspects of systems are quite straightforward and are developed through specifications contained in the logical design of the components. For example, how are the programs going to be implemented—structured programming, fourth generation languages, or what? What hardware and software is required? Implementation becomes a matter of analyzing and selecting the most cost-effective method and equipment that meets the specifications.

All this discussion about information resource management may seem obvious and commonsensical. That may be true, but why then isn't information management widely installed and utilized? Common sense, it seems, is not very common.

Common sense would dictate that



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all installations would have their systems well documented. Data would be collected, managed, and so forth. But, as everyone knows, that is not generally the case. Documentation is almost nonexistent. Data exist redundantly throughout an organization under many different names. This effort to document and control has been viewed as an overhead and an obstruction to progress.

Technically, the implementation of information resource management is relatively easy. At most organizations, people become discouraged over the amount of detail work necessary in capturing and defining the resources. In order to implement IRM, all the documentation that was not done when using the ad hoc approach to systems development has to be recovered.

There are two approaches to implementation—revolutionary and evolutionary. The revolutionary approach requires extensive immediate effort and the establishment of an information resource group.

Responsibility for information management must also be established under an evolutionary approach. It differs from the revolutionary approach in that the concepts of IRM are applied only to new systems projects. This takes more time than the revolutionary method, but the change has less impact on an organization's current activities. The evolutionary approach defers benefits, but also postpones implementation expenses.

COMMON SENSE IS NOT VERY COMMON.

The two dimensions of information resources—logical and physical—were previously discussed. Systems or business analysts are responsible for identifying and defining the logical resources. But who is responsible for the physical? The information resource management group is responsible for the data. The functions within this group include database administration and quality assurance. Creating an IRM group does not create additional overhead. In most organizations, the systems analysts and programmers do this work now. By centralizing the function in a dedicated group, IRM can be handled more effectively and quickly. As a result, the systems analysts and programmers can concentrate on their primary jobs. Even more important, IRM can boost productivity by taking that all-important, comprehensive view of the organization's overall systems development needs. ■

Milt Bryce is president of M. Bryce & Associates, a management consulting firm in Palm Harbor, Fla.

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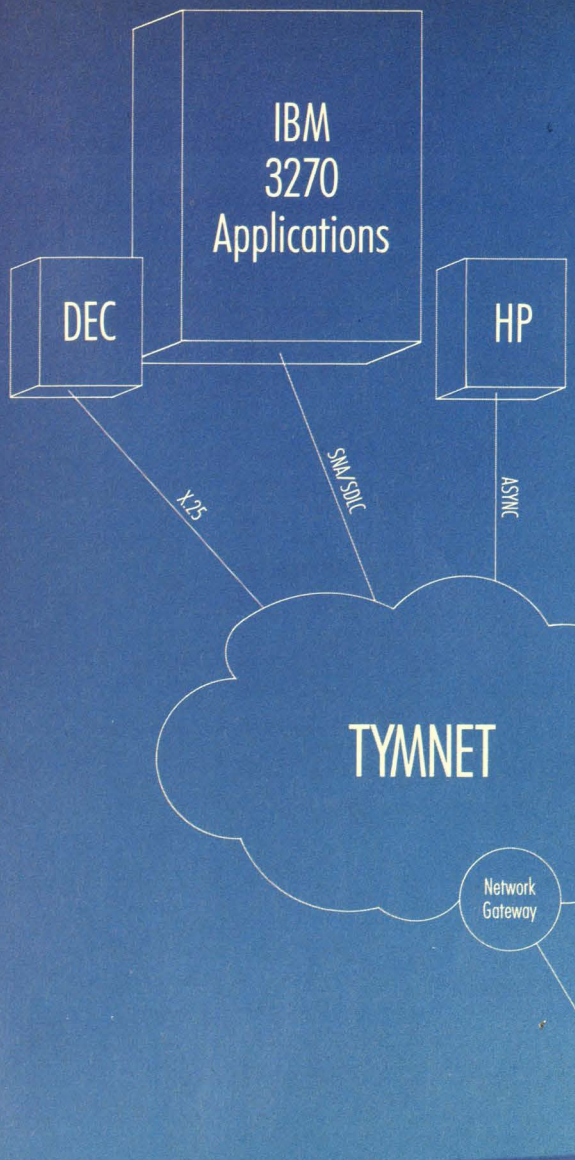

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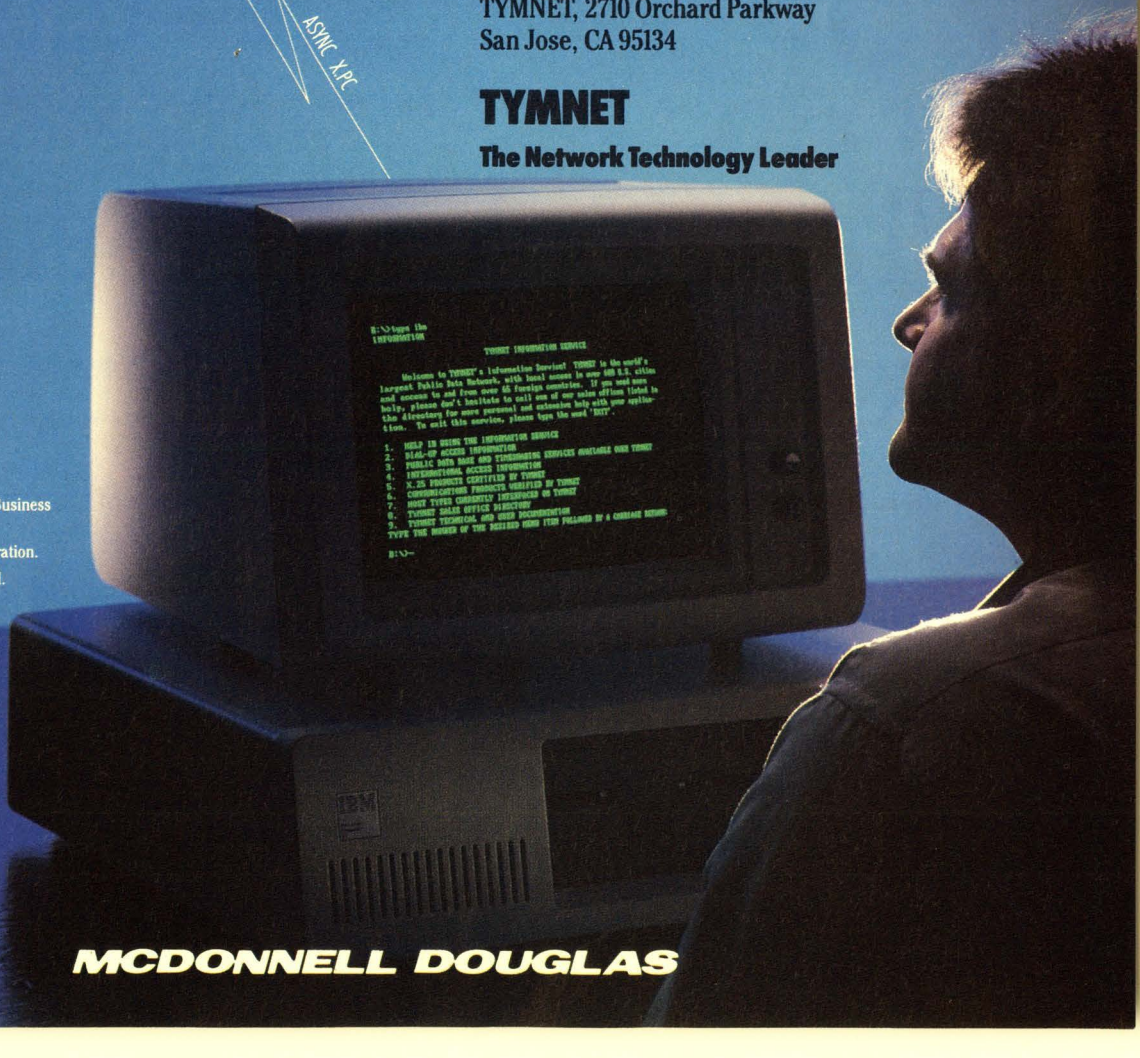

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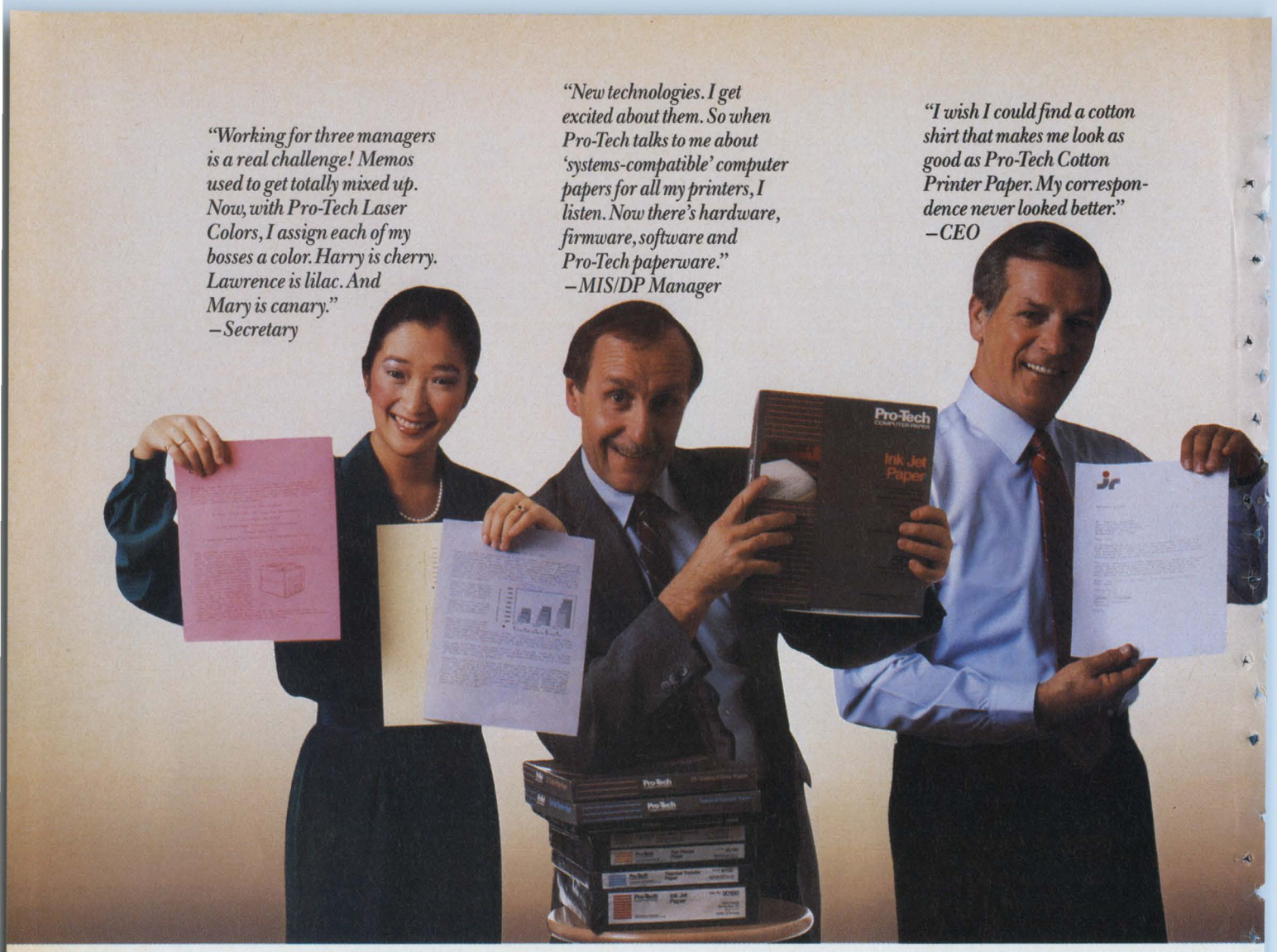

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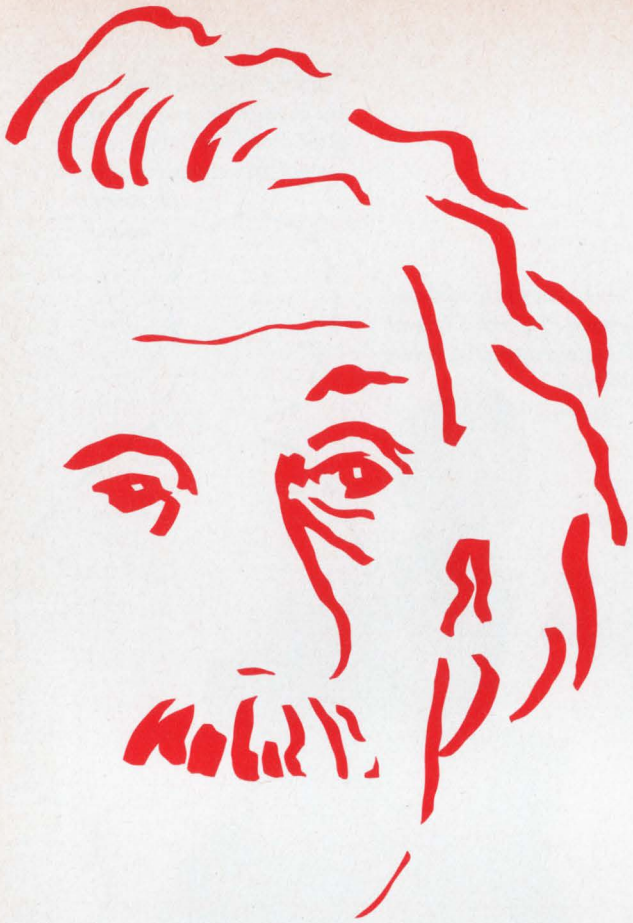

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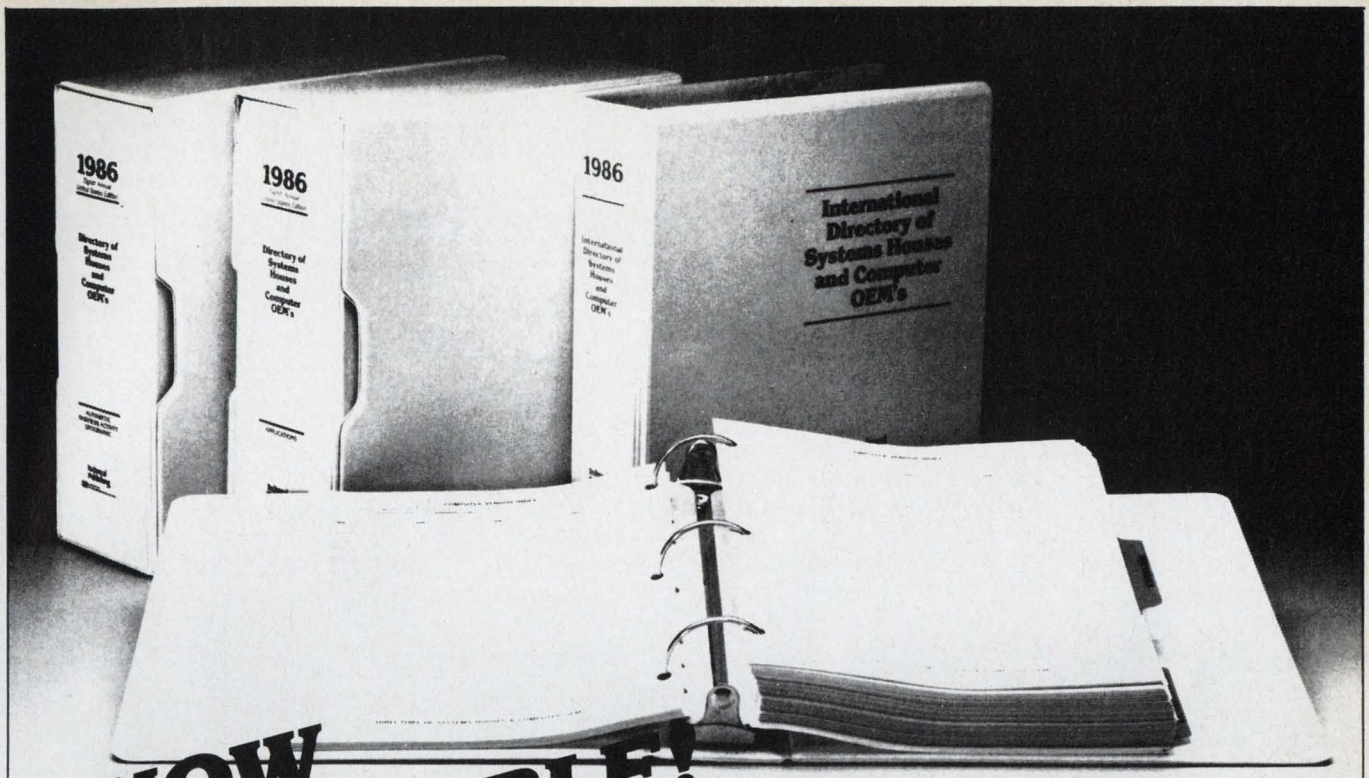

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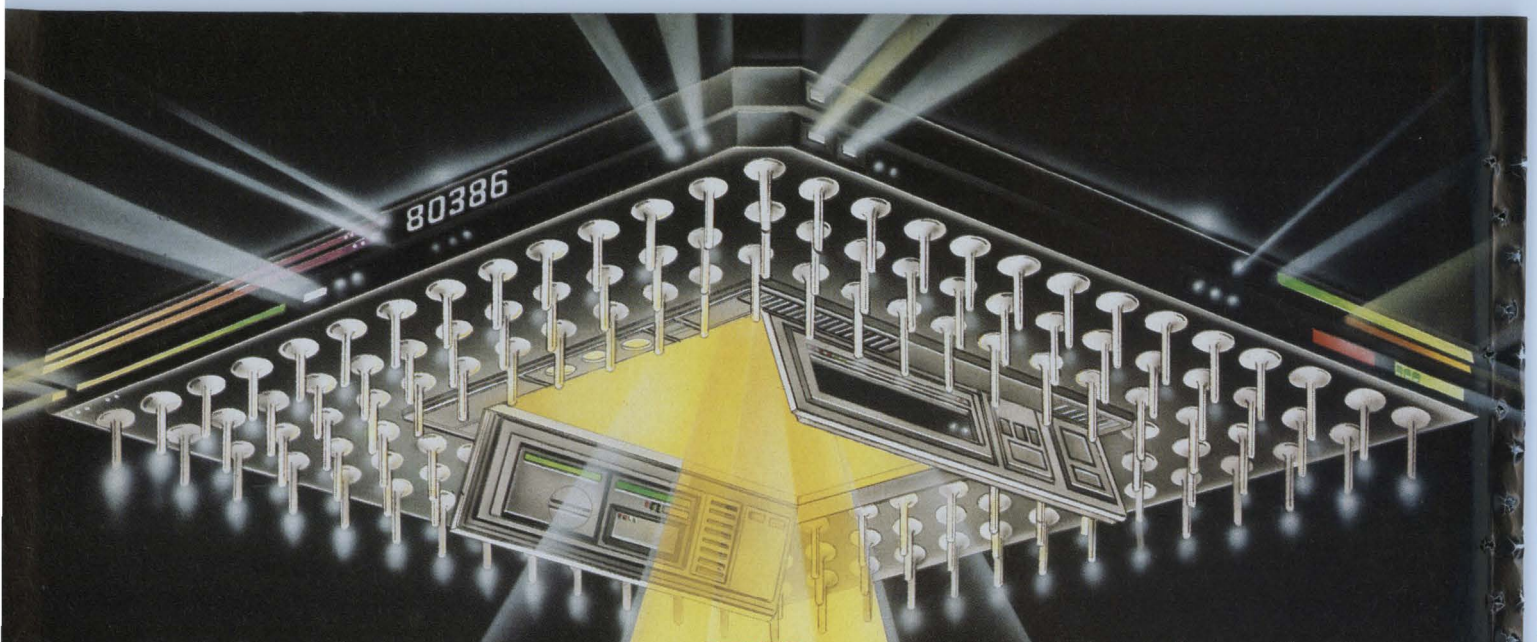

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APPLE COMPUTER INC. has rolled out its new top-of-the-line computers. As expected, the long-awaited Macintosh II and Macintosh SE feature IBM compatibility and offer expandability and many peripheral options (see Look Ahead, March 1, p. 12). Apple is also offering Unix for the first time, on the Macintosh II.

The high-end Mac II is intended, says Apple, for applications in business, desktop publishing, higher education, and engineering. The expandable Macintosh, the Macintosh SE (System Expansion), is being positioned by Apple as its "cornerstone in the business community." Both new computers operate most existing Macintosh applications software. Apple claims the Mac II operates four times faster than the previous high-end Macintosh Plus, and the SE is said to operate up to 20% faster.

The Mac II is based on the 32-bit Motorola 68020 microprocessor operating at 16MHz, and it includes a floating point chip for mathematical operations. It processes at 2MIPS and features a transfer rate of 1MBps over its Small Computer Systems Interface (SCSI). One megabyte of RAM expandable to 8MB is standard; add-in boards allow for an additional 1.5GB. Inside the Mac II, which closely resembles an IBM PC, are six internal expansion slots, which accept third-party function boards that will allow the Mac II to run MS/DOS software. A base system with 1MB of RAM and one 800KB floppy disk drive is priced at a hefty $3,898; a version that also has one 40MB internal SCSI hard disk drive is $5,498.

The Mac SE incorporates all the features of the Macintosh Plus with two built-in disks and an expansion slot, called the SE-Bus, which allows users to add cards for additional functionality, such as MS/DOS compatibility. It comes with 1MB of RAM, expandable to 4MB, and 256KB of ROM. The SE utilizes the 8MHz Motorola 68000 microprocessor.

The Macintosh SE in a dual-floppy configuration is priced at $2,898; a hard disk/floppy model is $3,698.

Apple is working closely with many third-party vendors to develop software, peripherals, and add-in cards for the new machines. A/US, a Unix operating system for the Mac II developed jointly with UniSoft Systems, Berkeley, Calif., will be available with the machine in May.

HARDWARE

Digital Equipment's new low-cost VAX systems.

Digital Introduces Two New VAX Machines

VAXstation 2000 and MicroVAX 2000 are low-cost entries to VAX line.

BY THERESA BARRY

Digital Equipment Corp. has added two new low-cost members to its VAX family of computers.

The multiuser MicroVAX 2000 is a scaled-down version of the MicroVAX II. Digital says it has reduced the system electronics to one board in the new system, which uses the same cpu and floating point unit as the MicroVAX II. The MicroVAX 2000 systems range from an entry-level configuration with 4MB of memory, a 42MB hard disk, and a 1.2MB floppy disk to a fully configured system with 6MB of memory, two 71MB hard disks, and a 95MB storage tape. A diskless version, for use in VAXcluster configurations, features 6MB of memory, a ThinWire Ethernet interface, and appropriate software licenses.

The price ranges from $11,100 for an entry-level system with 4MB of memory to $20,195 for a fully configured system with 6MB of memory. Digital says a standard configuration with 4MB of memory, 42MB of disk storage, and a software license for either MicroVMS or Ultrix-32 (Digital's implementation of Unix) operating system is priced "under $10,000." The new system has no Q-bus or other bus device, limiting its expansion capabilities.

The VAXstation 2000 is a 32-bit desktop workstation also based on the MicroVAX II chip and the single-board design used in the MicroVAX 2000. It's available in both diskless and disk-based configurations. Digital says it has the ability to cluster and share resources with Digital's other workstations and larger VAX systems via VAXcluster software, NFS, and DECnet. It operates in both VMS and Ultrix environments. The diskless monochrome workstation is priced at $10,500; the disk-based monochrome workstation is $13,150.

DEC says it will have available by the end of this year a color system and monochrome-to-color upgrades for the 2000. DIGITAL EQUIPMENT CORP., Maynard, Mass. CIRCLE **250**

IBM Enhances RT

Three new models of RISC-based workstation announced

The new RT models 115, 125, and B25 feature an advanced processor card containing a CMOS processor and memory-management chip, and a 20MHz floating point unit. Each comes with a 1.2MB diskette drive and 70MB of internal fixed-disk storage. They accommodate up to 5.6GB of external storage as do all current RT models.

Models 125 and B25 can accommodate two additional 70MB drives and offer a larger power supply and more expansion slots than the 115. All models contain a newly developed extended ESDI magnetic media adapter that provides a data transfer rate of up to 1.08MBps. It can support two diskette drives and three internal 70MB fixed disks. Fast memory expansion options of 4MB and 8MB can be used in combination with the 4MB on the processor card to increase internal memory to 16MB on the new RTs. A floating point accelerator is built into all models.

Models 115 and 125 also include a keyboard, and the B25 has a 5080 attachment for connection to an IBM 5080 graphics display system. The B25 uses the 5080's keyboard.

All new RT models will be available in May. The 115 is priced at $10,600; the 125 is priced at $16,100; and the B25 is priced at $17,670.

IBM announced a series of other products along with the new RT models, including enhanced processors for the Series/1 minicomputer line, enhanced S/36 models, and new 319X displays and 3174 controllers. SolutionPac Office Series was also announced. For details of the software, see Software, p. 108. IBM, Information Systems Group, Rye Brook, N.Y. CIRCLE **252**

Networked Printer

OTC's newest 850cps printer has connections for five users.

Output Technology Corp.'s TriMatrix 850 PrintNet is the latest in its series of 850 characters per second (cps) printers. It's a dot matrix printer, based on the 850XL printer that OTC introduced earlier this year, which has built-in networking capabilities.

According to the vendor, the PrintNet will allow up to five networking users to connect directly to it through resi-

dent serial ports. OTC says any device capable of serial communication, such as computers, printers, and modems, can be connected to the printer and exchange data in RS232C or RS422 formats, at speeds up to 19.2Kbaud. The speed throughput of the printer is 240 lines per minute.

Additional printers can be networked through any of the five dedicated serial ports. The printer has 256K of internal memory and a 1.5MB memory is optional.

The TriMatrix 850 PrintNet will be available this month and the price is $2,995. OUTPUT TECHNOLOGY CORP., Spokane, Wash. CIRCLE **254**

Desktop Publishing System

Corel system features high-resolution, 19-inch screen.

The Publisher Station is Corel Systems' newest desktop publishing workstation. It features a 1,280 by 960 dots per inch, 19-inch graphics monitor and Corel's enhanced Ventura (Xerox's proprietary package) page-layout software, which provides menu-driven user commands with icons, 11 typefaces ranging in size from one point to 254 points, and Linotron typesetter-compatibility/interface with reduced size previewing.

The Publisher Station is IBM AT compatible. Additional features include a 20MB hard-disk drive, 640K of RAM, a 1.2MB floppy disk drive, a Corel PS800 Plus Postscript (page description language) laser printer, and a mouse. Options include a 5¼-inch, 800MB, WORM (write once, read many) optical-disk drive with removable cartridges and a 300 dots per inch halftone optical scanner.

The Publisher Station is priced at $11,570; the scanner is $2,495. The disk drive is $4,900 and its cartridges are $160 each. COREL SYSTEMS INC., Ottawa, Ont. CIRCLE **251**

T1 Network Processor

Avanti introduces its foundation for open network environment.

The Open Network Exchange (ONX) is Avanti's network processor for building T1 communications networks that combine public, carrier-provided services and private, dedicated corporate networks. The ONX is capable of building networks of over 100 nodes with over 7,400 active channels per node, and it can simultaneously support up to 16 aggregates at 1.5Mbps or 2Mbps.

Standards met by the system include AD PCM, T1, D4, SDM, and the preliminary standards for ISDN. Avanti claims the ONX has a high level of fault tolerance because of its redundant reduced logic bus structure, databases, timing sources, and common logic. System diagnostics are said to occur without interference to operation of ONX nodes and networks.

The Open Network Management System/PC allows network management to occur using a PC workstation with a color graphics monitor. The ONX also supports IBM's NetView/PC network management system, allowing a T1 network to be integrated into an IBM SNA network control center. The price of the Open Network Exchange ranges from $35,000 to $100,000. AVANTI, Newport, R.I. CIRCLE **253**

Graphics Coprocessor

Tektronix introduces board and software emulation packages.

The Plot 10 PC 4100 graphics coprocessor board from Tektronix is a 640 by 480 multiple line rate graphics monitor. It features 256 simultaneous colors from a palette of over 16 million. It uses the Texas Instruments TMS34010 Graphics System Processor (GSP) chip, a separate processor dedicated to graphics func-

tions, which leaves the PC processor open for the application. The coprocessor has two memory banks. One is the display memory, the other is 1MB of general purpose RAM. It emulates IBM PC EGA and CGA boards, allowing compatibility with existing graphics software.

The Plot 10 PC 4100 board is available now for $1,800.

Tektronix also introduced two software emulation packages. The Plot 10 PC-07 terminal emulation package brings to an IBM PC, XT, AT, or compatible selected Tektronix 4107 color graphics terminal capabilities and enables it to run 4107 mainframe-based software applications. The Plot 10 PC-05 terminal emulation package adds selected 4105 graphics terminal capabilities to an IBM PC, XT, AT, or compatible. Both the PC-07 and PC-05 include extended GIN (graphics input) support, including mouse and tablet support, and both support DEC VT 100 alphanumeric terminals. Both packages run under MS/DOS 2.0 or higher. The PC-05 requires 128K of memory, the PC-07 requires 256K. The PC-05 is priced at $495 and the PC-07 is $995.

A 13-inch Tektronix multiple line rate color graphics monitor was also introduced. It uses color raster display technology and a 60Hz noninterlaced refresh rate. Its viewing area is 240 by 180mm, and the pixel resolution is 640 by 480. Its price is $950. TEKTRONIX INC., Information Display Group, Wilsonville, Ore. CIRCLE **257**

Cartridge Tape Subsystem

Exabyte ships newest product to oems and system integrators.

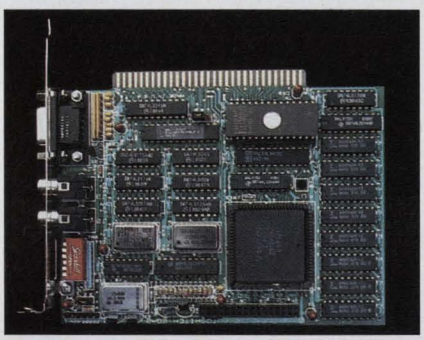
The EXB-8200 from Exabyte Corp. is an 8mm cartridge tape subsystem, consisting of a tape drive with an integrated controller that stores and retrieves up to 2,300MB of data per cartridge, says the company. The drive/controller package is the same size as a full-height, 5¼-inch disk drive. It contains an SCSI interface for system integration. The 8mm cartridge is available in five standard tape lengths, giving the user of an Exabyte Subsystem cartridge capacity ranging from 256MB to over 2,000MB of formatted data.

Helical scan technology is used to write data in a series of diagonal tracks across the surface of the tape, allowing for a greater number of tracks per inch of tape than the linear tracks used in other technology. The spinning drum of the subsystem rotates at 1,800rpm. Onboard error correction code and error recovery code are featured. Data transfer rate is 1.5MBps at peak level and 256KBps sustained. The subsystem is available now. In quantities of one, the price is $3,500; in large quantities the price is under $1,000. EXABYTE CORP., Boulder, Colo. CIRCLE **255**

EGA Card

Video adapter for IBM PC and compatibles.

The AutoSwitch EGA-480 Card from Paradise Systems is a video display adapter that shows selected EGA applications in 640 by 480 resolution and 132-column modes on multifrequency monitors. The card features automatic switching between different video modes, including EGA, CGA, MDA, and Hercules, and auto-



matic monitor detection.

Paradise claims 100% compatibility with pre-EGA and Hercules software and PGC (Professional Graphics Controller)-level resolution for specific software applications (256 colors out of a palette of 4,096 and 640 by 480 resolution). Paradise uses the Paradise PEGA2 EGA chip and software drivers for the EGA-480. Ten software drivers are bundled with the card, including drivers for AutoCAD, Ventura Publisher, Symphony, Lotus 1-2-3, and WordPerfect. The card includes 256KB of video memory and features a nine-pin connector for RGB or monochrome displays, a berg strip for a light pen, and an IBM feature connector with RCA jacks. The price tag reads $599. PARADISE SYSTEMS INC., South San Francisco, Calif. CIRCLE **256**

Plotters

Hewlett-Packard revamps its drafting-plotter line.

Two new plotters round out Hewlett-Packard's new family of three plotters, which replaces its HP 758X drafting-plotter line.

The DraftMaster I is a single-sheet feed and the DraftMaster II is a roll-feed. HP says the line has a comprehensive new design. Features include a smooth-curve generator, which produces continuous rather than interrupted pen motion; bidirectional plotting, which permits the plotter to begin automatically at either end point of a vector; a pen-sorting algorithm, which is said to minimize pen picks by drawing with the same pen until the buffer is empty; and a 5.7g diagonal acceleration.

Both plotters have a 10MHz MC68000 microprocessor and a 19.2K RS232C baud rate. A media stabilizer slows the x-axis acceleration. This is a patented, three-inch wide strip of polyimide along the front and rear edges of the platten that dampens media movement. HP claims the new plotters have 64% fewer parts than previous models and service adjustments have been reduced to two from 26. The plotters have an RS422A interface for long-distance connection and complete HP 7585/7586 software emulation. The DraftMaster I, Model 7595 is $9,900; the DraftMaster II, Model 7596 is $11,900. The HP DraftPro, introduced last August, comes replete with a price of $5,400. HEWLETT-PACKARD, Palo Alto. CIRCLE **258**

Looking Back

TWENTY YEARS AGO IN DATAMATION: " 'We're gonna take COBOL and bury it,' says Pete Harris, head of Applied Data Systems, San Francisco. His Adpac programming system has made converts on the West Coast, now spreads nationally with sales to be handled by Statistical Tab Corp. Stat Tab has bought Adpac for its 10 nationwide dp centers, cites its compile times as 25% of COBOL's, and one job that took 14 hours to write in COBOL took three hours with Adpac." (From Look Ahead, April 1967, p. 17.)

TWENTY YEARS AGO IN DATAMATION: "This is the first April that the Internal Revenue Service will be checking all income tax returns by machinery, using their 17 Honeywell 200s at seven regional offices." (From News Briefs, April 1967, p. 96.)

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Mainframe

Now PCs on your LANs can talk to your mainframe as easily as they talk to each other.

Talk about resource sharing.

All it takes is one PCOX Gateway to deliver full mainframe privileges to all the PCs on a LAN.

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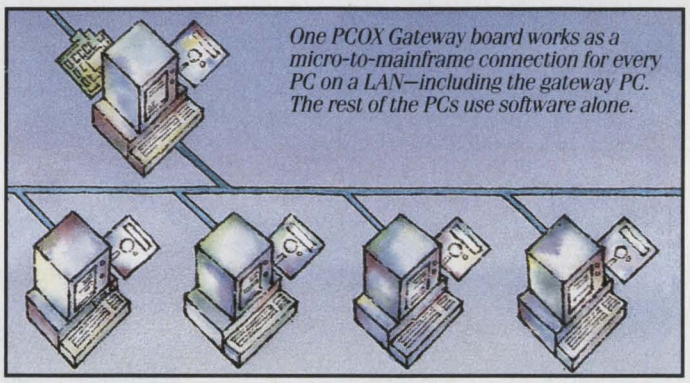
Each PCOX Gateway is a single board that plugs into a single slot on a single PC on the LAN. And unlike other gateways, PCOX Gateways let *every* PC on the LAN talk to the mainframe, using software alone.

In fact, PCs can talk through more than a single PCOX Gateway. They can automatically seek mainframe sessions through multiple PCOX Gateways on a LAN. Then they can carry out 3278/79 emulation, 3270 PC emulation, send-receive file transfers, or even 3287 host printer emulation with their PC printers.



One PCOX Gateway board works as a micro-to-mainframe connection for every PC on a LAN—including the gateway PC. The rest of the PCs use software alone.

PCOX Gateways work in all NETBIOS-compatible LANs, including IBM's own Token Ring and PC Network; plus LANs from AST, AT&T, Novell, Sytek, Ungermann-Bass and others.

Gateways: icro-To-Micro-To-Connections.

PCOX/GATEWAY COAX connects directly to a 3274 cluster controller, and supports up to five concurrent host sessions. In fact, you can even make a PCOX Gateway Coax out of your existing IRMA™ board.

PCOX/GATEWAY-16 and PCOX/GATEWAY-64 each connect to a mainframe communication controller over modems and phone lines, and support up to 16 or 64 host sessions.

You can also put any number of PCOX Gateways on any size LAN, and control access to the mainframe through configuration and security features built into the gateway itself.

PCOX Gateways are products of PCOX Technology, a modular system of advanced micro-to-mainframe connections that helps manage PC demands for mainframe access.

And PCOX Gateways are at the top of the PCOX product migration path. Which means all you need is software to turn any existing PCOX micro-to-mainframe link—coax or remote—into a PCOX Gateway.

So find out how PCOX Technology can help connect any number of micros to your mainframe. Call now for more information about PCOX Gateways. And ask for the name of your nearest CXI distributor.

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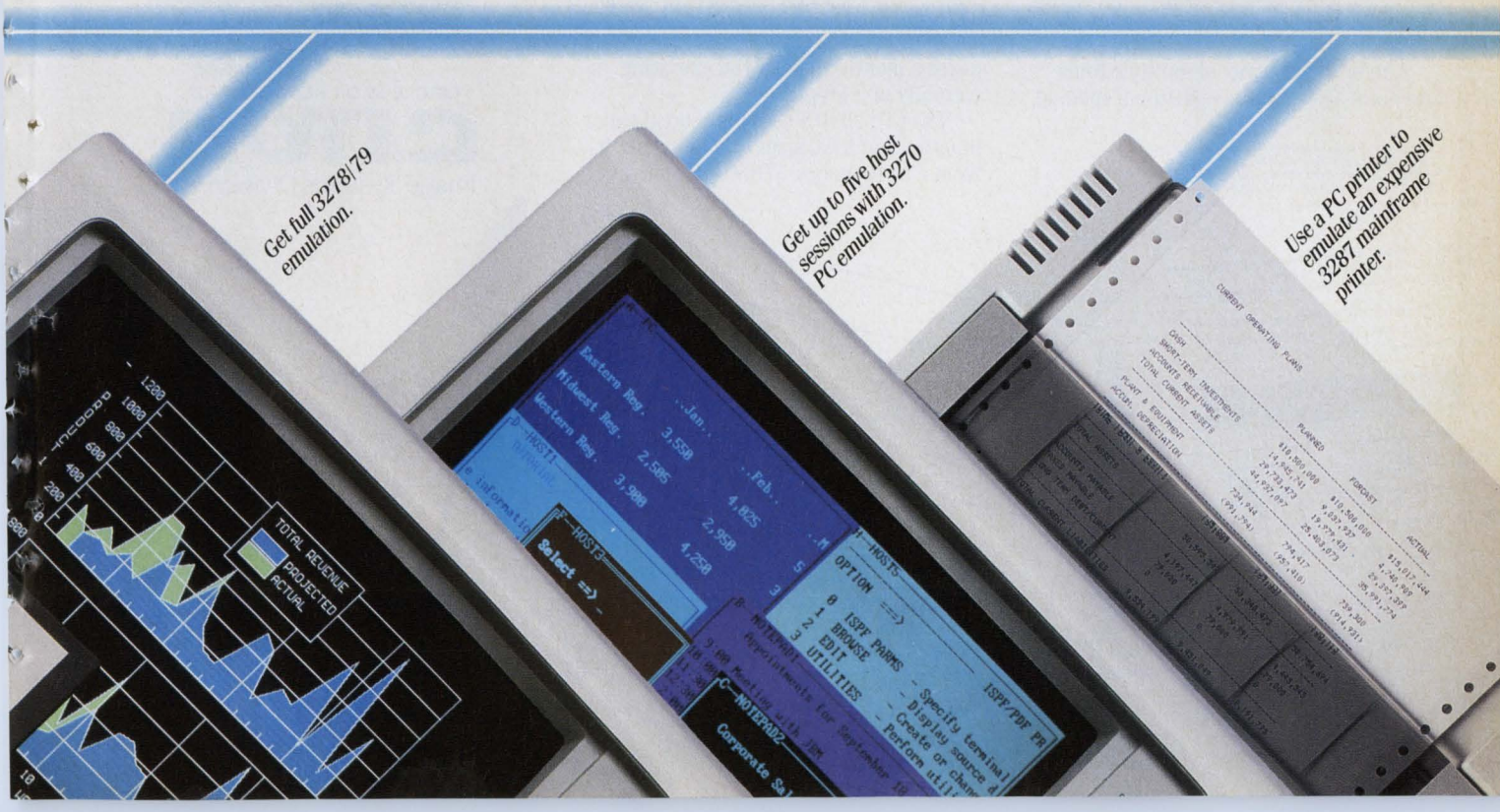

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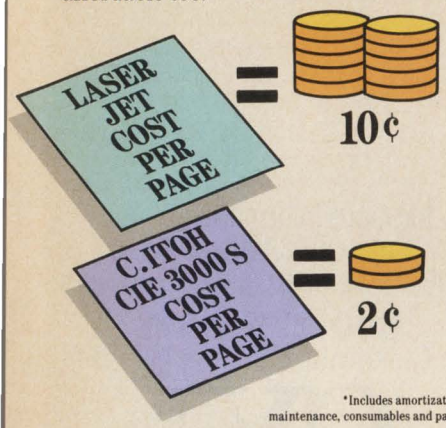

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Non-stop technology from C.Itoh. Ion deposition printing is durable and dependable. A revolutionary four-step printing process with few moving parts. This means very low monthly maintenance costs. In fact, about half what it takes to keep a laser printer going.

At a fast 30 pages-per-minute, it can print 20,000, 50,000 or as many as 150,000 pages a month, to keep you operating virtually non-stop.

	HP LaserJet	C.Itoh CIE 3000 S	XEROX 9700
Print Speed	8 ppm	30 ppm	120 ppm
Monthly Recommended Volume	3,000 pages	150,000 pages	1,300,000 pages
Engine Life	100,000 pages	5,000,000 pages	78,000,000 pages
Purchase Price	$2,995	$16,995	$313,635
Cost Per Page	$.1040	$.0212	$.0207

The CIE 3000 S uses plain bond paper in letter and legal sizes and form lengths from 7 to 14 inches. What's more, the CIE 3000 S is fully compatible with IBM and DEC, as well as a variety of other host systems.

Of course, C.Itoh offers nationwide service, with several on-site service plans to choose from, as well as an end-user support staff.

So, go ahead. Express yourself. Call or write C.Itoh today at (213) 327-9100. Phone toll-free at 1-800-843-6143. In California, call 1-800-323-2024. TELEX: 652-451. TWX: 910-343-7446. 19300 So. Hamilton Ave., P.O. Box 9116, Torrance, CA 90508-9116.

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Image Systems Division

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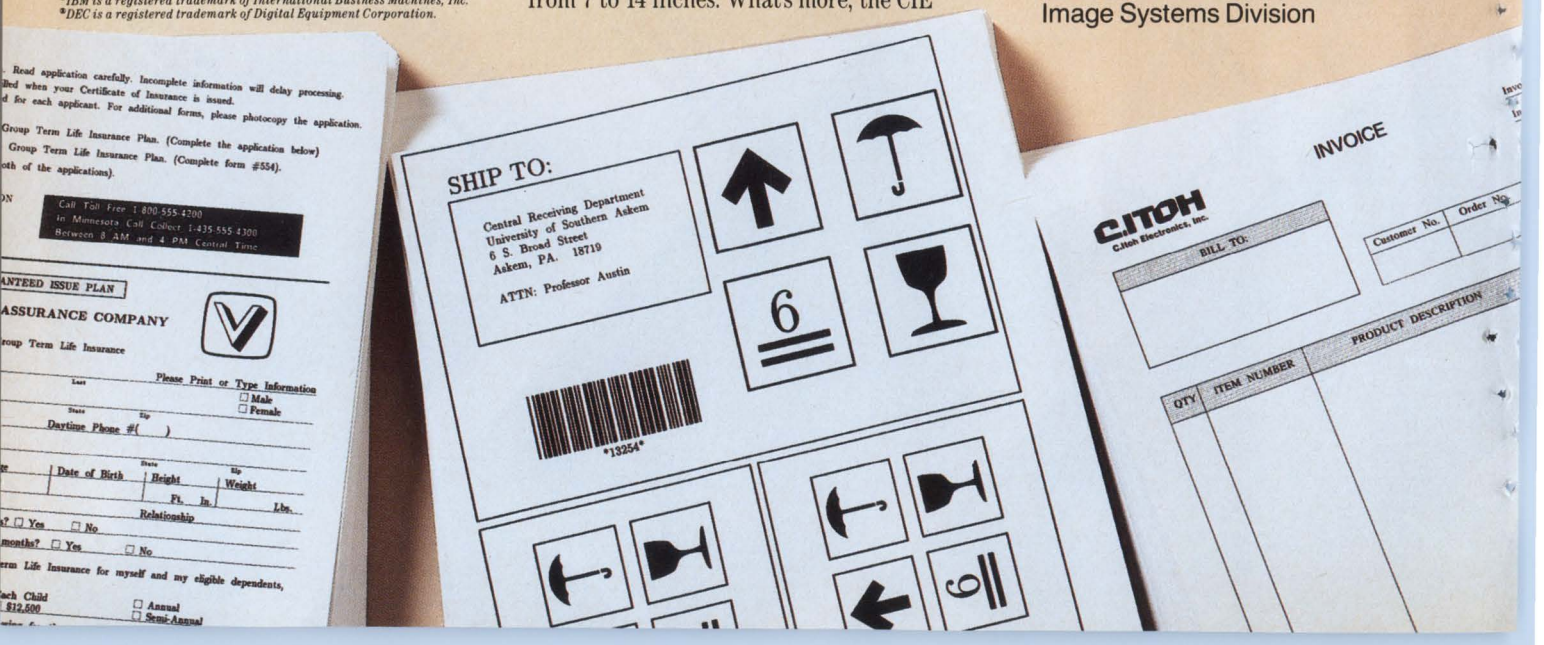


UPDATES

SOME MAJOR VENDORS recently took stands in two fledgling yet burgeoning fields of the computer industry. IBM announced its support of two de facto standards in the field of electronic, or desktop, publishing, while Microsoft, Lotus, General Electric, and RCA announced either products or their intentions in the field of CD-ROMs.

IBM announced its commitment to Adobe's PostScript page description language and also endorsed Microsoft Windows. These two standards join PC/DOS to become IBM's electronic publishing systems platform.

Although IBM did not announce a PostScript printer, the company did sign an agreement with Adobe, Palo Alto, to use the language in future printer products. IBM is expected to announce its plans for such a product later this year. PostScript received further endorsement recently when Digital Equipment Corp. announced its second printer using the language. Digital's first PostScript printer, the Printserver 40, was unveiled last November.

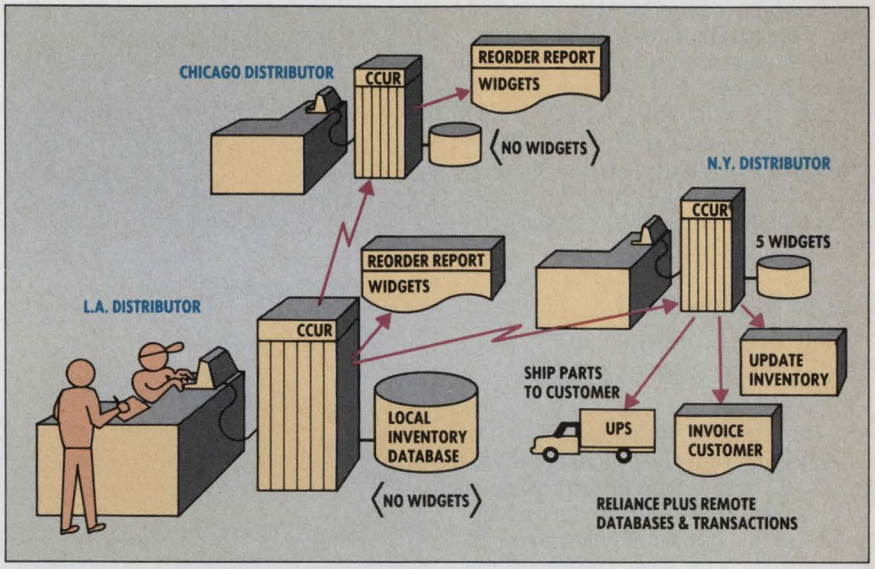
While IBM did not announce any intentions of incorporating Windows into its products, the giant's acknowledgment of it as a standard means that it most likely will be so.

In the CD-ROM world, Microsoft announced Bookshelf, a collection of 10 reference sources, including a thesaurus, Zip code directory, almanac, spelling checker, *Bartlett's Familiar Quotations*, and a built-in retrieval system. The product will be shipped in June and is priced at $295.

Lotus has begun shipping its first CD-ROM offering, called Lotus One Source. Announced last September, the product consists of eight historical financial databases, which are updated daily, and is geared toward financial managers in corporations and financial institutions. A one-year license for One Source is priced from $11,000 to $30,000, or $30,000 and upward for a LAN configuration.

Industry analysts have been predicting that growth in the CD-ROM area will be much like the growth experienced in the microcomputer market in the early '80s. Input revenues for CD-ROM disks and drives are expected to climb to close to $1 billion by 1990 from approximately $250 million now.

SOFTWARE



Reliance Plus, release 8.0, allows for remote and distributed facilities.

Concurrent Enhances Its OLTP/DBMS Software

Remote and distributed capabilites added and an OA environment is announced

BY THERESA BARRY

Concurrent Computer Corp. has announced release 8.0 of Reliance Plus, its on-line transaction processing and database management system. Also, the company has announced its office automation environment, called Reliance Office, and PENnet PC software for IBM PC connectivity.

Release 8.0 of Concurrent's on-line transaction processing and relational database management system provides users with remote and distributed facilities. It adds distributed capabilities that, for instance, enable users at any site to search and fill orders from either their local inventory or any other inventory on their network.

Added database facilities in release 8.0 include a new security system, SQL-like commands, a record transfer utility, support for unlimited terminals, light pen support, and Reliance Monitor, an optional package that provides tools for monitoring resource usage and for tuning Reliance Plus production environments. Also new are an optional Reliance Access product, which combines the query/update software into a single fourth generation language package, and an optional Reliance Interface package, which provides tools to build application interfaces into Reliance Plus from high-level languages.

Reliance Plus, release 8.0 is priced from $3,000 to $24,000, depending on the processor model; Reliance Access is $1,000 to $5,000; Reliance Monitor and Reliance Interface for OS/32, Concurrent's proprietary operating system, are each $200, regardless of processor.

Reliance Office is Concurrent's entry into the growing office automation integrated software arena. The system is designed to work with Reliance Plus and its capabilities include the RDBMS; a word processing package called Lex; an electronic mail package, called NEM/32, which also includes a calendar/diary; a telex package, called C-Telex, which works with NEM/32 to route messages outside the network; and decision support software. IBM PC connectivity is achieved through the new PENnet PC soft-

ware, which connects standalone PCs with Concurrent Series 3200 systems. PENnet PC is currently in beta testing and will be available in June. Lex is priced from $3,500 to $10,000; NEM/32 is $800 to $4,000; C-Telex is $2,000 to $8,000; and PENnet PC will have a $2,500 site license. All of the enhancements are free to current customers. CONCURRENT COMPUTER CORP., Tinton Falls, N.J. CIRCLE **259**

Expert System Shell

British firm Expertech enters U.S. market with PC-based product.

Xi Plus from Expertech is a rule-based expert system shell that is said to have extended inferencing, including forward, backward, and demon priority rules, as well as interfaces for external files, graphics, and telecommunications. Expertech uses what it says is called know-how programming in Europe; that is, the program uses English to create knowledge bases and applications.

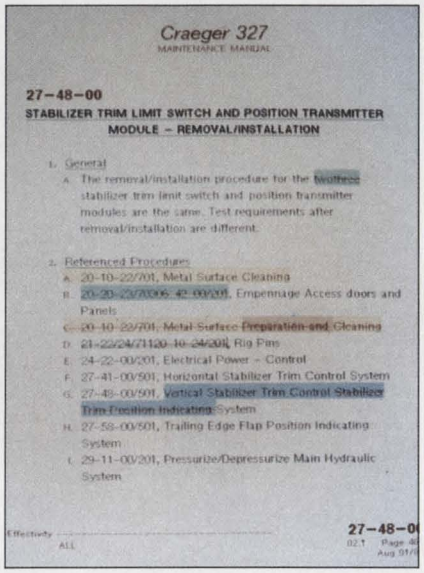
Xi Plus requires 512K of memory and runs on IBM PC and compatibles. The original Xi product was introduced in Europe and the U.K. in June 1985. Current U.S. customers include Ford, Boeing, and McDonnell-Douglas. The product is priced at $1,250, and is available directly from the company. EXPERTECH, Redwood City, Calif. CIRCLE **261**

Documentation Systems

Features added to Context series of documentation workstations

Context Corp. has announced the addition of the Engineering Writer and Engineering Writer Plus documentation systems to its workstation software series. The company has also announced a series of change control features.

Engineering Writer and Writer Plus work in conjunction with Context's Writer, Editor, and Documentator systems for the production of technical documents. Writer contains some of the features of other Context systems, including electronic mail and the same DBMS. It features WYSIWYG (what you see is what you get) document editing with automatic page, section, figure, and list number, table of contents generation, and cross-referencing. Features it does not have that other Context systems do include multicolumn format and index creation, but Context claims Writer and Writer Plus can read files produced by any Context system. Writer Plus offers the same


Craeger 327
MAINTENANCE MANUAL

27-48-00
STABILIZER TRIM LIMIT SWITCH AND POSITION TRANSMITTER MODULE - REMOVAL/INSTALLATION

1. General
A. The removal/installation procedure for the left/rear stabilizer trim limit switch and position transmitter modules are the same. Test requirements after removal/installation are different.

2. Referenced Procedures
A. 20-10-22/201, Metal Surface Cleaning
B. 20-20-23/2006-42-00/201, Empennage Access doors and Panels
C. 20-10-22/701, Metal Surface Preparation and Cleaning
D. 21-22/24/7120-10-24/201, Rig Pins
E. 24-22-00/201, Electrical Power - Control
F. 27-41-00/501, Horizontal Stabilizer Trim Control System
G. 27-48-00/501, Vertical Stabilizer Trim Control Stabilizer Trim Position Indicating System
H. 27-58-00/501, Trailing Edge Flap Position Indicating System
I. 29-11-00/201, Pressurize/Depressurize Main Hydraulic System

Effectivity ALL
27-48-0
02.1 Page 4
Aug 01/8

features as Writer, plus PicED, the Context picture editor for creation of graphics and flow charts. Writer is priced at $4,900 and Writer Plus is $8,900.

Context also announced a series of change control features for its Documentation workstations. The Change Control toolset has features that are claimed to build on the capabilities of DOC, Context's text editor and formatter. The features are said to streamline the review cycle for proposals, specs, and manuals by providing a means to identify changes and manage them as exceptions. Audit trails can be kept, and markings and pages can be changed electronically or as hardcopy. Change Control features are included in all Context document software products, including the Writer and Writer Plus packages. CONTEXT CORP., Beaverton, Ore. CIRCLE **263**

IBM's Departmental System

Rolls out SolutionPac for S/36 and VM machines

IBM has unveiled its all-around departmental computing software platform, the SolutionPac Office series. Like Digital All-in-1, Wang Office, and Data General CEO, the system, designed to strengthen IBM's standing in midrange computing, is a collection of existing office automation software packages. SolutionPac was announced in two versions: VM and System/36. The VM edition supports IBM 4300, 9370, and 3000 series computers, as well as the IBM XT, AT, 3270 PC, and 3270 AT. Nonintelligent display stations supported by PROFS are also supported.

Software in the SolutionPac series includes electronic mail, text, notes, calendar, decision support, and relational database and query functions for fixed function displays and intelligent workstations. Installation assistance and 24-hour support is also included.

SolutionPac for VM will be available in August and will have a one-time charge. A base system ranges in price from $51,690 to $157,095. A base system with decision support and database query, which are optional, ranges from $101,655 to $356,965. Installation assistance is $13,800.

The System/36 edition supports the IBM S/36, models 5360 and 5362, with a minimum of 1MB of memory and 260MB of direct access storage. It also supports the IBM XT and AT.

Software is the same as for the VM edition, and also includes installation assistance and support. Available on a one-time charge basis, SolutionPac for System/36 has a base-system price of $10,420. A base system plus an optional Query/36 is $11,370. Installation assistance is $1,850. IBM, Information Systems Group, Rye Brook, N.Y. CIRCLE **260**

Electronic Publishing

Xerox enhances Ventura. Also, three programs are introduced.

Xerox's desktop publishing software package, Ventura Publisher Edition, release 1.1, is claimed to incorporate 80 new features. One set of features is aimed at improving the package's ability to design shorter documents, including support for multicolumn frames for newsletter layouts, on-screen rulers, automatic kerning, font sizes up to 254 points in one-point increments for devices that support continuous font scaling, tracking and letter spacing control on a per-paragraph tag basis, and the ability to crop and size line art and images independent of frame size.

Additional graphics file formats are supported, including Microsoft Windows, Apple Macintosh PICT files and image files, HPGL for HP plotters, Dr. Halo, and encapsulated PostScript files.

Ventura supports all three page description languages—Interpress, DDL, and PostScript—and accepts text files from Xywrite and IBM's DCA-based mainframe word processing packages and DisplayWrite III and IV. Full hyphenation for Release 1.1 languages (it supports five languages in addition to En-

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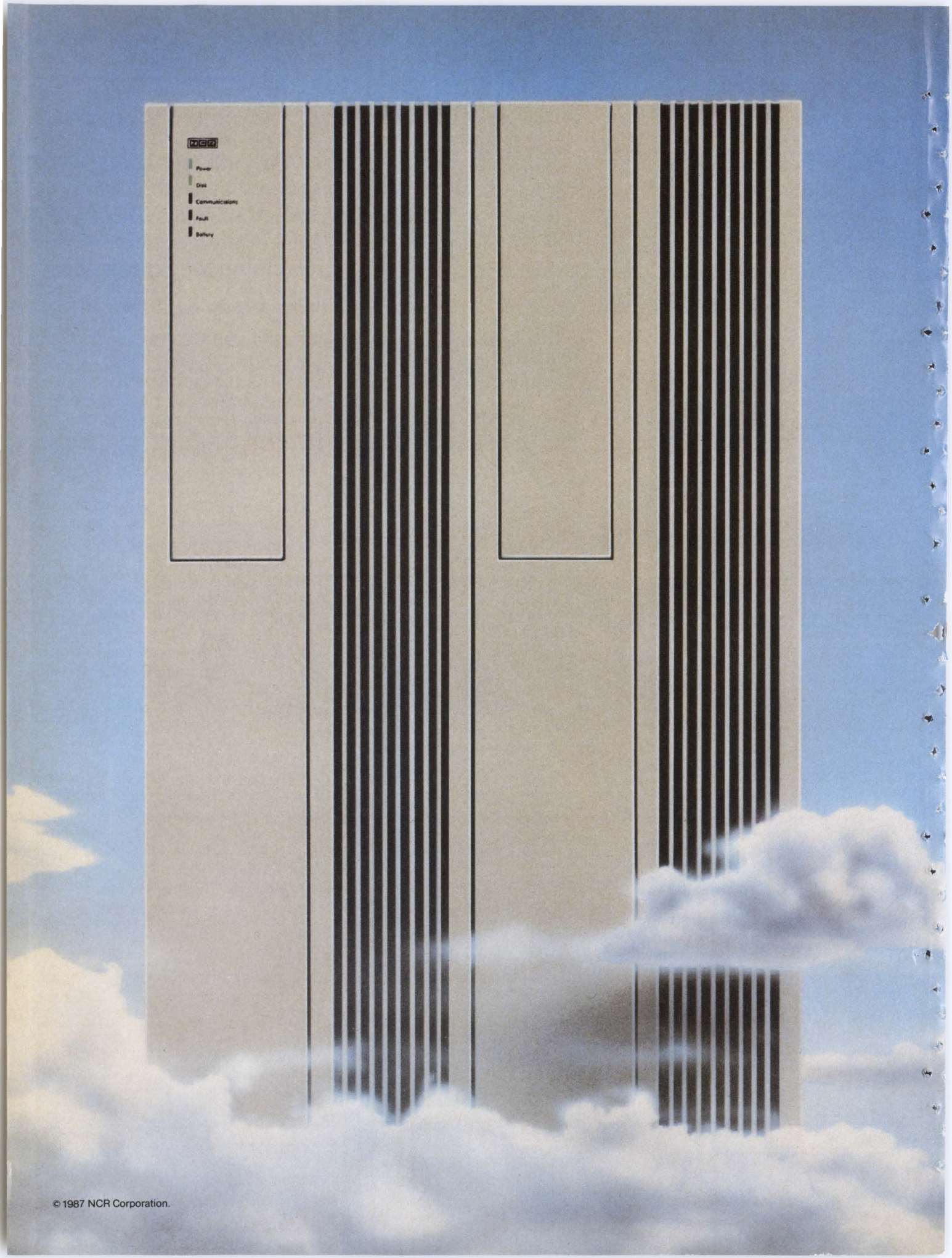

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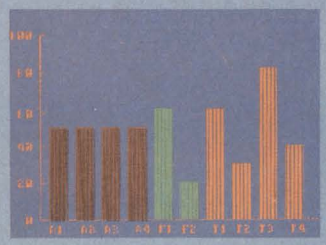
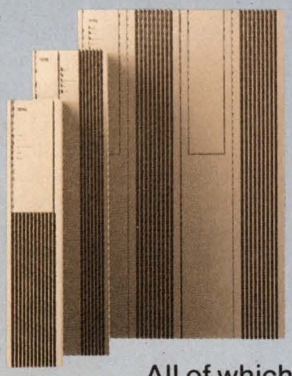


An Activity Analyzer tracks system activity, finds bottlenecks, and tells you when and where to add power or memory.



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Circle		Page
—	**Adobe Systems	CPT 17-CPT 22
21	AGS Computers, Inc.	41
—	AST Research Inc.	1
39	Amdahl Corporation	79
38	American Association for Artificial Intelligence	78
—	AT&T Business Marketing	30-31
—	AT&T STARLAN	98-99
32	AT&T Technologies	67
29	Avatar Technologies Inc.	54-55
59	BASF Systems Corp.	115
42	Businessland, Inc.	86-87
208	**Bestinfo	CPT 15
56	C. Itoh	106
6	California Software Products Inc.	5
49	Cognos Incorporated	96
—	Compaq Computer Corp.	80-81
8	Cullinet Software Inc.	8
61	CXI	120-121
22, 23	D&B Computing Services	42-43
54	Data General	114
58	Data Group Corporation	116
43	Datasouth	88
—, 26	Digital Equipment Corporation	38-39, 48-49
205	**Eastman Kodak	CPT 9
3	Equinox Systems Inc.	Cov 4
16	Exide Electronics	27
71	*Facit A.B.	52-2
62	Fibronics International, Inc.	118
25	Gould, Inc. — Computer Systems Div.	47
7	Harris Corp.	6-7
12	Hayes Microcomputer	16
11, 28	Hewlett-Packard	14-15, 53
—	***Illinois Dept. of Employment Security	113
46	Impact Systems Ltd.	92
44	Informix Software, Inc.	91
72	*Intel Corporation	52-5
206	**Itek Composition Systems	CPT 11
48	James River Corporation, Groveton Division	94-95
36	Kowin Computer	75
202	**Lino Type	CPT 5
14	McCormack & Dodge	23
—	Micom	76
59	Microcom	117
57	NCR	108B-C
31	NEC Information Systems	62-63
2	Nissho Information Systems	Cov 3
—	Northern Telecom	104-105
9	Novell USA	11
—	***Ohio State University	113
—	Oracle	13
40	Output Technology	82
56	Peat Marwick	108A
207	**Penta Systems International	CPT 13
24	Proteon, Inc.	44
34	QMS	70-71
62	Radio Shack	122
—	SAS Institute Inc.	Cov 2
30	Scientific Computer System	61
52	Software Link	100
201	**Software Publishing	CPT 2-CPT 3
13	Sorbus Service	21
19	Tektronix, Inc.	33-36
35	TeleVideo Systems, Inc.	72
—	Texas Instruments	29
70	*Text Lite	52-1
47	Tymet	93
27	Unisys	51
33	Universal Data Systems	69
45	VM Software, Inc.	92

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THE OHIO SUPERCOMPUTER PROJECT AND THE OHIO STATE UNIVERSITY

The Ohio State University is seeking an Associate Director for User Services to serve in the newly established Ohio Supercomputer Project. The Project will take delivery on June 1, 1987 of a Cray X-MP/24 computer with SSD. The responsibilities of the position will include the establishment of statewide user consultation and education programs, and the oversight of workshops on various technical aspects of supercomputer programming including FORTRAN and C code optimization and the use of advanced tools of computer graphics. The management of user support will include supervision of personnel, budget and products and services in that area as well as participation in hardware evaluation. Qualified applicants must have a master's degree or an equivalent combination of education and experience, extensive programming experience in scientific computing, and considerable administrative experience. Supercomputing experience is highly desirable. Salary is commensurate with experience. For consideration, materials must be received by April 15, 1987. To apply, send resume and three letters of reference to: Professional Employment Services, The Ohio State University, Lobby, Archer House, 2130 Neil Avenue, Columbus, Ohio 43210. The Ohio State University is an Equal Opportunity, Affirmative Action Employer.

Circle		Page
58	Wyse Technology	108D
15	Xerox	24-25
203	**Xerox	CPT 7
204	**Xyquest	CPT 8
209	**Xyvision	CPT 16

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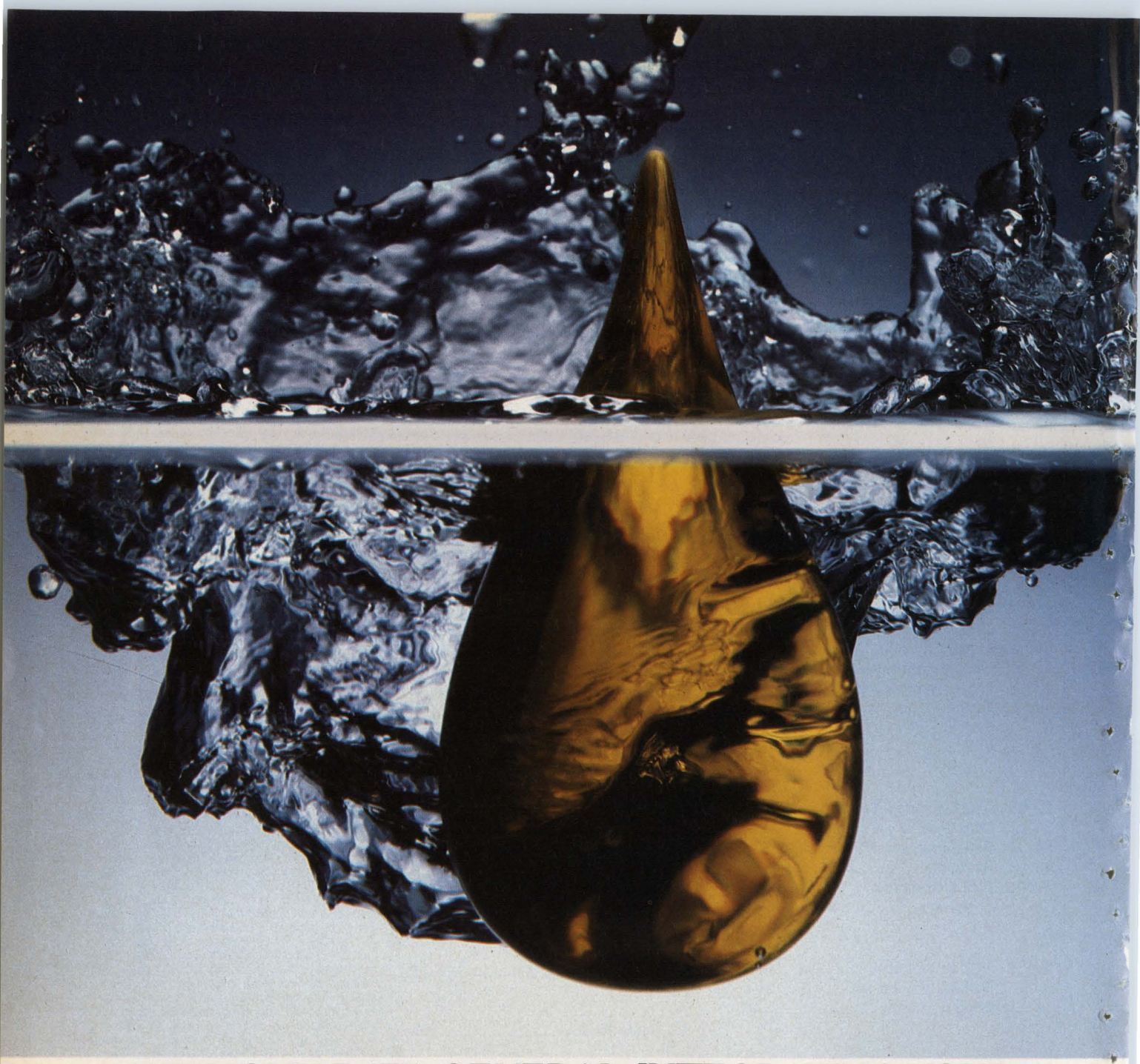

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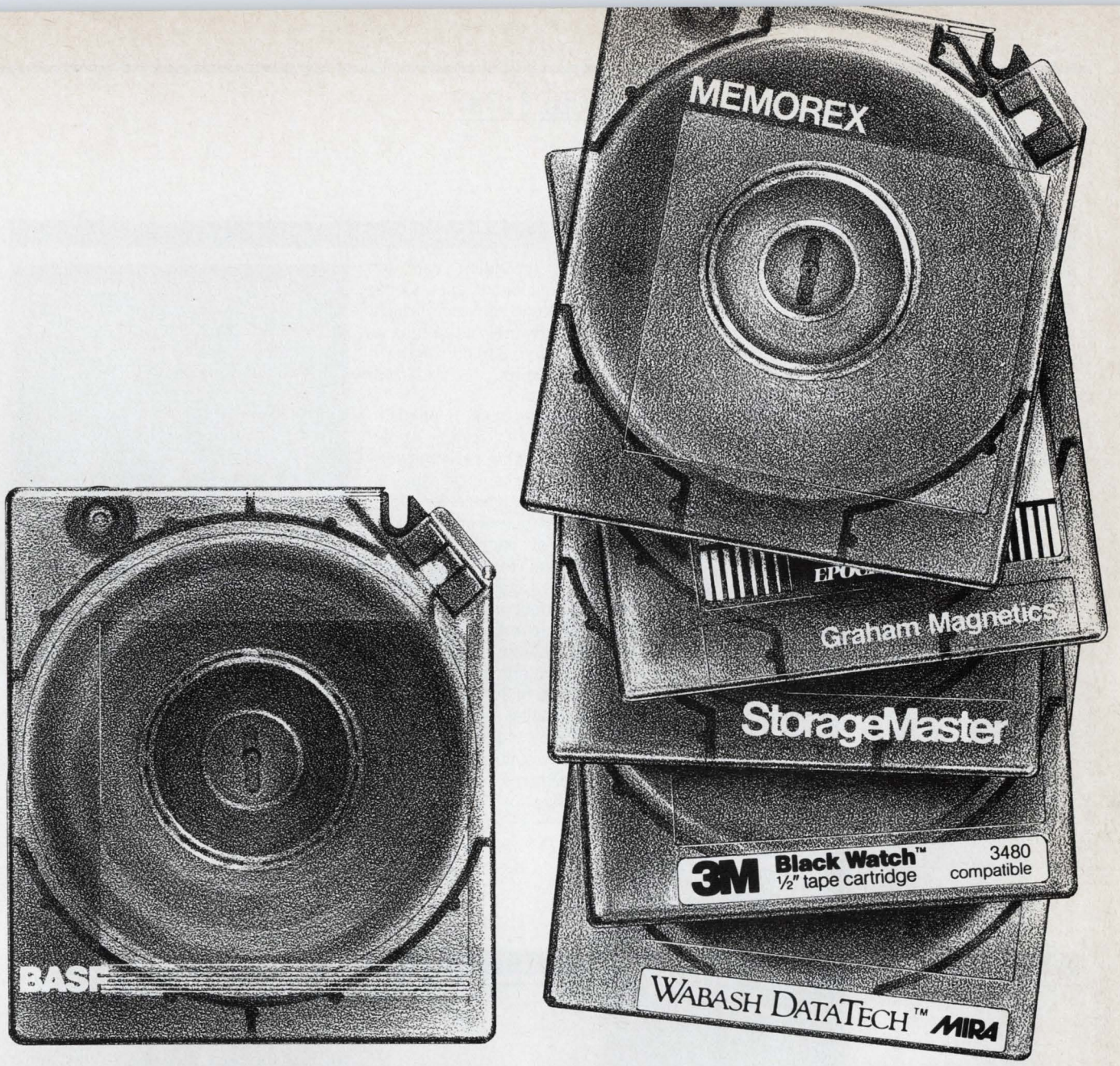

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glish) will be available in the third quarter. Release 1.1 is priced at $895 and will be available next month. For current customers, the upgrade is $100. XEROX CORP., El Segundo, Calif. CIRCLE **264**

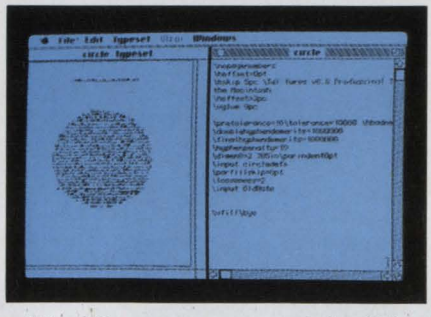
Intran Corp. has introduced Composer for its proprietary MetaForm Multi-Station electronic imaging systems, for both batch and interactive publishing.

Capabilites of Composer are automatic pagination, indexing, and table of contents generation. Composer also separates document contents from page layout and design processes, meaning that one user can enter text and another can control final layout. Leading features allow for specifying leading between lines, and above the first text line and below the last text line. All Composer fonts use full matrix kerning.

Additional features are hyphenation, widow and orphan control, renumbering, and automatic repositioning of lists, tables, and illustrations. Graphics, fonts, and form elements from Intran's other MetaForm products can be merged into Context documents. Composer is available now. The price, which includes Intran hardware and graphics, ranges from $20,000 to $40,000. INTRAN CORP., Minnetonka, Minn. CIRCLE **265**

Addison-Wesley's new desktop publishing package is TeXtures, for the Apple Macintosh. Based on the TeX typesetting language, the package provides a macro programming language for typesetting. Features include numbering and cross-referencing of pages, sections/chapters, paragraphs, footnotes, and illustrations/exhibits, and automatic hyphenation, justification, pagination, kerning, and ligature insertion. TeXtures allows users to preview typeset pages on-screen at any magnification up to LaserWriter resolution of 300dpi.

Users can display entire typeset pages in one window, and both editing and viewing windows can be displayed simultaneously. TeXtures also has word processing windows for text input and



editing. The program uses standard Macintosh printer software for any laser printer or any typesetter that uses PostScript. It also works with Apple ImageWriter and ImageWriter II printers. The price of TeXtures is $495, and it will be available next month. ADDISON-WESLEY, Reading, Mass. CIRCLE **266**

First Impression is Megahaus's new desktop publishing program. It's for the IBM PC and compatibles and is geared toward the technical publishing market, addressing such areas as aerospace, engineering, manufacturing, and architecture, where CAD/CAM technology is used.

Some of First Impression's features include single-file long documents, interactive WYSIWYG, built-in word processor, hierarchical format control, multiple file format control and importation, and document management utilities. It supports laser and dot matrix printers, including PostScript printers.

First Impression requires a PC with 512K of memory, two disk drives, and a CGA, EGA, or Hercules graphics adapter, or an MDS Genius display. It costs $895. MEGAHAUS CORP., San Diego. CIRCLE **267**

Unix OA Software

Division of Fortune Systems to market line to oems

Tigera Corp., a wholly owned subsidiary of Fortune Systems Corp. formed last year to market Fortune's line of proprietary Unix office automation software to oems, has introduced its first product, Word Era. Word Era was originally the Fortune word processing product, Fortune:Word. The Tigera subsidiary enhanced the product with a Wang-compatible interface and document conversion capabilities. It has a multiwindow editing capability as well as voice recognition and voice annotation. Word Era is available only through oems. Multiuser prices begin at $895. TIGERA CORP., Redwood City, Calif. CIRCLE **262**

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- *Built-in compression*
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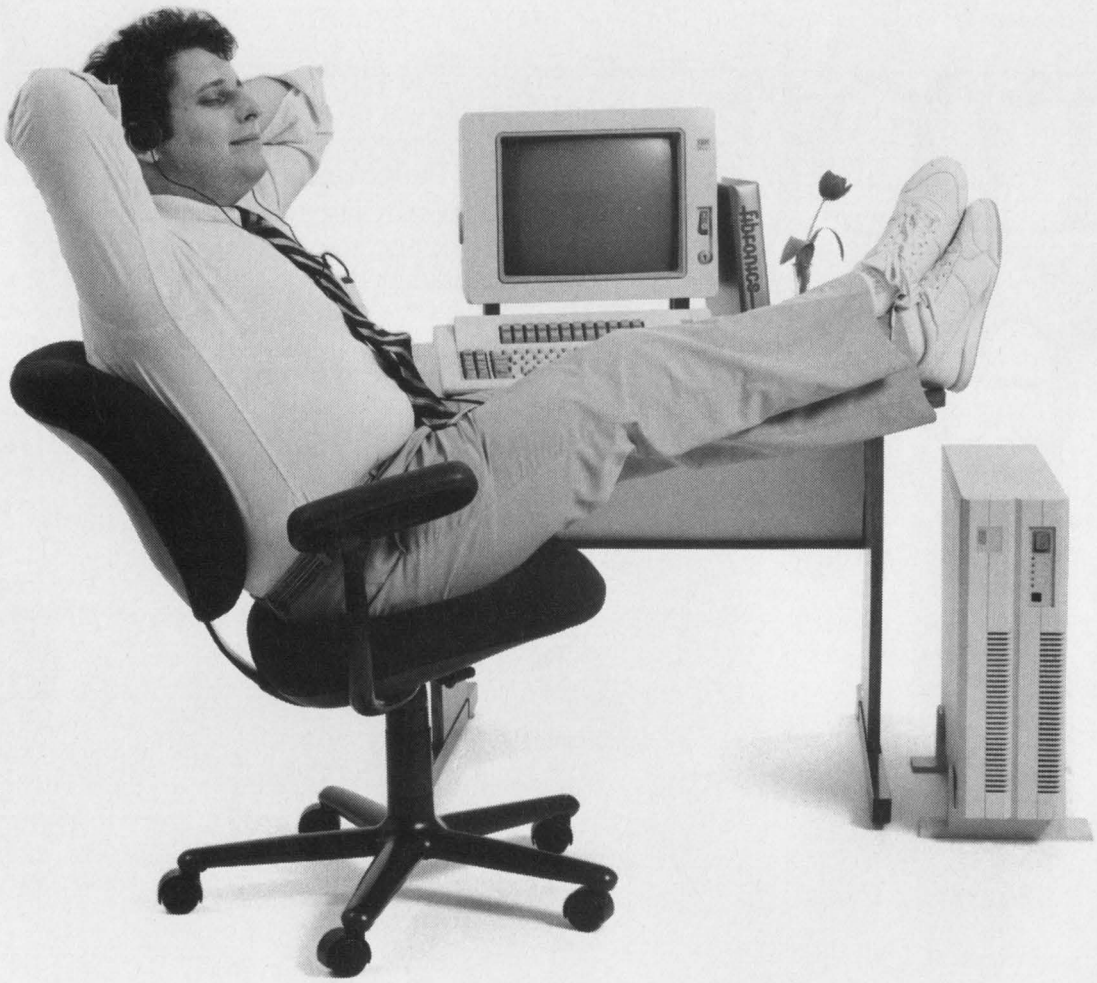

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CIRCLE 62 ON READER CARD

PEOPLE

Firing Up the Troops

Ian Diery brings much needed exuberance to his new position as head of Wang's U.S. operations.

BY GARY McWILLIAMS

After just a few months at Wang Laboratories Inc.'s Lowell, Mass., headquarters, Ian Diery became a larger-than-life figure. The bluff and balding native of Australia captured the allegience of Wang employees with a directness some believed no longer existed.

"I've a friend who, when he left a year ago, told me he felt there was no one in the organization he could respect and admire anymore," says a current manager, a veteran of three Wang presidents and a succession of marketing executives. "I think that's changed now. Diery is a guy a lot of us feel we'd like to be."

Brought to the U.S. in November from Wang's European subsidiary to repeat his overseas success, the recently appointed executive vice president of U.S. operations has set some crusty hearts pumping again with his fiery enthusiasm.

A former employee who stays close to the company says Diery has revived feelings of Wang's halcyon days, when it exuded prosperity, embodied by wise-cracking, cigar-chomping former president John F. Cunningham.

"Most of us feel Cunningham was a guy you could respect and admire. Diery appears to be that kind of guy." He credits Diery for the impression. "I felt it [the meeting] was a lot of hype. But when he got on I thought, 'I believe this guy. I'm going down the road with this guy.' "

Like the former president whose Horatio Alger rise won the respect of Wang's rank and file, Diery's ascent to the top U.S. sales post comes after a series of rapid promotions. Unlike Cunningham, Diery moved into his latest post as a virtual unknown among U.S. employees.

Despite the obvious parallels between Diery and Cunningham, president Frederick A. Wang, who appointed Diery upon taking over from chairman and founder An Wang, bristles at the suggestion that he and Diery recreate the Cunningham and Wang team of three years ago.

"I wouldn't call him my John Cunningham," says the younger Wang. "I'd call him my U.S. sales head."

Wang gives Diery credit for a strong business sense and a drive that others in the post have lacked. "He has that burning desire, a need to succeed in sales, that was lacking in other people who had that role," says Wang. "He also comes into the role with a much broader background in general business management. In Europe, because of the time difference, there hasn't been that dependency on the home office."

Still, there is the issue of whether Diery's formula for success can be repeated in the U.S. Diery rejects the notion that marketing plans can be imported like autos, but nonetheless suggests that his experiences abroad can be applied to the U.S. For instance, his list of European customer requirements resembles present conditions in the U.S.

"European companies have never been as profitable, and therefore tended to justify equipment more carefully," Diery says. "Europe is very high on the utilization of dp, and the definition of office automation has always included dp. Networking, too, was always a very high requirement."

A stout man with a boxer's nose left over from his rugby playing days, Diery says his greatest task at Wang is to convey to employees the preeminence of the customer. His voice deepens and stirs when he speaks about the importance of the customer and why employees must recognize it. "I managed Europe through a very tough time, through a no-growth environment," he says.

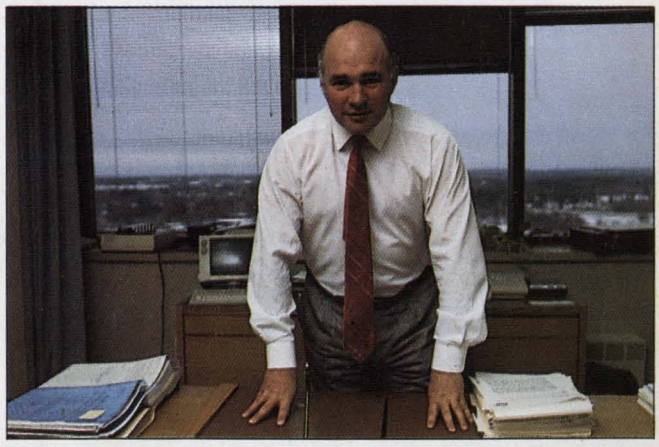
Part of his dogma is that management is never too busy to get involved in a customer problem. A story circulating through Wang suggests that his regard for the average salesman is turned into a lesson on customer relations.

According to the story, Diery called a sales rep to congratulate him on landing a significant order and during the call wished the rep a happy birthday. The story was quickly repeated by a work force unaccustomed to hearing of such attention from the top.

"I found out a salesman was having a problem getting paperwork done on an order because of a bureaucratic foul-up. I made the call to point out the way I felt, that a problem processing an order is a severe indictment of the system." Thus, he turns the story into a lesson that any customer problem is of concern at the top. The birthday greeting that was so widely circulated by Wang employees is brushed aside. "In the process, I found out some background on the person," he says matter-of-factly.

"The real point is, I would take the time out of my day for a customer satisfaction problem. I refuse to let people in the home office talk in a dispassionate way about customer problems. You've got to get out there."

However long it takes to refocus the U.S., his years of prodding Wang Europe employees to think about their work in terms of the customers' needs has hardened him to the task. With a bittersweet irony, Diery says the education was complete when his 'customer first' philosophy became theirs. "Three years later, people were coming to me and arguing how really important it was. I was pleased they were coming to me, but I was ready to knock these guys." ■



IAN DIERY: "I'm an absolute believer in focusing on the customer's needs."

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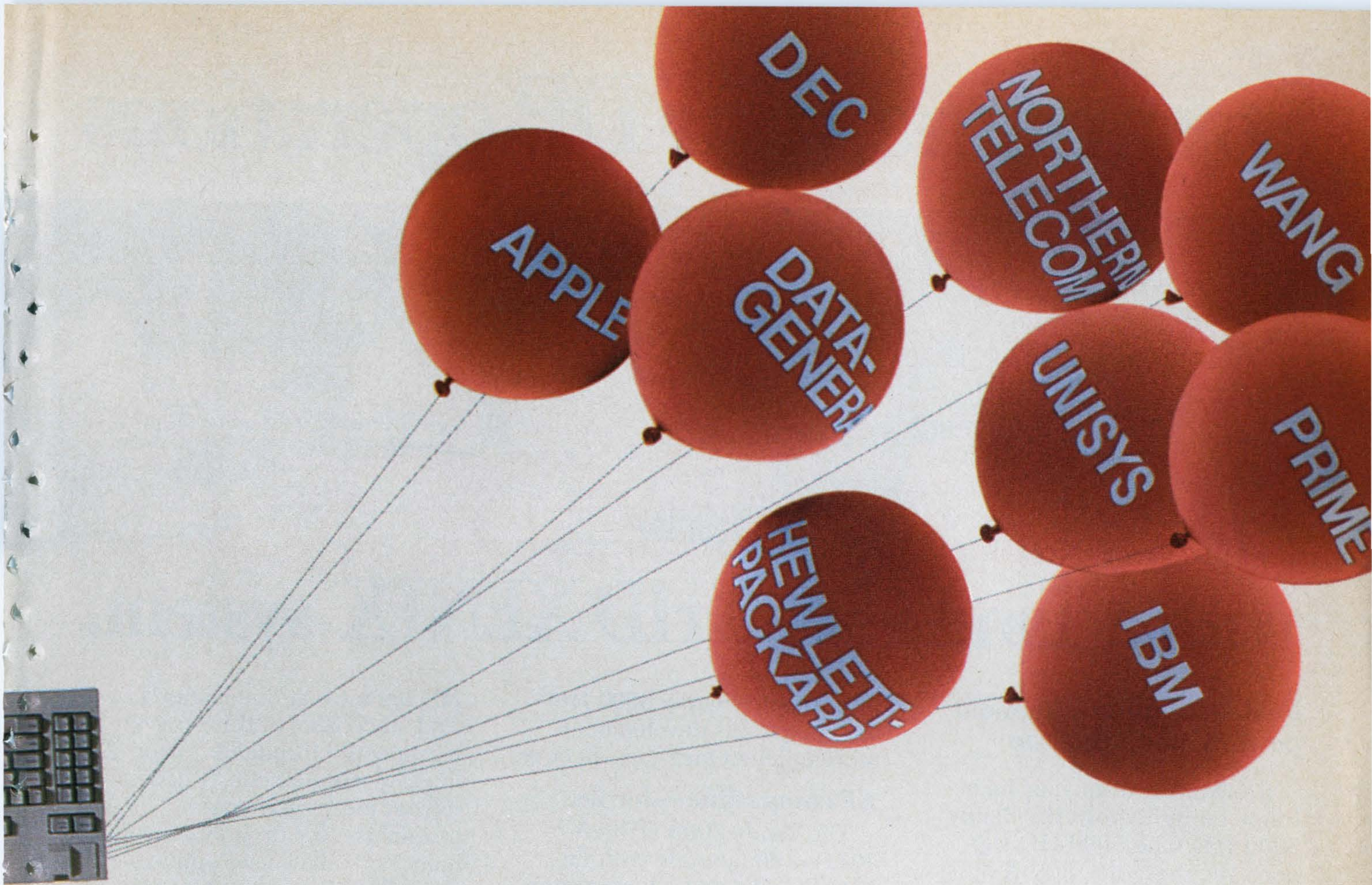

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CIRCLE 64 ON READER CARD

BOOKS

Marketing Is Hell

MARKETING HIGH TECHNOLOGY:
AN INSIDER'S VIEW
by William H. Davidow, The Free Press/MacMillan, New York (1986, 194 pp., $23.95).

BY ROGER FRANK AND MICHAEL AUSTIN

"Marketing is civilized warfare," writes William H. Davidow in the introduction to his book, *Marketing High Technology: An Insider's View,* and with that, the author takes us on an informative and entertaining journey into the turbulent world of high-tech marketing. While much of the book describes effective marketing in any organization, Davidow writes specifically for high-tech professionals—a focus that derives from his experience as vp of sales and marketing for Intel Corp.

Davidow's front-line experience also explains his fondness for military metaphors. As Intel's sales and marketing vp from 1973 to 1985, he ran the firm's microcomputer components and systems business. When Motorola challenged Intel's microprocessor business in 1978, Davidow was a key player behind Operation Crush, a companywide effort to reposition an existing product and mount a marketing crusade to crush all microprocessor competition.

Such combat experience lends weight to Davidow's unsurprising view that marketing is the key weapon in the fight for market share. As products become more homogenous, he writes, the need for effective marketing becomes critical. Even when significant technical differences between products exist, there is often no guarantee that the technically superior product will emerge the winner. Marketing, says Davidow, is that all-important factor responsible for the way a product is perceived by the potential customer. Effective marketing brings the product to the public's eye, differentiates it from the competition, and creates barriers to direct challenges.

Davidow's fundamental thesis throughout the book is the importance of what he calls the "strategic principle" of marketing: "Marketing must invent complete products and drive them to commanding positions in defensible market segments." The concept of a "complete product" is best understood by examining Davidow's distinction between products and devices. Devices are created in the laboratory. Products are devices that have a marketing plan. A business, which turns devices into products, is built around a specific market segment with a specific market need.

While this is a fairly straightforward distinction, the unique problem of high-tech marketing becomes apparent, as Davidow illustrates, through case studies and examples, a backdrop of accelerating technological change. In the fast-paced high-tech marketplace, Davidow contends, planning is a critical element of success, whether developing devices, creating products, or exploring business opportunities. The irony is that the longer the planning process, the greater the danger a plan will be obsolete when it's finished. Davidow's high-tech war stories illustrate the careful balance necessary between planning and action.

Davidow goes on to describe many other components of effective marketing in a clear, self-effacing manner that makes the book as entertaining to read as it is informative. He covers such essentials as the importance of good salespeople, of targeting distribution channels, of effective advertising and promotion, and of pricing. He also offers a 16-point checklist that readers can use to judge their own companies' marketing plans. What makes the book truly valuable is the author's generous sharing of his firsthand experiences, such as the pricing of the Intel 80186 or the selling of the Hewlett-Packard 2116 mini.

Davidow concludes his book with a discussion of what he calls the business of business—total customer satisfaction. The true product of business is not merchandise or profits, but making sure the customer is yours. "In this increasingly competitive environment," he writes, "companies must struggle against greater and greater odds to create and keep customers. To do that, they have no choice but to commit themselves to delivering total customer satisfaction." Whether your aim is to buy or sell such satisfaction, Davidow's views will leave you wiser about high-tech marketing. ■

Roger Frank and Michael Austin are New York City-based marketing consultants.

CALENDAR

JUNE

COMDEX Spring.
June 1-4, Atlanta. Contact the Interface Group Inc., 300 First Ave., Needham, MA 02194, (617) 449-6600.

FOCIS (Federation of Conferences on Information Systems).
June 8-10, Washington, D.C. Contact FOCIS, P.O. Box N, Wayland, MA 01778, (800) 343-6944, or (617) 358-5356.

DSS-87 (Seventh International Conference on Decision Support Systems).
June 8-11, San Francisco. Contact DSS-87, 290 Westminster St., Providence, RI 02903.

Summer 1987 Unix Conference and Exhibition.
June 8-12, Phoenix. Contact USENIX Conference Office, P.O. Box 385, Sunset Beach, CA 90742, (213) 592-3243.

Society for the Advancement of Material and Process Engineering (SAMPE) Conference and Exhibition.
June 9-11, Santa Clara. Contact SAMPE, 843 West Glentana, P.O. Box 2459, Covina, CA 91722, (818) 331-0616.

Electronic Data Processing Auditors Association (EDPAA) Annual Meeting.
June 15-17, Seattle. Contact EDPAA, P.O. Box 88180, Carol Stream, IL 60188-0180, (312) 682-1200.

NCC '87.
June 15-18, Chicago. Contact NCC '87, American Federation of Information Processing Societies (AFIPS), 1899 Preston White Dr., Reston, VA 22091, (800) NCC-1987, or (703) 620-8955.

CEPA 1987 Spring Conference.
June 22-23, Washington, D.C. Contact Society for Computer Applications in Engineering, Planning, and Architecture Inc., 15713 Crabbs Branch Way, Rockville, MD 20855, (301) 926-7070.

A/E/C Systems '87 (Computer Show for the Design and Construction Industry).
June 23-26, Washington, D.C. Contact Conference Director, P.O. Box 11318, Newington, CT 06111, (203) 666-6097.

Plas-Tech '87.
June 23-25, Atlantic City. Contact Delia Associates, Route 22 W., P.O. Box 338, Whitehouse, NJ 08888, (800) 526-5978.

LETTERS

Honeywell Pledge

Your report, "U.S. to Replace Multics Units" (Look Ahead, Jan. 15, p. 9), incorrectly leaves readers with the impression that Honeywell does not plan to support its Multics customers past 1988.

Major Chuck Bowen of the First Information Systems Group at the Pentagon is quoted in your report as saying, "Honeywell isn't going to support the equipment after 1988." This is certainly not the case.

While we have told our Multics customers that we do not expect to ship new-build Multics systems past 1988, we have also stressed that we will support our Multics customers well past then. Because Major Bowen is aware of our long-term support plans for Multics, we assume that your reporter confused our plan for new-build Multics systems with our plan for long-term support.

KARL L. LAUBSCHER
Director of Multics Marketing
Honeywell Information Systems
Waltham, Massachusetts

Supersites

Contrary to David Hebditch's assertion in his review of *High-Tech Espionage* (Books, Feb. 1, p. 94), there is a Cray X-MP in Reading, England, at the European Centre for Medium Range Weather Forecasts.

Further, if Bracknell is considered to be near Reading, I think he will find more Crays there.

VINCENT B. WAYLAND
Wayland Associates
Boulder, Colorado

David Hebditch replies: According to Cray, the Cray currently in Reading is at Cray's own data center and was not there at the time discussed in the book. There never was a Cray-1 at Reading University. The European Centre for Medium Range Weather Forecasts is located nearby in Bracknell. My point still stands: there was no machine like the one described by Jay Tuck anywhere in or near Reading at that time.-Ed.

Prescience?

In light of the recent revelations about exploding portables, I am convinced the designer of your June 15, 1985, cover has precognitive abilities. Is he available as an advisor on other new business trends?

ROBERT K. NELSON
Airflow Sciences Corp.
Livonia, Michigan

READERS' FORUM

Let's (Finally) Make Software Engineering a Profession

Even though software engineering has been a buzzword for nearly 20 years, defining what it is and what it means to be a "software engineer" remains very difficult. Part of the reason for this is that software engineering is a de facto profession that lacks the traditional forms of support and legitimacy other professions command. Software engineers are produced by no undergraduate degree program in particular, are a "special interest group" in the largest professional computing society, and are not likely to be licensed by anyone until somebody figures out what it is that they do.

Traditional engineering disciplines have fairly solid foundations in science. Physics applies to civil, mechanical, and electrical engineering in easily identified ways; chemistry and chemical engineering are similarly linked. The key relations between what computer scientists know and what software engineers do are not so clear. The reason for this is the special nature of computer science: whereas physics, chemistry, and biology study natural things in a natural world, computer science studies the behavior of a man-made construct, and thus does not fit existing models very well.

Probably the most serious reason why software engineering has trouble establishing itself is the generally poor work record of software engineers to date. Great software systems certainly have been produced, but almost invariably the systems were loaded with errors, over budget, and grossly late. Consider the disclaimer that typically appears inside the user manual of almost every software product sold today; what would you think if you went to buy a car and noticed the following legend on the inside of the driver's door:

We say that this is an automobile. However, it is not warranted to act like an automobile. Furthermore, we reserve the right to make changes to the parts of this automobile, regardless of whether the changes fit your purposes or not, and we are not obligated to tell you what the changes are.

No wonder software engineers don't get any respect. They can't even promise that what they have made does what it is supposed to do.

What can be done to get respect for software engineering? Make it into a proper profession. Right now most of what can be termed software engineering is done by former math, physics, and engineering majors who have taken one FORTRAN course and found themselves working on computers because the people with computer science degrees lack practical education. The situation is the same as if physics majors were hired to be civil engineers. Sure, you'd get bridges built, but each one would be a custom job with three prototypes lying in the valley below.

I'm not saying that computer science majors should study avionics hardware as an elective, as that is not fundamental to software engineering. The things that are fundamental to software engineering, however, such as specification techniques, design, testing, configuration management, and concepts of quality, are well within the power of an undergraduate to absorb. Wang Institute, Seattle University, and other schools with graduate programs in software engineering require industry experience for admission. Is that because software engineering is too tough for undergraduates? No, it's because those schools want the students to have closehand knowledge of how poor software development is so they will appreciate what is taught them in the master's program.

I propose that we skip the intermediate step, the part about going out on the job as mathematicians and computer scientists and messing up as you go. We should make software engineering a distinct degree path from computer science, and make its curriculum contain what is now at the graduate level at some schools. Enough is known about the knowledge requirements of software engineering to establish viable bachelor's programs.

Establishing these educational programs will take time. Certification of software engineers, in turn, can be a precursor to the eventual professional engineer certifications that may follow. Unfortunately, the infrastructure of the profession is still too weak to help achieve anything resembling consensus on the form of the certification instrument. It's up to the practitioners of software engineering to show initiative in setting themselves apart in order to be identifiable and earn respectability.

JAMES E. TOMAYKO
Associate Professor
of Computer Science
Wichita State University
Wichita, Kansas