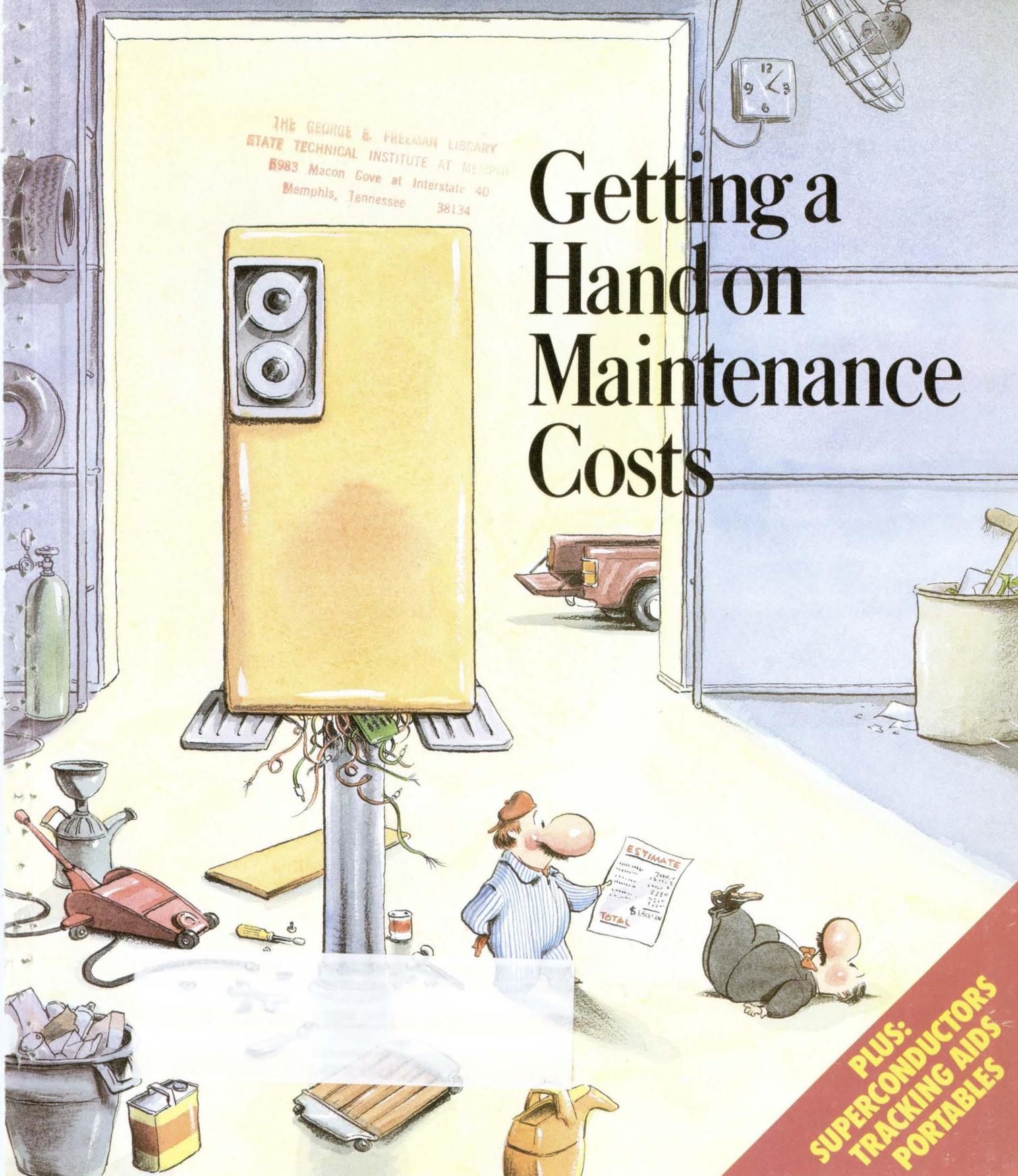


DATA MATION

AUGUST 15, 1987
A CAHNER'S PUBLICATION

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Getting a Hand on Maintenance Costs



**PLUS:
SUPERCONDUCTORS
TRACKING AIDS
PORTABLES**

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.

AF Command ***

PROC PRINT DATA= AIRDATA

KEYS (DMKEYS) Command ***

VAR	PRICE	Order	Shipping
ID	ORDERD	Date	Cost
----- DIVISION=AIRFRAME -----			
TITLES		\$50,234	\$976
1 Lee Aircraft Company Sales Report		\$786,555	\$3,400
2 For Month of January, 1987		\$109,333	\$2,890
		\$789,434	\$5,000
		\$1,735,556	\$12,266

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.

HELP Command ***

PROC DOWNLOAD copies a SAS data set stored on the remote mainframe system to the local PC system.

PROC DOWNLOAD DATA= OUT= ;

LOG Command ***

NOTE: Remote submit commencing.

5 x allow flacct1 dataacct.monthly) shr;

6 proc download data=acct.monthly out=pc.mon;

7 run;

NOTE: DOWNLOAD IN PROGRESS FROM DATA=ACCT.MONTHLY TO OUT=PC.MON

NOTE: The data set PC.MON has 500 observations and 55 variables.

NOTEPAD Command ***

Data Sets Available for Download

DATA SET	DESCRIPTION
MONTHLY	Monthly general ledger balances after last close

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[®].

FSEdit Command ***

Obs 151

Lee Aircraft Order Entry System

Part No.: 14-50126 Date Ordered: 03DEC86

Description: Rudder Gear Assembly MC 402/ACCT

Price: \$ 8,987.35 Time Ordered: 09:45

Quantity: 1 Taken by: JAD

Customer Name: Allen Aviation Inc.

Shipping Address: Billing Address:

Blide #4 MC 402/ACCT

1 Runway Drive P.O. Box 11036

Hargett IL 60623 Chicago IL 60622

Customer Contact: SHIPPING

John Stevens Command ***

312-344-2222 SHIPPING INSTRUCTIONS

Date Shipped: 07JAN87 Rudder gears are to be shipped through the

Shipped by: UPS central office in Seattle, WA. Parts will

be shipped by truck or rail. Air freight

can be used if customer prepays shipping.

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.

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 Cary, NC 27511-8000
 Phone (919) 467-8000
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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.

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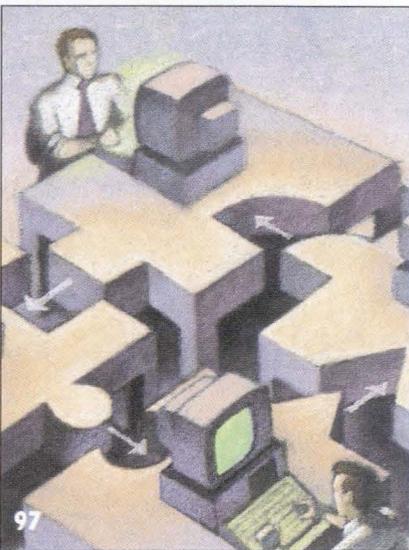
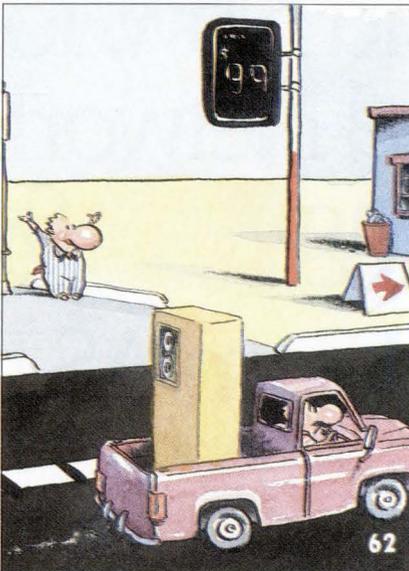
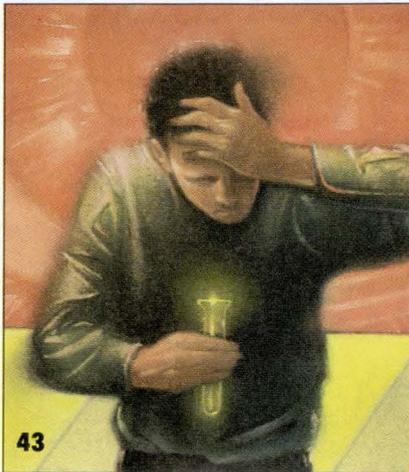
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ION

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Cover Illustration by Michael Witte

AUGUST 15, 1987
VOLUME 33
NUMBER 16
THIS ISSUE, 187,023
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AWARD

Editorial

From Selectivity to Connectivity

Selectivity is one of the main advantages of publishing a magazine twice a month rather than every week. DATAMATION's frequency allows us to carefully select and develop stories that are of the greatest significance to our readers. Unlike weekly publications, DATAMATION does not have to condense everything—without regard for its importance—that happens in the computer industry and the economy during the previous week.

Three stories in this issue underscore the value of being selective. In his Behind the News piece, "As AIDS Spreads, State Pc Systems Are Reaching Limits" (p. 43), San Francisco bureau manager Jeff Moad examines how state and federal agencies are using computers and custom software to track the deadly AIDS disease without jeopardizing the right to privacy of its victims. In this fascinating look at the social implications of computer security, Moad discovers that while states such as Colorado have made noteworthy strides in using systems to track the disease, its growth will necessitate the use of far more sophisticated computing power.

Former DATAMATION assistant features editor Stephen G. Davis untangles nearly as complex a web of information in entering the realm of superconductors. In "The Superconductive Computer in Your Future" (p. 74), Davis talks with the leading computer scientists at IBM and Hewlett-Packard, as well as other research gurus, to find out just how soon end users of systems will be able to take advantage of this emerging technology. It could be 10 years or more.

Senior writer Ralph Emmett Carlyle broaches a subject near and dear to all IS executives trying to get more out of their programmers: CASE. In "High Cost, Lack of Standards Is Slowing Pace of CASE" (p. 23), Carlyle reveals that it's the customers, not the developers, who are putting the brakes on computer aided software engineering.

Selectivity has led DATAMATION to focus on another subject—connectivity. In conjunction with the Gartner Group, we will sponsor a conference on the subject next March. Organized by the Cahners Exposition Group, a sister company of DATAMATION's owner, Cahners Publishing Co., the conference is called CONNECT'88. It will be held in New York at the Jacob Javits Center, March 8-10. If you have any ideas that might be used in a technical seminar that DATAMATION will run at the show, please feel free to write to me.



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EDITOR-IN-CHIEF

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DATAMATION (ISSN 0011-6963) Magazine is issued twice monthly on the 1st and 15th of every month by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington St., Newton, MA 02158-1630. William M. Platt, President; Terrence M. McDermott, Executive Vice President; Frank J. Sibley, Group Vice President; Jerry D. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing. Editorial offices, advertising and subscription departments, 249 W. 17 St., New York, NY 10011. Published at East Greenville, Pa. Annual subscription rates: U.S. and possessions: \$55; Canada: \$75; Japan, Australia, New Zealand: \$145 air freight; Europe: \$130 air freight, \$235 air mail. All other countries: \$130 surface, \$235 air mail. Reduced rate for qualified U.S. students, public and school libraries: \$40. Single copy: \$3 in U.S. Sole agent for all subscriptions outside U.S. and Canada is J.B. Tratsart Ltd., 154 A Greenford Rd., Harrow, Middlesex HA13QT, England, (01) 422-8295 or 422-2456. No subscription agency is authorized by us to solicit or take orders for subscriptions. Second-class postage paid at New York, NY 10001 and at additional mailing office. DATAMATION copyright 1987 by Reed Publishing USA; Saul Goldweitz, Chairman; Ronald G. Segel, President and Chief Executive Officer; Robert L. Krakoff, Executive Vice President. All rights reserved. DATAMATION is a registered trademark of Cahners Publishing Co. Reprints of articles are available; contact Frank Pruzina (312) 635-8800. Microfilm copies of DATAMATION may be obtained from University Microfilms, A Xerox Company, 300 N. Zeeb Rd., Ann Arbor, MI 48106. Printed by Brown Printing Co. POSTMASTER: send address changes to DATAMATION, 249 W. 17th St., New York, NY 10011.

ABP



BPA

Letters

The DATAMATION 100

As always, your DATAMATION 100 report (June 15, p. 28) helps keep us all current in this ever-changing industry.

I would like to note though that some of your readers may be confused by the acquisition information you conveyed in the summary report on United Leasing plc (No. 92).

It is true that United was recently acquired by Inspectorate International SA, as reported. However, Inspectorate is the parent company of equipment lessor The Meridian Group which will manage the leasing portfolios of the former United Leasing in Europe and of its Unilease Computer Corp. subsidiary in the U.S. Those companies' offices will now operate under the Meridian banner.

HARVEY KINZELBERG
Chairman of the Board
Meridian Leasing Corp.
Deerfield, Illinois

Congratulations on your June 15th issue.

A subtle puzzler is the reference to "100" in the photo at row five, column eight. It would seem that that section of India is roughly 80 longitude and 15 latitude, but that adds up to only 95.

DONALD B. DERR
IBM Corp.
Hopewell Junction, New York

You have found our subcontinental error. We meant to include a section of the map containing the hundredth longitude, but were off by about a thousand miles.—Ed.

The Case Against 1706

In making his case for Section 1706 of the Tax Reform Act of 1986 ("How Should Contractors Be Taxed? A Debate," June 1, p. 89), Sen. Daniel Patrick Moynihan admits that the legislation has led to "a lot of confusion."

With all due respect, that's the least of the problem. Thanks to the restrictive and anticompetitive measures as a result of Section 1706, dozens of the country's biggest companies have stopped using independent high-tech consultants. That's bad news not only for the consultants, but for the companies themselves and the economy as a whole.

High-tech consultants simply are among the best and the brightest of the skilled professionals who have helped make this country a leader in all high-tech industries. Thanks to a single piece of legislation, passed as a midnight amendment with no discussion or debate, these

talented professionals are being singled out for discriminatory treatment in the new tax code.

Section 1706 forces thousands of technical service workers who prefer to be self-employed to pass a number of tests to qualify as independent contractors. The tests are so arbitrary and ambiguous that 10 years ago, Congress passed legislation providing a "safe harbor" for contractors who, by their industry customs, are deemed to be self-employed. Section 1706 removes this "safe harbor" for high-tech businesses only, thus creating a suspect class of individuals. Its effect seems designed to knock out the "little guy," the small businessmen and women and the independent professionals who are the idea factories of the high-tech world.

The senator argues that Section 1706 promotes fairness. Tell that to the nearly 60% of former self-employed contractors who have been unjustly forced to become employees or find employment in other lines of work, all because of this legislation. They no longer have the choice of going it alone—and that simply isn't fair.

The senator talks about competition. Tell that to the small businesses that have closed down, no longer able to compete with the corporate giants because they can't contract out to independents.

Section 1706 was written at the behest of organizations who stand to profit by the demise of independent contractors. Its chief supporters are the large employee-oriented technical service firms that will monopolize the industry if the independents are eliminated. They have said that repeal of Section 1706 itself is at worst revenue neutral.

A number of bills are before Congress to either repeal or postpone the implementation of 1706. The small businesses and independent professionals affected by this discriminatory and anticompetitive legislation are marshaling their limited resources to persuade Congress to support the bills.

The nation's lawmakers not only have a chance to correct what is a singularly bad piece of lawmaking, but also can score a victory for a free and competitive market and for freedom of choice.

THOMAS GOLWAY
Chairman
Technical Consultants National
Association
New York



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CIRCLE 5 ON READER CARD

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

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

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

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

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

The key: Keep the data and the form separate.

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

That separation unleashes impressive power.

How a smart form helps a company work smarter.

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

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

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

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

When the same information goes

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

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

Desk top publishing can't do anything like this.

How you "teach" your smart form.

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

You can tell each blank:

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

How the smart form can "teach" the user.

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

Your forms become the capture point.

Most companies spend money to capture the same information twice: First when someone puts it on a form, and later when someone reads it off the form and enters it into the computer. Electronic forms end this duplication because data

entered for the form can be exported to a DOS file for use in all your other applications. Data capture for the form and data capture for the computer are one.

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

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

A true electronic form will eliminate hidden costs.

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

Visible cost — Creating forms.

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

Visible cost — Inventorying forms.

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

Electronic forms are stored in the

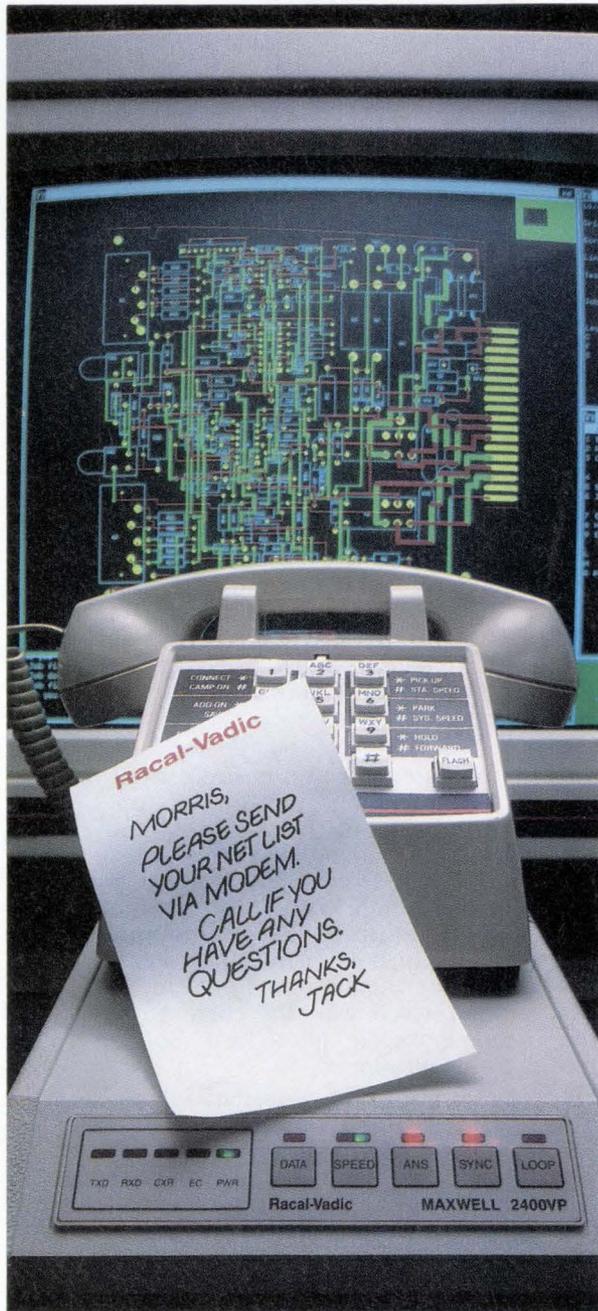
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Nancy Yoneda

Nancy Yoneda
Vice President, Finance
Racal-Vadic, Inc.



A shoe box full of receipts. That was how the Vadic Corporation collected critical financial and accounting data when the company was founded in 1969 in a small carriage house in Palo Alto, California. Nineteen years later this leading modem manufacturer is a major division of a two billion-dollar corporation. And their financial reporting system is one of the most sophisticated anywhere.

Racal-Vadic uses the Cullinet Financial System (CFS) - a fully integrated set of accounting, decision support and financial analysis tools. Working in tandem with Cullinet's manufacturing system, CFS automates and controls Racal-Vadic's routine accounting functions, freeing up professional staff resources.

CFS also provides the company's analysts with direct on-line access to reliable, up-to-the-minute information from a variety of sources, such as general ledger, accounts payable, purchasing, inventory order entry, accounts receivable and cost control. It's the kind of access that facilitates sound financial planning and informed decision making. And it's the kind of access that can take a company from a carriage house to a very exclusive club: the Fortune 500.

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Look Ahead

KEEPING THE FAITH

ROCHESTER, MINN. -- Don't bury that System/36 nameplate yet. IBM is preparing a fall release of a new System/36 in order to demonstrate its commitment to System/36 users in advance of Silverlake, the so-called bridge machine for the S/36 and 38. With Silverlake's unveiling not expected until sometime in the first quarter of next year, IBM apparently wants to prove its fidelity to System/36 users first. Moreover, price cuts on the 9370 models 40 and 60 and the unveiling of a high-end 9370 should take place before Silverlake's release, sources say.

BUSINESS AS USUAL

WASHINGTON, D.C. -- The U.S. Defense Department isn't ready to cut all ties with Toshiba over the Toshiba Machine Corp.'s sale to the USSR of equipment for milling ship propellers, which is restricted by the Coordinating Committee for Multilateral Export Controls. Toshiba recently revealed that even after the illegal sale was disclosed, DOD inquired as to whether it could fill an order for laptop computers by assembling them at its Irvine, Calif., plant. At press time, direct import was impossible because of the Reagan administration's semiconductor-related trade sanctions. Assembly in Irvine is to begin "as soon as possible," a Toshiba spokesman says. Toshiba is reportedly the only company able to fill the order because of the plasma display technology required by DOD.

FOR THE LOVE OF LEARNING

CAMBRIDGE, MASS. -- If NEC Corp. gets another foot into the university supercomputer door, MIT is likely to be the place. Last year, NEC delivered an SX-2 to the Houston Area Research Consortium. Now, sources say the university is very close to nailing down a deal in which it would get an NEC SX-2 for yearly maintenance costs of \$500,000. The quid pro quo for NEC would be software development and timesharing. "A lot of people in the government are very unhappy with MIT and NEC," says a government agency computer expert. Chuck Nies, Honeywell-NEC's executive vice president for marketing and sales, says the company has no proposal active at MIT and "categorically" denies "deep discounting."

GLASH OF THE TITANS

CHICAGO -- McCormack & Dodge Corp. this week unleashes its answer to MSA Corp.'s Information Expert with the release of Viewprint, a cross-application detail report writer that works with its Millenium Series of applications. The package supports high-volume transaction reporting in batch, real-time, or on-line environments. The first two members of the Natick,

Look Ahead

Mass., company's Satellite Series of pc-based software will be released separately at its users conference here. The pc packages enable users to enter data and offload processing for general ledger and accounts payable mainframe applications.

WEBSTER'S WOULD BE PROUD

SAN RAFAEL, CALIF. -- When the Fireman's Fund Insurance Corp. wanted a data dictionary to run with its IBM DB2 database, it found nothing it liked in the marketplace. So it had its Systems Enterprise subsidiary (FFSE) build a new one. Called Addict, the system was developed jointly by FFSE and Indian software house Tata Consultancy Services of Bombay. "We believe it is the only DB2 data dictionary near completion in the world," says Tony Chalmers, president of FFSE's main development center in Brighton, England.

ABRUPT 180

LOWELL, MASS. -- Wang Labs, in a sharp reversal of its past allegiance to broadband networks, plans to embrace native Ethernet for its VS computers. Previously, Wang supported Ethernet only as a subnetwork under WangNet, its proprietary broadband LAN. The VS-to-VS Ethernet links are a prelude to linking Sun Microsystems' and Apollo Computer's workstations for electronic publishing and technical applications via Ethernet. Wang also plans to add a new VS computer to plug the gap between its 40-user VS 65 and 128-user VS 7110, which suggests a new VS supporting 80 active users. A long expected VS workstation based on pc technology also is reported to be on the loading docks.

VOICE MAIL BANDWAGON FORMING

WASHINGTON, D.C. -- The regional Bell companies are eyeing the voice mail business for possible entry since the Justice Dept.'s recommendation in early July that they be allowed to offer information service businesses. Ameritech in Chicago and BellSouth in Atlanta have both expressed interest in voice mail. No doubt the regional companies would be naturals for this service, now supplied by such companies as Rolm, VMX Inc., and Wang Labs, which dominate the market for voice store-and-forward services. The regional companies are in limbo on the issue until a federal court judge issues a ruling, maybe in September or October.

PACTEL EYES DATABASE OFFERING

WALNUT CREEK, CALIF. -- Pactel Spectrum Services, a Pacific Telesis company that services network management equipment, is "seriously considering" moving away from being purely a service organization by licensing its database software. Pactel's database con-

(continued on p. 12)

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tains data on all of its clients' communications systems, including the physical dimensions and location of equipment, the logical connections, and the chain of command when repairs are needed. The database has a real-time graphics capability and Pactel runs it on a DEC VAX 8600 using Oracle's RDBMS.

SPICING UP THE SOUP

NEW YORK -- Project management software vendor Applied Business Technology (ABT) will incorporate the Accelerator software design tool into the next release of its micro-based Project Workbench. Project Workbench is scheduled for October release. Accelerator is from CASE vendor Index Technology in Cambridge, Mass. This integration will allow software designers to track and manage their resources during the design process. Still in the planning stage, but not to be included in this release, is the addition of templates in Project Workbench, which will allow users to insert predefined sets of specific tasks into any part of a project. ABT is also working on prototypes for "workplan customization," which will allow users to perform tasks based on an expert system-type description of the project.

TOUGH JOB TO KEEP FILLED

PRINCETON, N.J. -- The Consortium for Scientific Computing (CSC) is on the prowl once again. Joseph Traub just became the third president to resign as head of the National Science Foundation's John von Neumann Center. Traub, who lasted eight months--twice as long as his predecessor--will return to Columbia University. Look for someone close to the CSC to be picked.

LESS BUCKS, MORE BANG

BILLERICA, MASS. -- Honeywell Bull Inc. is shooting for an October unveiling of a new low-cost DPS 6 Plus departmental computer. Available initially as a uni-processor supporting 2MB to 8MB of memory, the DPS 6 Plus model 200 is believed to be priced starting at under \$20,000. The model 200 is a reengineered version of the 32-bit DPS 6 Plus model 400 released more than a year ago. The computer was expected to be available in July but engineering delays pushed back initial availability, sources say.

RUMORS AND RAW RANDOM DATA

Digital Equipment Corp. plans a Sept. 1 release of a dual system packaged for high-availability applications. The idea is to designate one MicroVAX II as the backup in the event of a primary system failure. Fault detection software and configurable port selectors enable users to be returned to an application with minor delays.

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AL Huntsville Jul 9, Sep 17	GA Macon Aug 13	MA Burlington Sep 30	MO St. Louis Jul 16, Aug 18, Sep 16	VA Norfolk Aug 14	VA Norfolk Aug 25
AR Little Rock Jul 7, Sep 16	HI Honolulu Sep 17	MA Springfield Sep 16	NC Charlotte Jul 22, Sep 23	VA Richmond Jul 8, Sep 8	VA Richmond Jul 8, Sep 8
AZ Phoenix Jul 14, Aug 27, Sep 24	IA Des Moines Jul 15, Sep 17	MA Worcester Aug 5	NC Raleigh Jul 15, Sep 16	VA Virginia Beach Jul 23	VA Virginia Beach Jul 23
CA Tucson Aug 26	IL Chicago Jul 14, Aug 19, Sep 15	MA Worcester Aug 5	NC Winston-Salem Aug 12	VT Burlington Sep 2	VT Burlington Sep 2
CA Lafayette Jul 30, Sep 24	IN Springfield Aug 11	MA Worcester Aug 5	NE Omaha Jul 9	WA Seattle Aug 6, Sep 3	WA Seattle Aug 6, Sep 3
CA Los Angeles Jul 16, Aug 13, Sep 8, Sep 30	IN Indianapolis Jul 21, Aug 12, Sep 24	MA Worcester Aug 5	NH Manchester Aug 27	WI Green Bay Aug 10	WI Green Bay Aug 10
Newport Beach Jul 21, Sep 17	KS Wichita Aug 4	MA Worcester Aug 5	NH Nashua Aug 13	WI Madison Aug 20	WI Madison Aug 20
Sacramento Aug 13	KY Louisville Sep 10	MA Worcester Aug 5	NJ Cherry Hill Jul 30, Sep 9	WI Milwaukee Jul 22, Sep 3	WI Milwaukee Jul 22, Sep 3
San Diego Jul 30, Sep 10	LA Baton Rouge Jul 23	MA Worcester Aug 5	NJ Iselin Jul 15, Jul 23, Aug 5, Aug 18, Sep 16, Sep 29	OR Portland Jul 21	
San Francisco Jul 21, Aug 18, Sep 15	LA New Orleans Aug 21	MA Worcester Aug 5	NE Princeton Jul 9	PA Harrisburg Aug 4, Sep 15	
San Jose Jul 9, Aug 6, Sep 2	MA Boston Jul 16, Aug 25, Sep 10	MA Worcester Aug 5	NM Albuquerque Jul 7, Sep 22	PA King of Prussia Jul 16, Sep 17	
CO Colorado Springs Jul 16, Sep 17	MA Burlington Sep 30	MA Worcester Aug 5	NV Las Vegas Jul 9, Sep 9	PA Philadelphia Jul 9, Aug 6, Sep 10	
Denver Jul 14, Aug 13, Sep 15	MA Springfield Sep 16	MA Worcester Aug 5	NY Albany Jul 14	RI Pittsburgh Sep 8	
CT Hartford (Farmington) Jul 23	MD Baltimore Jul 28, Sep 3	MA Worcester Aug 5	NY Buffalo Aug 6, Sep 29	RI Providence Aug 8	
New Haven Jul 28	MD Bethesda Jul 28, Aug 6, Sep 8	MA Worcester Aug 5	NY Long Island Sep 15	SC Charleston Aug 12	
DE Wilmington Jul 9, Sep 1	MI Detroit Jul 14, Aug 11, Sep 15	MA Worcester Aug 5	NY New York City Jul 8, Jul 16, Jul 22, Jul 29, Aug 6, Aug 13	TN Memphis Jul 29	
FL Ft. Lauderdale Jul 16	MI Grand Rapids Jul 8	MA Worcester Aug 5	NY Rochester Jul 30, Aug 20, Sep 22	TN Nashville Aug 6	
Jacksonville Sep 9	MI Traverse City Jul 28	MA Worcester Aug 5		TX Austin Aug 12	
		MA Worcester Aug 5		TX Dallas Jul 14, Sep 9	
		MA Worcester Aug 5		TX Houston Jul 9, Aug 6, Sep 18	
		MA Worcester Aug 5		TX Lubbock Aug 4	
		MA Worcester Aug 5		TX San Antonio Aug 13	

CANADIAN SEMINARS

Calgary Jul 15, Sep 9	Edmonton Aug 25	Hamilton Aug 18	London Jul 14, Sep 15	Montreal Jul 22, Aug 19	Ottawa Jul 4, Aug 6, Sep 3	Quebec City Jul 8, Aug 5	Toronto Jul 7, Aug 18, Sep 8	Vancouver Jul 23, Sep 17	Victoria Aug 20	Winnipeg Aug 11
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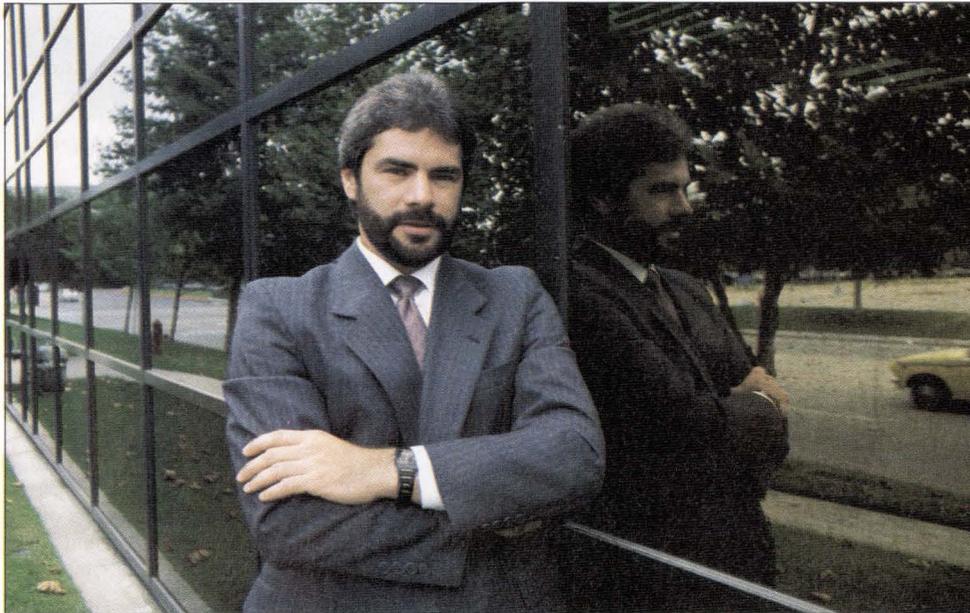
CIRCLE 10 ON READER CARD

News in Perspective

NETWORKS

Microsoft and 3Com Position LAN Manager as OS/2 Standard

Despite the politicking with Novell and others, the LAN product will change the rules of the networking game, placing a greater emphasis on distributed applications.



JACK BAUMANN OF HUGHES AIRCRAFT: It is a horse race between 3Com and Novell.

BY SUSAN KERR

It sometimes seems that in the computer industry things happen in a blink of the eye. Latest case in point: Microsoft Corp.'s LAN Manager.

On April 2, when the Redmond, Wash., software giant detailed the new microcomputer Operating System/2 it developed with IBM, it also included the first particulars of an add-on program dubbed LAN Manager. Three scant months later, beaming officials from Microsoft and newly announced LAN Manager codeveloper 3Com Corp., Santa Clara, proudly heralded the as-yet-unfinished product as the standard for pc networking.

"It's an oxymoron, such as 'instant classic,'" fumes Craig Burton, vice president

of corporate marketing and development at 3Com archival Novell Inc., Provo, Utah. Burton says his highly successful communications company will not support LAN Manager. Referring to the president of 3Com and the chairman of Microsoft, Burton declares, "Success comes not just by Bill Krause and Bill Gates saying this is a standard."

The LAN Manager skirmish is just the latest in a series of positioning battles involving OS/2. Although the operating system itself, as well as LAN Manager, won't hit the market in force until next year, vendors' attempts to interest potential users and, in some cases, other computer and software developers, are proceeding now at a frenzied pace.

Thus, while neither 3Com nor Novell shies away from a war of words, particularly with one another, there's more behind the latest posturing than usual. Along with offering faster and higher performance, the powerful combination of multitasking OS/2 and 80386-based microcomputers is expected to open the floodgates for a new generation of pc-distributed applications for which networks will be the key. 3Com, for one, makes no secret that it sees this next round as a chance to get a leg up on Novell.

Currently, in terms of size, the two companies are fairly close, with a slight edge belonging to Novell. Part of the reason may be that as far as product features go, some users find it hard to delineate between the two companies.

Hughes Aircraft Co., Long Beach, Calif., uses both 3Com and Novell products. Jack Baumann, Hughes's head of microcomputer consulting comments, "It seems to be a horse race" between the two.

With OS/2, the rules of the game could change, depending on the strategy each company chooses. And the one that guesses correctly is likely to be well rewarded. If networking companies can get software developers to follow their lead and actually release, for example, viable network server-based applications (as opposed to individual workstation-based programs), it follows that the already healthy rate of network purchases will increase dramatically.

"I think we'll start to see pc networks used differently in the future with all the development going on with the [IBM OS/2-based] PS/2s," asserts Linda Winkler, a computer scientist at Argonne National Labs, Chicago, and a 3Com user. She notes that with today's networks "there still are severe limitations to doing sophisticated applications like desktop publishing and databases." In fact, these two areas are most often cited as the prime candidates for potential microcomputer-distributed applications.

The 3Com View

According to the 3Com way of thinking, as most software companies are working frantically to migrate to OS/2, they'd probably prefer to write distributed applications using the programming tools learned for the new operating system. Microsoft and 3Com both say that applications developers need write only to OS/2, not to LAN Manager. LAN Manager then provides developers with what the two companies hope are standard interfaces for message handling, directory services, and electronic mail routing, as

well as built-in network administration and control features. Today, some of those features are written by the application developers or supplied by specialized LAN operating systems such as Microsoft Networks (MS-Nets).

"OS/2 LAN Manager is not a standard coming out of left field," says Paul Maritz, Microsoft Networking Business Unit general manager. "It is very closely related to OS/2. Loosely speaking, it's multiuser OS/2."

But since applications will be written to OS/2, not to proprietary networking pro-

NOVELL IS RESISTING SUPPORT FOR LAN MANAGER.

grams, 3Com president Krause claims that both workstations and network servers must use OS/2. Thus, he goes on, Novell's proprietary but popular NetWare operating environment will not work.

Novell has said it will support OS/2-based workstations but has been less clear about servers. Burton says that "eventually" Novell will support OS/2 on the server, "but it's more that *how* is the issue." To which Krause retorts, "Either it runs there or it doesn't. . . . The longer Novell delays the inevitable, the more advantage to 3Com."

Microsoft's Key Advantage

That has yet to be proven. LAN Manager isn't deliverable for at least another six months and there's no guarantee that it will live up to all the promises, points out Brian Mutert, an analyst with

Robertson, Colman & Stephens, San Francisco. On the other hand, he notes, Novell has a big job ahead trying to come up with a different scheme. "The important fact is that application developers write to the operating system and not to networking software," Mutert points out. "This gives Microsoft a key advantage unless Novell can write networking software that sits on the operating system and maintains compatibility with older products."

Thus, while one of the biggest questions appears to be how well Novell will pull off the migration to OS/2, it's obviously far too early to write off a company that controls a base of 120,000 servers and 785,000 users. Ashton-Tate database products director Eric Kim, when asked whether his company would be prepared, if necessary, to support separate LAN software from Microsoft/3Com, Novell, and IBM, answers, "It's not clear right now, but it looks like it's shaping up like that."

As far as LAN Manager itself, Burton says many of its purported features are already available, although not as closely integrated with the operating system. According to Burton, Microsoft talked to Novell about doing some of the work 3Com is doing, but Novell said no, because "the position was that we'd have to take a hit on technology" to support Microsoft's scheme. But he emphasizes the issue isn't who supports or writes LAN Manager, it's "that all three of us think distributed processing is better than shared processing."

Torrance, Calif.-based Ashton-Tate certainly agrees that a mighty potential lies in networked micros. It currently offers application software for LAN servers called dBase III Plus, but due to the limitations of DOS, it has been primarily a niche product, ac-

ording to Ashton-Tate's Kim. The combination of OS/2 and LANs will lead to "more group-oriented productivity tools," he says. But does that goal, per se, require LAN Manager?

"The LAN Manager basically provides the underlying capability necessary, for example, to establish communications between nodes," says Kim. "One of the key things is the concept of named pipes for interprocess communication. Without it we'd have to build in something like that ourselves. It allows applications to hand off streams of data, so there is cooperative processing—processing in the server and processing in the workstation."

IBM's position has yet to be determined. It has not voiced support for LAN Manager, and many expect it will



BILL GATES OF MICROSOFT

not. Yet, even if IBM chooses not to, there's a good chance it will incorporate LAN Manager's redirector (i.e., commands for file sharing) into its own version of the product, says Krause. He also believes that IBM will use OS/2 as the basis for its server operating system.

For that reason, observers think that 3Com's decision to hook up with Microsoft is invaluable to 3Com. That company will play a big part in finishing LAN Manager, and, in turn, will use it as the core of its next generation network operating software line, to be called 3+open. Among the added-value components of 3+open will be remote access and connectivity to Apple's Macintosh family.

Upgrades from older 3Com products will be available.

As developer of OS/2, Microsoft appears to be one of the few companies in a position to have relatively clear knowledge of IBM's plans in relation to that environment. There are some, however, with the more cynical opinion that IBM has its own agenda calling for less Microsoft involvement, and that as a result Microsoft is anxious to paint itself now as the standard bearer, as it is doing with LAN Manager.

Lotus Changes a Release Date

Additionally, a major goal of 3Com and Microsoft must be to see proper applications released not too long after LAN Manager. But Lotus Development Corp., for example, won't even comment on its plans or voice an opinion on LAN Manager. In fact, Lotus has slipped from a planned early 1987 release—of an implementation of its popular 1-2-3 that would sit on a server—to a release later this year.

Users definitely think that the concept of distributed processing holds promise for advancements in application packages that reside on the network server and can be distributed when needed. Of particular interest is the ability not only to do more complex applications, but also the gain of such benefits as updating multiple software copies at the same time and better track usage. But pricing will be a big determinant of its success, they agree, and that's something applications vendors have yet to work out.

"The next issue is licensing," says Argonne's Winkler. "It's either expensive or not clear what the rule is" today with server-based applications. She adds that in terms of networking applications, "some vendors are getting their act together and others are still wondering." ■

PRODUCTIVITY

High Cost, Lack of Standards Is Slowing Pace of CASE

The difficulty of measuring productivity gains has also deterred potential buyers, but some vendors, like Texas Instruments, are in it for the long haul.

BY RALPH EMMETT CARLYLE

Productivity. The word is never far from the lips of executives hoping to unleash the power of their massive software systems. Often uttered in the same breath is one of the industry's latest buzzwords: CASE (computer aided software engineering), or the automation of the software development process.

Unfortunately, as one large company found out, red-hot CASE turned out to be a case of all smoke and no fire. Earlier this year, the Connecticut-based Hartford Insurance Group (owned by CASE pioneer ITT) doused a multi-million-dollar initiative aimed at selling an integrated set of CASE tools. It did so after discovering that its peer companies were not ready to receive such technology, largely due to a lack of software development standards. But the Hartford affair may be only a harbinger.

"Despite its growing fascination with computer aided software engineering, corporate America, for the most part, is culturally unprepared to receive CASE technology," warns Capers Jones, who was a CASE pioneer while at IBM and ITT, and now heads Software Productivity Research (SPR), Cambridge, Mass. "The Defense Department and systems software developers have learned that there are no cheap CASE solutions, but the majority of the MIS community is ignorant of this fact." ITT, for example, projected that a 110-product set

of CASE tools would take from five to six years to develop and would require \$85 million for the software alone.

The ignorance to which Jones refers helped derail Hartford's endeavor and may threaten the well-being of other firms that have targeted leading dp shops with CASE products. Knowledgeware, Ann Arbor, Mich., for example, which markets a methodology and an integrated set of CASE tools, recently trimmed its sales and development staffs due to a corporate consolidation. A spokeswoman agrees that CASE is a tough market niche to commercialize, but she believes this will change when successful implementations of the technology occur.

In the Hartford situation, word of the insurance company's prowess in the CASE area reached MIS managers across the country. Having shed 175 programmers (from a base of 1,300 systems development staff) between 1985 and 1987, reduced maintenance costs by 20%, and improved overall productivity by almost 30%, the Hartford Insurance Group (HIG) was eager to pass on the fruits of what it internally called its Developer Workstation Program, later renamed the Solution.

MIS Execs Were Flown In

As a result, late in 1985 the insurer created a spin-off, Hartford Integrated Technologies (Hitech), to market its CASE family. Wang Laboratories Inc. invested \$3 million in the venture. During 1986, Hitech flew in MIS directors

from more than 170 of the nation's top companies to see its tools in action. But by the spring of this year, with only three small pilots and no sales, Hitech decided enough was enough.

What happened? Jack Crawford, former Hitech president, now back at HIG as vice president of Information Management, provides one answer. "The assumption with our product was that the leading corporations had a common [or standardized] life cycle for all their applications development and an effective measure of productivity. Many had neither. These are the nation's biggest companies. That is what is so surprising—and disturbing."

HIG developed its own software productivity measure based on industrial engineering techniques. "It worked for us, but it can't be used as a standard measure by other companies," says Crawford. Without such a measure—or productivity in-

dex—companies can't quantify the benefits of CASE.

Thus, at a time when the industry is paying lip service to the need for CASE, computerized tools for software developers are emerging ahead of an accepted productivity index, or effective measure. And, as SPR's Jones points out, many large companies are afraid that they could invest more in trying to improve productivity than they would actually be able to save.

Why Some Rejected Solution

While no company in the information systems community wants to admit openly that it doesn't have the culture in place to receive CASE, a number of those who rejected Hitech's Solution did discuss the technology.

"We believed their numbers [i.e., a 30% productivity increase]," says a senior MIS manager at a large blue chip industrial firm who requested anonymity. "But we couldn't come up with a financial model of what the cost benefits would be across our entire organization. We're so highly decentralized that we have a real problem getting a unified view of our data."

Adds an MIS executive from a large manufacturing company, "It seems like every new application we create ends up with its own data



HARTFORD'S CRAWFORD: Many firms had no productivity measure.

structure, and none of the data structures are compatible. We simply don't have the support organization for integrated CASE."

Several other MIS executives complain about the high costs and the risks. "You're talking millions of dollars and years of effort before you see any real benefits," says one in the banking sector. "And my boss keeps asking, 'Why isn't IBM doing this?'" Some of the MIS executives also note that they had balked at the idea of using Wang workstations, preferring instead to wait for more advanced IBM micros.

In recent years, IBM has come up with a numerical scoring system that attempts to measure the amount of function that programmers are delivering. These so-called "function points" are now catching on at large corporations, but early adopters claim that though these are useful, they are not yet a measure of software productivity in the fullest sense. "Function points can't be used effectively to compare dissimilar applications or measure the productivity of real-time software," states Amoco Oil's Dale Hull, manager of systems development support, corporate staffs, in Chicago.



SPR's JONES: There are no cheap CASE solutions.

Later this year, SPR is expected to announce a micro-based measuring tool that will be of use in the real-time arena.

Though a trifle late for Hitech, these measurement initiatives should be of benefit to other vendors taking up its integrated CASE mantle. Texas Instruments, for example, has taken an aggressive CASE posture.

TI insiders say that its CASE initiative, Information Engineering Facility, is regularly monitored by the company's directors who have already sunk more than \$50 million into the program and are currently spending between \$6 million and \$10 million a month in an effort to dominate the fledgling industry. Major beta sites such as Amoco are impressed by TI's commitment. "They're in for the long haul," declares Amoco's Hull, who had also evaluated Hitech and Knowledgeware, as well as other offerings.

TI's Productivity Goals

TI's goal, says one manager, is to improve its own internal dp productivity by a ratio of five to one by 1990 using its CASE tools.

"With a productivity payoff of that magnitude, it'll be apparent to everyone that we're on to something; even without an industry standard measure," says Phil Passmore, who is TI's manager of Information Systems and Services Commercial Products Marketing.

It's not beyond the bounds of possibility that Hitech could reenter the market, but the company would have to pay its own way. Though disappointed that Solution didn't set the world on fire, Crawford is nevertheless buoyant about the future. "We've made tremendous progress within HIG. We'll have recouped much of the original CASE investment by 1989." He adds that all of his

The IEEE Struggles for a Standard

"If it's tough to get a consensus on CASE standards within a single company, imagine what it's like trying to reach agreement across different industries." So says Robert Sulgrove, a consultant analyst at NCR's R&D group, and chairman of an IEEE committee on software productivity metrics, which has been struggling for the past three years to achieve just such a consensus.

"Many corporations are looking to us [IEEE] to come up with the 'one perfect measure' of software productivity. But I seriously doubt that there is such a thing," says Sulgrove, who, along with what he calls "committed" men and women from a number of companies including AT&T, Hewlett-Packard, and NCR, is nevertheless seeking this holy measurement grail. "How do you get a consensus on metrics when there are so many styles of applications development and at least a dozen different ways to measure a line of code?"

Sulgrove says that in the past, people measured manufacturing efficiency, but now for the first time are trying to assess how productive they are in development. "The trouble is we want to use the same old measure of efficiency—'Is Johnny coding enough?' and 'How fast?'—when what we really need is a measure of effectiveness. Often, efficiency can be down [less code output] and effectiveness up [fewer, but more quality lines of code]."

Sulgrove believes that the best that companies can hope for is to create a standard that will allow U.S. companies to use metrics—whether lines of code, function points, or whatever—in the same way.

He also urges more U.S. corporations to get involved in this standards initiative. "Only a few are measuring and interpreting data on their software development activities at this point. The rest are just waiting to be followers."

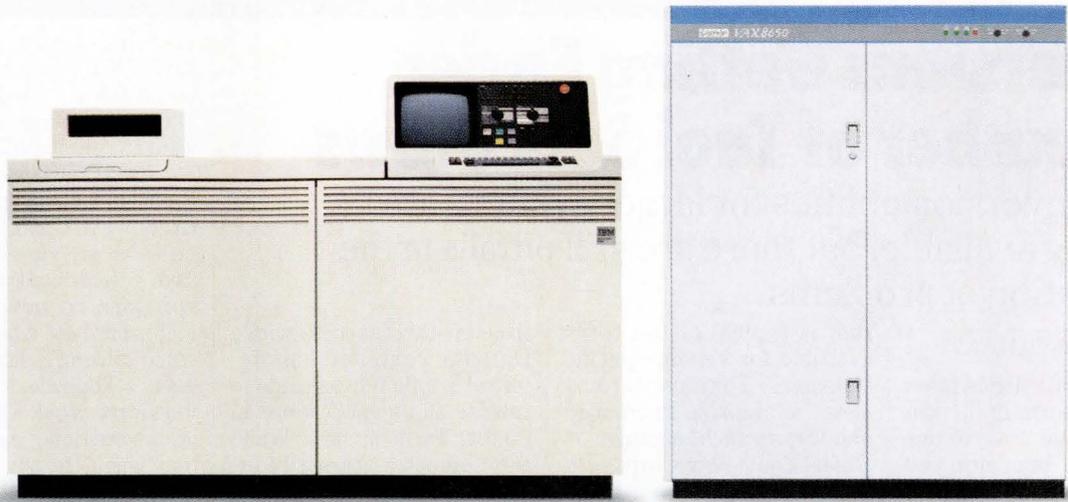
In contrast, he warns that the Japanese have a much more pragmatic approach. "They're saying, 'Let's use the measures we have now and be learning from them—even just counting lines of code is better than nothing.'" More than 100 companies have banded together in Japan to form the Joint Systems Development Corp. To date, more than \$100 million reportedly has been allocated for the CASE portion alone. Other initiatives, such as project Alvey, a consortium of industrial companies in the U.K., have also been launched to explore CASE.

But Sulgrove isn't all gloom. "Progress has been made by our committee, especially over the past year. We could have a draft standard within two years," he predicts cheerfully. Until that time, he adds on a more somber note, new CASE technology will continue to emerge ahead of effective ways to measure its benefits.

1,100 systems development staffers now have programmer work benches and do not have to compete for HIG's IBM mainframe resources.

Capers Jones declares software creation to be the worst measured and worst managed activity in computer society today. Certainly, the

programmer's craft has remained in the realm of "handwork" long enough, with pen and paper as tools. With luck, and with the help of the likes of Hartford Insurance and Texas Instruments, the nation's long-suffering programmers and analysts may soon get their due. ■



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CIRCLE 11 ON READER CARD

SOFTWARE

Conversions Getting Easier As Number of Tool Sets Grows

More conversion utilities for larger systems are becoming available, but there are still pitfalls in the perpetuation of problems.

BY GARY McWILLIAMS

Conversion software is often depicted as a form of pain reliever—a little dose of this utility or that emulator and the headache of a full conversion is alleviated.

The allure of simple conversions—in which applications are transferred from one make of computer to another—is being spread to users by a growing conversion tool set and by the opening of vendor conversion centers that provide the tools, free or low-cost computer time, and technical assistance.

Conversion Easier than Rewrite

Especially at the low end, where conversion software is prevalent, the conversion from one environment to another can be as easy as using an interpreter or emulator to transfer existing applications to a new system. The ease of these transfers can be compared with the prospect of a lengthy rewrite, which would require building an application from the ground up.

"I had no idea of the task before me," Chester Turnock, a vice president at Southwestern Petroleum Corp., Fort Worth, says of his company's decision to migrate from San Antonio-based Datapoint Corp.'s ARCnet computers to a minicomputer from Prime Computer Inc., Natick, Mass. The conversion software, which was obtained through a consultant's recommendation, "made the job a lot easier," he says.

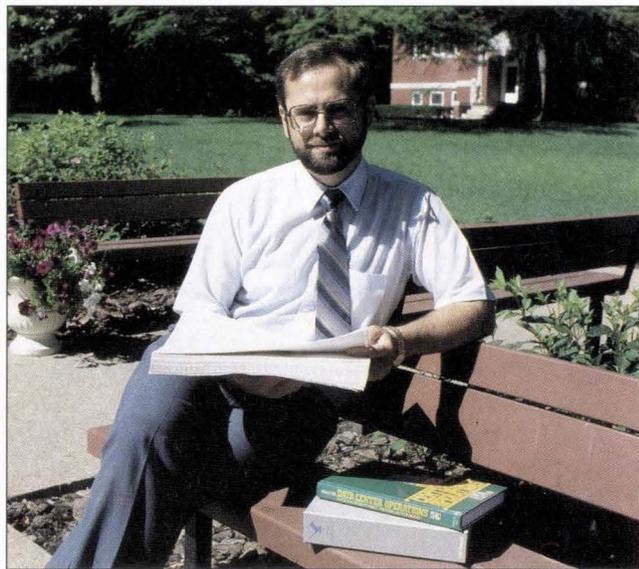
Turnock obtained a language compiler for his mini-

that is typical of the tools available for vendor-specific languages. Third-party packages are available to emulate or interpret such languages as Digital Equipment Corp.'s DIBOL, Wang Laboratories Inc.'s BASIC 2, Datapoint's Databus, and MAI/Basic Four Inc.'s Business Basic, among others. There is often more than one package to choose from for each language.

Users of such packages marvel at how quickly they can put existing software up on a new system. McKendree College, Lebanon, Ill., for in-

trolem, early success with a Databus compiler has deferred indefinitely its plans to rewrite all its applications in COBOL, Turnock says. While the company originally intended to phase out its Databus applications, it now will pick and choose which applications to preserve and which to discard.

"We've learned COBOL has some advantages, and Databus has some advantages that we're not willing to give up," Turnock says. "There may be a few applications that, because of the strength



McKENDREE COLLEGE'S BARKER: Maintaining existing software is key.

stance, plans to put an administrative system up during a weekend after reformatting data, according to computer center director David Barker. The only change users will see are new displays and slightly faster performance.

For Southwestern Pe-

and power of Databus, will remain [in Databus]."

Similarly, Northwestern Mutual Life Insurance Co., Milwaukee, a few years ago replaced dozens of Wang 2200s in field offices with pcs.

Northwestern's associate director of information

systems, Jeffrey S. Dunn, says, "We had a lot of host-based software written in the 2200's language and didn't want to rewrite it."

Reg Charney, who heads Program Conversions Inc., a Greenwich, Conn.-based conversion service company, says conversions of existing software to new environments are best when the software already has proven itself. "The reason why conversions work is the programs are doing exactly what they want," he says.

Possible Conversion Problems

But conversions aren't without some drawbacks. In many cases, the software emulators or interpreters turn out to be a temporary means of preserving applications. "The conversion lets me get data over to a more functional machine very quickly," says McKendree College's Barker, "and allows me to operate in my existing software until I'm ready to do a rewrite."

Problems can crop up when the stay is more than temporary. For instance, conversions typically entail moving one or more applications to a higher-performance system. What can be lost in such cases is full performance of the machine due to the overhead of language interpretation or emulation. The advantage of not having to retrain users in these instances is tempered by the inability of the software to make full use of the new environment.

Bill Kuechler, a senior analyst at Maxwell & Co., an Atlanta developer that has used such tools to move its home building software from Wang 2200 minicomputers to networked micros, cautions that conversions can result in the transfer of an older system's limitations. "People want to see pop-up windows and pull-down menus" that older systems don't include and that cannot be included

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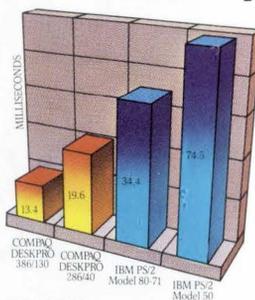
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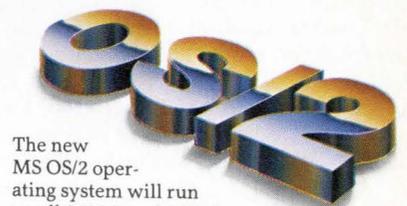
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STRATEGIES

CDC's Tough Road To Recovery

A leaner and meaner Control Data says the worst is over, but user concerns over late products linger.

BY KAREN GULLO

A cartoon tacked to an employee bulletin board at Control Data Corp.'s headquarters 18 months ago depicted the upper floors of the company's glass building enveloped in a mass of clouds as bewildered employees peered into the haze. The caption read something to the effect of, "Has the smoke cleared yet?"

That cartoon has been discarded and in its place these days are the slick new ads touting CDC's new departmental computer, the 930. This is a far cry from the tone of uncertainty in the old cartoon.

Has the dark cloud indeed lifted from CDC? As it gets ready to celebrate its 30th anniversary next month, a leaner and meaner Control Data is attempting to bounce back from two years of disastrous losses and prove itself a tough and viable competitor, boasting a strict focus on the market it rode to fame in the first place: scientific/technical/engineering systems.

Users say the jury's still out on whether the company can do it. CDC has a big task ahead, they say, in catching up to IBM, Digital Equipment Corp., and other competitors, who are offering systems that include not only high-performance hardware but also software that addresses both technical and administrative applications. The latter is gaining importance among technical users, and though CDC has made some headway, it has a ways to go.

"They are trailing other

vendors," says Ray Argo, computer project director at the University of Georgia, Athens, and president of VIM, an independent CDC user group. "Time got them into this mess and only time will get them out."

The company is leaner in that it has divested some 20 businesses and reduced its work force by over 10,000 employees in the past two years. In addition, CDC sold off most of Commercial Credit Co.

As for being meaner, a new breed of aggressive executives now occupies the 14th floor of CDC's corporate headquarters. Gone are William Norris, CDC's founder and former chairman, and the programs to invest in businesses that address society's unmet needs.

"Our aim is to concentrate on those computer businesses where we have a competitive edge," says John Buckner, chief financial officer, who joined the company last year from EG&G Inc., a Boston-based conglomerate. "We think that's a good way to satisfy society's needs."

Many observers credit Robert Price, Norris' hand-picked successor, for bringing the new aggressiveness to the company. Price was unavailable for comment.

The company has embarked on what is, for CDC, a bold program of product introductions and enhancements in the areas of computer integrated manufacturing (CIM), CAD/CAM, and computer systems.

Analysts estimate 1987

without a significant rewrite.

Others with conversion experience say that, prior to buying an emulator or converter, a test of the package on the appropriate applications will sometimes—but not always—highlight potential problems. "In our case," notes Bert E. Picot, vice president at Globe Information Systems, Tampa, Fla., a test "didn't give us the key to knowing how long a conversion would take; the test just told us it could be done. You need to understand the application and the structure of the source code and files."

The transitions by vendors from one product line to another, as well as the rise and fall of smaller vendors, suggest that more and more MIS people will be looking for

ed to commercial software developers.

Digital is testing a Wang VS-to-VAX COBOL converter and several HP 3000-to-VAX migration tools with selected developers. Wang even promotes a transcontinental hookup to an Indian company specializing in IBM and HP software conversions.

While the tools are expanding from low-end computers to encompass minis, many believe it's unlikely to be carried much further. Mainframe conversion tools, for instance, are rare.

There are times when a rewrite is the better alternative. For instance, Management Engineers Inc., a Reston, Va., software developer, rewrote its association and membership package to support the Wang vs.

"It took a year-and-a-half to rewrite," says Management Engineers vp Michael Werner. "It was a somewhat laborious task." The rewrite, however, "has an intrinsic advantage—it allowed us to incorporate the most recent technical advances and expertise in that package."

Goldome Credit Corp., Birmingham, Ala., also has ruled out more than temporary use of a conversion process that will see its loan origination software carried over from Texas Instruments' minis to newer DEC VAXs.

Roy Tonkin, Goldome Credit's vp of dp, says the use of System Z, a 4GL developed by Zortec Inc., Nashville, "was a fast way to get to Digital while we rewrite [the applications]. It looks like a pretty good product," adds Tonkin, "but we plan to have something that is easily supported internally. COBOL is easy to support."

While such packages can provide a quick means of moving software to more robust computers, they—like pain relievers—sometimes being only temporary relief. ■

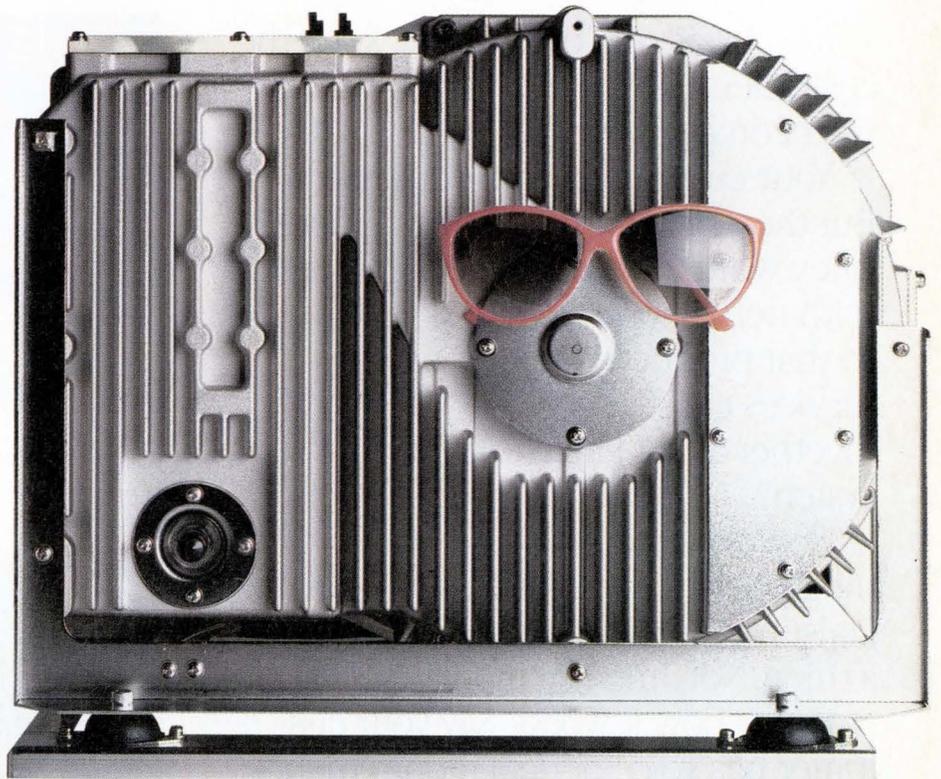
MORE VENDORS ARE OPENING CONVERSION CENTERS.

help in the future. Jack MacDougall, who is responsible for Prime's conversion efforts, says 50 software developers and users have been through Prime's conversion center in less than a year. Honeywell Bull vp James Murphy says a similar number have contacted his company's technical team.

More and more computer vendors are opening conversion centers and providing technical assistance. Digital, Data General, Hewlett-Packard, Honeywell Bull, Prime, and Wang are among those offering such services to users. Texas Instruments recently established a conversion center in Austin, Texas, restrict-

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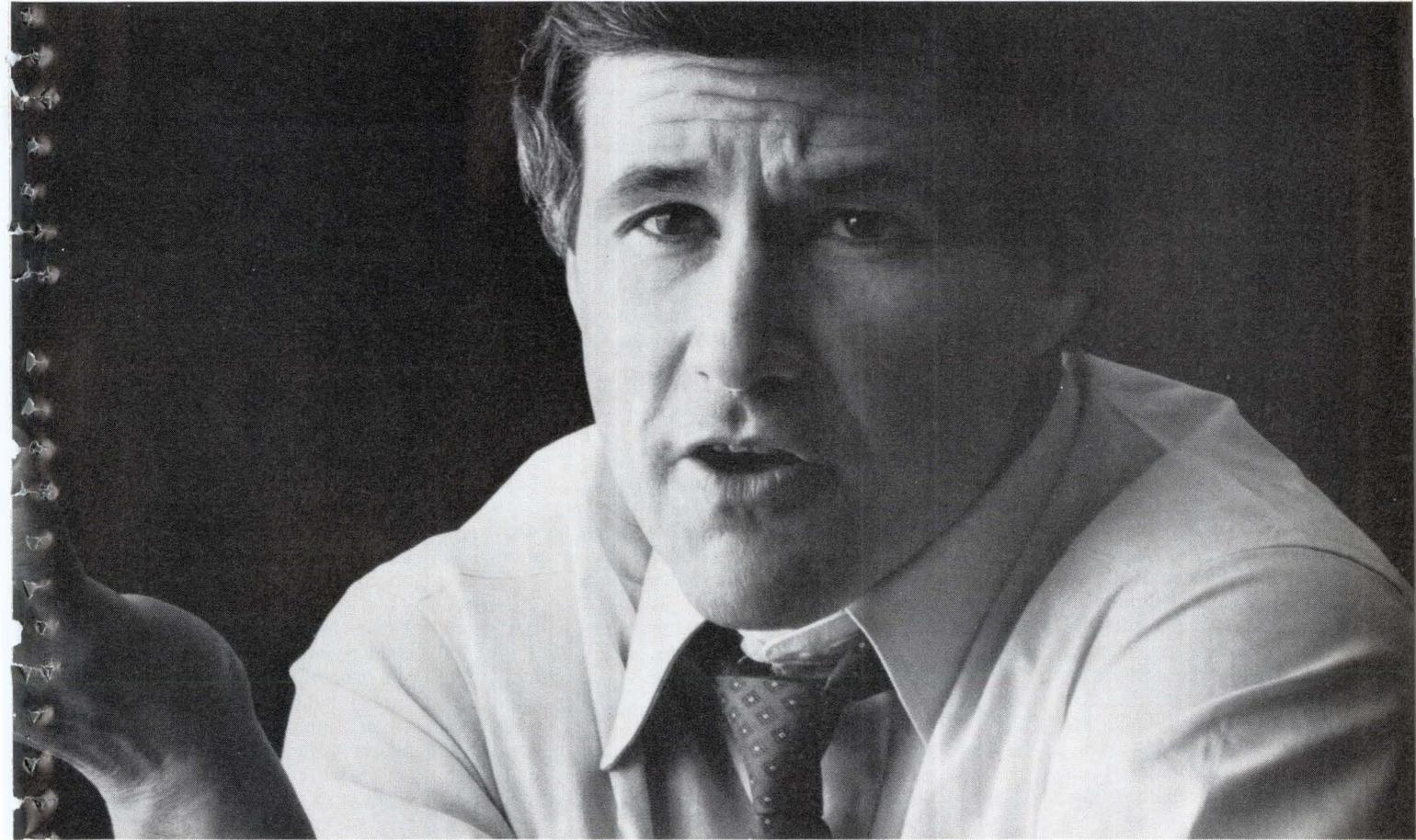
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News in Perspective



CONTROL DATA'S JOHN BUCKNER: "We won't hit our stride until 1988."

earnings to be around \$20 million. The company's net losses last year totaled \$264.5 million.

The company reported a profit for the first quarter (ended March 31) of \$7.2 million. The second quarter (ended July 31) saw a loss of \$5.5 million.

While returning to profitability is a big step in the right direction, it doesn't necessarily amount to viability in the eyes of customers. "Profitability is not the only answer," says Abraham Levine, manager of software systems at the scientific computing center at Rockwell International, Seal Beach, Calif., and vice president of VIM. Levine says CDC must correct a problem that has plagued it for a number of years—being late in delivering products.

Gil Williams, CDC's vp of computer systems, says the company is becoming more results oriented. "We're focused more clearly on who we are and we're getting products to market a lot faster," says Williams.

Last year, the company rolled out the Cyber 910, oemed by Silicon Graphics of Mountain View, Calif. The 910 is the first model in a family of Unix-based integrated graphics workstations.

The 910 is figuring into the plans of some large users, while others are still contem-

plating it.

Rockwell's Levine says he is incorporating 910s into his environment, and calls the machine an "excellent way to provide a workstation on the desk with the power of a mainframe behind it."

The manager of computer planning and operations at a large automotive corporation, who requests anonymity, says his company plans to implement a computer aided engineering (CAE) network of workstations and data systems.

910 Makes CDC Attractive

While he says it's premature to comment on who will get the business, the executive says CDC has made itself a much more attractive competitor with the 910, the performance enhancements of its top-of-the-line Cyber 990, and Unix and VMS shells for NOS/VE.

This summer, CDC improved the performance of the 990E and 995E, the high-end machines in the Cyber 180 series. A new FORTRAN compiler boosts cpu performance to 28MIPS for the 990. CDC also introduced a new disk system, which gives the 990 channel speeds that are four times faster than those of an IBM 3090, CDC claims.

Levine of Rockwell says that without the new compiler, he would not have made

the decision to initiate a companywide migration to the 990, along with an aggressive move to NOS/VE as a production system. But, he warns, the real key to gaining market share is the timely release of the next-generation 990. CDC has to get to market as quickly as possible, or risk being "swallowed up by IBM," Levine says.

CDC officials say a 990 follow-on is just around the bend, but decline to elaborate.

Another key product announcement this year was that of the 930, a departmental computer that offers cpu power comparable to that of a DEC VAX 8500 and a list price some 57% lower. The company, at press time, had orders for "more than 10 and less than 50," according to vp Williams. While vague about CDC's expectations for the product this year, Williams says that he has "no reason to think that the number of machines we produce this year, which is in the hundreds, won't be sold."

Much of CDC's Cyber line performance improvement strategy relies heavily on NOS/VE, which became available in its full production version in March. To take advantage of performance enhancements and of new application software, users must migrate from the old NOS to NOS/VE. While users are enthusiastic about the power the OS affords, they say that the trade-offs involved in implementing it make adopting NOS/VE a tough choice.

So far, NOS/VE has been installed in about 300 sites. "When you have to decide to either stay where you are or go with NOS/VE, it's almost like changing vendors," says Argo at the University of Georgia. "It's both a strength and a hindrance for CDC. They stand to lose a few customers."

CDC's Nagging Losses

Other uncertainties nag the company. The \$100 million to \$150 million that the company has sunk into ETA Systems, based in St. Paul, has yielded no return as yet (see "The Thrill Is Gone," April 15, p. 17). The subsidiary will lose \$50 million this year, says chief financial officer Buckner, and significant revenues are not expected until 1989. In the data storage area, faulty 9-inch disk drives will cost the company \$25 million this year.

Buckner says the company is bullish on the outlook for ETA. He is philosophical about the drive problem. "We've said all along that 1987 would be a year of change and this is an example. We're going to have some disappointments. We're building momentum. We won't really hit our stride until 1988."

While customers are not ready to say that CDC's viability is assured, many seem to share Buckner's cautious optimism. Says Rockwell's Levine, "They began to turn the company around before it's too late. They haven't lost out forever." ■

CDC at a Glance

(IN MILLIONS)

	1985	1986	1987*
Total Revenues	\$3,679.7	\$3,346.7	\$3,500.0
Corporate Earnings	-484.0	-280.6	20.0
Computer Business	-562.7	-307.1	20.0

*Estimated

Sources: E.F. Hutton; Piper, Jaffray & Hopwood; DATAMATION

TRADE

Despite Sullivan's Latest Call, Firms Continue in South Africa

Unisys, Control Data, and Hewlett-Packard will continue to follow the Sullivan Principles, but greater pressure is expected from the anti-apartheid movement.

BY WILLIE SCHATZ

Now that the Sullivan Principles have been shelved by their creator and replaced with more stringent demands, what happens to the computer companies that continue to use the principles as justification for staying in South Africa?

The Sullivan Principles, first promulgated in 1977 by Rev. Leon Sullivan, a Philadelphia minister and member of the board of directors of General Motors, are guidelines for determining if U.S. corporations doing business in South Africa are following fair employment practices. Almost all U.S. companies subscribe to them.

A year ago, Sullivan announced that if the South African government hadn't made substantial progress in dismantling apartheid by May 31 of this year, he would call for a total economic boycott of South Africa and urge U.S. companies to leave. When the deadline came but change did not, Sullivan kept his word.

Business As Usual

"Sullivan's pronouncement means a great deal," contends Tim Smith, executive director of the Interfaith Center on Corporate Responsibility (ICCR), an interdenominational church group in New York. "It rips away the moral rug from under the corporations' feet. It makes them much more exposed and vulnerable to criticism. Now they don't have anything to hide behind."

But for Control Data,

Hewlett-Packard, and Unisys, it's business as usual. "Rev. Sullivan's announcement has not changed our position at all," says a CDC spokesperson. "We will continue to do business in South Africa as long as we can do it profitably and contribute to meaningful social change. We were one of the original signers to the principles, and we will continue to follow them." An HP spokesperson says HP also will continue to abide by the original principles and has no plans to leave.

The same holds true for Unisys. Chairman W. Michael Blumenthal is one of the organizers and is current cochairman of the U.S. Corporate Council on South Africa, a group of major U.S. business leaders that is trying to end apartheid. Blumenthal reaffirmed Unisys's steady-as-she-goes course at last April's annual meeting, telling stockholders, "This is a difficult and painful subject. We find it difficult to give up the fight after working there for so many years. We know the risks involved and are constantly re-evaluating our position."

Not after Sullivan's announcement, though. "That's had no effect," a Unisys spokesperson says. "We're not listening to his call to leave South Africa." Blumenthal had not returned calls by press time.

But even the power of two may not be enough; the business of doing business in South Africa is about to become markedly more difficult. Anti-apartheid groups have vowed to put even more pres-

sure on American companies that have yet to join the growing exodus from South Africa.

Randy Carter, a staffer at the American Friends Service Committee, a Quaker peace group in Seattle, says, "Now that Sullivan's come to what we consider a more correct political analysis, he's become more valuable than ever. He can stand up to corporations in a way we can't."

The Roles of IBM and AT&T

The movement against apartheid happens to have two readily available targets on which Rev. Sullivan can focus his efforts: IBM and AT&T.

Both companies argue strenuously that they have left South Africa and aren't coming back, but critics counter that there is a world of difference between getting out of South Africa and *getting out of South Africa*.

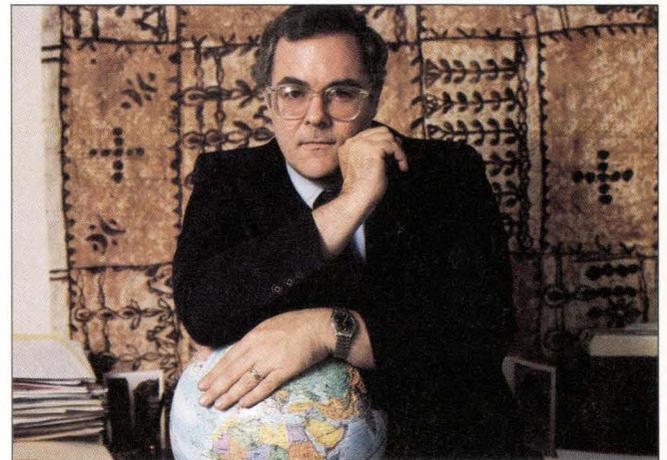
IBM last year sold its business interest to its employees. The new owners then formed a new, totally inde-

pendent entity, over which IBM insists it has no control, but Big Blue continues to supply the new entity with computers, peripherals, parts, service, and anything else it needs to carry on its business. There hasn't been much damage to Big Blue's public image, either. AT&T's, however, is taking a beating even though it is much farther out of South Africa than IBM ever intended to be.

The company made a mighty splash when it ceased all business in South Africa other than basic international phone service. Unless you count computers.

According to *The Report on AT&T* newsletter, AT&T's 3B computer line and Unix software remain readily available in South Africa today. And the *1987 South African Computer Users Handbook*, published by Systems Pty. Ltd., Johannesburg, lists sale prices for the 3B1, 3B2, 3B5, and 3B15. But AT&T's not selling the machines. Olivetti is. And therein lies the problem.

AT&T's 25% interest in Olivetti makes it the company's largest shareholder, but it's not enough to dictate Olivetti's South African activity. Olivetti has made it clear that it's full speed ahead in South Africa. According to the *Johannesburg Mail* newspaper, Olivetti has built a new fac-



INTERFAITH'S SMITH: "Sullivan's pronouncement means a great deal."

tory in South Africa designed specifically to make Unix computers for the South African market.

Meanwhile, AT&T maintains that everything's cool. "Our position on South Africa has not changed," an AT&T spokesperson says. "As far as we're concerned, both Olivetti and AT&T are following the original agreement. We announced last Dec. 31 that we would not ship any computers to Olivetti for sale or distribution in South Africa. We haven't. But Olivetti was authorized to sell its 3B inventory until it's exhausted. We don't know how many they had."

The subject remains very sensitive. Sources say that AT&T has refused to meet with employees concerned

SULLIVAN WANTS A COMPLETE PULLOUT.

about South Africa and has made it clear that the issue is closed. It's going to be around for a while, though, because of a resolution presented by the Episcopal Church at AT&T's annual meeting that asked AT&T to do nothing more than make its best effort to talk to Olivetti. It gained 9.5% of the shareholders' vote, and the subject will be on the ballot next year.

Assurances From Japan

AT&T is not the only entity facing a foreign competition question. The Anti-Apartheid Act of 1986 provides penalties for other companies and/or countries that sell to agencies enforcing apartheid. At a recent House Subcommittee

on Africa hearing, Rep. Howard Wolpe (D-Mich.), chairman of the committee, asked Paul Freedemberger, assistant secretary of commerce for trade administration, if Freedemberger had any information or evidence that Hitachi or any other foreign computer companies had been replacing U.S. firms' sales to agencies enforcing apartheid.

"We have assurances from the Japanese that they will not fill in behind us," Freedemberger replied. "We have no direct evidence, but when we have our [postshipment diversion] checks in South Africa, we hear all sorts of anecdotal remarks that 'We'll get it in Europe or Japan.'"

They're more than anecdotal. According to ICCR, the previously documented Hitachi-BASF connection (see "Out of Africa," Nov. 15, 1986, p. 22) continues to be a supply line for prohibited South African users. Hitachi was concerned enough to have a memo written to ICCR's Smith in which the company asserts it is in full compliance with Japanese export restrictions on computer sales in South Africa and "has taken steps to ensure that Hitachi does not benefit from or take advantage of restrictions on U.S. companies." Hitachi also says that its oem customer—BASF—agreed to limit its 1987 volume of South Africa sales to the 1986 level.

Good, but not good enough. ICCR is just going to keep those cards and letters coming in. Its latest was a letter to Secretary of Commerce Malcolm Baldrige about possible violations of U.S. export controls on computers and computer technology supplied to South Africa.

"U.S. computer companies definitely support the white infrastructure in South Africa," Smith contends. "I don't see how they can argue otherwise." ■

BENCHMARKS

IBM Takes Off

IBM is making great strides toward establishing itself in the airline reservation industry. Big Blue recently won large contracts to supply hardware for both a European system and a worldwide system, beating out Unisys for both deals. The European contract, which is reportedly worth \$300 million, is for a shared reservation system called Amadeus formed by Air France, Lufthansa, Scandinavian Airlines System, and Iberia. The other contract is for a worldwide system established by United Airlines' computer subsidiary in conjunction with the reservation systems of British Airways and several other European airlines. The deal is said to be worth \$120 million.

Inmos For Sale

Thorn EMI is seeking a buyer for Inmos Ltd., its Bristol, England, semiconductor subsidiary. The London-based Thorn had been searching for investment partners to purchase a minority interest in Inmos, but Thorn officials say in published reports that they would prefer a complete sell-off. Over the past two years, Inmos has lost nearly \$44 million. Several U.S., Japanese, and European companies are reportedly considering the purchase of all or part of Inmos.

Hitachi Opens U.S. Plant

Hitachi hopes to be producing digital PBXs worth \$60 million a year within five years at a new facility it is setting up in Norcross, Ga. A newly established company, Hitachi Telecom USA, has already hired 70 workers and expects to expand to 100 when full production is reached.

Ryan-McFarland Deal Complete

COBOL products maker Austec Inc., San Jose, completed its acquisition of Ryan-

McFarland Corp., Rolling Hills Estates, Calif. Terms of the acquisition were not disclosed but net revenues of the combined companies are believed to exceed \$25 million. All Austec and Ryan-McFarland products will be sold under the latter company's "RM" label.

Cullinet-DEC Pact

Cullinet Software Inc. has signed an agreement with Digital Equipment Corp. to study the feasibility of jointly developing software for DEC's 32-bit VAX line. Cullinet officials say the agreement is part of the company's effort to compete in the 32-bit computer software market.

Former Culler Chief Joins Prime

Gerald V. Butler, who was removed from his post as president of Culler Scientific Systems Corp., Santa Barbara, Calif., over two months ago, has been named vice president of engineering and scientific products at Prime Computer Inc., Natick, Mass. Butler will oversee the development and marketing of workstation and parallel processing products. Culler was put up for sale by its financial backers after its personal supercomputer offering failed in the market (see Look Ahead, July 15, p. 9).

Thomson Buys Nomad

Thomson SA, a Paris-based high-tech and aerospace company, has acquired the Nomad fourth generation language software product line from D&B Computing Services, Wilton, Conn., for \$17 million. The products now will be marketed by a newly formed Thomson company called Must Software International, also in Wilton. The new company sprung from the Must project, which Thomson formed to develop software products that will integrate text, images, and graphics. ■

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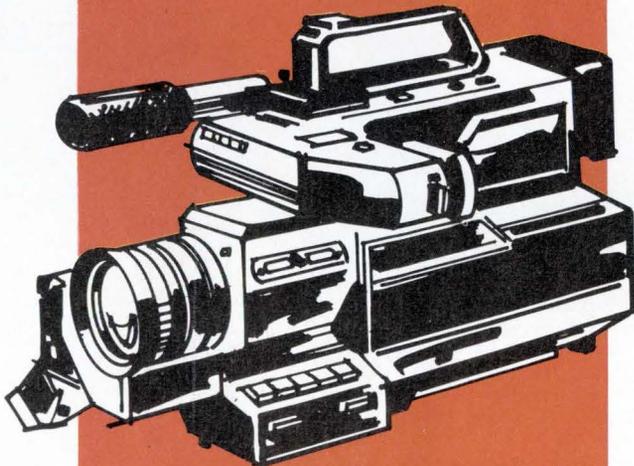
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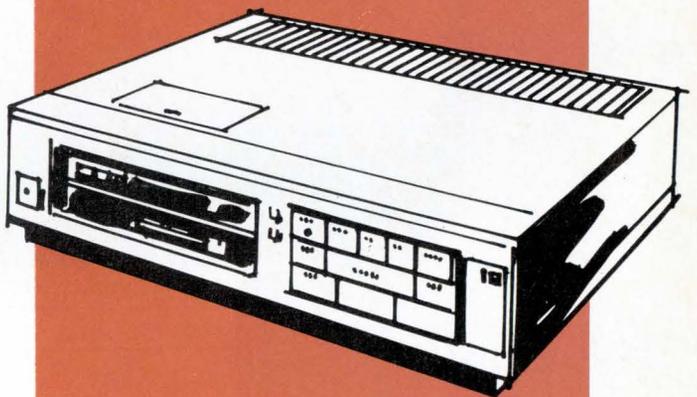
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PERSON	ID NUMBER	TERRITORY	CUSTOMER	CUST. NUMBER	PART NUMBER	ITEM	SHIPDATE	WAREHOUSE	SHIPDEST	CARRIER	CUST. T
	101000000	NEW YORK	APEXINC	33333000000	KL23487654	200	10/02/85	NYPHILIDE	NEW YORK	ACMETRS	25
	102277754	BOSTON	ZINCINC	33388990044	KL23450987	007	12/01/85	CENTRALLA	BOSTON	ATAAIR	25
	100000456	CHICAGO	AASEHER	98750372378	KL23090867	999	ONHOLD	WOODLAIN	CHICAGO	DUMAIR	10
	109857363	ATLANTA	TUSINC	77493687549	KL23999999	808	11/19/85	ATLANTANJ	AUGUSTA	EMFRT	50
	107584948	MINNIAP	XYZCORP				07/85	MINNSTPAUL	MINNIAP	TRUCKER	1
	100958408	SANFRAN	JAKINC				28/86	SANTOSESE	SANMATED	SHORTAIR	50
	100674637	SANJOSE	ACDCORP				08/85	SACRAMENTO	SANTOSE	EZHAULER	50
	107583848	LOSANGEL	LYNINC				18/87	IRVINECA	WESTLAIN	LATRUCK	50

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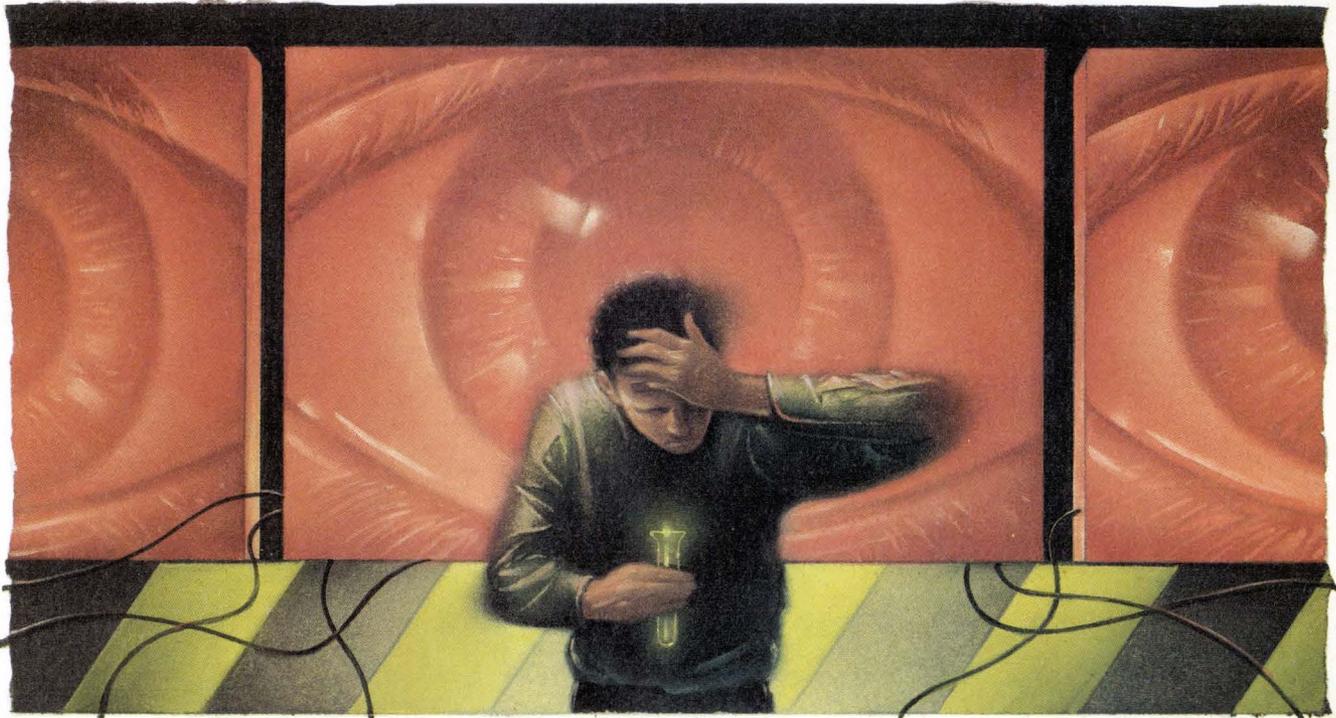
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CIRCLE 16 ON READER CARD

Behind the News

PRIVACY



As AIDS Spreads, State Pc Systems Are Reaching Limits

So far, privacy has been largely maintained, but the government's desire for routine testing could place an even greater burden on records systems.

BY JEFF MOAD

Kathy Raevsky was working for the State of Colorado's public health department when, in the fall of 1985, a state law went into effect requiring mandatory reporting of all state residents testing positive for the Human Immunodeficiency Virus (HIV), which can develop into the Acquired Immunodeficiency Syndrome (AIDS). "Suddenly, we started to receive all these lab reporting slips from testing sites throughout the state," remembers Raevsky, now associate director of the state's AIDS testing, counseling, and record-keeping program. "My boss came in, took one look at the piles of paper, and said, 'You need to get all this stuff on a computer.'"

With that, the State of Colorado kicked off a race to develop a computer system that could keep track of the

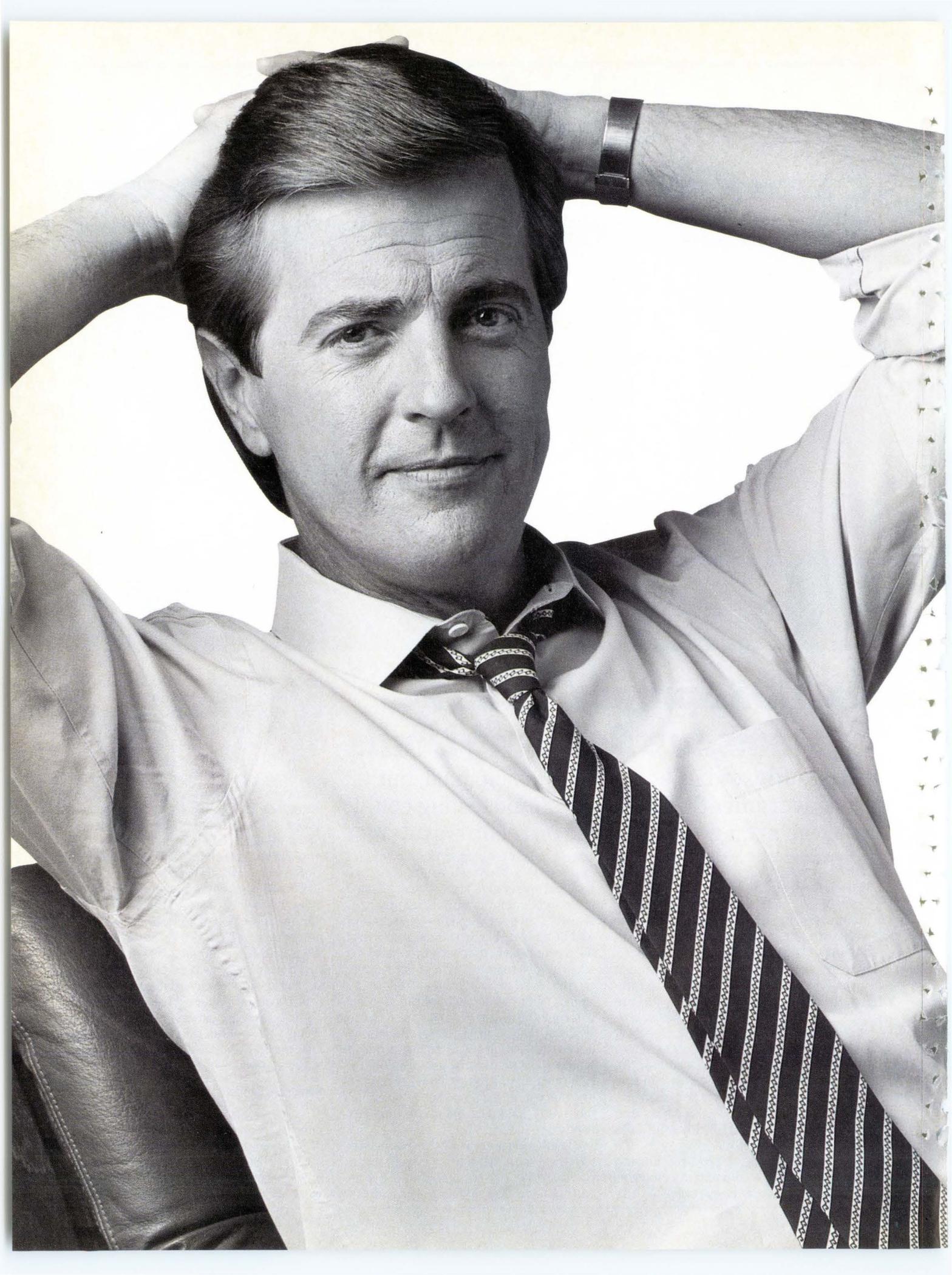
state's rapidly expanding number of AIDS cases and positive test results. The system had to receive and analyze test results and demographic information from test sites all over the state—and do it on a tight budget. Perhaps most important, the system had to ensure the complete security of sensitive HIV test data stored on the system and transmitted to research operations, such as the Centers for Disease Control (CDC) in Atlanta. Without that security, state officials believed, the testing and reporting program would collapse because many people at risk of exposure to HIV would avoid taking the voluntary blood tests on which most AIDS diagnosis and prevention currently depends.

Colorado is one of the few states that requires mandatory reporting of positive HIV test results. But the state has not been alone in focusing significant

resources on the capacity and security of its AIDS-related electronic data collection, analysis, and distribution systems. As the AIDS crisis has spread to include 38,867 diagnosed cases and 1.5 million individuals exposed to HIV, most state governments and many local health agencies have developed personal computer-based systems to track and report diagnosed AIDS cases to federal authorities and, where mandated, to keep track of positive HIV tests. The Department of Defense and all branches of the military also have been forced to develop secure systems to keep track of the nearly 3 million mandatory HIV tests that have been performed on members of the armed services and their families. Even privately run operations, such as blood banks, insurance companies, and medical records reporting companies, have had to develop policies and systems in an attempt to ensure the confidentiality of HIV testing information or else face prosecution in many states.

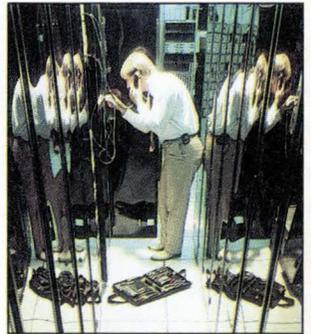
Successes Despite Weaknesses

Although state and local agencies have been on their own and usually short of funds in developing secure electronic AIDS reporting systems, most seem to have been successful so far. In spite of what many state and federal AIDS pro-



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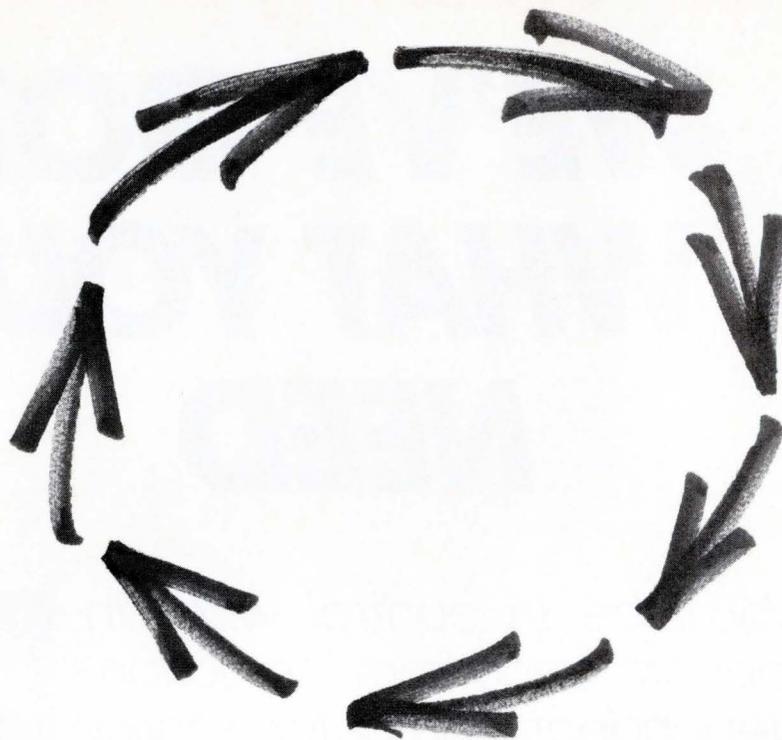
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Behind the News

gram officials admit are some potential weaknesses in most systems, there have been few reports of systematic security breaches in state-run AIDS reporting systems.

As the number of AIDS cases continues to grow, however, many officials at the state and local levels fear that their systems will be swamped. Most state and local health officials have opposed the Reagan administration's push for widespread "routine" HIV testing, arguing that they would have a hard time paying for the necessary expansion of their computerized data collection systems, as well as paying for the increased testing itself.

In Colorado, where nearly 16,000 people have been tested since 1985 through the state's test site program alone, the computer system to track and analyze test results has grown from a single IBM AT to three PCs running software developed both internally and by the Centers for Disease Control. Based on a recently enacted state law, which requires reporting an individual's AIDS symptoms in addition to HIV exposure status, Colorado's Raevsky predicts the program will have to be upgraded to a larger minicomputer-based system in less than a year.

Currently, the Colorado system is housed in a secure room in the health department's Denver offices where a heat-sensing alarm system protects against unauthorized access to the computers. Software written by state consultants tracks positive HIV test results, which are required to be reported to the state. The software uses special utilities to hide the actual HIV test reporting directories, and there is a security log-on program on top of that to limit access to the system to six persons. The password is changed once every few weeks.

Security Expenditures Pay Off

According to Colorado officials, the software and physical security features so far have accounted for the bulk of the state system's cost. "The decision to go with confidential testing as opposed to anonymous testing and to have mandatory reporting has really put a burden on the system and made us focus on security," acknowledges Raevsky. But, say Colorado officials, the program has resulted in more efficient AIDS education and better follow-ups because the state has the identities of those who have tested positive for the virus and also exten-

sive demographic information.

Beth Dillon, the state AIDS education program manager, says Colorado's system has succeeded in protecting the confidentiality of HIV test information. "I'm sure the ACLU would love to have a couple of cases of breached confidentiality to use against us, but they don't because there have been none," she says.

Dillon says several states have contacted her in recent weeks to find out more about Colorado's confidential testing operation and the state's computer tracking system. She says Arizona and Washington are currently considering using the Colorado computer system as a model.

Still, Colorado officials, like most officials developing computerized AIDS reporting systems, admit the security safeguards are not perfect. "Certainly, someone who was computer literate,



**COLORADO
HAS DONE
WELL IN
PROTECTING
CONFIDENTIALITY.**

with enough time, could crack it," says Raevsky. "If someone were to try, we just want it to take long enough so that they would still be here when the police arrived."

Civil liberties and AIDS activists worry that the confidentiality of HIV testing information could be compromised, especially as testing becomes more widespread and particularly in states where reporting is mandatory. "The security of testing information that is stored on computers is something we're very concerned about," says Norm Nickens, the AIDS representative on San Francisco's Human Rights Commission, which investigates AIDS discrimination allegations. "We haven't had any cases so far that we can trace to computer security problems, but the more data you have being stored in more places, the greater the chance for abuse."

Specifically, officials like Nickens

are concerned that insurance companies, lending institutions, or employers could improperly gain access to AIDS information and deny sufferers insurance, housing, and employment. Activists say discrimination against AIDS patients or even against those who have simply tested HIV positive is booming. The number of reported AIDS discrimination cases in San Francisco more than tripled last year, according to city officials.

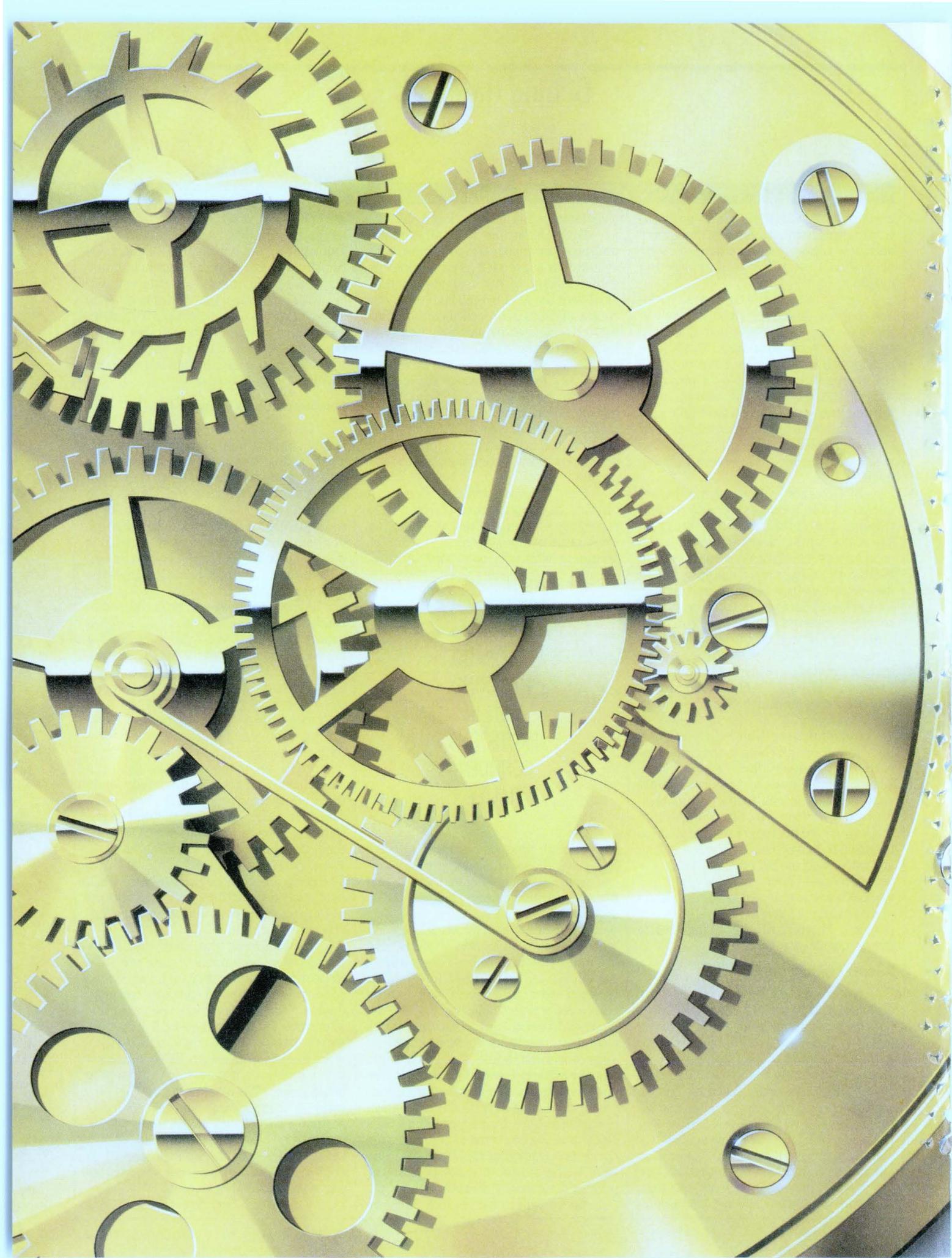
Pressures Differ In Other States

Unlike Colorado, most states currently support only anonymous testing. That means most states' computerized AIDS record-keeping systems aren't under as much pressure as Colorado's is to handle an increasing number of confidential test results. To the extent that confidential testing is done in most states, it is done by private doctors and blood banks, which, under state law, must keep AIDS records confidential.

All states, however, are required to track actual diagnosed AIDS cases and to report those cases to the Centers for Disease Control. Forty states, comprising about 95% of the diagnosed AIDS cases, currently use a special CDC-developed software program called the AIDS Reporting System. Developed by Mead Morgan, the AIDS program's chief of statistical data management, the program is written to run on the IBM PC and incorporates an encoding device intended to hide the identity of AIDS patients. The code—called Soundex—is a function of the patient's last name, a number assigned by the CDC plus a local identifier and, in some cases, the patient's date of birth. The program also integrates some statistical analysis functions, although it does not include encryption or a security log-on routine.

In California, the state health department in Sacramento runs the AIDS Reporting System program on an AT in a room protected by an infrared security device. Officials there say the system is adequate for current needs, but they worry that if routine, confidential testing were required, the AIDS Reporting System running on a PC would be woefully inadequate. "We would probably need to bring in a mainframe and to write the software ourselves," says Dennis Webb, section chief for prevention and epidemiology at California's AIDS office. "The cost of that and of insuring security on the system would be very high."

California health director Ken Kizer





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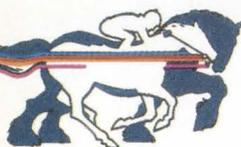


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Behind the News

has estimated it would cost the state about \$20 million annually just to perform routine, confidential HIV tests on, and do follow-up counseling for, the 500,000 persons who apply for a marriage license each year in the state. "And that doesn't count what it would cost to upgrade our data collection and security operations," says Kizer. Although Kizer hasn't estimated the additional cost, he says it would be significant. "And the [Reagan] administration hasn't indicated where the money would come from to do it," he adds.

The CDC's Morgan, who developed the AIDS Reporting System, agrees his program could not be used to track and provide security for widespread routine testing. For one thing, he says, it was developed only to track diagnosed AIDS cases, not exposure to HIV. In addition, he says, the Soundex code that the system uses would yield too many duplicate identifications if it were applied to a significantly larger number of cases. Furthermore, the PC hardware on which the program runs would be too slow to process all the data that widespread routine testing would generate. "The real problem we're running into is the processing speed of the PC," says Morgan. "Already at the CDC, with 37,000 cases to deal with, we've moved our system over to a mainframe. And some states like New York have had to do the same thing."

The CDC opposes routine, confidential testing in favor of anonymous testing, says Morgan. "Even if you've got a perfect system, as soon as you ask someone to write their name down on a piece of paper, it's difficult to convince them that it will always be confidential."

Sending Floppy Disks in the Mail

There are some potential security problems even with the AIDS Reporting System software on a PC. To avoid the risk of unauthorized remote access to on-line AIDS databases, most states receive and transmit AIDS records on hardcopy or floppy diskettes via the mail. In California, for example, only the state's two counties with the most AIDS cases—Los Angeles and San Francisco—use the AIDS Reporting System's Soundex code on records prior to mailing them to Sacramento. All other counties mail AIDS records with patient names to Sacramento, health department officials say.

Likewise, most states transmit AIDS records to the CDC in Atlanta via the mail, although the CDC requires that all the

disks they receive first be encoded with Soundex.

According to California health director Kizer, "The fact that we currently don't transmit data via modem makes it impossible for unauthorized persons to tap into our system." Officials in the state's AIDS office also say they believe transmitting unencoded AIDS information through the mails is safe. "Basically," says California's AIDS research manager Mike Hughes, "we like to think that anyone who might be interested in the information would be above trying to intercept the mail."

Outside of public health and medical research agencies, insurance carriers for obvious reasons seem to have the most interest in who has AIDS and who has tested HIV positive. The CDC has estimated that just the medical care costs of AIDS will rise to \$8.5 billion per year by 1991, up from \$600 million in 1985.

In addition to using physical security systems, encoding, and passwords to protect AIDS databases, many states have

tried passing legislation forbidding insurance carriers from asking for or using AIDS-related information in making underwriting decisions. California, New York, Massachusetts, Wisconsin, and Washington, D.C., have such laws. Other states, including Washington, New Jersey, and Maine, prohibit discrimination by insurance underwriters based on HIV testing.

The insurance industry, as well, has attempted some self-regulation. The National Association of Insurance Commissioners earlier this year, following meetings with gay activists, issued guidelines recommending that if questions about AIDS are used in applications for insurance, then a conservative testing protocol, including at least three tests, should be followed.

Even in states that prohibit the use of any AIDS information in underwriting decisions, however, there have been reports of confidentiality abuses. Many civil liberties activists are concerned that the insurance industry is well on its way

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A COMMITMENT TO EXCELLENCE

Behind the News

to developing an extensive HIV testing database of its own, which could be used to discriminate against insurance applicants now and in the future. In California, where insurance companies are not supposed to ask applicants for AIDS information, more than one company has been accused of doing so. In one case, handled by San Francisco attorney Gary James Wood, an insurance company in the fine print of its application form asked for permission to test an applicant's blood for HIV exposure and for permission to share the results with the Medical Information Bureau (MIB), a Boston-based clearinghouse for medical information that is widely used by insurance companies.

MIB and such firms as the \$636 million Equifax Corp. are in the business of obtaining and distributing to their clients medical information—including blood test results—on individuals applying for coverage. Atlanta-based Equifax claims that most of the country's large insurance companies are among its clients.

While state and local governments handling sensitive AIDS data seem to have done a good job keeping it away

formation and distribute it only with specific patient authorization. In fact, at the urging of gay rights groups, MIB earlier this year discontinued its practice of identifying AIDS sufferers and now uses the broader designation, "immune deficiency."

Distributing Private Information

At Equifax, a spokeswoman says the company does receive and distribute HIV test information but only with specific applicant approval. In addition, the spokeswoman says Equifax keeps HIV and AIDS records only in original hard-copy form in locked files. The original files themselves are sent to the insurer, and no records are kept by Equifax. "Once we send the files to the insurer, we are out of the picture," says the spokeswoman, adding that Equifax employees are asked to sign "confidentiality statements" promising not to reveal sensitive information. Equifax does, however, distribute AIDS and HIV information even to states in which insurance compa-

nies are prohibited from asking for such information. Keeping the information private under those circumstances is up to the health care provider, according to Equifax.

One of the largest single AIDS and HIV data collection operations is currently being run by the Department of Defense. DOD AIDS-related electronic data collection is extensive, with each branch of the military doing its own testing and record-keeping, then reporting the results to the DOD's medical evaluation review board operation in Colorado Springs. In 1986, DOD spent about \$18 million on its testing program, and \$25.2 million has been budgeted for 1987. A significant portion of those expenditures has gone to creating computerized data collection, distribution, and security systems, according to John Mazzuchi, principal director of the DOD program.

The DOD HIV testing program is built around several different databases—some on the same computers—to which password systems give access only to

**SOME SAY THE
MORE AIDS
DATA YOU
HAVE, THE
GREATER THE
CHANCE OF
ABUSE.**

from insurance companies and operations like Equifax, individual health care providers have sometimes not done so well. San Francisco attorney Wood is currently representing several California AIDS patients who claim their doctors illegally made their files available to insurance investigators. AIDS advocates worry that once such information makes its way to MIB or Equifax, it is then available to insurance companies and others around the country, regardless of local regulation.

Officials at MIB and Equifax, however, claim they are careful with AIDS in-

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authorized persons. For example, after the DOD receives HIV test results from the Army and Air Force in the mail, and from the Navy over a dedicated line to a dumb terminal, the department keeps a large listing of all persons who have been tested, along with a separate database of all those who tested positive for the virus. Direct access to the database of positive HIV tests is limited by the use of a password system, and identifications of individuals are disguised with a coding scheme. Using the coding scheme, the military branches send what they call "flash results" of those who have tested HIV positive to each military post. Local commanders get to see the reports, which are usually mailed in double envelopes marked "eyes only." Service members testing HIV positive can be denied overseas duty or discharged, depending on their health and level of entry training.

Despite the scope of DOD testing, department officials claim the program has been relatively free of confidentiality problems. "It would be foolish to say that out of some 3 million people tested that someone hasn't acted improperly or made mistakes. But to date we haven't seen it," says Mazzuchi.

Recently, however, there have been reports that personal medical records stored on computers at military hospitals have lacked proper security protection. A Washington, D.C., newspaper recently reported that records, including HIV test results at Walter Reed Army Medical Center, are not protected with password or encoding systems and they are regularly read by unauthorized persons. Army officials have denied that the hospital system is being abused, but Army Major Steve White, who is in charge of the program, does acknowl-

edge that HIV testing information is less secure in military hospitals than it is elsewhere in the system. "Virtually everyone who comes into contact with the patients needs to know this information," explains White. "You just can't keep it an absolute, total secret."

The Army's HIV Network

This fall, military hospitals will have more direct access to HIV test information. As part of a new program to match lists of blood donors with HIV test results, the Army will be installing about 60 microcomputers, which will be linked to the DOD's mainframe computer. Although the matching will not be done on an interactive basis, officials at Army blood donor centers will be able to tell if a prospective donor should be rejected.

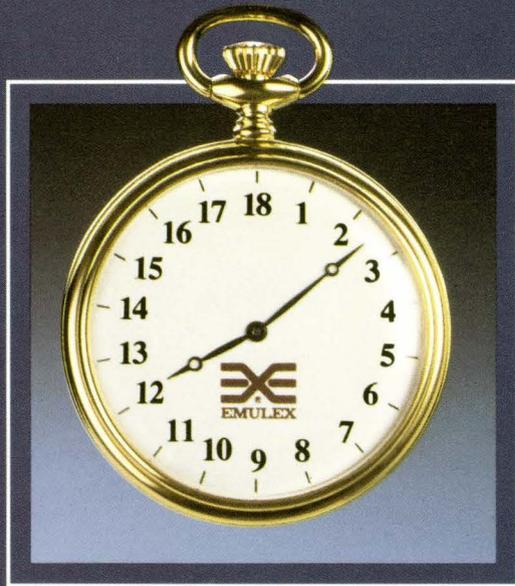
Critics have called such database matching a significant threat to individual privacy since information is often used in ways that were not initially authorized or expected by the individual. If the DOD were to engage in such database matching with other departments in the federal government, the confidentiality of DOD HIV test results could be compromised, critics say.

Database matching would be curtailed under federal legislation authored by Sen. William S. Cohen (R-Maine) and recently passed by the U.S. Senate. Although the DOD currently is not prohibited from engaging in broader database matching with its HIV test data, the department's Mazzuchi says there are no plans to do so.

Military critics say they hope the DOD continues to pay close attention to the confidentiality of electronically stored HIV test results. According to Washington, D.C., attorney James Klimaski, who often represents soldiers, "Most people who test positive for the virus end up in a situation where they are desperately trying to fight other battles. They don't need to worry about the world finding out about their problems."

Of course, that goes for anyone testing HIV positive or diagnosed as an AIDS sufferer. To date, although they have received little help or funding, state and local governments have done a good job protecting the confidentiality of electronically stored AIDS-related information. So have most private and federal agencies involved in storing HIV testing information. As the disease spreads, however, many of those agencies may be hard put to continue to do so. ■





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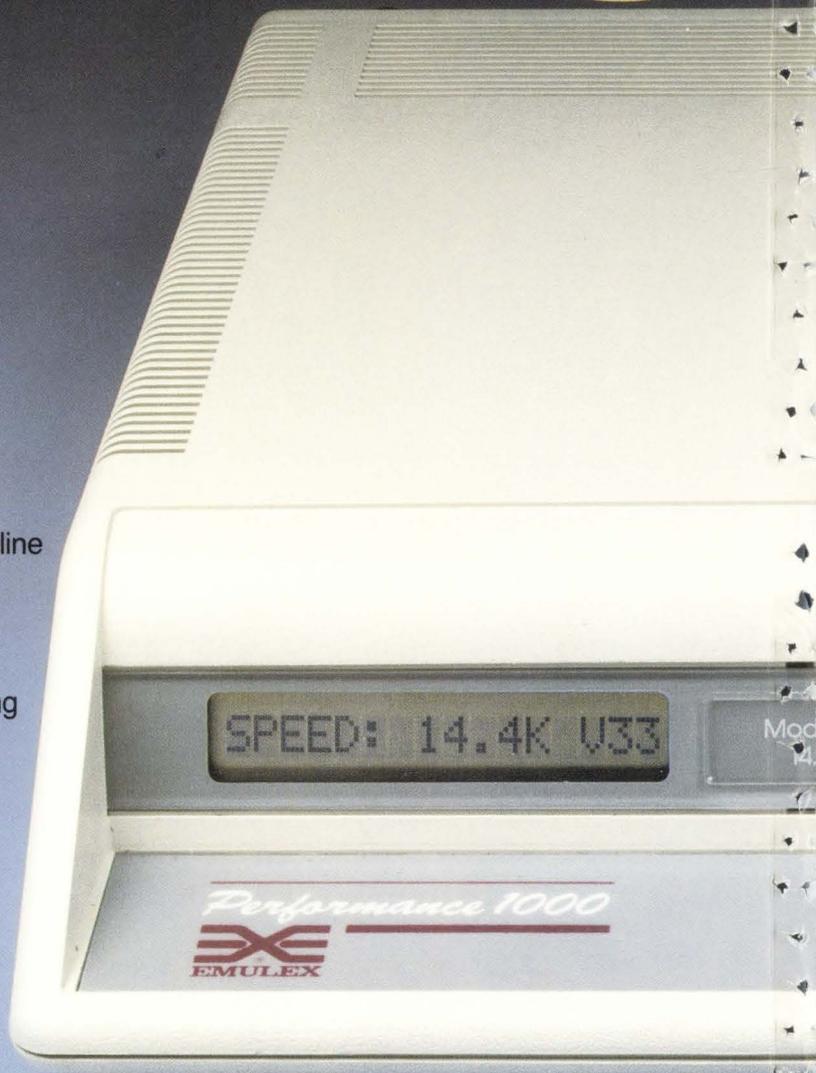
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PerformanceTM 1000

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Actual Size

14.4Kbps Modem

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```
FB: 12.0K U33
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Then bring up the download command and press ENTER a second time.

```
REMOTE: DOWNLOAD
```

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Transmit clock	(Internal/External/Receive)
Transmit level	(0 dBm to -15dBm)
Transmit carrier	(0msec/15msec/Switched)
Automatic retraining	(Enabled/Disabled)
Carrier threshold	(-26dBm/-43dBm)
DSR in test	(On/Off)
Function monitoring	(Signal quality/Speed)

Diagnostics:

Signal quality monitoring
Self-test
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Local Line Loopback
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Once upon a time, third-party maintenance companies were small, regional outfits that would come in to service the exotic gear your prime vendor wouldn't touch. Now, many independents have national and international networks that will handle equipment of all types. They claim to provide seamless and cheaper service on mixed vendor installations—the environment of choice in today's MIS world. Both IBM and Digital have responded to the independent challenge with price cuts and expanded equipment coverage.

Getting a Hand On

BY SHARON E. BRADY

Computer service costs—expenses that users once thought were as certain as death, taxes, and software bugs—can be controlled. Today, the savvy MIS chief who understands how to shop for maintenance can get a much better deal than the one who merely signs on the dotted line.

Until a few years ago, most MIS managers were afraid to break out from under the protective umbrella provided by their vendors; they just bit the bullet and signed off on service bills. Things began to change when users welcomed third parties into their shops. These newcomers apparently did a bang-up job. The independent service trade became wealthier, as did the users who were able to cut their maintenance bills by a hefty 20% to 35%.

By 1985, third parties had pulled in \$1.5 billion—roughly 13% of the estimated \$12 billion spent on computer maintenance. These independent service organizations have steadily encroached upon the OEMs, which derive 10% to 12% of their revenues from this sector of the business. It also means big bucks to IBM, which hauled in over \$7.4 billion last year from maintenance—more than one seventh of the company's total take.

When third-party maintenance firms began taking away some of those dollars, the big boys—particularly IBM and Digital Equipment Corp., the companies with the largest service bases, and thus the most to lose—began to get nervous about customer defections, and the slump in profits that might ensue.

Retaliatory campaigns were mounted. IBM cut its maintenance prices and offered users more comprehensive cov-

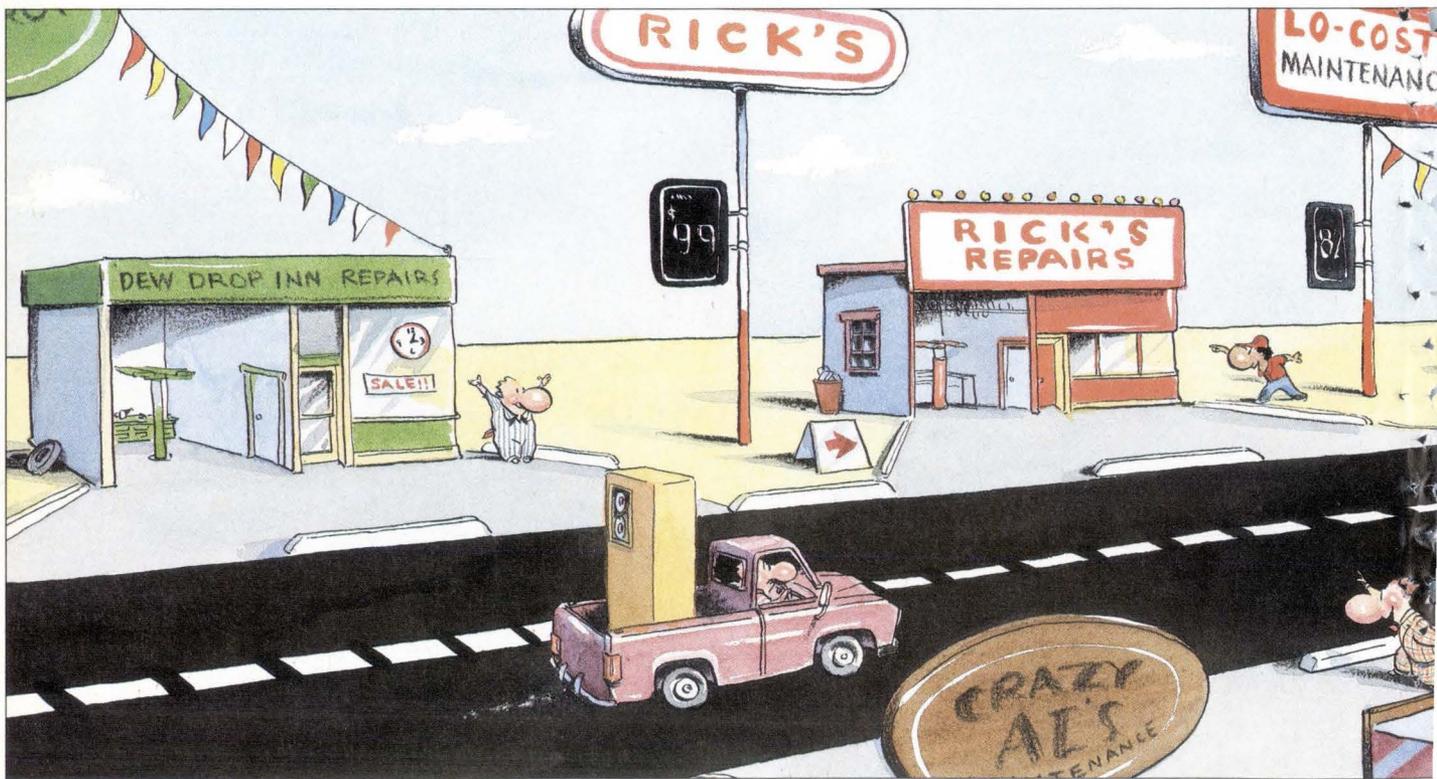


Illustration by Michael Witte

Maintenance Costs

erage at lower rates. Digital became more flexible in service contract negotiations, and increased the amount of non-Digital equipment it would service. The third parties quickly followed suit, fueling the development of the competitive maintenance market that exists today.

But even in a competitive market, a computer maintenance contract can be a very expensive bit of insurance. Every year, users of large machines can expect service charges that amount to roughly 4% to 7% of their equipment's list price. When a minicomputer has to be kept up and running, the service contract will cost more, usually 10% of list per year. Workstation maintenance is even pricier: it can claim 15% or more of list per year.

Those who shop the used equipment market to save money must pay even more for service. As equipment

ages, maintenance fees increase, which means that service has come to represent a bigger and bigger portion of the user's equipment budget. At the same time, the value of the hardware being repaired keeps decreasing. For users with very old equipment—for instance, IBM 3278 terminals—the maintenance cost can be higher than the price of the lease.

You Can Always Negotiate

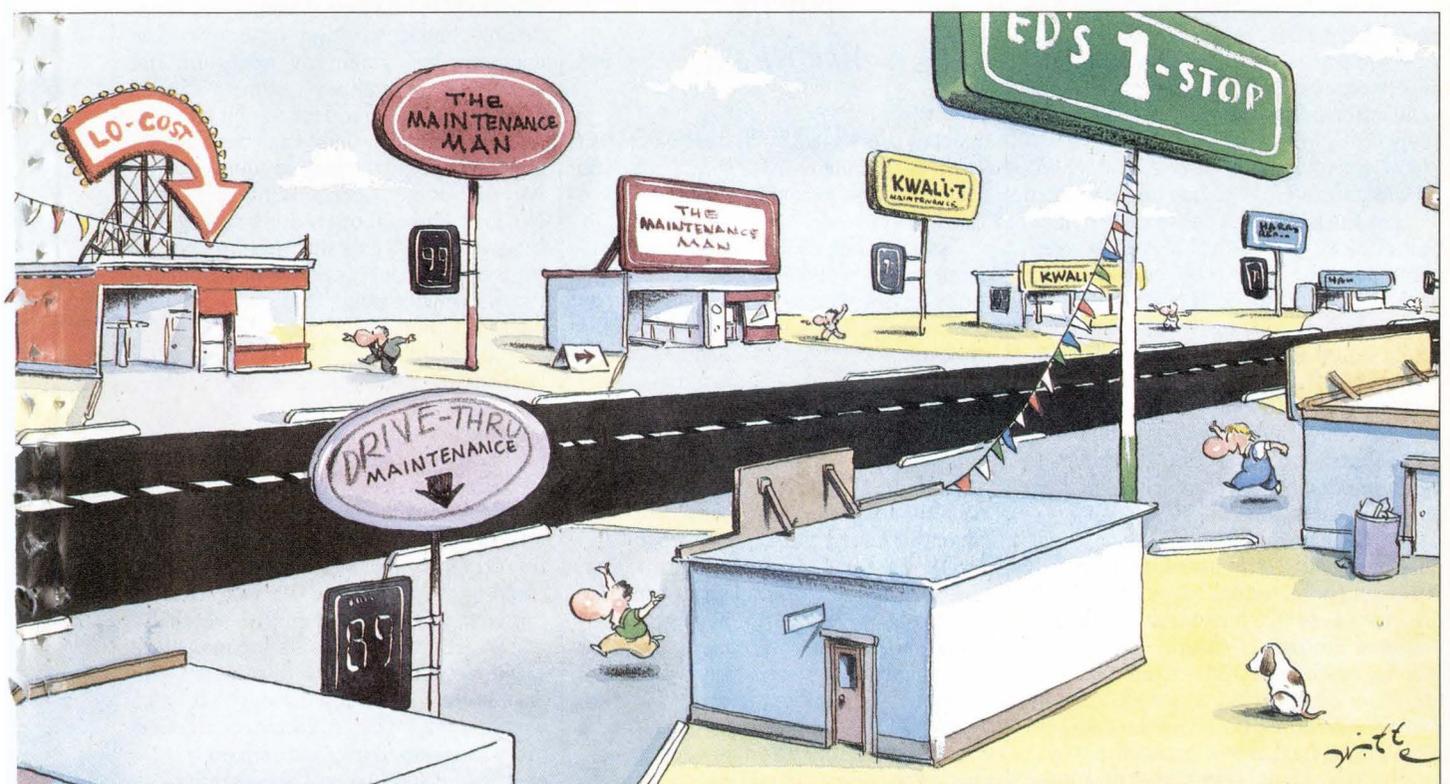
While cost is important, it is not the only factor in the maintenance equation. Quality is also a key issue. Nobody wants to sacrifice quality service just to save a few bucks. You want quick response no matter when or where equipment fails, regardless of price. You also want coverage of all installed gear.

"The cost savings we can offer to our customers is certainly an issue, but it would be shortsighted to try to run a

business based on how much you could undercut IBM," explains Jack Haring, president of Computer Hardware Service Co. Inc., an independent maintenance and refurb house in Ivyland, Pa. "The majority of our customers come to us because they believe that we will give them better treatment than IBM, not just because we cost less."

There is no simple way to select a service organization. Nevertheless, you should always remember that you can negotiate. The negotiable aspects of a maintenance agreement can include the amount of coverage, the price, and the types of equipment to be serviced. A good maintenance plan protects the user from the direct costs of catastrophic failures, but maintenance—even frequently scheduled preventive maintenance—can't guarantee equipment won't fail.

Nonetheless, there are ways that



users can reduce the chances of a failure. Working with the service provider, a user can arrange for preventive maintenance or have a perpetual on-line link with a remote diagnostic system. A user can have a service organization on call 24 hours a day, seven days a week. In a big shop with a steady stream of maintenance activities, a service provider will keep field engineers on-site at all times.

One company with rigorous service demands is AMR Corp., the parent company of American Airlines, headquartered at the Dallas/Fort Worth airport. "We have serious uptime requirements, and there's no way we could get along with less than 24-hour service," explains Mike McNeil, controller of dp and computer services at Tulsa, Okla. "We have 30 IBM field engineers here most of the time. There are fewer on the midnight shift, but we are never without some of their people here as well as our own. It is more expensive," he readily admits, "but there is no sense in saving a few bucks up front if you put yourself in a position where you can make trouble for yourself later."

Scholastic Inc., a Lindhurst, N.J., publishing company, doesn't have the same 24-hour requirements as AMR. "We have 40-hours-a-week service because it makes the most sense in our operation," says Mike Bangs, vp of information systems at Scholastic. "IBM will charge 30% more for 24-hour, seven-day-a-week service and for us that kind of cost doesn't make sense. In the rare cases where we need after-hours service, we'll eat the costs."

Users having a hard time deciding how much coverage to buy might want to discuss the issue with a service provider. Sometimes, prime-shift coverage supplemented by extra coverage during peak work periods is the way to go. A vendor hoping to keep the user loyal will try to come up with a reasonable plan, even when it means developing a variation on a standard maintenance agreement. A good time to work out a plan with a hardware vendor is when equipment is being purchased and your sales rep is eager to please.

"IBM has the reputation for giving quality service to its users, and that is a big selling point for us," says Ken Cargill, director of service business with the IBM National Service Division. "Our people talk to customers right from the start about service, so they know we are concerned with not only selling the gear, but maintaining it once it is installed."

IBM isn't alone. Digital also promotes



Getting a Hand On Maintenance Costs

its maintenance with its machinery. "Our basic selling points are breadth and consistency of service," asserts

Ron Thompson, marketing manager with Digital's corporate field service group, Westboro, Mass. "As a prime vendor, we can work with our customers when they are building their systems to assess all of their needs, including uptime requirements. And we can offer our clients a wide range of service options, depending upon those needs."

"There Is No Perfect Service"

Overwhelmingly, users have gone to vendors for service, particularly those shops that buy nearly all of their equipment from a single supplier. But even the most true-blue customers are aware of their vendors' limitations. "We have certainly gotten a good level of support from

WORK OUT A SERVICE PLAN WHEN YOU BUY THE HARDWARE.

IBM, but there is no such thing as perfect service," confirms AMR's McNeil, who describes his company's installation as "fairly significant."

AMR houses 15 IBM mainframes and a room so full of disks that McNeil says "it looks like a wheat field." The vast dp complex supports all of the reservation systems for American Airlines. Good service, even at a premium price, is what this user wants. "We know that IBM is not nearly the cheapest way to get service," he adds, "but when you bring in third parties, there's invariably a lot of finger pointing when things go down. We don't have the time or the patience for that."

While service from such prime vendors as Digital and IBM usually isn't the cheapest, it is comprehensive. "Our maintenance support," says Digital's Thompson, "is international in scope. We have \$500 million in spare parts inventory, 450 service locations across the country, and 13,000 employees in field service to ensure we will always have the

parts and the people when our customers need them."

One of the most important things a vendor can give the customer is peace of mind. IBM's Cargill explains: "Depending upon how critical computers are to the business and how heavy that critical workload is, we will keep employees on-site at all times. We have many customers with large data centers and extensive networks that simply can't afford to have that system go down. We make sure that doesn't happen if we can."

IBM even has service sales staff assigned to its largest customers. These national customer service execs perform no repairs or maintenance functions. Instead, they coordinate service, expedite deliveries of parts, and make recommendations on ways to improve IBM maintenance. If the installation is large enough, IBM makes this job a career.

Independents Have Won Firms Over

Despite all this attention, some customers have dropped Big Blue and other prime vendors in favor of independent firms. One satisfied third-party customer is Sunkist Growers Inc., Sherman Oaks, Calif. Sunkist got more service for less money by going with Frazer, Pa.-based Sorbus, a division of Bell Atlantic Corp. Milt Wolf, manager of information services at Sunkist, reports that "Sorbus came in 20% less than IBM, and was more flexible about working off-hours. The company has given my operation the same service for less money. That's good for me and good for my budget."

Another company that has saved a bundle by going the independent route is Ingersoll-Rand Corp., Whitecliff Hills, N.J. Guy Pagano, operations manager at Ingersoll-Rand, explains that he decided to give a third-party service firm a chance to trim service costs that had been topping \$2 million a year.

Ingersoll-Rand has over 80 general business computers—mostly IBM—scattered all over the country. Until three years ago, Big Blue was handling most of the maintenance chores. "We were really happy with the service that IBM gave us and would have really liked to stay with them," notes Pagano. "On the other hand, we realized that if we could get comparable service from a third party for less, it would be worth it."

A group of Pagano's shop managers spoke with a number of third-party vendors before the company decided to go with Control Data's Engineering Services Division. They also talked to CDC customers and brought the company in

to service four of its sites on a trial basis before inking the final deal.

Pagano says that IBM was given a chance to make one last pitch, but couldn't match CDC's price. "We will continue with CDC as long as its price remains better and the service remains adequate," Pagano explains, but he does point out, "We keep our service on a very short contract."

Sometimes the user has no choice when it comes to service: for some gear, a third party can be the sole source. When OEMs want nationwide service on special systems they've assembled, they often work with one or more third-party maintenance outfits. It's actually better for them and their users than the alternative—hotshots that fly in to do repairs, trailed by air couriers hauling parts.

Users who have some special purpose computers amid their numerous standard systems already have a multi-vendor service situation. Another class of user that has both prime vendor and third-party service is the shop that has installed compatible peripherals. This type of arrangement is common among large IBM sites. While the company will repair some non-IBM equipment, users who want service on an IBM mainframe with a non-IBM line printer won't be able to get complete coverage from Big Blue.

"We don't fix anyone else's gear on the high end," says IBM's Cargill. "However, our first concern is our client. If he has a problem, we will help him isolate it, and if it is our gear, we'll fix it."

Independents Service Everything—Almost

A mixed vendor shop isn't a problem for independents. They will service everything in a system, from terminals to processors. Except when that everything includes a new IBM mainframe.

During its first year of use, an IBM mainframe is under warranty anyway, so service is not a factor, even in a shop serviced by a third party. After that, an independent may be reluctant to take on a machine that hasn't proven stable; it would rather leave that headache to IBM.

"We make a policy of keeping one step behind a vendor's most advanced gear," explains Sorbus president Louis Ross. "We began servicing IBM 3084s, for instance, in August 1986." This approach doesn't lock out Sorbus clients; the company will bid on the full-service contract for a shop with a new IBM mainframe, and then pay Big Blue to maintain that processor until it feels certain its personnel can deliver equivalent service.

However they work out the details,

Remote Diagnostics: Maintenance by Wire

Users want quick resolution of their computer problems; remote diagnostics can shorten the amount of time between the recognition of a problem and the system's return to operation. Remote diagnostic capability means that users of an on-line system can have a permanent link between their critical computer and a vendor's maintenance war room. When something goes wrong with a system that's being monitored, vendor technicians are alerted immediately. They may then dispatch personnel to the user site or run diagnostics from their remote port to determine the best way to keep the user in operation.

The most sophisticated remote diagnostic offerings are an outgrowth of a technique pioneered on Amdahl mainframes. Seeking a way to improve on IBM's service, the makers of the first large-scale IBM-compatible mainframes built into their PCM wares methods of connecting factory technicians with users' machines. This capability supplemented the on-site service that was generally standard in the mainframe business in 1979, the year Amdahl jumped in.

Remote diagnostic capability caught on. Many companies now offer it. IBM, which used on-line support to ease the introduction of its first commercial quadratic processor, the 3084 mainframe, has a special service center for such purposes. While mainframe makers have made an effort to make it easier for their users to get quality support, vendors of fault tolerant processors have gone one better.

The most extensive on-line diagnostics are provided by Stratus Computer, which also supplies fault tolerant systems that IBM markets under its own label. Users participating in Stratus's remote maintenance program connect their systems into the vendor's main service center in Marlboro, Mass. If there is a failure in the hardware, or if the number of transient (and usually recoverable) errors exceeds a preset threshold, the user's system will notify the computer at the service center. Technicians then run diagnostics to determine where the fault lies. Next, either a Stratus field engineer goes out to the site with the new part or, if the fault lies in a plug-in component, the part is sent to the user.

Until the technician or the part arrives, the user may not even be aware that the system is failing, particularly if the error is intermittent and correctable as it occurs. That's the beauty of a fault tolerant system. Users who run fault tolerant systems are dependent on a high amount of uptime. They don't want to be surprised by a system that looks okay until nearly every component in it has died.

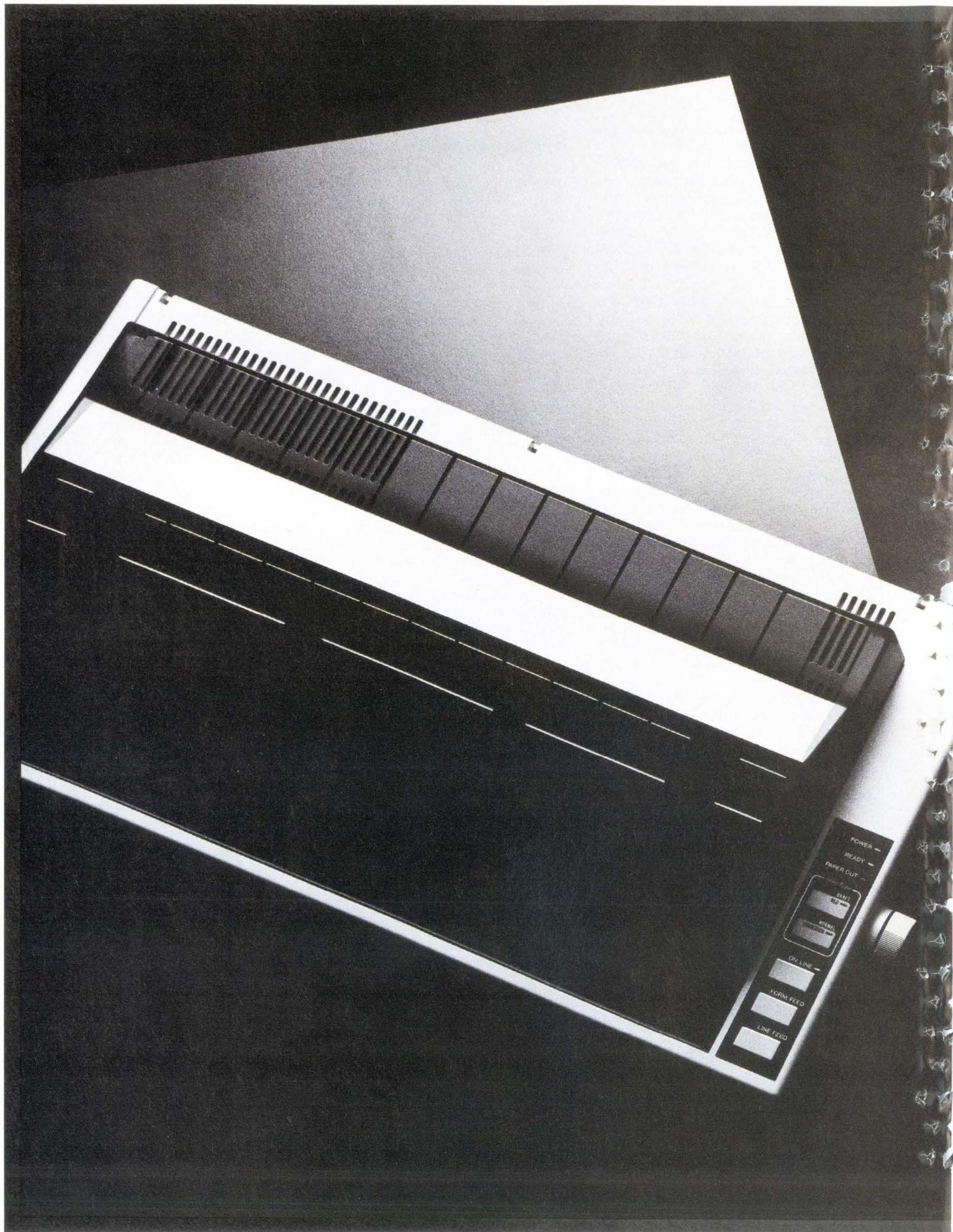
Having technicians permanently on-site is expensive, so the costs saved by this approach are obvious. In fact, many user problems can be solved without an engineer ever visiting the location, and, by diagnosing the trouble beforehand, service technicians are likely to have the correct parts when they do arrive.

Stratus says that by using remote diagnostics, the company is able to provide service for its entire installed base with only 25 field engineers. The savings are passed on to users, who pay about 6.5% of the list price annually, compared with an industry average of 10%; on some machines, service rates can be as low as 3.5%.

A vendor with a larger installed base can get even more mileage out of remote diagnostics. Like Stratus, Digital Equipment Corp. offers its diagnostics by wire to users. Each session, however, must be initiated by the user, who calls up and asks for help. Digital's main center for this service is in Colorado Springs and is staffed by 130 hardware and 300 software specialists. The facility includes at least one of every type of system on which Digital supports maintenance. That means that if the user's machine won't allow Digital to run a remote diagnostic, the technicians can attempt to re-create the user's environment at the service center.

In order to provide remote support, vendors must make a very large commitment. Their service center must have equipment to monitor all the users' systems and they must be able to support huge databases on performance data and solutions to past problems. The largest expense, however, is personnel.

"You need people who are highly trained in working with both hardware and software," explains Omri Serlin, president of ITOM International, a research and consulting house in Los Altos, Calif. "You also need enough of them to support your user base 24 hours a day. It is incredibly expensive." So, despite the substantial benefits to users and, ultimately, to vendors, Serlin believes that in the near term, only a handful of manufacturers will join the ranks of remote diagnostic providers.



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the big independents' appeal stems from their willingness to give the user wall-to-wall service. "The product we sell is a total maintenance solution," claims Jim Larkin, a marketing manager with TRW Inc., Fairfield, N.J., which services equipment from just about every major vendor. "The success of our company depends upon our ability to give users complete coverage of all their equipment at a competitive price."

DEC has responded to the third-party

threat by liberalizing its equipment service rules. Under its DECompatible program, Digital will service about 175 Digital-compatible pieces of equipment. In addition, the company's regional offices have a list of 700 Digital-compatible components that they can choose to service. This makes the giant less of a target for third parties, thinning the ranks of in-

dependents. Some speculate that IBM now will move in a similar direction.

The major dp vendors have been battling the independent forces on more than the flexibility front. They have also struck back by cutting prices. IBM, for example, has begun to modify its price lists in order to maintain key accounts. This presents a real opportunity for users, who can wade through the options.

In October 1986, IBM instituted a major maintenance policy change. It an-

FIGURE 1 Selected Third-Party Mainframe Service Vendors

American Computer Engineers
11175 Flintkote Ave., Suite F
San Diego, CA 92121
Territory: Southern California

CIRCLE 150

Butler Key punch & Computer Maintenance Co. Inc.
10 Crowley Ave.
Dedham, MA 02026
Territory: New England

CIRCLE 151

Celtech Inc.
1300 Mercantile Ln., Suite 116
Landover, MD 20785
Territory: International

CIRCLE 152

Computech Maintenance Service Inc.
2317 S. Danville Dr.
Abilene, TX 79605
Territory: West Texas

CIRCLE 153

Computer Hardware Service Co. Inc.
Jacksonville Park
11 Vincent Circle
Ivyland, PA 18974
Territory: East Coast

CIRCLE 154

Control Data Engineering Services
8100 34th Ave. S.
Minneapolis, MN 55440
Territory: U.S., International

CIRCLE 155

Cosmic Enterprises Inc.
84 South St.
Hopkinton, MA 01748
Territory: U.S.

CIRCLE 156

Data Clean Corp.
369 Highway 36
Keyport, NJ 07735
Territory: East and West Coasts

CIRCLE 157

Dataserv Computer Maintenance Inc.
12125 Technology Dr.
Eden Prairie, MN 55344
Territory: U.S.

CIRCLE 158

Decision Data Service Inc.
1 Progress Ave.
Horsham, PA 19044
Territory: U.S., Canada

CIRCLE 159

DPCE Inc.
2550 Boulevard of the Generals
Norristown, PA 19403
Territory: Pennsylvania, New Jersey, New York

CIRCLE 160

Eaton Corp.
Data Systems Services Div.
5875 Green Valley Circle
Culver City, CA 90230
Territory: U.S.

CIRCLE 161

Electronic Service Specialists Ltd.
N92 W14612 Anthony Ave.
Menomonee Falls, WI 53051
Territory: U.S., International

CIRCLE 162

Grumman Systems Support Corp.
90 Crossways Park Dr.
West Woodbury, NY 11797
Territory: U.S.

CIRCLE 163

GMW Services Inc.
33 W. Higgins Rd., Suite 4100
South Barrington, IL 60010
Territory: U.S.

CIRCLE 164

Honeywell Bull
Customer Services Div.
151 Needham St.
Newton, MA 02161
Territory: U.S.

CIRCLE 165

NSA Computer Maintenance Corp.
P.O. Box 47712
San Antonio, TX 78265
Territory: Texas, California

CIRCLE 166

Response One Inc.
P.O. Box 309
Freehold, NJ 07728
Territory: New Jersey, Pennsylvania

CIRCLE 167

Sorbus
50 E. Swedesford Rd.
Frazer, PA 19355
Territory: U.S.

CIRCLE 168

Total Tec Systems Inc.
2 Gourmet Ln.
Edison, NJ 08837
Territory: U.S., International

CIRCLE 169

TRW Inc.
Customer Services Div.
15 Law Dr.
Fairfield, NJ 07007
Territory: U.S.

CIRCLE 170

TSSI
81 Croton Ave.
Ossining, NY 10562
Territory: U.S.

CIRCLE 171

Unisys
Customcare Service Div.
P.O. Box 500
Bluebell, PA 19424
Territory: U.S., International

CIRCLE 172

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Business Products & Systems Group
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Stamford, CT 06904
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CIRCLE 27 ON READER CARD

Getting a Hand On Maintenance Costs



nounced a pricing change which, in effect, lowered the cost of service on most of its machines. In some cases, the company slashed service fees by as much as 25%. IBM's Corporate Service Amendment (CSA) enables users to reduce their maintenance costs on individual pieces of IBM gear or on all-IBM networks. After proving that their management and systems practices are up to snuff, users then shell out \$3,500 per equipment site or \$8,600 per network control site in exchange for the reduced service cost (see Updates, July 15, p. 97).

CSA also gives 24-hour, seven-days-a-week service to users that had 11-hour, five-days-a-week service, at no additional charge. The contracts, which run one, three, or five years, pertain only to on-site maintenance. Neither exchanges nor carry-in service were affected.

For many users, this has reduced the price incentive for going the third-party route. "We'll definitely take another look at IBM next year in light of the CSA," declares Jim Lambertson, assistant vice president of processing services for Beneficial Management Corp. in Pea-

pack, N.J. Beneficial signed up Sorbus for one year to service its predominantly IBM shop because Sorbus promised savings of 30% to 35%. "That was enough to convince us it was worth it to give them a try." In general, he says, "We have been pleased with the service. It is comparable to what we were getting from IBM, if not a little better."

Nevertheless, at the end of the year, Beneficial will take another look at IBM. "We calculate that the difference between Sorbus and IBM will be reduced to 5% or 6%," reports Lambertson, "and if IBM is throwing in 24-hour service, that makes a pretty compelling argument to rethink our service agreements."

Despite all the incentives on both sides of the maintenance fence, some users still favor splintering the service job among several organizations. One company that seems to have done well using this approach is Palm Inc., an Indianapolis software house. While IBM maintains Palm's 3705 communications front end

and 4245 line printer, TRW services its 3083-J. The software firm also uses Memorex for some tape transports and National Advanced Systems for its model M80, an IBM 4300-compatible mini made by the now defunct Magnuson.

Ralph Wilding, Palm's operations hardware manager, believes this mixed maintenance arrangement is a blessing. "We have found that the way to get the best service possible is to match vendors and services," says Wilding. "As a small company, we were concerned with how IBM would respond to problems with our main computer, so we went with TRW. Since they are at a competitive disadvantage to IBM, we felt they might try harder to give us better service."

That same line of reasoning is in the minds of the third-party maintainers that have made a business out of striving to provide seamless service at mixed vendor installations—the equipment environment of choice in today's IS world. ■

Sharon E. Brady is director of research at Technology News of America Co. Inc., a New York research and publishing house.

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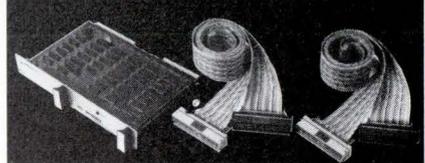


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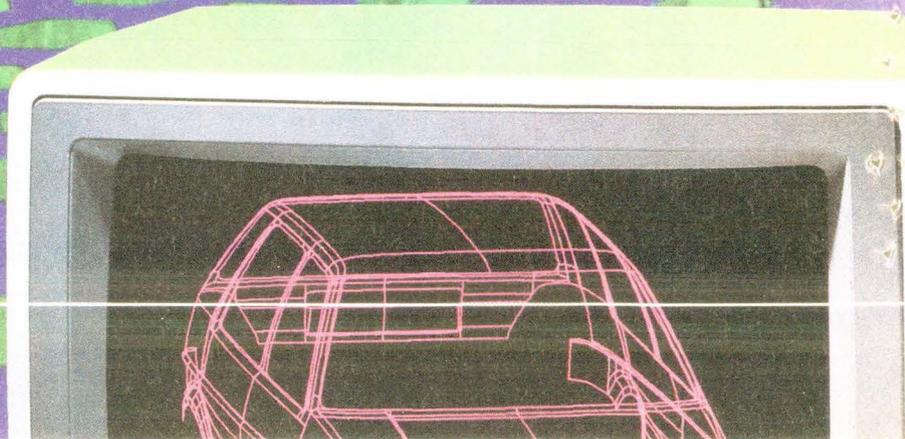
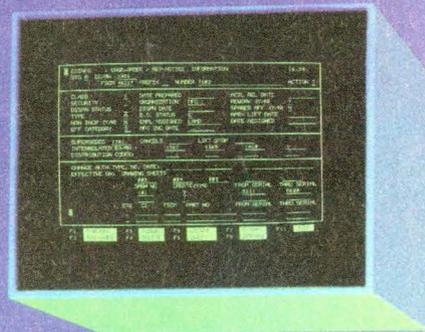
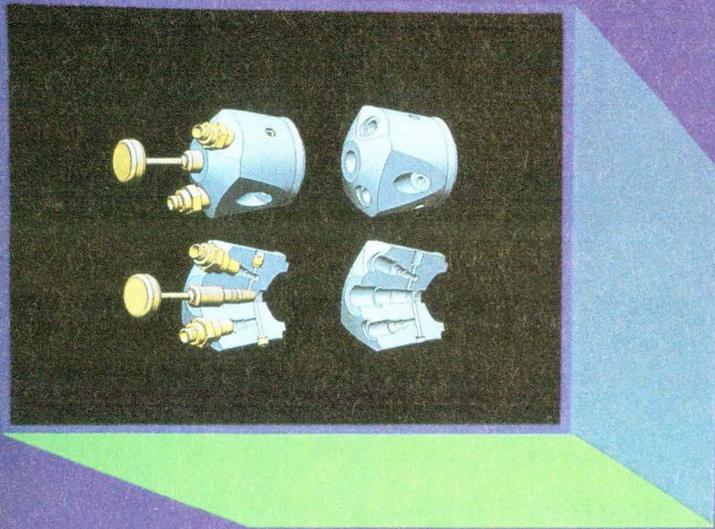
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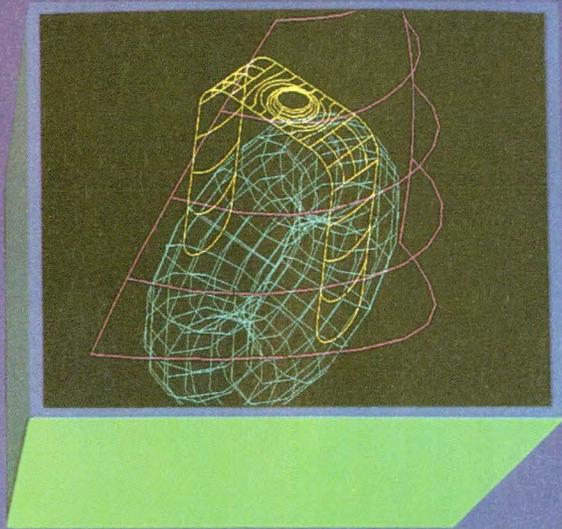
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 CONTROL DATA

CIRCLE 29 ON READER CARD

The temperature at which superconductivity occurs is rising. New breakthroughs are made almost daily. Research at IBM, Bell Laboratories, and Hewlett-Packard holds promise of real-world applications for data processing. But the promise of superconductivity may not be realized in the computer room for a decade or more, when hardware components may be revolutionized.

The Superconductive Computer In Your Future

BY STEPHEN G. DAVIS

The dizzying advances in superconductivity research have fostered widespread speculation that computer hardware is about to be revolutionized. Superconductivity, the capacity to conduct electricity without any energy loss, has captured the attention of several computer manufacturers, including IBM, Hewlett-Packard, and a handful of Japanese firms, all of which have launched research efforts aimed at exploiting the recent developments.

Counterbalancing the almost magical promise of cool-running, fast-as-light superconductor circuits is the hard reality that actual implementation of the materials still requires considerable innovation. The application of superconductors in computer hardware will advance in steps characterized by hybrid designs; an all-superconductive computer technology is a decade off in optimistic scenarios, if it ever arrives.

"We read about this stuff in the papers and we don't know what to make of it yet," says Andy Boughton, a researcher of hardware architectures at MIT's Laboratory for Computer Science. Kenneth G. Wilson, a Nobel Prize-winning physicist and computer scientist at Cornell University, adds, "Superconductors

will have to go all the way to mass production before they can be said to have any significant impact on the computing world. As far as I can tell, that's a long way away."

"It's all very much blue sky," concedes William J. Gallagher, who, as manager of applied cryogenics at IBM's T.J. Watson Research Center in Yorktown Heights, N.Y., is overseeing some of IBM's superconductivity research. "But it's somewhat less blue sky than it was last month," he continues, "and an awful lot less than it was a year or so ago."

Superconductivity was first identified by Dutch physicist Heike Kamerlingh Onnes in 1911. Until a year and a half ago, the property had been observed only when certain metals were chilled with costly liquid helium to nearly absolute zero, or -459°F. Metallic alloys are the basis of the few products commercially available today that rely on superconductivity, including the room-sized magnetic imaging systems that are used by many hospitals in place of X-ray machines.

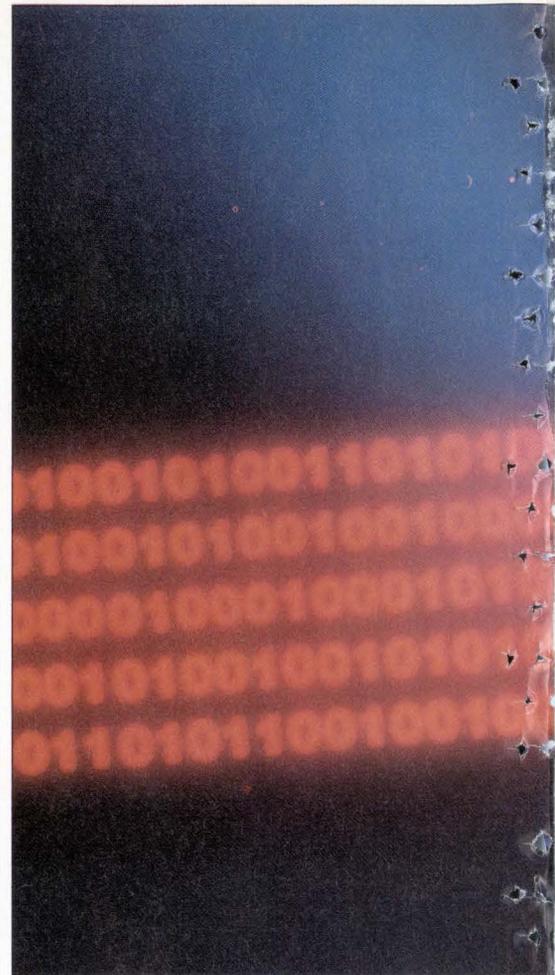
Ceramic Oxide Found Intriguing

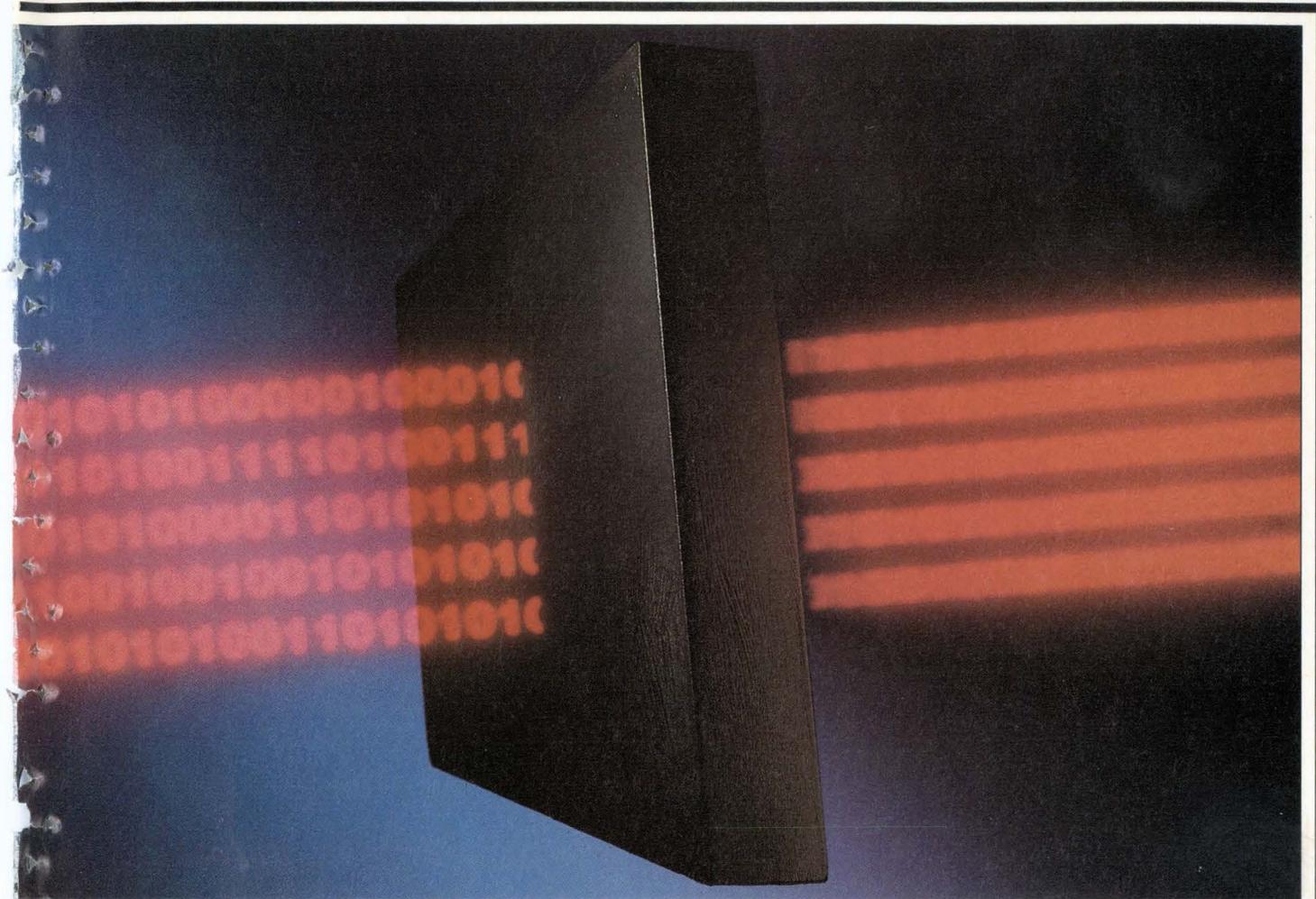
In the early 1980s, however, two scientists at IBM's Zurich Research Lab in Switzerland began looking for superconductivity in a different class of com-

pounds altogether: ceramic oxides. Although ceramics are typically poor conductors at room temperature (in fact, they are used as insulators on high-voltage power lines), previous research into their low-temperature properties intrigued the IBM scientists, K. Alex Müller and J. Georg Bednorz. Their April 1986 report of a ceramic that achieved superconductivity at 13 Fahrenheit degrees above the best metal alloy inspired a few other labs to redirect their search.

It was Paul C.W. Chu who made history last February when his team of physicists at the University of Houston and the University of Alabama chemically combined four elements to create a compound capable of superconducting at the then record-high temperature of -283°F. Chu filed a patent application for the compound, the first to achieve superconductivity above the boiling point of liquid nitrogen (-320°F), a cheap and easily obtained coolant, and tried to keep the exact composition of the compound a secret until his findings could be published formally.

But before Chu's report appeared in the March 2 issue of *Physical Review Letters*, rival researchers at the University of California, Berkeley, independently guessed the recipe and concocted the breakthrough substance, and the knowl-





edge spread like wildfire to researchers at IBM, AT&T, and around the world. Just three months later, with the help of IBM's San Jose-based Almaden Research Center scientist Paul Grant, students at a local high school successfully cooked up some of the stuff in their chemistry class, relying almost entirely on the school's standard equipment.

The substance that Chu discovered has been dubbed 1-2-3 by IBM scientist Grant and his colleagues, referring to the atomic ratio of its components: one part yttrium, two parts barium, three parts copper, and a varying amount of oxygen.

When any of this work might reach the computer market is difficult to predict. While the R&D resources of the computer industry today far exceed those of the past, several well-known technological breakthroughs took roughly a decade before their impact was made on mass-produced computer hardware. The transistor, which was invented in 1947, didn't make an appearance in computers until the late 1950s. The laser was invented in 1961, but optical computing—wherein pulses of light would replace electric signals as the means of data transmission—remains a still remote dream of some engineers. According to Gerald Present, an IBM spokesman and physicist at Yorktown Heights, however, the pace of the

recent advances, and the number of people worldwide actively studying superconductivity has led some observers to contend that results may come much more quickly than they have in the past.

IBM's superconductivity research is widely presumed to be the largest such effort in the computer industry, rivaled in the U.S. private sector only by AT&T's Bell Labs. One knowledgeable source outside the company says IBM may have as many as 100 scientists working on one or another aspect of superconductivity. Spokesman Present claims that an exact head count is impossible because so many IBM researchers are free to investigate whatever they choose. "There has been no mobilization of troops and therefore no specific budget. IBM's research in this area has been driven by the excitement of scientific development."

Crossing Josephson Junction

Some of IBM's researchers, including Gallagher, cut their teeth on cryogenic applications in the company's Josephson junction project, which was abandoned for technical and economic reasons in 1983. Josephson junctions are superconductor-based switching devices that operate 50 times faster than today's best silicon transistors and 10 times faster than the best semiconductor devices,

which are made of gallium arsenide. IBM's attempt to build a Josephson-based computer, which began in the mid-1960s and was cosponsored by the Department of Defense, had 115 researchers at its peak and an annual budget of \$20 million.

Researchers at AT&T Bell Labs, headquartered in Murray Hill, N.J., were responsible for developing the metal alloy that held the record for high-temperature superconductivity from 1973 to 1986. According to spokesman Mike Jacobs, "Superconductivity research is still entirely in the basic research area," the whole of which takes in approximately 600 people. There is no superconductivity budget, Jacobs says, and in any case it would be a proprietary figure. "Well under a hundred people are looking into the problem," he continues, "and many of them only on a part-time basis."

Other industrial firms reported to be funding research efforts in superconductivity include General Electric, Du Pont, Lockheed, and Westinghouse. Among university researchers actively studying superconductivity, the standouts include Chu's team at the University of Houston and the University of Alabama (Chu himself has been studying the subject since 1965); experimental physicist Alex Zettl and theorist Marvin Cohen at the University of California, Berkeley;

FIGURE 1 Three Steps Toward Constructing an All-Superconductive Computer

COMPONENT	REQUIREMENTS	OBSTACLES	RECENT BREAKTHROUGHS	TIME FRAME
Chip Interconnections	Thick film fabrication with current densities high enough to be practical for most architectures.	Refrigeration, especially when combined with conventional silicon technology. Also, limited payback because conventional wiring does not represent a significant processing bottleneck.	High current densities achieved in film work at Stanford University in March 1987.	Possibly within one year.
On-chip Connections	Thin film fabrication with current densities high enough to be practical.	Brittleness of ceramic compounds; refrigeration, especially when combined with conventional technology.	Fabrication of simple working microelectronic device with sprayed-on ceramic superconductor by IBM, April 1987.	Prototype chips possibly within two years.
All-Superconductive Circuits	Fabrication of a two- or three-terminal microelectronic switching device.	Conventional semiconductor technologies are likely to continue to improve, which tends to bias any cost-benefit equation against new technology.	None, beyond reports of unstable superconductivity at higher temperatures.	Possibly within 10 years.

CONCLUSION: It will be at least a decade, if then, before technological advances yield an all-superconductive computer.

and a team at Stanford University that includes applied physicists Malcolm Beasley, Theodore Geballe, and Aharon Kapitulnik. Other universities with significant programs in material science research are Cornell, MIT, and the University of Illinois. Research is also under way at the Departments of Defense and Energy.

In the private sector, most computer companies seem to be adopting a wait-and-see stance—at least officially. Top supercomputer maker Cray Research, minicomputer giant Digital Equipment Corp., and chip maker Intel are typical. "We do not set up projects to develop new technologies," says Cray spokeswoman Tina Bonetti, "unless we believe that we need to take leadership because the technology is not adequately available outside the company." DEC spokesman Mark Steinkrause says, "We don't have any active research in that area. We are closely monitoring the situation, however." At Intel, the response is similar: "We find superconductivity an interesting area," says spokesman Gary Bonham, "and we're following it closely."

But not all computer companies are content to follow superconductivity from

the backseat. Japanese computer manufacturers NEC, NTT, Toshiba, and Fujitsu all have active programs that have been spurred by, and in some cases reorganized around, the new high-temperature superconductors, raising the possibility that yet another technology pioneered in the U.S. may ultimately be marketed by Japan. Japan's Ministry of Industry and Technology, which organized Japan's much publicized fifth generation computer project, has already put together a similar consortium of industry and government researchers to study applications of the new high-temperature superconductors.

HP at the Forefront

One of the first U.S. computer companies to mount an inquiry based on the development of the new high-temperature superconductors was Hewlett-Packard. Len Cutler, who along with John Moll is directing the effort in HP's Corporate Research Lab in Palo Alto, hopes to assemble an eight- to 10-member team by the end of this year.

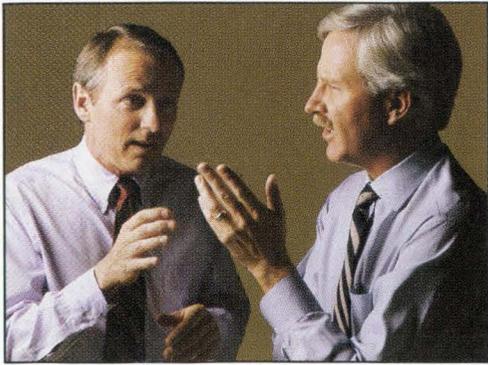
"My guess is that the new materials might show up in instrument devices first," Cutler says. "An analog-digital convertor, high-speed samplers, and the

like. To a large extent we'll begin by trying to understand the fundamental mechanism behind superconductivity. We'll also aim some of our efforts on fabrication."

What makes superconductor prospects so attractive? For computer designers, the main appeal of superconductors stems from their low power consumption and low heat dissipation.

One of the ways computer designers have been improving computer performance is to pack ever larger numbers of circuits into chips, thereby boosting the amount of processing that is done by each chip during a single machine cycle. Until the late 1970s, the density of circuits on a state-of-the-art silicon chip had been doubling each year; since then the rate of doubling has slowed to every two years. But higher circuit densities also boost the electrical resistance of the chip. With more resistance, the chips run hotter, thus increasing their vulnerability to failure. Some 10% of the cost of installing a typical mainframe goes to buying the air-conditioning systems needed to keep the computer from overheating; supercomputer systems are often dwarfed by their companion cooling systems.

A superconductor that loses no en-

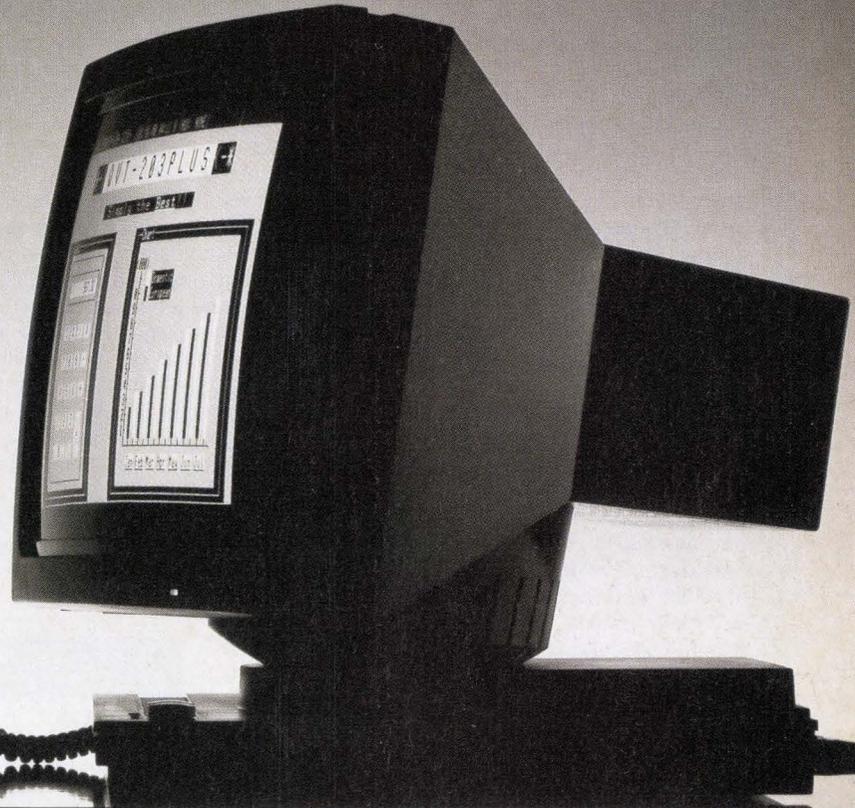


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Superconductive Computing

ergy as heat, could, in theory, allow considerably denser circuit packing than any semiconductor chip. Still, any application of the stable high-temperature superconductors discovered so far would require cooling systems even more expensive than today's, because these materials must be chilled hundreds of degrees below room temperature before they achieve superconductivity.

The first stage in the development of an all-superconductive computer (see "Three Steps Toward Constructing an All-Superconductive Computer") likely would be to use the new materials for chip interconnects, the fine lines on printed circuit boards that currently are made of copper and other metals. Next might come on-chip connections between silicon transistors. Finally, and perhaps most distant, there would be manufacture of integrated circuits (ICs) in which both active elements and connections would be fabricated entirely out of superconducting materials.

Chip interconnections would require that the new oxides be selectively applied to circuit boards in paths with current densities high enough to be practical. (Current density is the term physicists use to describe the amount of current a given volume of a substance can conduct.) Today's metallic interconnections are usually sprayed onto masked boards in so-called thick film fabrication (as opposed to the much finer "thin film" used on chips themselves).

Superconductor chip interconnections would also require so much refrigeration that their use would effectively be prohibited in an otherwise conventional mainframe. But since designers have learned that today's state-of-the-art silicon technology, CMOS (complementary metal oxide semiconductor, which dissipates less heat than the conventional NMOS that is based on so-called n-type transistors), runs twice as fast when chilled, use of superconductors for chip interconnects might dovetail with certain cryogenic advances for high-end computer designs.

Gains Not Worth the Costs

Otherwise, the potential gain of superconductor interconnects probably is not worth the cost: most heat generated by computer hardware is given off by ICs, not connective wiring. Also, though some designers of computers have complained that as much as 50% of processing time is wasted transmitting signals through various connective wires, such interconnect delays are due more to limi-

tations of silicon that cause complex circuits to require many chips, and thus many connections, than to interconnect resistance per se. The speed of electricity through any medium is a constant for that medium, unaffected by resistance. In fact, IBM research indicates that some of the new high-temperature superconductors actually conduct electricity at a slower constant rate than copper does; current flows through copper wires at about one-fourth the speed of light.

There's another problem that limits the potential of superconductive interconnects when used between conventional ICs: as these ICs heat up they could raise the temperature of interconnects enough for them to lose their superconductive property.

On-chip connections could be limited by the same problem. But replacing today's metallic on-chip connections

remain with aspects of Josephson systems outside their switches, however. It's also conceivable that another property of superconductors, such as their ability to circulate electricity in a closed loop indefinitely, could be exploited in a completely new circuit design.

In a Single Bound

None of these problems appear to be insurmountable, according to IBM's Grant. Several hurdles could indeed be overcome with a single bound, that being the discovery of a stable, room temperature superconductor. But Grant warns optimists of another challenge that superconductors will face. "Researchers working for a front-line company like IBM or AT&T eventually realize they're fighting a moving target," he says. "While they're doing research, the revenue-producing technology continues to improve." The anticipation of advances in silicon, in fact, was one reason IBM decided a Josephson junction computer was not worth developing.

The ultimate impact of superconductors on hardware may be overshadowed by a software application to which they're drawing attention: materials science modeling. Says Cornell's Wilson, "Unlike aerospace, where researchers have well-developed modeling software packages, materials science modeling is still the province of the professional simulation researcher. Applying supercomputers to materials science holds the promise of combining new materials by design rather than discovery. As supercomputers themselves become increasingly materials-bound, it's likely we'll see innovative ideas jumping back and forth between the two. If you think superconductors are a marvelous idea, you could well be astounded by the rate of technology advance 10 years from now."

Thus, the one application that superconductors are certain to affect is the advance of scientific knowledge. As IBM's Grant comments on his high school superconductivity experiment, "One application of the new high-temperature superconductors has already happened—science education." Or as 16-year-old student Jessica Rooney describes the experience, "Oh, it was totally terrific. I jumped four feet in the air. It was overwhelming." ■

Stephen G. Davis, former DATAMATION assistant features editor, is associate editor of Computers in Physics, an American Institute of Physics magazine that will debut this November.



SUPER- CONDUCTORS MAY TRANSFORM COMPUTER HARDWARE.

with superconductors might offer a bigger gain than superconductor interconnects. Today's chip designs attempt to minimize the total metal length of the on-chip connections between active chip elements such as transistors. Even so, since the connectors must carry enough current to meet the power needs of the active elements (plus what the connectors themselves dissipate), the most densely packed chips are typically half-covered with metallic conductors, sprayed on in thin films. Superconductive on-chip connectors could reduce the chip's power needs significantly while allowing denser circuit packing. Thin-film fabrication of the 1-2-3 substance was demonstrated at Stanford last March and at IBM in April.

A more distant prospect would be the development of an IC on which even the active elements are fabricated from superconductors. One candidate for a superconductive switching circuit would be the Josephson design. Some problems

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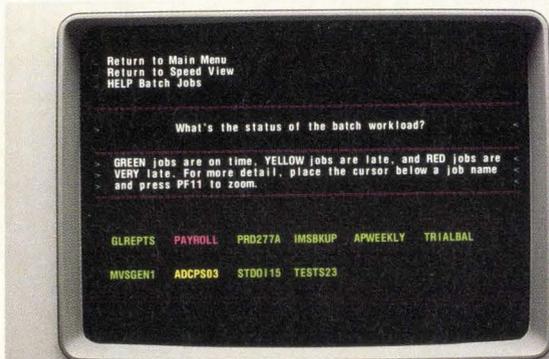
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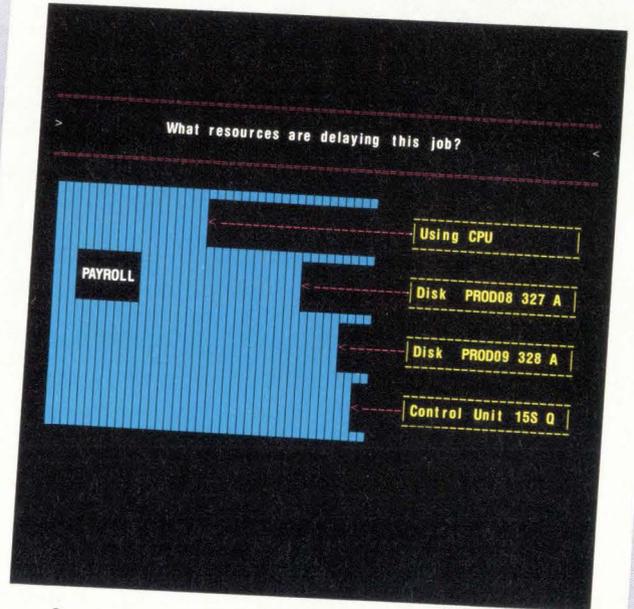
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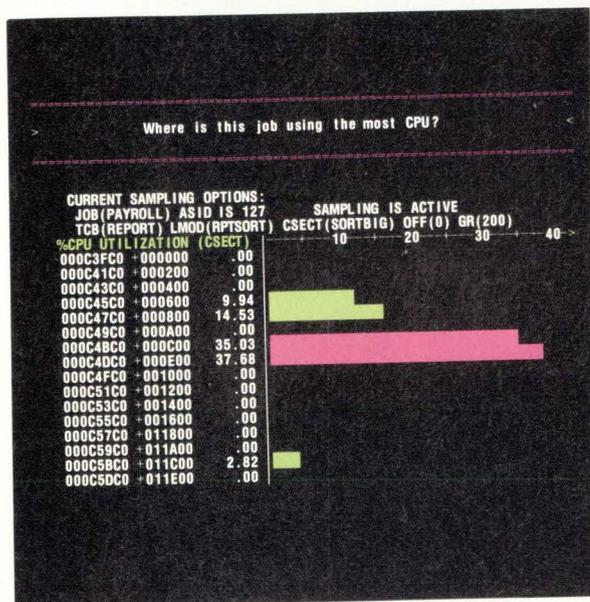
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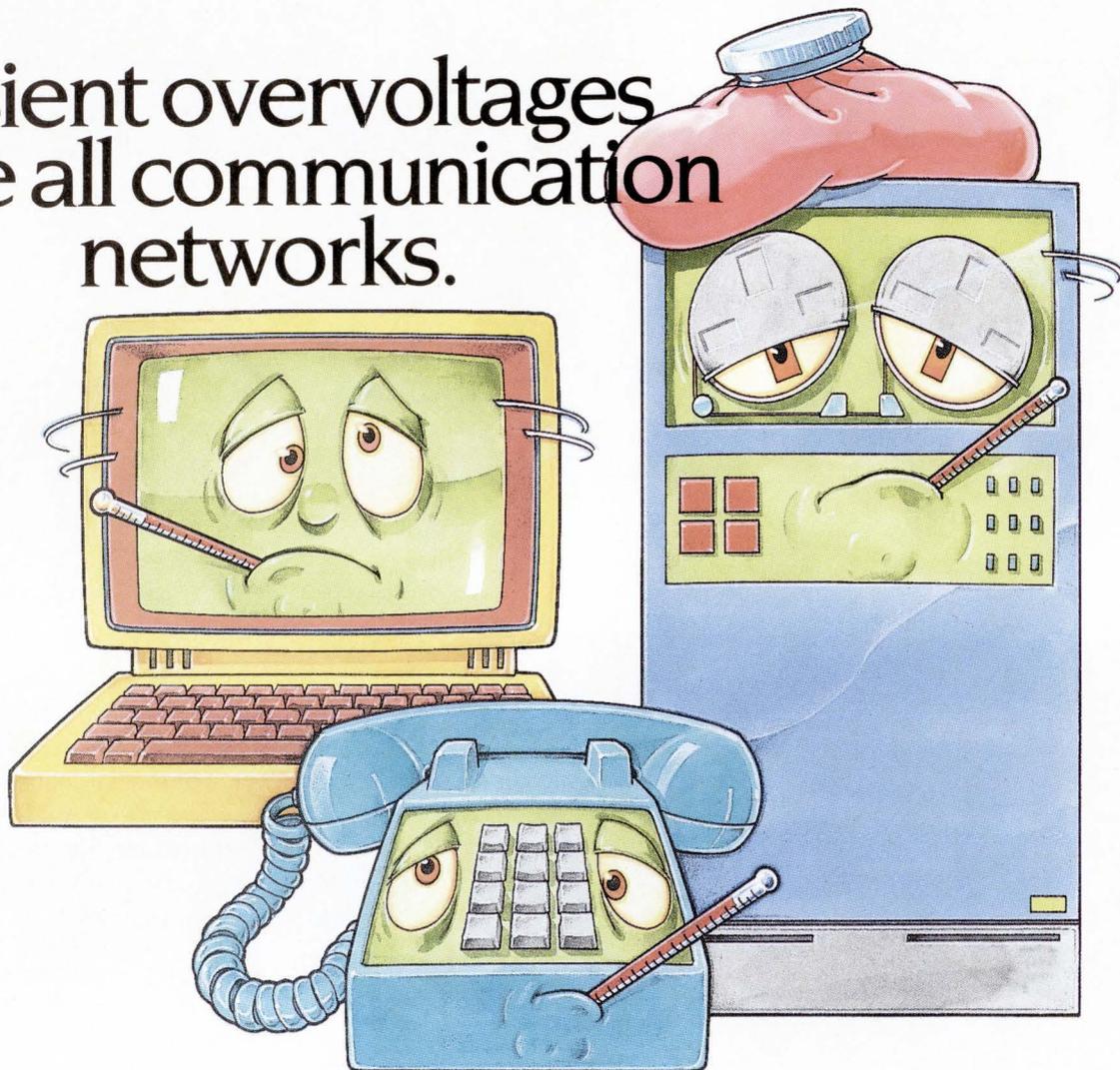
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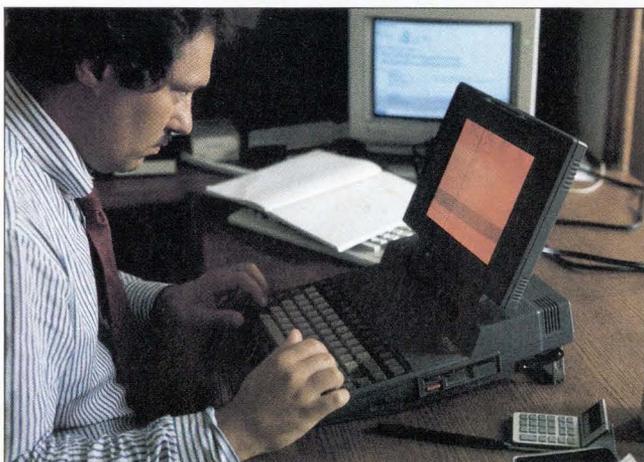


Once deemed little more than an expensive executive's toy, necessary only for traveling reporters, laptop computers have gained acceptance in the corporate world. Their biggest fans are sales reps and sales managers, particularly those who sell high-priced, high-tech goods. While there are still some kinks to be worked out, new screen technologies are solving what was once a major barrier to laptop popularity.

Portable Possibilities

BY CONNIE WINKLER

The portable computer business is picking up. No longer perceived as expensive executive gadgets, portable and laptop computers are being used in large organizations more and more, most typically by sales forces with complex products to market. Moreover, portables have



FARID NAIB: He uses his Toshiba 3100 at home, in the office, and on the stock exchange.

received the blessing of senior management and the support of MIS.

Chrysler Corp. started with 650 laptops for its U.S. district managers, recently added 150 for its Canadian managers, and, with the company's acquisition of American Motors Corp., just bought another 200 for the AMC managers. "They love it," reports Paul Berrigan, manager of Sales Management Information at Chrysler in Highland Park, Mich. The managers depend on GridCase computers from Grid Systems Corp., Mountain View, Calif.

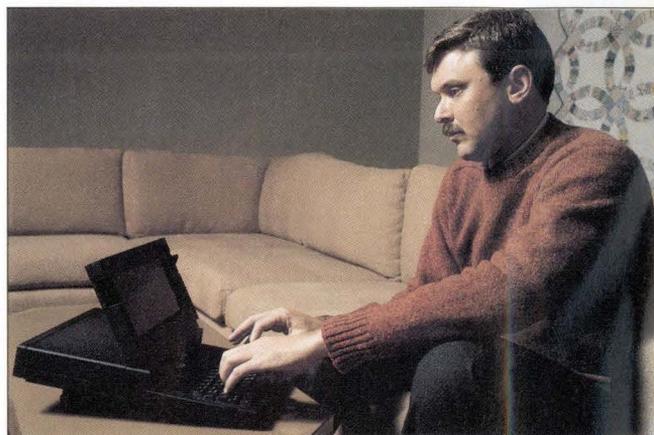
"The district managers have become business consultants, not order takers," continues Berrigan, who conceived the laptop system and then worked with Chrysler's internal departments to implement it. The GridCase was selected after extensive evaluation, and, despite the spate of new laptops, Berrigan says Chrysler remains

satisfied with the product. The Chrysler district managers use the laptops to tap into a sophisticated lineup of data about the dealers they call on.

With the portable system, managers can now walk into each dealer's office with a contact report on what they need to know about the dealer's performance—with the deficiencies highlighted in red, if so desired. The reports contain the variables managers need to evaluate dealers: total sales, minimum sales requirements, sales against allocations, financial status, and a customer satisfaction index.

The night before they visit the dealers, the district managers dial up one of the eight to 10 Chrysler databases from their office or hotel room. They download the data into customized programs and then prepare the reports and charts. "When calling on the dealers, the managers know exactly what to discuss," explains Berrigan. "This is a very businesslike approach."

The databases of dealer information have existed for a long time at Chrysler. What's new is the means of access and the consolidated reports the portables generate. Initially, to get everyone up to speed on the new technology, Chrysler ran special training programs on the laptop systems. New hires now receive the laptop training along with their orientation. The Sales Management Informa-



WILSON OF LEVI STRAUSS: He headed the project that chose GridCase.

Portable Possibilities

tion group regularly delivers updates to its district managers via the Chrysler closed circuit television network.

Tiny computers have always fascinated users as the latest in high-tech toys; these machines epitomize state-of-the-art technology by packing greater computing power into a smaller and smaller space. Until recently, however, the technology always fell short: screens were unreadable, memory was small, and the battery packs weighed three times as much as the computer. Moreover, executives quickly tired of their pricey toys because there was little use for them and no one else to play with.

Within the last six to 12 months, however, that's changed. The small, briefcase-sized computers are showing up in corporate America in large numbers, and they're being used.

"In the last six months—as compared to the six months before—we're getting calls from MIS managers and sales managers saying, 'We're thinking about doing this,'" says Peter Rothstein, president of Portable Computer Solutions Inc. in Cambridge, Mass. "Six months ago, we were calling them, asking if they had thought about the concept.

"Now, customers are beyond the conceptual state. Most people who are good candidates for portable computer systems know they're good candidates," says Rothstein, whose firm provides both packaged sales software and consulting services. "They have outside sales forces calling on major accounts in a repeating business, and they need to track information about those accounts."

"Three or four years ago, it was a very forward-thinking vice president of sales who called us," echoes Charles Johnson, president of Sales Technologies Inc. in Atlanta. "More recently, it's an MIS project group or an MIS manager."

The new status of portables has been propelled by several forces:

- **Improved technology.** Many point to the Toshiba 3100, from Toshiba America Inc., as the turning point. "It's the best computer I ever bought," says Naim Habib, a jet-set computer whiz who gave himself a 3100 for Christmas. Underneath its sleek, black case and highly readable gas plasma screen, the 3100 uses the fast Intel 80286 chip, an internal 10MB hard disk, and 3½-inch diskettes. (The 3100 was announced in April 1986, about the same time as the IBM Convertible; it followed the Toshiba 1100, a plainer, lighter 3½-inch disk portable.)

Other portable manufacturers, such as Data General Corp. and Zenith Data

Systems, have matched both the technology and price of the 3100—and the improvements continue.

- **IBM's entrance into the marketplace.** IBM's April 1986 announcement of the IBM Convertible lent credibility to the laptop products. With dual 3½-inch disk drives, the Convertible has a liquid crystal display and a nine-inch detachable crt, so that the system can become a desktop unit. In January 1987, IBM improved the Convertible with a fully Hayes-compatible, built-in modem and a super-twist screen with higher resolution, and offered a 640KB memory option, up from the 512KB originally announced. IBM's

new 12.4-pound, \$1,695 Model 3 Convertible uses a backlit screen to improve readability. It is scheduled to ship this summer.

- **Competitive pricing.** "IBM helped establish fair, attractive price points, and most people reacted to the prices they established," says Sales Technologies' Johnson. Last month, IBM raised the stakes again by lowering the price of its Model 2 to \$1,395.

- **Growing capabilities and acceptance of personal computer-based systems.** At the time laptops became more technologically practical, corporations were making multimillion-dollar investments in per-

The Portly Portable Market

One reason you hear so much about portable and laptop computers is that many of their most enthusiastic users are journalists who use them while traveling. Unfortunately, these reporters may have overstated the early estimates on how many portables would be sold. In 1984, for example, in the midst of personal computer euphoria, several then respectable market researchers estimated that the portable market would reach \$7.6 billion by 1987.

It didn't quite work out that way.

Last year, an estimated \$522 million was spent on laptops, according to International Data Corp. (IDC) in Framingham, Mass. The leaders were Zenith Data Systems, Toshiba America Inc., and Grid Systems Corp., which each had about a 20% share. IBM's 1986 entrant, the Convertible, took about 8.8% of the market, according to IDC. Estimates on the installed base range from 400,000 to 500,000, and it's expected that another 300,000 to 600,000 briefcase units will be sold this year.

Those numbers will undoubtedly be affected by the April U.S. trade sanctions on Japanese manufactured micros; those sanctions have had the greatest impact on Toshiba America Inc., Epson America Inc., and Sharp Electronics Corp., as well as the Brother International Corp. laptop sold in the U.S. by Wang Laboratories Inc. While these manufacturers, several of which have built up inventories in anticipation of the clampdown, hope for an early cancellation of the 100% tariffs, the duties have doubled the price of the Toshiba 3100. Aaron Goldberg, an analyst at IDC, says he thinks it unlikely that further sanctions will put Toshiba out of business in the U.S. (see "Toshiba's Troubles and U.S. Trade," p. 100). If, however, Toshiba is barred from U.S. business for several years, he says the laptop spoils will be split by "Zenith, NEC, IBM, and Hewlett-Packard." Goldberg doesn't think Grid machines are priced right to get much of Toshiba's share, and adds that the popular Compaq 3 is in short supply and won't be able to take quick advantage of any Toshiba sanctions.

In 1987, the question still remains: besides roving journalists, who really needs a portable computer—especially with today's bargains in clones? Manufacturers are making some surprising discoveries.

Predictably, half the Toshiba 1100 users are mobile professionals, but the other half are a less well defined group, claims Daniel M. Crane, marketing vice president at Toshiba in Irvine, Calif. "They're an amorphous group, many in small businesses, who see the laptop as a sleeker alternative to a personal computer. For example, a gas station owner may want a computer that he can take home at night." Crane adds, "We know how to sell to the mobile professional; we're not sure about how to reach small business users."

Crane's research has found laptops being used on desktops. Others say the machines are being used for instant reports during meetings. Some users of the neatness persuasion simply want a powerful machine on their desk without the clutter and cables of most pcs. They can even hide the laptop in their desk, Crane notes, adding, "Next they'll want one that's Steelcase compatible, with zero footprint!"

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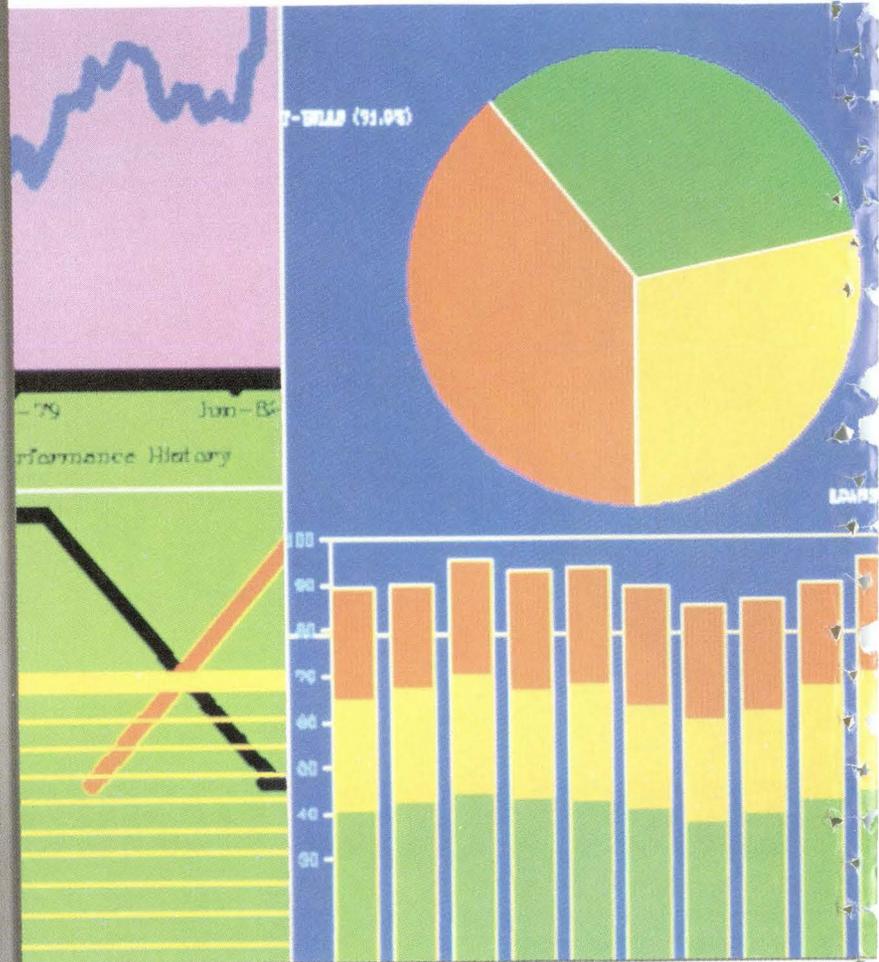
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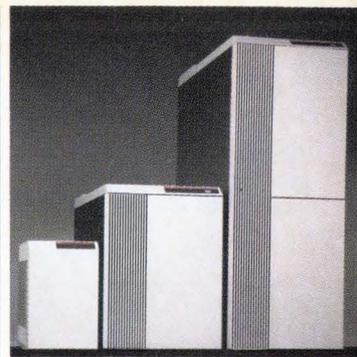
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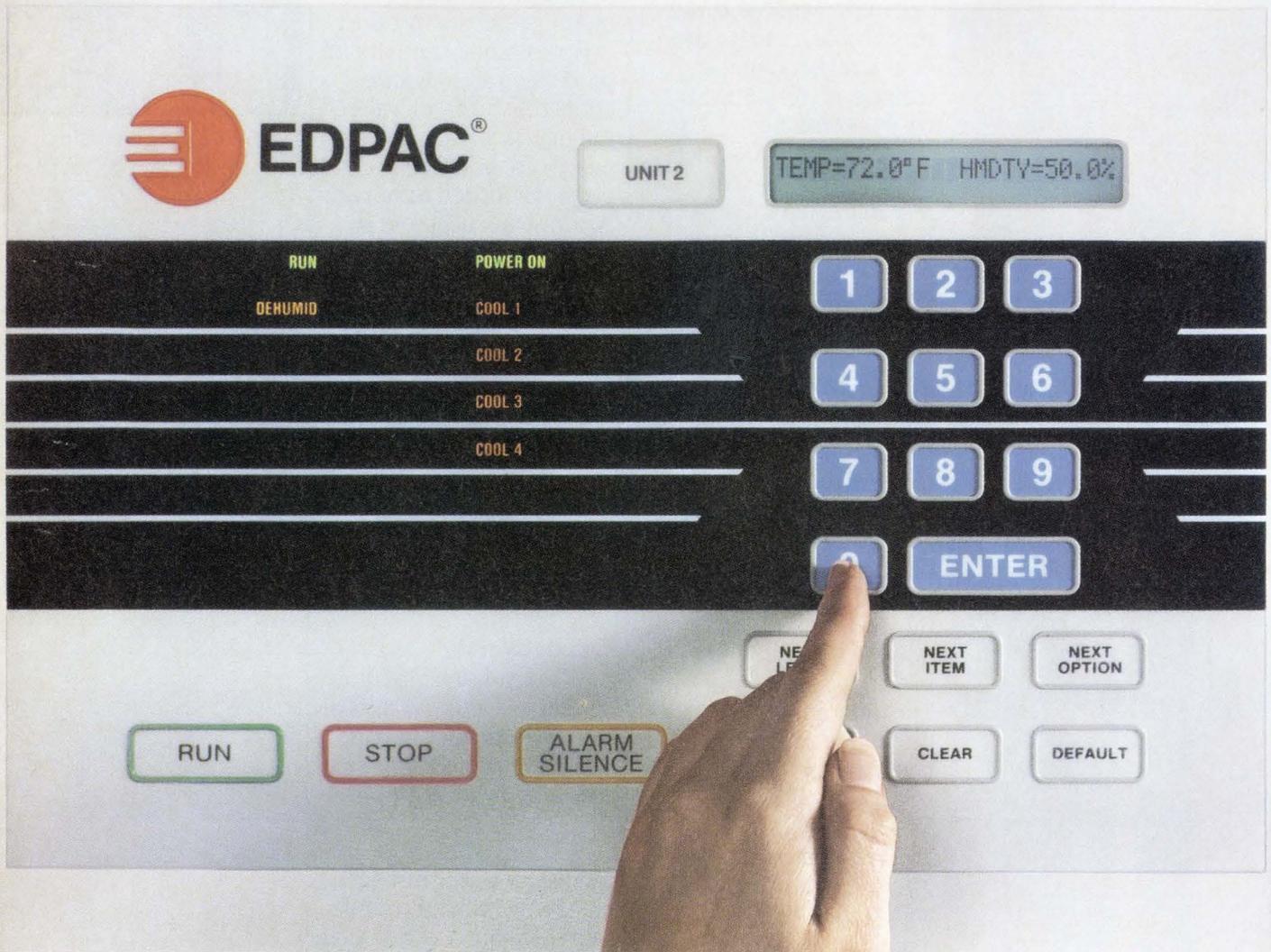
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CIRCLE 35 ON READER CARD

Portable Possibilities

sonal computers. Users discovered the benefits of laptops by using machines on their own desktops.

• *Slowdown in large-systems development.* Coincidental to the spread of the pc, large traditional systems development slowed, paralleling the 1985-86 slump in the computer industry. Many data processing organizations found they essentially had saturated the "back office" applications.

• *Sales force sophistication.* Heretofore relatively untouched in the automation rush, salespeople were tantalized by the benefits of pcs, but they required portability, and help installing the systems. "Why shouldn't the sales force use computers if every other function does?" Johnson recalls asking back in late 1982, as he was starting Sales Technologies. Johnson and his partner had been Procter and Gamble marketers and then served as management consultants with McKinsey & Co., making calls on gro-

cery stores.

• *Availability of sales management packages.* Canned sales management software is now available for smaller companies that can adjust to standardized packages; larger companies are willing to customize sales software for the particular needs of their employees.

"We had developed software to run on personal computers for order entry and customers' inventory modeling," recalls James Wilson at Levi Strauss & Co. in San Francisco. "This [pc system] worked great for sales reps who worked out of urban areas or their homes, but it didn't help the reps who traveled a great deal, especially during ordering periods." So, the jeans and clothing manufacturer started seriously looking at portables in late 1983 and early 1984, finally selecting the GridCase, when that company introduced an MS/DOS, PC-compatible machine.

"Companies which embrace the

portables tend to be selling high-tech products," reports Portable Computer Solutions' Rothstein. "It's easier for them to adapt to the technology." Rothstein says current users are peddling phone systems, other computer systems, software, or sophisticated banking and financial products. "These are sales organizations where the sales people don't try to close the sale after the first call. They gather information and really have to have the proposal validated back in the office. These companies have to have a fairly expensive service or product line with repeat sales so that it's worth spending \$200 to \$500 on a sales call in order to be able to justify the cost of the portable systems," he adds.

The pharmaceuticals industry seems to have caught on to portables as well. Salespeople use the portables to specify drugs and their usage, and to detail treatment programs for doctors. Pharmaceutical reps can take advantage of a zip code listing of doctors within their territory, so that if one doctor cancels an appointment, others in the area can be quickly identified. These small fixes can pay off big: Ciba-Geigy Corp.'s Pharmaceuticals Division reports that for every 1% improvement in a sales rep's performance, the company gains at least \$1 million dollars each year. Laptops are also popular with some insurance agents, but, so far, not every company's proprietary software is available on a laptop.

One study of AT&T sales reps using laptops showed a 10% to 15% increase in productivity and a 20% to 30% increase in client contacts, says Paul E. Fink, staff manager of marketing information systems at AT&T in Basking Ridge, N.J. Fink, who took his Toshiba 1100 on his vacation last year, verifies those improvements. He is looking forward to attaching more laptops to AT&T's internal processing networks.

"We realized that the drivers of this would be the companies that truly understand the advantage of better, more timely information," recalls Johnson, "but they wouldn't buy cookie-cutter software; they would want software that reflected the way their organizations worked.

"The budget for a portable system is significant," says Johnson. "Software comes to about \$1,000 per representative, in addition to whatever the laptops are. It's pretty easy to spend \$500,000 on software alone." And while some companies are buying as few as 10, others are buying thousands of the briefcase com-

How Portly the Portable?

With the continued introduction of new models, the potential size of the portable microcomputer market depends on, well, how portable they are.

In 1982, Compaq Computer Corp. introduced a product it called the Portable. But those who had to schlepp around the boxy, 40-pound machine felt differently. "We found the Compaqs mostly stayed where they were first installed," reports James Conerly, who manages a national office project for accounting giant Ernst & Whinney. In February '87, Compaq tried again, introducing an 18- to 20-pound toddler called the Portable III.

Weight remains a key factor in selecting a portable, say users who've evaluated the available hardware. The preference seems to be for machines that weigh between four and 15 pounds. If the user requires true portability, using the computer in a car, for example, then special rechargeable battery packs or several commercial batteries are necessary. Add one to three pounds for a battery pack.

Equally important is screen quality and readability. Most common are liquid crystal display (LCD) screens, which, like venetian blinds, open and close to display characters, often allowing some light to shine through and diminish the contrast. With the latest round of laptops, several manufacturers have introduced super-twist LCDs in which the blinds close more tightly. The most sophisticated—and the most expensive—of the screen technologies is gas plasma, which has the highest resolution and, thus, greatest readability. But some portability is lost: plasma screens require an AC outlet.

Screen quality can make or break a machine, says one laptop project manager, who has trained about 200 sales reps to use portables. Training is often done in hotel conference rooms, where the lighting can be awful. If the trainee doesn't become comfortable with the machine during that session, then he or she won't be likely to use it in the future.

Paul E. Fink, staff manager of marketing information systems at AT&T, says, "If I can't read the screen, I turn off the Toshiba 1100 and go to sleep. I'm obviously too tired if I can't focus."

Portable users still scramble to convert programs and data to and from 5¼-inch and 3½-inch disks; but as more products begin to use the smaller plastic diskette—including IBM's new Personal System/2—conversion may become less of an issue.

Memory is hardly a problem: almost all laptops now come with 640KB of RAM, or can be easily upgraded from 512KB. This is in sharp contrast to the early systems that proudly flaunted 96KB or 128KB.

puters. "The large customer is very price sensitive," adds Johnson. "If he can save several hundred dollars on a thousand machines, he will."

There's no doubt that the needs of sales organizations vary with the product they sell, but companies that are now marketing sales software have developed modules that handle sales lead tracking; proposal, document, and invoice generation; individual and bulk mailings; time, travel, and expense accounts; catalog listings; and communications.

Grid, one of the first portable makers, has found that individual applications like these are not sufficient. "What we're talking about is a new class of support for professionals," says Grid marketer Alan Lefkof. "Supporting professionals away from headquarters is a different game, involving different software, different training, a different perspective. Initial [hardware] costs are irrelevant; you're going to chew up that much in communications and training costs."

What successful corporate users—and vendors—have found is that linking individual sales reps and regional sales groups in a network adds value. "In the past, individuals had their own portable computers for single tasks such as word processing, spreadsheets, and electronic mail," says Johnson. "Those are fine tasks, but they're not necessarily tasks the salesperson does day to day. The individual salespeople wanted to be tied back to the headquarters. Now the power of the network does that."

Thus, Sales Technologies will either develop a minicomputer-based database for the sales rep's information, or users can access Sales Technologies' computers in Atlanta as a traffic controller service. The controller—a kind of system traffic cop—is critical in a sales force system, Johnson explains, because the salespeople's needs cut across so many departments. Often, companies test their sales system on the Sales Technologies mini.

Front-end software for portables is also important at the accounting firm of Ernst & Whinney, Cleveland, which has developed its own in-house software for portable users. Portables account for about 4,000 of the 5,000 pcs now used by Ernst & Whinney's accounting professionals. (Most of those portables, however, are earlier Compaq computers, which at 32 to 40 pounds are suitably described by their users as "luggables.") Now, more of the MS/DOS-compatible laptops with 3½-inch disk drives are

Toshiba's Troubles and U.S. Trade

The Senate already has threatened Toshiba products with at least a two-year ban from the U.S. market. The President could stretch the downtime to five years for the Japanese company, which is getting socked for its Toshiba Machine Co.'s illegal shipment of sensitive milling equipment to the Soviet Union. The equipment enables the Soviets to make much quieter propellers for their submarines, thereby making detection more difficult. But U.S. computer companies' dependencies on Toshiba as a supplier may prevent any meaningful sanctions.

"I think Toshiba is out of the laptop business in dealing with the federal government," says an independent procurement expert in Washington, D.C. "This deal of selling to the Soviets has killed them. With the Defense Department not permitted to buy Toshiba units, I don't see how the company can make it in the federal market. I think they're dead."

Escaping the Senate's wrath were "spare parts and component parts, but not finished products, essential to U.S. production; imports under contracts signed before May 1, 1987; routine servicing and maintenance of products already supplied or information and technology." The first loophole, specifying component parts, could save Toshiba's nonfederal laptop business: the company now has a U.S. assembly plant for the laptops. The President also could waive the ban on any products needed for U.S. national security.

The Toshiba clause was added to the trade reform bill on the Senate floor. If passed, the bill would hit Toshiba where it hurts. Toshiba America's U.S. sales (for the fiscal year ended March 31) amounted to \$2 billion, says Nobuo Ishizaka, chairman and ceo of the subsidiary. The Senate would also require the U.S. to seek damages from Japan and Norway, where the firm Kongsberg Vapenfabrik was sentenced to two-to-five for the same offense.

Toshiba's best shot is in the House, which has passed a bill seeking damages from the two offending countries, but has not taken as specific an anti-Toshiba action as the Senate. The computer industry and the Reagan administration want to prevent the House from following the Senate's path. The industry wants every country in the Free World Export Control Coordinating Committee, not just the U.S., to punish Toshiba. The administration would like Japan and the other Cocom members to tighten their export controls. None want to establish the precedent of state-initiated punitive action.

"This reinforces a classic pattern," says a computer company government relations executive. "Every time the industry gets close to achieving liberalization in export controls, something happens. We've never thought it was coincidental." While sources indicate Toshiba made the shipment well before the public became aware of it, the timing of the revelation may not have been coincidental. The delay can be attributed to diplomatic efforts, legislative tactics regarding trade, or both.

The affair also raises the issue of reciprocity. If IBM or DEC were to do something comparable to Toshiba's action and France or Great Britain decided their national security had been compromised, what's to stop them from banning the offending U.S. companies? "I think the House needs to avoid acting in a manner that will provoke a similar reaction by other countries," says Ed Black, vp of the Computer and Communications Industries Association. "What all this means from a business standpoint is unclear. But it is clear that it's one hell of a mess."

BY WILLIE SCHATZ



A sledgehammer and a laptop provide a photo opportunity for Congressional Toshiba bashers.

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we never stop asking

What if...

Soup

Canned Soup Council

Mr. J. C. Ryan, President
Flossmoor Soup Company
Flossmoor, Illinois 60422

August 1, 1987
Dear Mr. Ryan:

In an effort to help you stay competitive, we are publishing 5-year sales projections for two soup categories: canned and dry. Please keep these projections handy as they will aid you in your product planning over the coming years. Of special interest to you are the dry soup projections.

	CANNED	DRY
1987	\$6,700,000	\$1,100,000
1988	\$7,300,000	\$2,100,000
1989	\$8,400,000	\$2,600,000
1990	\$9,300,000	\$4,800,000
1991	\$9,900,000	\$7,300,000

As you can see, industry experts project that the gap between dry and canned soups will begin to close by 1990. They also believe mergers will follow.

Noodle Price Hike

Bad news this month comes from TNG (The Noodle Group). By year's end, they project the price of noodles to double — up to eighteen cents a barrel. How will this price hike affect you? A two-cent per can increase on all noodle soups you sell.

Recommended Reading—"Cup or Bowl"
This in-depth study discusses the habits of the American soup eater. Call and I'll send you a copy.

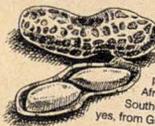
Sincerely,

Robert Welke
Mr. R. Welke
Director, Canned Soup Council

NUTS

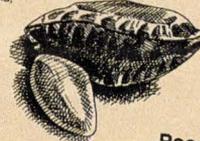
Deluxe Assortment

Spring 1987



Peanut

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Hazelnut

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Almond

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Walnut

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Pecan

Another great favorite in the bakery. And our own superb pecans will satisfy even the most discriminating Southern tastes.



Pistachio

With an unusually subtle and delicate flavor, these perennial favorites will be perfect for either sweet or savory dishes.



Chestnut

Superior varieties from our own plantations in Italy and France. All the best for more than seasonal consumption.

You're looking smarter than ever, MIS!

JCPenney Company's MIS department shares the inside story on creating a successful Executive Information System using an outside data service.

"We've actually had department heads from throughout the corporation walk into MIS and say, 'Hi! I like what you're doing and we need to get on your system.'

"All in all, I'd say we're on the right track," says Bill Friel, Vice President of MIS for JCPenney Company.

With a modest "We're on the right track," Friel sums up the tremendous success of JCPenney's Executive Information System (EIS), now serving over 30,000 users.

What's the secret to their success? And how can you make your department look as good when designing your system, the most visible MIS activity since introducing PC's to the Executive Suite?

The secret is that there's no secret at all.

Robert Capone, Senior Vice President and Director of Technical Operations, explains that when the EIS was designed in 1983, "We already had an extensive internal network. Our problem was how to improve the value of our existing decision support system.

"The obvious answer was to provide more of the information people really need. That meant adding external data, which led us to Dow Jones News/Retrieval®."

Take the "easy way out."

Capone found that Dow Jones News/Retrieval offered an easy, economical way to integrate reliable external data.

"It's there, the systems exist. It's easy to integrate. It's not very expensive—less now than when we installed it. And it fits the needs of a very broad user base," he says.

Dow Jones News/Retrieval is an online information service of Dow Jones & Company, Inc., publisher of *The Wall Street Journal*. It offers over 40 business and

financial databases, including exclusive online access to the full text of *The Wall Street Journal*.

Capone remembers, "We experimented with various means of dial-up connections, but they were not convincing."

on-the-spot analysis."

Al Lynch, Director of Planning and Research, calls it "...one of the most powerful tools in our system. Thank goodness for the corporate insider trading data. It showed us some things that

influenced a major deal. It can pay for itself very quickly."

Heather May, a coordinator for new business activities in Lynch's department, uses Dow Jones News/Retrieval because "...I believe in gut reaction. When my instincts say 'go to Dow Jones,' that's where I go. It sounds like habit, but there's a reason it became habit: I've found it works."

"It's a definite necessity," says Raul Consunji, a financial analyst at the company. "There's a lot of credibility in the name 'Dow Jones,' and no way to get along on the job without it."

Holly Clemente, manager of the Investor Relations Department adds, "This is a great way to obtain information quickly. Without it, everything would be done manually, and that shouldn't be the case in this day and age."

An MIS story that always ends happily. Well, almost always.

Properly planned and implemented, an EIS is an almost sure-fire coup for MIS.

But it can quickly turn into a fiasco if just one element, such as timely external data, is overlooked.

Dow Jones News/Retrieval can help guarantee your success, giving users the information they can really use.

Capone sums up the bottom line: "I didn't have to promote it; the system sold itself. You put it up, and what's not to like?"

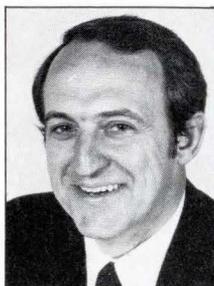
That's the kind of "selling" most MIS/DP executives would love to be faced with. ■



Robert Capone
Senior Vice President



Robert Northam
Chief Financial Officer



Al Lynch
Director of Planning and Research

"You're looking smarter than ever, JCPenney," is more than advertising, it's how users throughout the company view their MIS department, and the EIS they've created. Dow Jones is a major reason it rates above average.

To guarantee absolute reliability, JCPenney Company pioneered the technology for connecting to Dow Jones via a dedicated line and worked out an attractive pricing structure.

Other corporations, such as ConAgra and IBM, have followed their lead.

"It wasn't very difficult at the time," Capone says. "Today it would be even simpler."

What are the users saying?

Capone uses the service daily as a kind of executive security blanket. "I take a few minutes in the morning to look at the headlines and make sure I'm well informed. It really starts the day off right."

But what do others outside of MIS think of the decision to bring Dow Jones News/Retrieval inside?

JCPenney's CFO, Bob Northam, agrees wholeheartedly: "It's very timely and simple to use. In meetings, I can easily call up figures for immediate

How to make your MIS department look smarter than ever.

Discover how easily you can integrate external data into your decision support system, and how economically you can connect your users to timely, authoritative business and financial data with Dow Jones News/Retrieval.

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Portable Possibilities

showing up at the company.)

The Ernst & Whinney front-end software allows users to access the company's Wang-based internal network and exchange files between mini and pc formats, explains Los Angeles-based James Conerly, the director of a national office systems project at Ernst & Whinney. The conversion is less than perfect, especially when the user is at the home office docking station. "I'd like to see an integrated solution providing greater connectivity," says laptop enthusiast Conerly. But he adds, "We've worked out a pretty slick solution. It's the only one I know of that is as convenient to use. It's a near perfect translation."

Other laptop users have developed their own software and combined it with commercially available packages. Levi Strauss uses its own software for order entries, but also provides reps with the Enable integrated software package for database, word processing, and spreadsheet applications, says James Wilson, who led the portable sales project at Levi Strauss. All-in-1 Enable is made by the Software Group in Ballston Lake, N.Y.

There are two rival schools on how much communications capability laptop users need; depending on the circumstances, each is probably correct. Levi Strauss reps, for instance, need dial-up communications from their client sites so they can immediately check on product availability and orders. Other users simply enter the information into the laptop and later prepare the final pricing or proposal.

Other Laptop Issues

Technology is not the only issue in the laptop world. There are courtesy and communications questions: will the rep be able to log on through the client's PBX? Will it be a long distance call? Often calls cannot go through. Should a sales rep even ask to use the client's telephone for his computer?

A similar issue develops when the portable requires an electrical outlet, as does the Toshiba 3100. "I'm concerned about the need for an electrical plug," says one manager of a laptop sales system who asked not to be identified. "It's like someone coming into your office and

wanting to use your telephone when you haven't bought anything from them. People don't always like you to do that."

Nor have users—or manufacturers—solved the printer problem when it comes to laptops. "It's funny," observes Conerly at Ernst & Whinney, "to see a professional toting a slim briefcase, a toney portable, but with a bulging printer wrapped with cables under the other arm." Several vendors provide small printers (often requiring thermal paper) and some even attach to the laptop itself. The catch is speed and print quality.

Until better printer solutions are available, laptop users will have to rely on printers at their own or their customer's office—if they can find the appropriate connector cables. Or they make do with what's available, turning on the system before they go out to dinner. As one consultant has found, "salespeople are a pretty practical bunch." ■

Connie Winkler, the former executive editor of PCM Magazine, clings to her Radio Shack Model 100 with 16KB of memory and a 40-character, eight-line screen.



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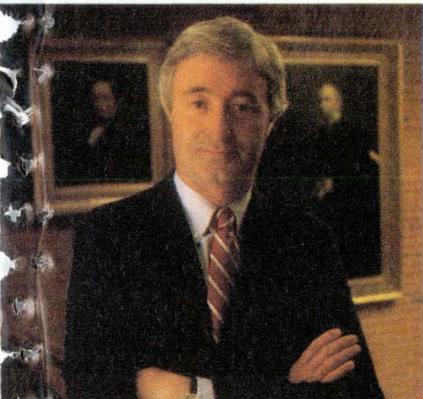


When The Johns Hopkins University decided to launch an ambitious fund-raising campaign, its Development and Alumni Services Department decided to do something even bolder — break away from the administration's traditional mainframe environment. And go with a system from Digital.

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"A computing architecture that raised some eyebrows when it helped Johns Hopkins raise a few million dollars."

output," Vogelsang remarks. "I'm constantly faced with growth. And Digital's open architecture lets me add on whatever I need."

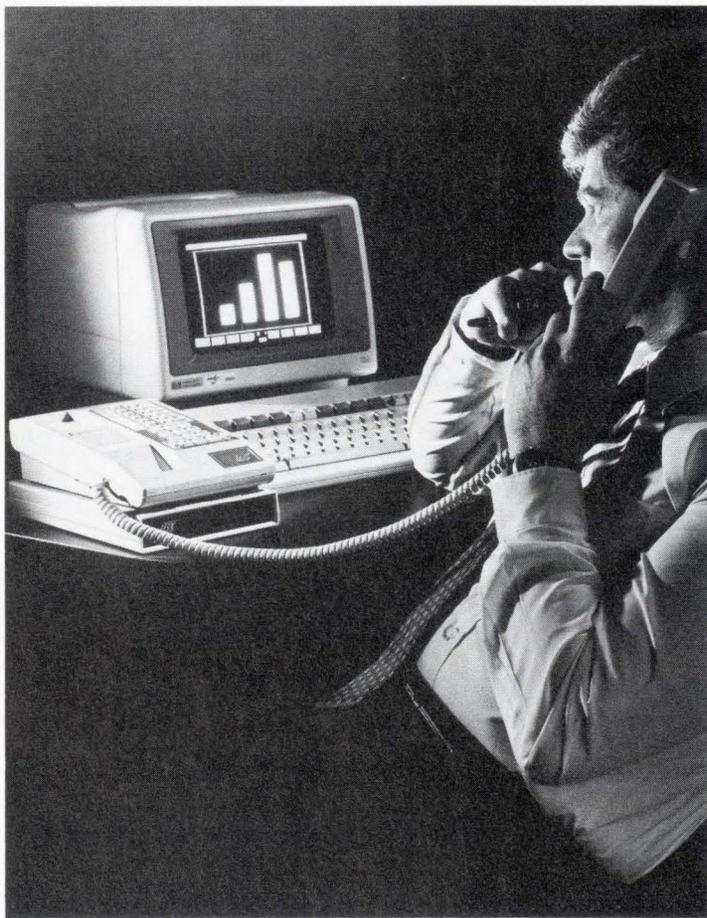
How successful is the department? According to Vogelsang, "We've cut response time from three weeks to three days. And when needed, to three hours. In fact, we've tripled the work processed. Now, we have time to branch out into event management, alumni networking. Even a little PR.

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Why Software Prototyping Works

Systems developers are so enthralled by today's graphic, narrative, and representational modeling aids that they are losing sight of their mission and forgetting that the map is *not* the territory.

So much emphasis is placed on developing construction sets that usually there is no conceptual model against which to judge the development tool. This lack of perspective is worsened by the industry's constant craving for the newest portfolio of systems development tools. It's no wonder that business professionals and even some developers view the current state of systems development as wasteful and inefficient.

Research we've conducted at the State University of New York at Buffalo

suggests that today's available techniques are not consistently applied to systems development in an effective manner. The following discussion provides a conceptual framework for selecting and incorporating software development tools, particularly prototyping, into the systems development life cycle. The challenge facing developers is not to create more tools but to learn how to apply available tools and techniques effectively.

Experience and research show that there is no one best approach to systems development. Still, we believe more emphasis should be placed on the problem recognition and definition stage of systems development. All those involved

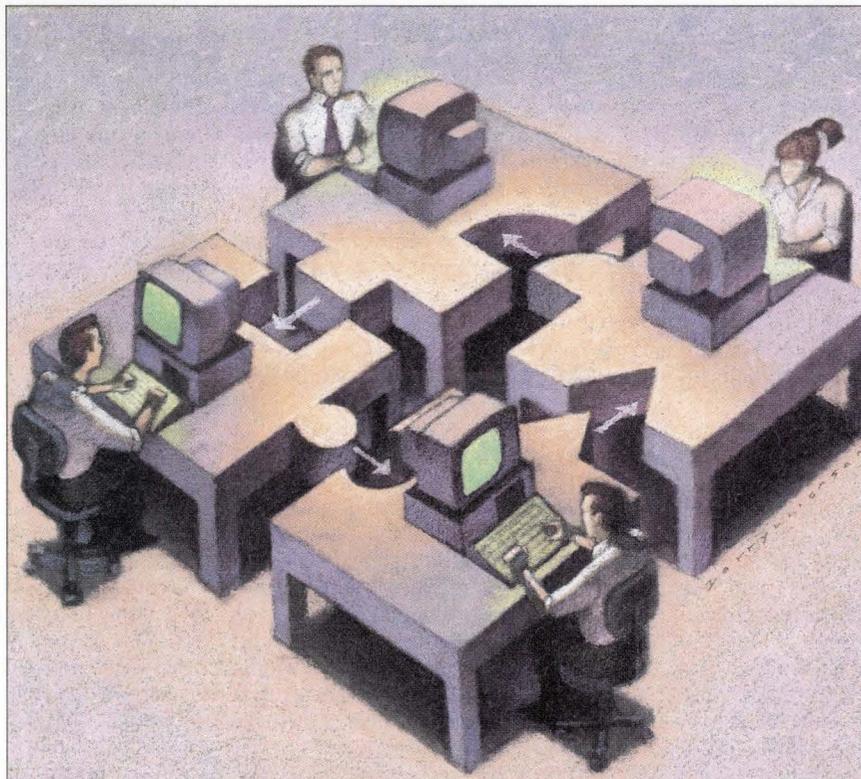


Illustration by Dorey Ligason

Systems developers produce spotty results largely because the development process itself is not well understood. Systems development should be seen as a process of concurrent learning by users and analysts. Abstraction tools, such as modeling, are the common ground upon which analysts and users communicate about systems design. Research conducted at the State University of New York shows that prototyping is a good abstraction tool for converting a mental construction into a tangible working system.

Why Software Prototyping Works

must gain a clear understanding of the problem at hand. Thus, our approach stresses the crucial role that learning plays during systems development.

Systems development is a process that requires concurrent learning by the analyst and the user. The analyst must first comprehend the user's task. A major function of the analyst during requirements analysis is to help users formalize their tasks and decision processes. The user, on the other hand, is charged with learning about the system modeling techniques of the analyst and understanding the scope of the project specifications. All this learning is for naught, however, if the results cannot be readily incorporated into the design solution or into the implemented system.

Prototyping, in our opinion, is an excellent technique for promoting this process of mutual learning between analysts and users.

The etymology of the word prototype can be traced to the French form that is derived from the Greek root (*protos* + *topos*) meaning "first model" or "first type." A software prototype is a first model. The typical descriptions of a prototype include "built quickly and economically," "standalone system," "alternative to the traditional approach," "throwaway system," "useful for small projects," and "relies on fourth generation technology." Our view of a prototype is broader than this and is influenced by our concept of abstraction.

Abstraction helps humans make sense of very complex systems by reducing them to a simplified form. Abstraction tools can consist of flowcharts, hierarchy charts, report layouts, and Warnier/Orr diagrams. More recently, approaches in knowledge representation such as semantic networks, frames, and production rules have joined the list. Some of these tools are used primarily by systems developers, while others are used for communicating system specifications to users.

Supporting Better Communications

Abstraction tools are the common ground upon which the analyst and the user can communicate with one another about systems design. The various diagrams, roughed-out reports, and file layouts send signals to users that considerable work has been done. They also give users a way of understanding the results or efforts to date. It is important to remember that abstraction tools appropriate for the analyst may not be appropriate for the user trying to understand

the system structure. Users sometimes indicate agreement with specifications when in fact they have trouble understanding the design. Yes, the user has attended all of the review sessions, but, no, the user does not comprehend the subtle nuances of the design.

Because they are so far removed from the implementation process, abstraction techniques can interfere with the learning process of users and analysts. The result is less than total understanding and commitment to the system on the part of the user. Therefore, in choosing among abstraction tools, you must consider the needs of both the analyst and the user. The most appropriate abstraction tools encourage user involvement and joint ownership of projects and support—or at least do not impede—the learning process of user and analyst. Prototyping satisfies these criteria perhaps better than any other ab-



LEARNING IS THE KEY PROCESS IN SYSTEMS DEVELOPMENT.

straction tool because it helps convert a mental construction into a tangible working system. The result is something a user, who is naive in systems development and operations, can comprehend.

The form of the development life cycle should depend on the level of uncertainty in the requirements. Prototyping, which affects the development life cycle, can be applied according to the system type, which in turn is a reflection of the amount of uncertainty.

A prototype can be built to model an entire system or only a part of a system and can be created at any point in the life cycle. The critical feature of our definition is that a prototype must look or act like the target system. Thus, a screen, a report, a file interaction, or a batch process can be prototyped. The trick is to determine which aspect (or aspects) should be prototyped. Not all systems should be prototyped to the same extent. This means that the analyst and the user must determine precisely what type of application system is being developed.

Three general types of systems will be discussed here: transaction processing, reporting and control, and decision support.

Some applications primarily support the processing of transactions. Inventory tracking applications, automatic teller systems, payroll programs, and personnel tracking systems are examples of transaction processing systems.

Requirements uncertainty is less of a concern in transaction processing systems, which have a high degree of structure and a high level of activity. This is not to say that such systems are not complex or sophisticated. A transaction system may exhibit design complexity in terms of the sophistication of data communications between workstations and database processing requirements. A firm may have specialized requirements, but the solution may nevertheless be highly structured.

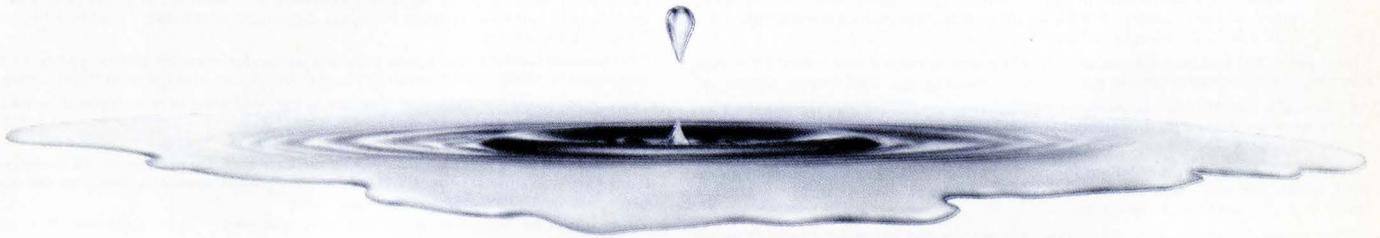
An easy way to identify a transaction processing system is to determine if the primary function of the system is to add, delete, or change records. Transaction processing applications are design intensive, and technology plays an important role in their development.

In contrast to transaction processing, reporting and control systems have a greater degree of requirements uncertainty. Logical requirements analysis begins to emerge as a crucial process in the development of reporting and control systems. Typically, these applications are used to track, allocate, and control the use of organizational resources. Examples of such applications include reports on variances from budgets, minority distribution, and slow-moving inventory items.

Of the three major types of systems, decision support systems have the highest level of requirements uncertainty. A decision support system may be required for an application in the following cases: when there is little experience with the problem under consideration; when the type of inputs that are necessary to solve the problem are unknown; when the model to solve the problem has not been determined; when individual analysis and problem solving behavior is important to the solution; or when the outcome of pursuing a particular course of action won't be known for some time.

When users want to be able to ask what-if questions, the system involved is usually a decision support application. Examples of so-called unstructured problems suitable for decision support systems include: determining the impact

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Why Software Prototyping Works

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Determining System Type

Most systems exhibit operational facets of all three types of system. There are few applications that are purely one type or another. It is the task of the analyst and the user together to determine what aspects of a system fit into a particular category. Once that's been established, the analyst can determine the proper degree of prototyping.

The systems development life cycle is not replaced by prototyping; it is supported by the use of prototyping. In fact, life cycle-oriented project management techniques are essential for the coordination of prototyping efforts if the problem being attacked cannot be handled by an analyst and a user.

With transaction processing systems, prototyping takes place primarily in the design stage. User interfaces are prototyped using text editors and screen generators. A major consideration in developing transaction systems is their processing efficiency. A prototype could be developed to model cpu performance. Mathematical modeling and discrete event simulation languages can be used to model internal processes. Simulating the expected transaction processing capability of a system may signal the need for additional cpu capacity or the need for a faster executing language.

Unmodified 4GLs are often inappropriate for high-volume or multiple workstation systems. While prototypes of transaction processing systems usually are not retained, the lessons learned are incorporated into the final, more efficiently programmed implementation. Technological advances in fourth generation hardware and software performance may change this situation.

In addition to modeling the user interface, a prototype of a reporting and control system can also model record and file interactions. A limited database can be created and reports generated from it. In this case, prototyping is a response to the requirements uncertainty of the user. Here, a symbiotic learning relationship begins to emerge. Users start to understand their requirements as they interact with the prototype.

Tools used to develop reporting and control system prototypes include relational database systems and fourth generation languages. Sometimes it is

necessary to recode the prototype using a third generation language for the final system. This requirement may be the result of machine efficiencies that are needed to process high-volume transactions or frequent processing cycles effectively.

In prototyping decision support systems applications, the entire systems development life cycle is executed—but within a shorter time. The distinction between the phases of the systems life cy-

**PROTOTYPING
SHOULD BE
USED WITH
OTHER
ABSTRACTION
TOOLS.**

cle are blurred. Problem definition, analysis, design, and implementation become concurrent processes. The separate phases of the system's life cycle are still there, but they are abbreviated.

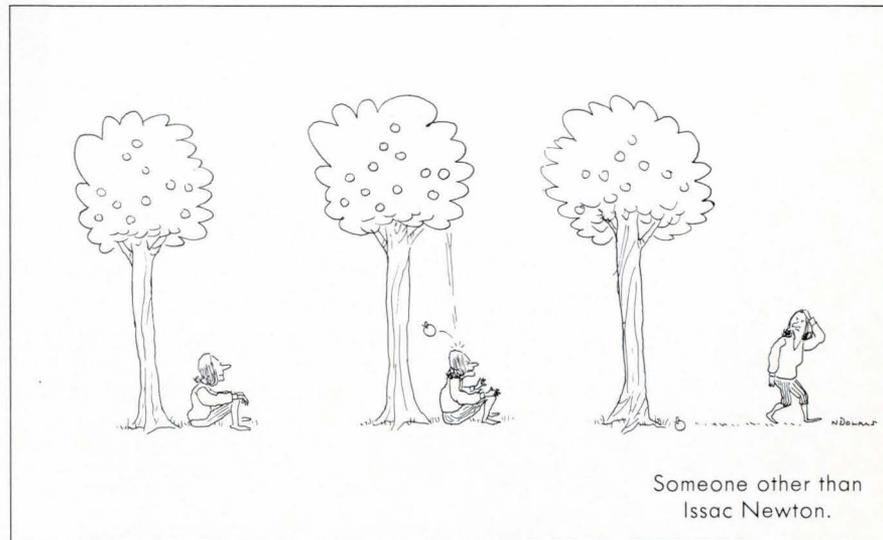
Decision support systems characteristically require an iterative and shortened development environment. Requirements uncertainty is quite high, and the implementation of a system redefines and redirects problem definition, analysis, and design. As noted earlier, a learning process is basic to developing decision support systems.

Tools used in the construction of decision support systems prototypes include the following: relational database systems, fourth generation languages, spreadsheets, and various high-level modeling languages. Often the prototype becomes the final system for decision support applications.

While prototyping is an outstanding development tool, we recognize that it is not a panacea. Prototypes can and should be used in conjunction with other abstraction tools. The strength of prototyping lies in the way it complements and enhances other tools and processes for systems development.

The development life cycle can be implemented in a multitude of ways. Controls can be applied, graphic approaches implemented, structural reviews placed in various stages, and diverse techniques applied in an unlimited number of combinations. The key question becomes, what are the boundaries of the system in terms of transaction processing, reporting and control, and decision support? The selection of a development approach depends on the answer to this question. ■

This article is based on research conducted at the State University of New York at Buffalo by Robert P. Cerveney, associate professor of MIS at SUNY Buffalo; Edward J. Garrity, who is completing PhD work; Raymond G. Hunt, currently chairman and professor in organizational behavior at SUNY Buffalo; Peter J. Kirs, assistant professor of MIS at Florida International University; G. Lawrence Sanders, assistant professor of MIS at SUNY Buffalo; and Janice C. Sipior, who is currently completing her PhD.



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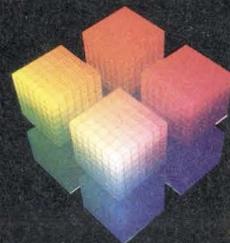
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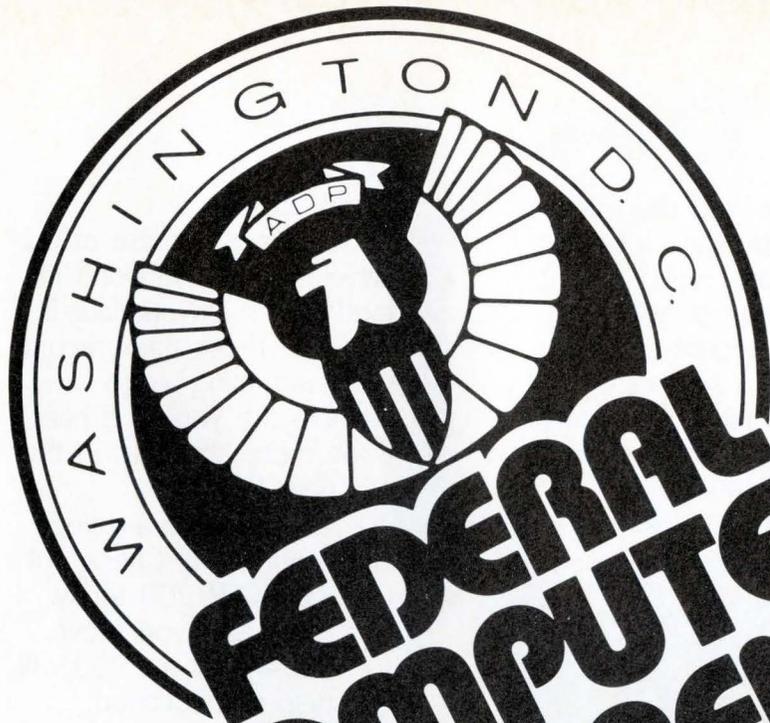
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WHILE DOT MATRIX PRINTERS still hold a commanding lead among desktop printers, nonimpact printer technology is growing at a robust pace. The low end of this market (up to 10 pages per minute) is experiencing the most growth, with laser printers by far the most dominant. The top players in the market are using engines supplied by Japanese companies Canon, Ricoh, and Mita.

Another Japanese company, Casio, has just entered the U.S. nonimpact printer market, in conjunction with Data Technology Corp. of Santa Clara. Unlike its Japanese cousins, the company's engine offering is not a laser printer. Casio's engine is a liquid crystal shutter, a technology it has been using in its watches and other consumer products for years. Together with a Data Technology-supplied controller, it forms the heart of the new Data Technology Crystal-Print VIII printer. This is the first printer offering from Data Technology, which has been known for its controllers. Michael Sugihara, director of strategic planning at Data Technology, says a liquid crystal shutter printer requires fewer parts and is less costly to manufacture than other nonimpact-type printers.

The CrystalPrint VIII is a "plug-and-play" emulation of the Hewlett-Packard LaserJet Plus. It provides nine ROM-resident type fonts; cartridge-based fonts; downloadable fonts, including HP-compatible fonts; 1.5MB of RAM for 300dpi resolution bit-mapped graphics; and optional Epson, Diablo, HPGL, and IBM ProPrinter font emulation. The price tag is \$2,495, which includes toner and drum.

With the CrystalPrint VIII, Data Technology and Casio are hoping to tap into the growing nonimpact market, which research firm Dataquest Inc., San Jose, expects to reach \$1.8 billion by 1990, an increase of nearly 30% over 1986. John Boldt of Dataquest says that Data Technology has "a good shot" at gaining market share in this highly competitive field because the technology is solid, the company has adequate financial resources, and the product's price is right.

Says Data Technology's Sugihara, "We are hoping to replace some of the dot matrix and daisywheel printers out there." Meanwhile, the leading printer companies are continuing to develop dot matrix printers; Okidata, HP, and Canon all have introduced new models this summer.

HARDWARE

Mainframe Optical Storage System Debuted

Data/Ware ships unit that emulates standard IBM magnetic tape units.

BY THERESA BARRY

The new Data/Ware DW34800 Mainframe Optical Storage Transport (MOST), an IBM plug-compatible "write once, read many" (WORM) optical data storage system, is available in four models. The unit's removable 12-inch optical disk cartridge stores 1GB of data on each side, providing a total equivalent to 10 or more 200MB capacity magnetic tape cartridges. The data is nonerasable, and permanently written data is said to have an archival life of 30 years. Data/Ware claims the MOST system offers a transparent interface to the software and hardware of IBM System/370-compatible mainframes and is compatible with IBM's MVS, VM, and DOS operating systems.

All four MOST models include a controller, one or more optical disk drives, an operator's console, and space for cartridge disk storage. Attached to IBM-compatible I/O data channels, the MOST emulates either 3420 reel tape control units or IBM 3480 cartridge tape control units. Its controller can accept up to

four optical disk drives, and when fewer than four are used, the unused drive capacity is emulated as off-line tape drives. Data/Ware says no software modifications are required to install additional drives. The unit's data streaming is provided by the controller's cache memory. Reading and writing from cache is performed at 3MBps and noncache operations are performed at the continuous optical disk transfer rate of 250KBps.

The pedestal model DW34800-P accommodates up to two disk drives and stores up to nine 12-inch cartridges. The price is \$54,795; a second drive is an additional \$16,340. The desk model DW34800-D accommodates up to four drives and stores 27 cartridges. It's priced at \$60,295. The jukebox highbay model DW34800-J1 holds up to four drives and stores 42 cartridges. A robotic cartridge handling system is included and the price is \$157,940. The jukebox media expansion storage unit model DW34800-J2, an expanded version of the J1, accommodates four drives and 95 cartridges. Its price is \$187,145. The jukebox for all units is manufactured by Cygnet Systems Inc., Sunnyvale, Calif. DATA/WARE, San Diego. CIRCLE 250

LAN Products

DSC launches LAN file server for ARCnet and Token Ring.

DSC Nestar and DSC Granger have unveiled a new series of communications products.

Nestar's PlanStar is a pc LAN file server that comes in two models, each with 1MB of memory. Model 1 provides 80MB of disk storage capacity and 60MB of streaming tape backup; Model 2 provides 150MB of storage and 150MB of backup. Both disk drives have a 16.5msec average access time and a 1.5MBps transfer rate using the Motorola 68000 processor. Additional features include support of IBM Token Ring and Datapoint's ARCnet, NetBIOS compatibility, support of up to 255 nodes, fault tolerance capabilities, and direct service



Data/Ware's plug-compatible Mainframe Optical Storage Transport comes in four models.

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9-Track Tape Subsystem for the IBM PC/XT/AT



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*Marketplace

**Demographic Insert

and support. PlanStar supports all IBM PCs and compatibles and DOS 2.1, 3.1, 3.2, and 3.3. The price ranges from \$7,000 to \$10,000, and it will be shipped in October.

Also new is the PlanStar X.25 gateway, a menu-driven LAN data communications option that allows 32 LAN workstations to have concurrent access to public data networks. It conforms to CCITT recommendations X.25 and X.29. It will be available in September for \$6,000.

DSC Nestar has also rolled out a co-processor Intelligent Network Interface Card (INIC) that allows simultaneous operation of the PC and Token Ring network communication. It's a plug-in PC board for the XT or AT and allows communication via the Token Ring cable to a Nestar LAN file server. It supports NetBIOS, uses a NEC V40 microprocessor, and includes up to 1MB of buffering. It's available now for \$595.

The Granger division of DSC introduced an enhanced CP2000 Digital Network Access System, a gateway that connects integrated voice, data, and video to private and public T1 lines. It's available now and ranges in price from \$10,000 to \$40,000, depending on the configuration. DSC COMMUNICATIONS CORP., Plano, Texas. **CIRCLE 252**

NCR's New Micro Offerings

Include a 386 model and an AT-compatible.

NCR recently rolled out a series of micro products, including the NCR 3392 workstation; the PC916, a 32-bit 80386-based micro; the PC710, an entry-level 80286; and the PC810, a high-end AT-compatible.

The PC916 comes with the following: 2MB of RAM; a 5¼-inch, 1.2MB floppy drive; a 30MB, 44MB, 70MB, or 115MB fixed drive; and an enhanced graphics adapter (EGA). NCR claims it executes at from 3MIPS to 4MIPS, and ranges in price from \$6,353 to \$8,653. All models will be

available in the fourth quarter.

The PC810 comes with 640KB of RAM, expandable to 16MB; a 5¼-inch floppy drive; 720KB or 1.44MB, 3½-inch floppy drives; 20MB, 30MB, 44MB, or 70MB fixed drives; and a choice of color graphics adapter (CGA), EGA, or no graphics. Prices for all models, which are scheduled to ship in September, range from \$2,950 to \$5,920.

The PC710 has 640KB of RAM, expandable to 16MB, one 3½-inch floppy drive, and a CGA or an EGA. It's priced at \$1,954 with a CGA and \$2,154 with an EGA, and will also be shipped in September. The PC710 features a modular architecture that permits users to increase the system's expansion slots and storage capability by adding new function modules. The modular design allows upgrades to 80386 technology. The 3392 workstation provides 640KB of RAM, expandable to 16MB; one 5¼-inch, 1.2MB floppy drive; CGA or EGA; and two expansion slots. Fourth quarter availability is slated. Prices will begin at \$1,974. NCR CORP., Dayton, Ohio. **CIRCLE 251**

Superminicomputers

Gould adds two high-end Tempest systems to line.

The Federal Systems Division of Gould Inc. has introduced Tempest versions of Gould's PowerNode 9600 and Concept/32 computer systems. Gould says the new machines, the 9000T and 9700T, can process at speeds of 10MIPS and are hardware- and software-compatible with the midrange 6000T and 6700T, which Gould introduced in June '86.

Both the 9000T and 9700T are designed to meet NACSIM 5100A specifications and support all Gould software. The 9000T is Unix-based and runs Gould's UTX/32 and its NCSC-rated C-2 secure Unix software. The 9700T runs Gould's MPX-32 real-time operating system. The machines are priced starting at \$300,000. GOULD INC., Federal Systems Division, Fairfax, Va. **CIRCLE 254**

Color Graphics Printer

HP introduces PaintJet for pc market.

Hewlett-Packard's new PaintJet is a terminal ink-jet color printer for experienced pc users, says the company. It produces text and graphics with 180 by 180 dots per inch (dpi) resolution and near-letter-quality text at 167cps. A typical



text page can be produced in 40 seconds and a full page of color graphics takes about four minutes.

The printer has four inks—black, yellow, magenta, and cyan—that it mixes to produce red, blue, and green. Depending on the software used, the primary colors can be mixed to provide 330 shades. Ink is transferred to the paper via 60 nozzles, and two disposable cartridges (black and color) contain the nozzles, inks, and electrical printing elements. The cartridges have a life of about 1,100 pages of black text and 180 pages of color graphics. The printer handles Z-fold or cut-sheet paper and single-sheet transparency film in either A or A4 sizes. RS232C, Centronics parallel, and HP-IB interfaces are optional.

HP says 55 software packages currently support the printer, and it plans to add 70 more in the next six months.

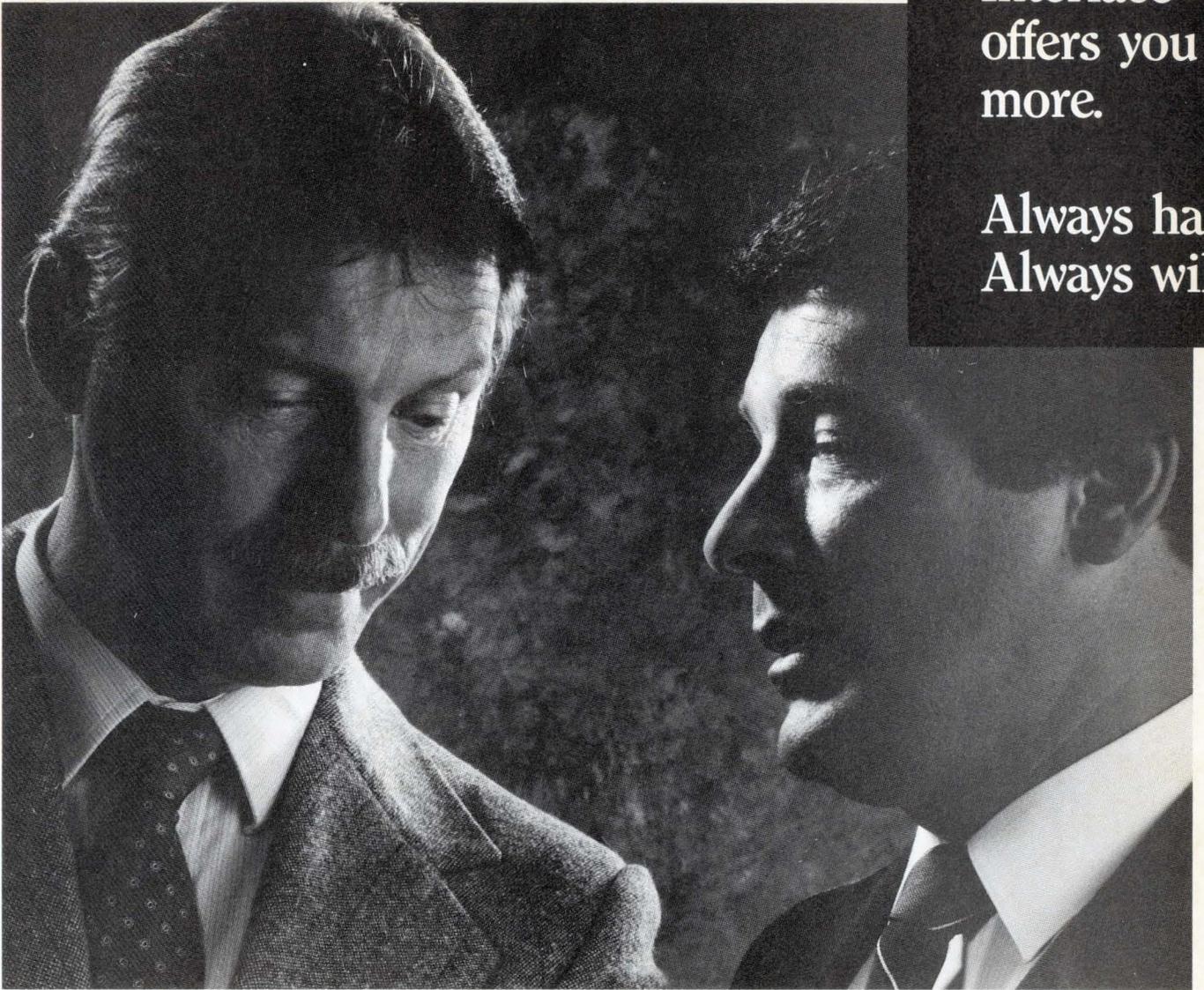
The PaintJet is available now, priced at \$1,395; cartridges are \$27.95 for black and \$34.95 for color. HP offers its own paper for \$14.95 per box of 250 sheets, if eight or more packs are purchased. HEWLETT-PACKARD, Palo Alto. **CIRCLE 255**

Dial Modem

Gandalf unveils modem for high-speed metropolitan networking.

The new Access Series V.32 from Gandalf is a two-wire, dial modem designed for high-speed networking in metropolitan areas over standard telephone lines. The 9,600bps V.32 is geared for full-duplex synchronous or asynchronous data transmission. It is software controlled and has a 200-mile operating range, although, Gandalf claims, it can operate over longer distances when a high-quality DDD line is used. The V.32 can communicate with CCITT V.22 bis, V.22, and Bell 212A-compatible modems, allowing users to integrate V.32 9,600bps communication into their existing operations. The price is \$2,295. GANDALF DATA INC., Wheeling, Ill. **CIRCLE 265**





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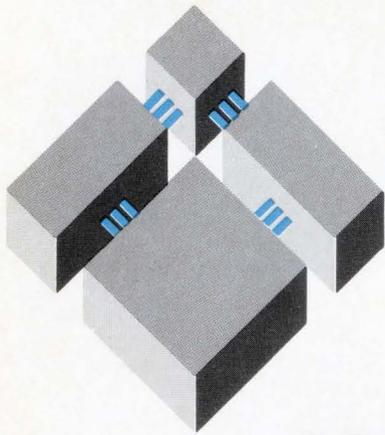
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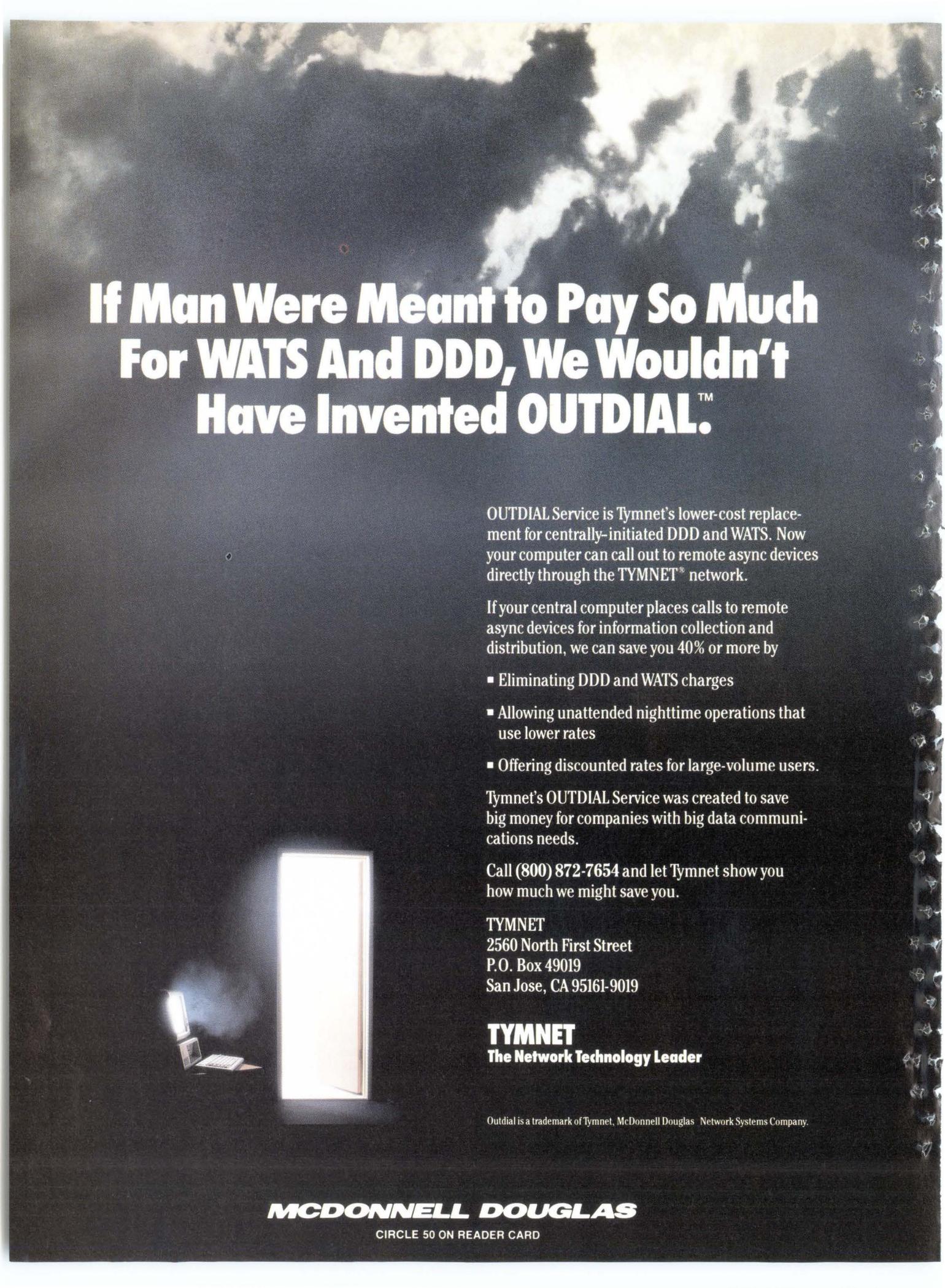
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CIRCLE 50 ON READER CARD

UPDATES

IBM CAN'T STRESS THE POINT enough these days that it's in the business of selling systems, not just hardware. Last October, its Information Systems Group in Rye Brook, N.Y., launched its SolutionPac software, service, and support offerings, of which almost 30 have been released to date. The program is getting mixed reviews from both end users and competing software vendors (see "SolutionPacs Making Little Impact So Far," Aug. 1, p. 20.)

In an attempt to further acquaint its sales staff with "solution selling," IBM has launched its Cooperative Software Program, under which IBM salespeople will sell IBM hardware and other vendors' application software with the software vendor's logo intact. According to an IBM spokeswoman, this marks the first time that IBM salespeople will be selling non-IBM products independent of the vendors of those products, and, she adds, all the programs are complementary to IBM hardware.

The 10 software vendors involved in the program, currently offering 13 packages, have not signed exclusive deals with IBM. They are free to sell their applications independent of IBM, or they can make a joint sales call with IBM. The IBM spokeswoman says that in "most cases the calls will be made jointly." The application program supplier is responsible for licensing, terms and conditions, and charges and distribution of the program. The installation, customer education, support, and maintenance are provided by the supplier or the customer.

Shared Financial Systems of Dallas is one of the initial participants in the program. The company has signed an agreement whereby IBM will market and accept orders for SFS's On/2 family of application software for the on-line transaction processing market. The software operates on IBM's System/88 fault tolerant computer system. Neil Johnson, SFS's chief financial officer, says that the relationship with IBM "will dramatically improve our sales without [the necessity of our] adding salespeople." The IBM/SFS agreement stipulates that each vendor will service its own product.

Among the nine other software suppliers that have made agreements with IBM under this program are CADAM, Burbank, Calif., with its CADG + FM multiuser program for strategic planning and facilities management, and BASICAD, a macroinstruction productivity tool; and Marcam Corp., Needham, Mass., with its Prism manufacturing planning and control system.

SOFTWARE

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On-Cue is an on-line query and report program.

Decision Technology Adds to Decision Analyzer Series

On-line query and reporting for IBM 9370 and low-end 4300 users.

BY THERESA BARRY

On-Cue is the second component in Decision Technology's Decision Analyzer product series. It's a menu-driven program for on-line query and reporting designed for IBM mainframe end users.

The company says that On-Cue, which is available as part of the first release of Decision Analyzer, leads the user through a hierarchical path of fill-in-the-blank menus. The menus gather information about the data to be used in the reports, as well as the formats, headings, mathematical functions, pagination, and output characteristics. On-Cue also works in conjunction with On-Demand, the first component of Decision Analyzer.

On-Cue generates and automatically submits a batch job request and returns the request to the user for scrolling and browsing of the output at the terminal in dual-window format. A hardcopy can be obtained by routing the report to an available printer.

On-Cue is available for use with

DOS/VSE and MVS using CICS or TSO, and it requires 10KB of virtual storage for each user, in addition to a one-time overhead of 32KB for its own routines. Fully configured, Decision Analyzer includes On-Cue, On-Demand, the Financial Statistical Option, and the Analyzer reporting product. Pricing starts at \$12,000 per cpu for 9370s and low-end 4300s and at \$36,000 per cpu for high-end 3090s. DECISION TECHNOLOGY INC., Princeton, N.J. **CIRCLE 256**

IBM's New VM

Intended to take advantage of high-end hardware architecture.

IBM has announced the Virtual Machine/Extended Architecture System Product (VM/XA SP), a high-end VM operating system that will replace IBM's current VM/XA. IBM says the new VM will take advantage of the architecture of its high-end systems, such as the 3090 Model 600E.

The new VM supports the Conversational Monitor System (CMS), and IBM claims it delivers full VM compatibility on

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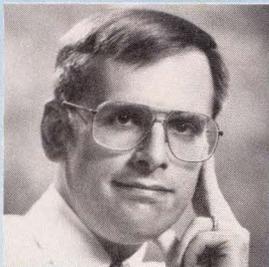
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When required you can expand the standard 0.5 Mbyte memory to 2 Mbyte. This facilitates advanced vector/raster graphics and alphanumeric emulations which can be provided as options. Both parallel and serial interfaces are standard.

The operator is continually informed of the machine's status by means of an alphanumeric display which supports several different languages. This feature and all other set-up operations - such as the selection of fonts, national version and formats - can be performed from either the control panel or your computer.

For an enhancing demonstration of the Opus 2E (and the other members in our growing laser printer family), contact your nearest Facit representative.

Management summary

The results for the first quarter directly reflect the current market instability. While our lower priced products show an increase compared with the last quarter, our top of the line show a slight decrease.

To take advantage of the forecast from here this year, it is important that our production capacity is accurately based.

R&D investments will pay off

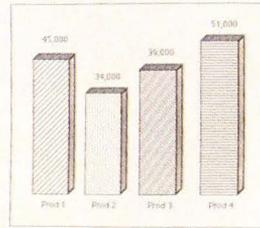
The big investment in Research and Development should pay off here this year with the introduction of the 8th product range. Risk will be reduced end of next quarter.

The R&D range looks the best for a new marketing strategy based on flexibility rather than fixed products. The customer reply which is currently being compared looks very promising.

For our competitors have captured a big share of the replacement market. Although this has led our competitors leader than us, we should get ready for a tough fight here this year.

New production methods

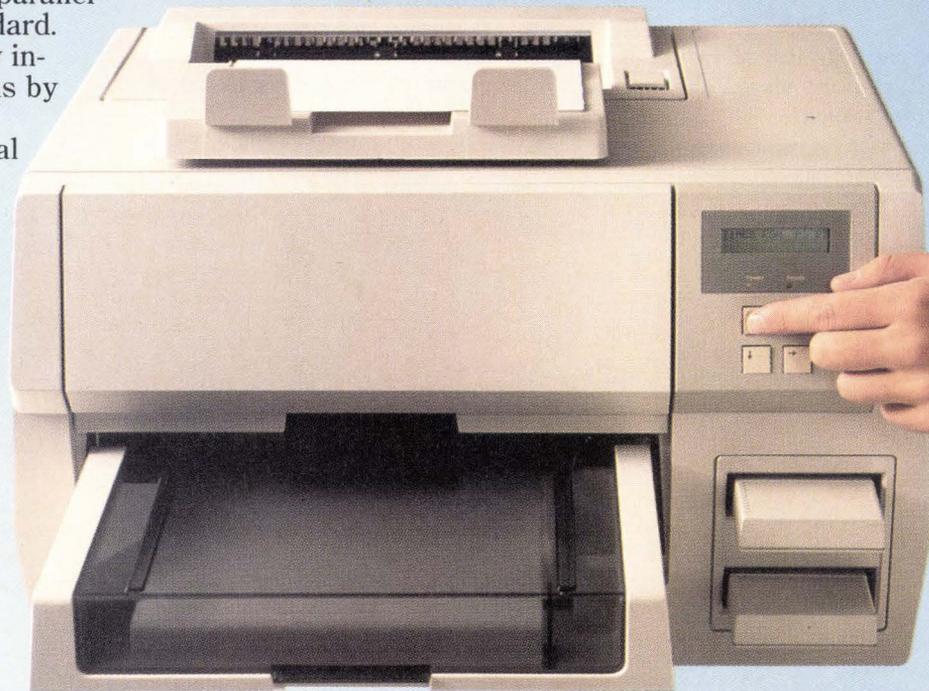
The benefits of our new fully automated plant are obvious, as production are manufactured just in time or ordered by our customers. According to our plans, two more plants will be constructed to this technology next year.



The large internal memory enables you to take advantage of advanced graphics and alphanumeric software.

Parallel and serial interfaces combined with Diablo, HP and IBM emulations ensure easy integration with your computer.

Set-up programming can be performed from either the host or from the user-friendly control panel.



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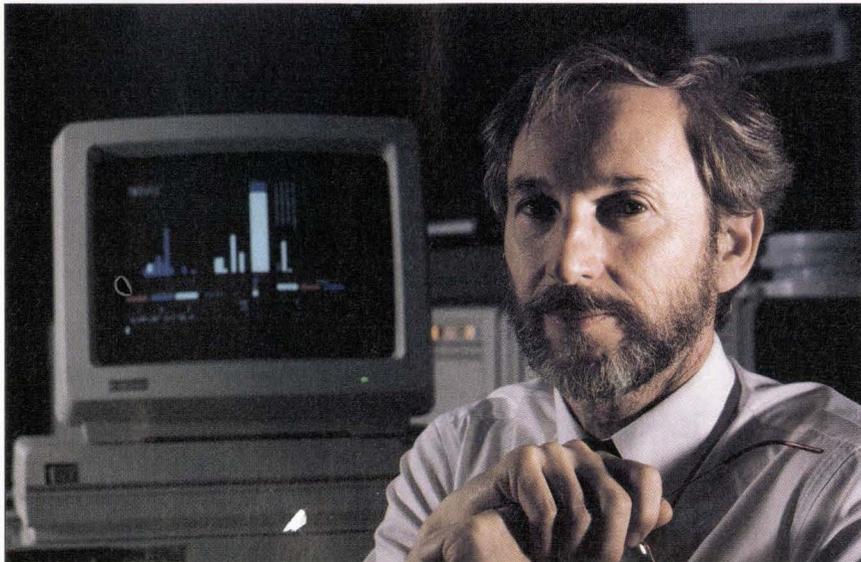
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CIRCLE 20 ON READER CARD

PEOPLE

From Operations Research To Ancient Literature

Gerald Cohen set out to be a mechanical engineer but his interest in programming eventually led him to contribute to RAMIS and Focus.



COHEN: The success of RAMIS paved the way for the success of Focus.

BY EDITH D. MYERS

Gerald Cohen, president of Information Builders Inc., New York, doesn't really like "nth generation" labels.

He says this after noting that his company, an acknowledged leader in fourth generation languages (see "The Gauntlet is Thrown: RAMIS Challenges Focus," May 15, p. 36), is moving into fifth generation languages with the planned acquisition of Level Five Research, Indialantic, Fla. Level Five makes the Insight 2+ expert system development shell that Cohen plans to integrate with Information Builders Inc.'s (IBI) 4GL, Focus. A letter of intent to acquire Level Five was signed in June.

"I really hate these terms," Cohen says. "You could go on to sixth generation, seventh generation, it doesn't mean anything. With this type of thing [Focus integrated with Insight 2+] we're actually going to be in generation one—artificial intelligence—we hope in a big way."

Cohen, who is 50, helped found IBI in 1975. The company now has 750

employees. Cohen says that Focus installations on IBM, Digital Equipment Corp., and Wang computers total in the neighborhood of 2,600. In addition, there are some 60,000 pc copies of Focus installed, for a total of 350,000 users.

Cohen set out to be what he calls, "an Eisenhower era engineer. You know, we had the missile gap back then and everybody wanted to be an engineer, even me." He earned a degree in mechanical engineering at City College of New York but, "I found out I didn't like it."

So it was back to school, this time to work toward a master's degree in operations research at Columbia University in New York. This, he explains, is the use of mathematics to solve business problems. "We thought we were going to solve all of the world's problems back then," he recalls.

A dedicated Manhattanite, in spirit if not in domicile, Cohen is proud of the fact that he was born on the island and received all of his education there: PS 165 and Stuyvesant High School, in addition to CCNY and Columbia. Most of his working life also has been spent in Manhattan.

From Columbia, Cohen went to work in operations research for Allied Chemical Corp. in Manhattan. "That's where I started to get involved with computers," he says. "I realized computers were essential to operations research. We had a General Electric 635 and after I joined we got an IBM Model 50. I found myself becoming an applications programmer."

In 1965, he was approached by Mathematica Inc., Princeton, N.J., and joined it to do operations research. "After I'd been there a year or two," he recalls, "Allied Chemical gave Mathematica a contract to study a problem it was having and out of that came RAMIS [now a product of Fort Lee, N.J.-based On-Line Software International]. We didn't use that term [4GL] then, nobody did. We thought of it as the first end-user tool for data collection."

When RAMIS was developed, it stood for Random Access Marketing Information System. "When we commercialized it," Cohen recalls, "we changed the meaning to Rapid Access Management Information System."

He and others left Mathematica to form Information Builders, he says, "because it [Mathematica] was basically a consulting company, oriented to consulting ideas. They thought in terms of people time, not commissions, which was not conducive to becoming a full-fledged commercial software company."

IBI's Focus initially was intended for timesharing use. Its original meaning was "For On-Line Computer Users." The company received some early funding from Tymshare Inc., Cupertino, Calif., (now part of McDonnell Douglas Corp.) and still counts that organization as one of its customers.

Cohen is happy that RAMIS is still around and is number two behind Focus in the 4GL world: "If it had failed, we never would have been successful."

The father of four sons, ages 18 through 34, Cohen no longer lives in Manhattan. But he's ventured only as far afield as Great Neck, a Long Island suburb. He's going back to school this summer for four weeks but he won't be studying engineering or operations research. He's taking a four-week course in ancient literature. He looks with anticipation to the opportunity to delve into works from the ancient Greeks and the scholars of the Middle Ages: "I've always liked reading and literature and I've never looked at this niche before." ■

BOOKS

Informed in the U.S.A.

THE NEW CAPITALISM: AN ECONOMIC TRANSFORMATION, LED BY AMERICAN ENTREPRENEURS, TO MASTER THE INFORMATION AGE
by William E. Halal, John Wiley & Sons, New York (1986, 486 pp., \$24.95).

BY BRUCE J. SCHULMAN

In *The New Capitalism*, William E. Halal, a professor of management at George Washington University in Washington, D.C., describes the coming of a "new capitalism"—a style of corporate management and political economy that he believes is busting out all over the globe.

Information and information technology are vital in Halal's land of the near future. He sees that innovative U.S. entrepreneurs, particularly in the computer and air travel industries, are leading an economic transformation from the uncertainty, stagnation, and materialism of the "old capitalism" to the liberating,

idealistic "knowledge society" of "democratic free enterprise."

Making no apologies for his optimism, Halal offers more than mere solace for a rainy day. He draws on extensive research, consulting assignments, and a fund of personal experience. His efforts to apply his corporate management insights to a moral political economy deserve applause.

His analyses of corporate management are cogent and instructive. Any businessperson could profitably follow Halal's recommendations regarding "participative management," "return on resources" accounting, and "democratic corporate governance."

Unfortunately, distorted history and dubious prophecy compromise the sound business advice. While Halal astutely notes the international progress toward hybrid economies, he exaggerates the prospects of a world "beyond

left and right." He takes pains to show that neither capitalism nor socialism has a monopoly on oppressive secret police and political assassinations. For him, that observation helps establish the basic similarity between East and West. It should have reminded him that the blending of socialism and capitalism will not end political conflict.

Recent events—such as the demise of People Express and AT&T's retreat from the pc market (which seems to postpone the marriage of communications and computers)—have applied brakes to the progress of Halal's new capitalism.

The barriers between the goals of the new capitalism and social reality remain implacable. His assessment of what he calls "Future Studies" describes his own vision of the coming Information Age: "fascinating, but divorced from the present." ■

Bruce J. Schulman teaches history at the University of California, Los Angeles.

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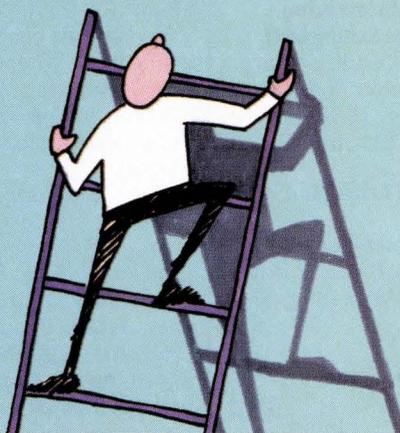
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DATAMATION

CIRCLE 53 ON READER CARD



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CALENDAR

SEPTEMBER

IMS '87 (Integrated Manufacturing Solutions Conference and Exhibition).

Sept. 14-17, Long Beach, Calif. Contact IMS '87, Intertec Communications Inc., 2472 Eastman Ave., Bldg. 33-34, Ventura, CA 93003-5774, (805) 658-0933.

Smau '87 (International Exhibition for Office Automation).

Sept. 16-21, Milan. Contact Fiera Milano, Delia Associates, P.O. Box 338, Route 22 W., Whitehouse, NJ 08888, (800) 524-2193 or (201) 534-9044.

Second Annual Conference and Consultants Market.

Sept. 18-19, Atlanta. Contact Information Systems Consultants Association Inc., P.O. Box 467190, Atlanta, GA 30346, (404) 458-3080.

Relcomex '87 (International Conference on Reliability and Exploitation of Computer Systems).

Sept. 22-25, Wroclaw, Poland. Contact Relcomex '87, Wroclaw Technical University, Institute of Engineering Cybernetics, Janiszewskiego Str. 11/17, 50-372 Wroclaw, Poland.

DGC'87 (Conference on Computer Graphics in Defense and Government).

Sept. 29 - Oct. 1, Washington, D.C. Contact World Computer Graphics Association Inc., 2033 M St. NW, Suite 399, Washington, DC 20036, (202) 775-9556.

Federal Computer Conference.

Sept. 29 - Oct. 1, Washington, D.C. Contact Registration Director, Federal Computer Conference, P.O. Box N, Wayland, MA 01778, (800) 343-6944.

Info '87 (14th Annual Information Management Exposition & Conference).

Sept. 29 - Oct. 2, New York. Contact Info '87, 999 Summer St., Stamford, CT 06905, (203) 964-0000.

OCTOBER

AVIOS '87 (Voice Input/Output System Applications Conference).

Oct. 6-8, Alexandria, Va. Contact Leon Lerman, AVIOS, P.O. Box 60940, Palo Alto, CA 94306, (408) 742-2539.

Unix Expo.

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

READERS' FORUM

Building Artificial Intelligence

There's an Isaac Asimov short story about a remarkable electronic device with one input connection and one output connection. When a voltage was applied to the input it appeared at the output. The remarkable thing was that the output preceded the input by a fraction of a second.

This fantastic feature provided the substance of Asimov's plot. When these devices were mass-produced and chained together, output preceded input by seconds, by hours, even by whole days. Great opportunities, as well as problems, ensued. When someone adjusted the input for a chain of devices to be a function of the Dow Jones average, the output showed the DJ for the next week. A simple thermocouple became a weather forecaster.

It's not likely that anyone is going to design this Asimov device, but as we move forward in the field of artificial intelligence, we could design modules with some of the same characteristics—that is, broad applicability and the capacity to be chained together. If, in combination, they could provide us with the means to anticipate the future, then they would have the hallmark of intelligence.

The difficulties of producing thinking machines are many, but if we suppress our tendency toward anthropomorphism and remember that intelligence is not really a voice that says "Hi, Bob," these difficulties can be overcome. We must address the functions of intelligence, rather than the sights and sounds incidental to it.

An entity is intelligent if it achieves some predetermined goal with a frequency or duration that defies the laws of chance and if it improves its performance through a process of internal change based on observation of its environment. We assume that the entity will meet these criteria through the use of memory, experimentation, tree pruning, modeling, and other tricks. But these strategies don't belong in the definition of intelligence—they're just ways to get the job done.

One way to get the AI job done is to use Asimov's device as a model for the building blocks of an intelligent entity. This device would be afferent—it would convey impulses between sensory terminals and a central decision maker.

It would sample the environment, converting inputs to numeric values that it stored in short-term memory

panels. It would maintain the contents of short-term memory chronologically, deleting obsolete panels according to a FIFO (first in, first out) schedule. When it received a signal that a certain condition had occurred, the module would store the identity of the condition and the contents of short-term memory in long-term memory. It would continually analyze the contents of short-term memory against evidence contained in long-term memory and output the likelihood of any recognized conditions. (This output could be an input to another module placed higher in the afferent network.)

These Asimovian modules would be information filters, reducing input volumes enormously, and sending data upstream only when something of significance became imminent.

The modules would not be task specific, but each might be designed with a type of task in mind. One might be particularly effective at detecting spatial relationships, for instance, and another better suited to mathematical relationships. One complex of modules could be taught to recognize printed letters, malignant cells, or pollen spores in atmospheric samples. An inference engine of modules might be trained to predict economic trends, then retrained to forecast political trends.

Trying to design these devices reminds us that intelligence derives largely from complex statistical analysis. Although it's a very difficult task, we need design only a few. Then, multiple copies could be chained together to achieve surprising results. These Asimovian modules could become the "DNA molecules" of intelligent software organisms.

BEN SHELTON

Coordinator

Administrative Computing

Southwest Missouri State University
Springfield, Missouri

If you'd like to share your opinions, gripes, or experiences with other readers, send them to the Forum Editor, DATAMATION, 249 W. 17th St., New York, NY 10011. We welcome essays, poems, humorous pieces, or short stories.

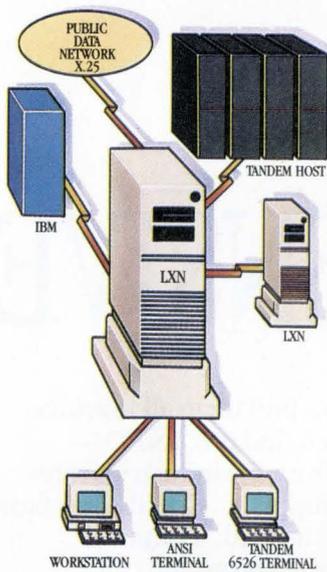
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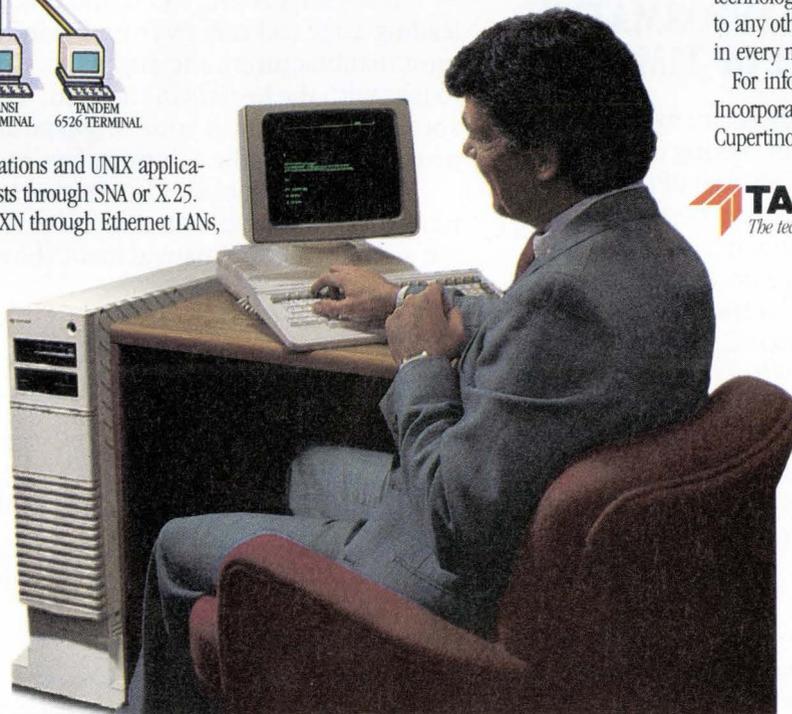
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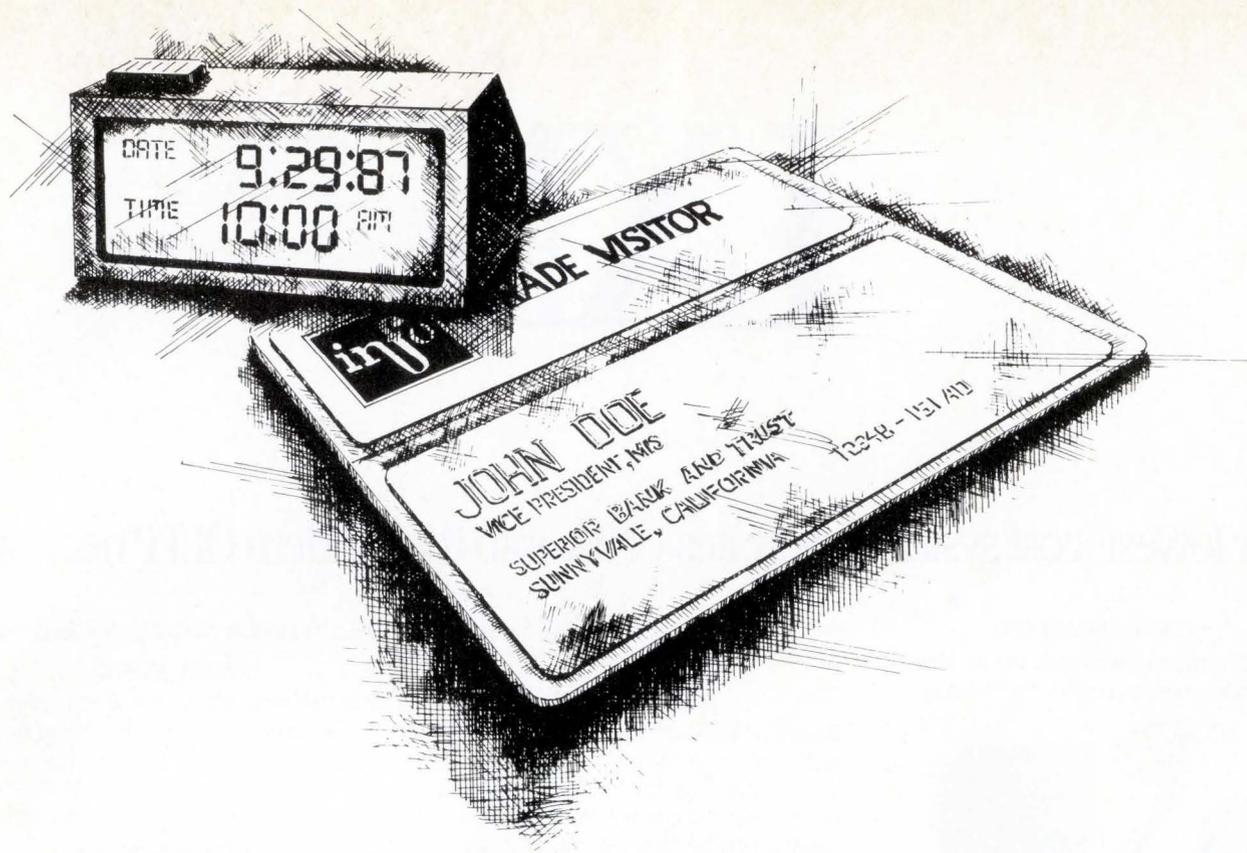
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