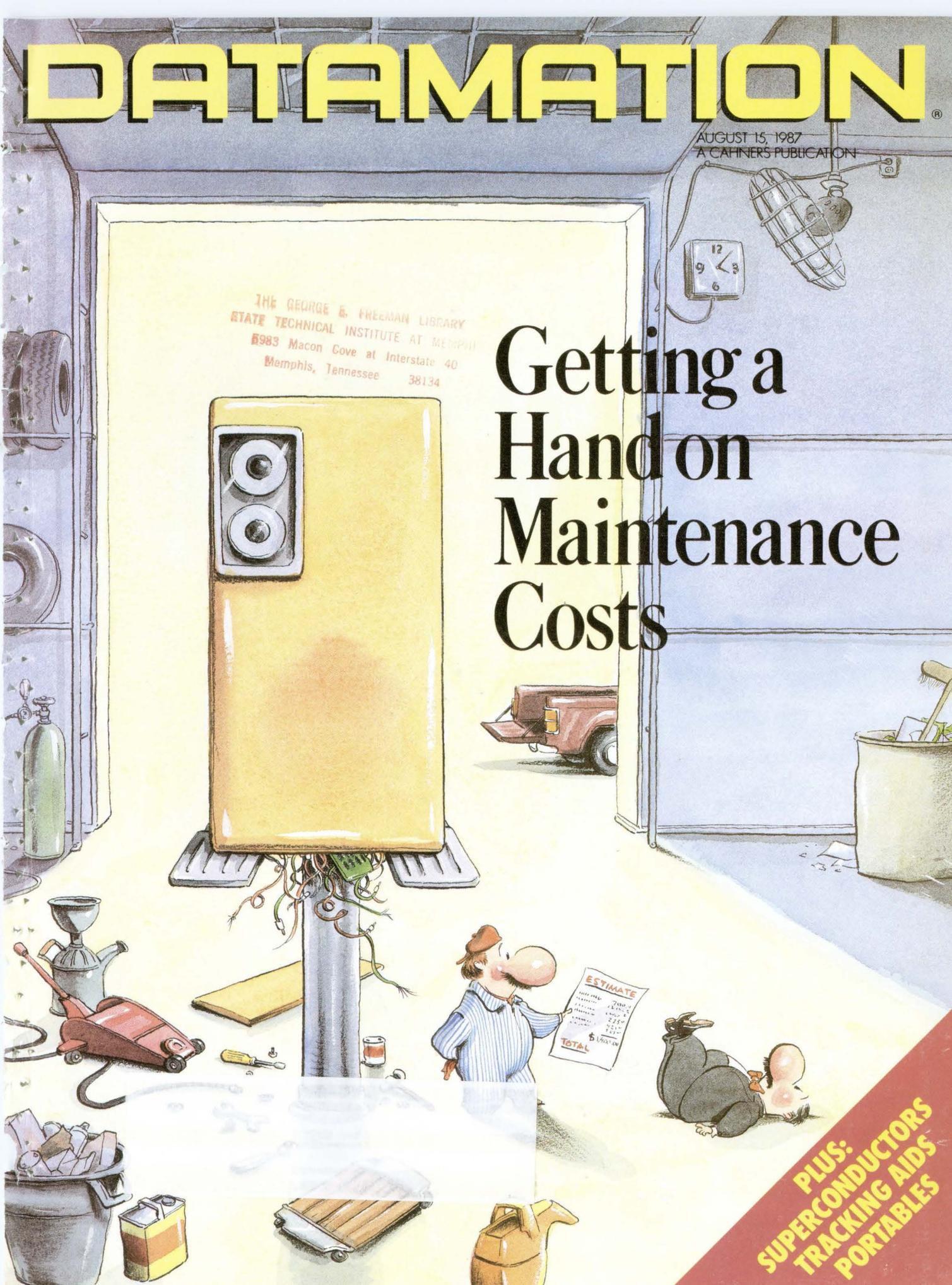


DATA MATION

AUGUST 15, 1987
A CAHNER'S PUBLICATION

THE GEORGE E. FREEMAN LIBRARY
STATE TECHNICAL INSTITUTE AT MEMPHIS
#983 Macon Cove at Interstate 40
Memphis, Tennessee 38134

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	ORDERID	DIVISION	AIRFRAME	Order Date	Price	Shipping Cost
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 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[®].

FSE011 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 Rd 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.

Call or write us today.



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

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

SAS is the registered trademark of SAS Institute Inc., Cary, NC, USA. dBASEII and dBASEIII are registered trademarks of Ashton-Tate. Lotus and 1-2-3 are registered trademarks of Lotus Development Corp. Copyright © 1987 by SAS Institute Inc. Printed in the USA.

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

When it comes time for you to plan or expand your PC network, make sure you rely on AST to provide the performance, the reliability and the ease of use you need to realize your networking goals.

After all, AST's strong line of industry-standard networking and communications products covers the spectrum of complete networking solutions. In fact, with an AST network system, there's no need to mix and match from the offerings of incompatible vendors. And, you can rely on a single source for training, service and support. It's that easy.

And Now, Introducing AST-Advanced NetWare™

To make things easier still, and to increase the capabilities of AST's networking hardware, we're introducing AST-Advanced NetWare—a network operating system that defines what state of the art is all about in network management.

AST-Advanced NetWare lets you have built-in compatibility with other manufacturers' networks through a feature called "Bridging." Bridging allows you

to tie networks together and achieve a single operating environment. Not only does this flexibility insure the protection of your investments, it can also increase the performance of your networking system.

Of course, when AST-Advanced NetWare is in charge of your network, you'll gain the benefits of added security, speed, data integrity and sophisticated communications.

The AST Network System

AST's reputation for providing powerful networking hardware, file servers, mini/mainframe communications and peripherals is now matched with our new AST-Advanced NetWare. All together, it's called the AST Network System, the most powerful and compatible selection of networking tools available today.

For more information on AST LAN products, call (714) 863-1480. Or, send the coupon to AST Research, Inc., 2121 Alton Avenue, Irvine, CA 92714-4992, AITTN: M.C.

AST
RESEARCH INC.



Yes, send me information on AST's complete selection of LAN products today.

Name: _____

Title: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

D 8/15/87

Send to: AST Research, Inc., 2121 Alton Avenue, Irvine, CA 92714-4992, Attn: M.C.

AST markets products worldwide—In Europe call: 44-1-568-4350; in the Far East call: 852-0-499-9113; in Canada call: 416-826-7514. AST and the AST logo are registered trademarks of AST Research, Inc. NetWare is a trademark of Novell, Inc. AST-Advanced NetWare is a trademark of AST Research, Inc. by agreement with Novell, Inc. Copyright © 1987 AST Research, Inc. All rights reserved.

DATAMAT

NEWS

9 Look Ahead

IBM will release a new System/36 to show its commitment to S/36 users.

15 Networks

"Microsoft and 3Com Position LAN Manager as OS/2 Standard," which, Susan Kerr reports, would throw a spotlight on distributed applications.

23 Productivity

"High Cost, Lack of Standards Is Slowing Pace of CASE," but Ralph Emmett Carlyle finds that some vendors are in for the duration.

26 Software

"Conversions Getting Easier As Number of Tool Sets Grows," reports Gary McWilliams, but applications transfers between environments are not problem-free.

30 Strategies

Karen Gullo examines "CDC's Tough Road To Recovery" and finds a brighter profit outlook, but also that users remain wary of late deliveries.

35 Trade

"Despite Sullivan's Latest Call, Firms Continue in South Africa." Willie Schatz explores the anti-apartheid movement's response.

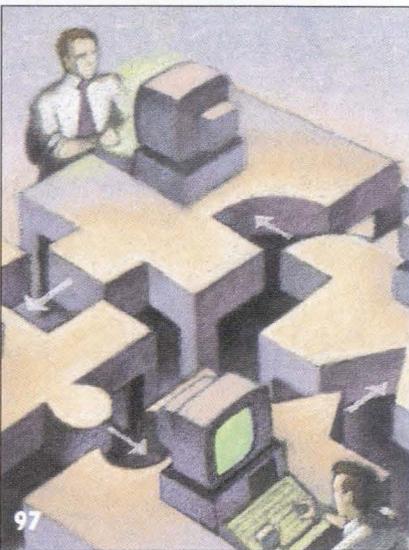
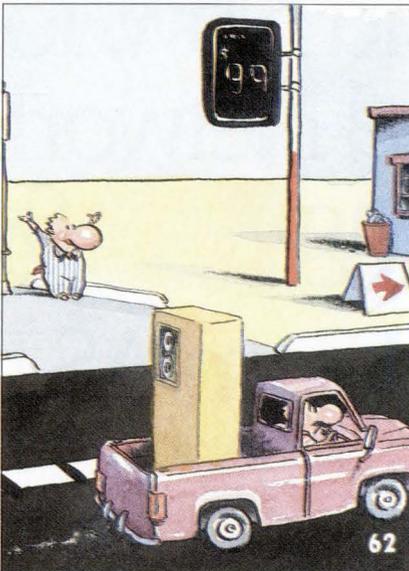
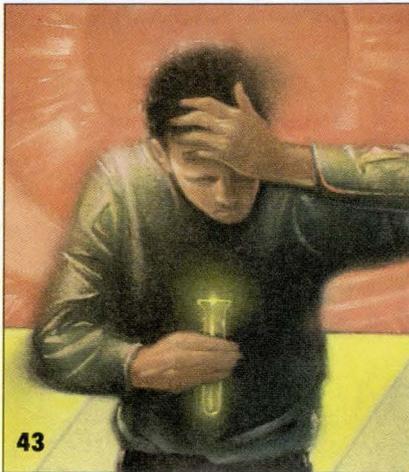
36 Benchmarks

IBM wins two airline reservation hardware deals.

43 Behind the News

Jeff Moad reports that "As AIDS Spreads, State Pc Systems Are Reaching Limits," and concerns abound that the confidentiality of test results may be threatened.

FEATURES



62 Getting a Hand On Maintenance Costs

BY SHARON E. BRADY

While it can be said, "They also service those who only stand and wait," aggressive shopping for maintenance has helped IS chiefs cut service bills by up to 35%. Giving them that helping hand have been the independents, who are facing stiffer competition from IBM and DEC.

74 The Superconductive Computer in Your Future

BY STEPHEN G. DAVIS

Superconductivity and its promise of greater computer efficiency has stimulated the research efforts of computer companies, but realistically an all-superconductive computer is likely to be at least 10 years away.

93 Portable Possibilities

BY CONNIE WINKLER

Laptop computers, once looked upon as an extravagance, are winning the favor of users in the corporate world. Sales reps and sales managers have taken to the portables, particularly those who deal in high-tech, high-priced wares.

107 Why Software Prototyping Works

Research conducted at the State University of New York indicates that communication is the crucial factor in the systems development effort. Software prototyping is a method for analysts and users to exchange their ideas in the design process.

ION

REAL TIME

4 **Letters**

Comments on the DATAMATION 100 include a note on the management of United Leasing in the wake of its recent acquisition by Inspectorate International, and a request to clarify some cartographic confusion; the chairman of the Technical Consultants National Association says that Section 1706, "passed as a midnight amendment with no discussion or debate," has resulted in "talented professionals being singled out for discriminatory treatment in the new tax code."

117 **Hardware**

Data/Ware ships its new optical disk storage system for the IBM mainframe environment.

123 **Advertisers' Index**

123 **The Marketplace**

129 **Software**

The second component in Decision Technology's Decision Analyzer product series is released.

133 **People**

Gerald Cohen of Information Builders Inc. set out to be "an Eisenhower era engineer" but when he could not generate enthusiasm for the profession, he moved on to help develop the 4GLs RAMIS and Focus.

134 **Books**

Bruce J. Schulman of UCLA reviews *The New Capitalism: An Economic Transformation, Led By American Entrepreneurs, To Master The Information Age* by William E. Halal.

136 **Calendar**

In October, don't miss the Unix Expo in New York.

136 **Readers' Forum**

Ben Shelton, Coordinator of Administrative Computing at Southwest Missouri State University, expresses his desire for AI researchers to address the functions of intelligence, rather than its incidental sights and sounds.

Cover Illustration by Michael Witte

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



1987 JESSE H. NEAL
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.



Tim Mead

TIM MEAD
EDITOR-IN-CHIEF

DATAMATION

Editor-in-Chief Tim Mead
Senior Editor Linda Runyan
Managing Editor Parker Hodges
Senior Writer Ralph E. Carlyle
News Editor David R. Brousell
International Editor Paul Tate
Copy Chief Eric Brand
New Products Editor Theresa Barry
Associate News Editor Karen Gullo
Copy Editors Steven Korn, John Quain
Assistant Editor Mary Kathleen Flynn
Editorial Assistant Karen J. Scher
Editorial Secretary Sheila D. Maddox

Bureau Managers

Boston Gary McWilliams
Los Angeles Edith D. Myers
San Francisco Jeff Moad, Susan Kerr
Tokyo Robert Poe
Washington Willie Schatz

Editorial Assistant, Europe Lauren Murphy
Technology Editor, Europe Fred Lamond
Foreign Correspondents James Etheridge, Paris; Norman Kemp, Sydney; Janette Martin, Milan

Art Director Sharon Bystrek
Assistant Art Director Cheryl Storti
Production Editor Susan M. Rasco
Art/Production Coordinator Renéé Bundi Nied
Art/Production Assistant Hernalée Walker

Contributing Editors Joseph Kelly, Laton McCartney, Tom McCusker, Hesh Wiener
Advisory Board Lowell Amdahl, Philip H. Dorn, Joseph Ferreira, Bruce W. Hasenyager, David Hebditch, John Imlay, Irene Nesbit, Angelina Pantages, Robert L. Patrick, Malcolm Peltu, Russell Pipe, Carl Reynolds, F.G. Withington

Publisher James M. Morris
Associate Publisher William Segallis
Operations Manager Donna O'Meara
Promotion Manager Stacy Aaron
Production Manager Dollie Viebig
Director of Research Mary Connors
Director of Production Robert Elder
Director of Art Department Barrie Stern
Circulation Vice President Joseph J. Zaccaria

EDITORIAL OFFICES

Headquarters: 249 W. 17 St., New York, NY 10011, (212) 645-0067; telex 429073. **New England:** 199 Wells Ave., Newton, MA 02159, (617) 964-3730; **Washington, D.C.:** 4451 Albemarle St. NW, Washington, DC 20016, (202) 966-7100; **Control:** 9330 LBJ Freeway, Suite 1060, Dallas, TX 75243, (214) 644-3683; **Western:** 12233 W. Olympic, Los Angeles, CA 90064, (213) 826-5818; 2680 Bayshore Frontage Rd., Suite 401, Mountain View, CA 94043, (415) 965-8222. **International:** 27 Paul St., London EC2A 4JU, England, (44-1) 628-7030, telex 914911; 3-46-10 Sekimachi-Kita, Nerima-ku, Tokyo 177, Japan, (81-3) 929-3239.

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



MANTIS® vs. CSP

Before You Pass Judgement, Bring Both To Trial.

Considering CSP? Then consider this: with MANTIS from Cincom® you can prototype, develop and process better quality applications, faster, and more effectively than CSP from IBM®. And the higher quality MANTIS applications are far easier to maintain.

Fewer Development Steps Mean Faster, Easier Program Development.

MANTIS is more powerful than CSP, and it is much easier to learn and use. MANTIS gives faster start-to-finish development of applications. Its functionality also enables a much broader and more comprehensive range of usage. For example, studies show

that 90% of all MANTIS users are using MANTIS for over 90% of all on-line development.

More Flexibility, Complete Portability.

MANTIS supports all the same environments as CSP, and provides complete portability to DEC™ VAX™ and MicroVAX™, WANG® VS, NCR® VRX, and certain Honeywell® systems.

Fast Processing Means Low Cost.

Its high speed processing facilities make MANTIS usable for almost all on-line requirements, thereby increasing programmer productivity while also cutting processing costs.

Why Not Learn More?

Call Today For An In-House Trial.

Don't make a final judgement until you have all the facts about MANTIS. Call today to set up an in-house trial. Or, write Marketing Services Department, Cincom World Headquarters, 2300 Montana Avenue, Cincinnati, Ohio 45211. Experience the ease, speed and power that MANTIS provides in solving **your** application development needs. You'll be glad you did.

1-800-543-3010

In Ohio, 513-661-6000.
In Canada, 1-800-387-5914.

 **CINCOM**

Advanced Systems And Applications Software For IBM And VAX

MANTIS is a registered trademark of Cincom Systems, Inc. IBM is a registered trademark of International Business Machines Corporation. DEC, VAX and MicroVAX are trademarks of Digital Equipment Corporation. NCR is a registered trademark of NCR Corporation. WANG is a registered trademark of WANG Laboratories, Inc. Honeywell is a registered trademark of Honeywell, Inc.

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

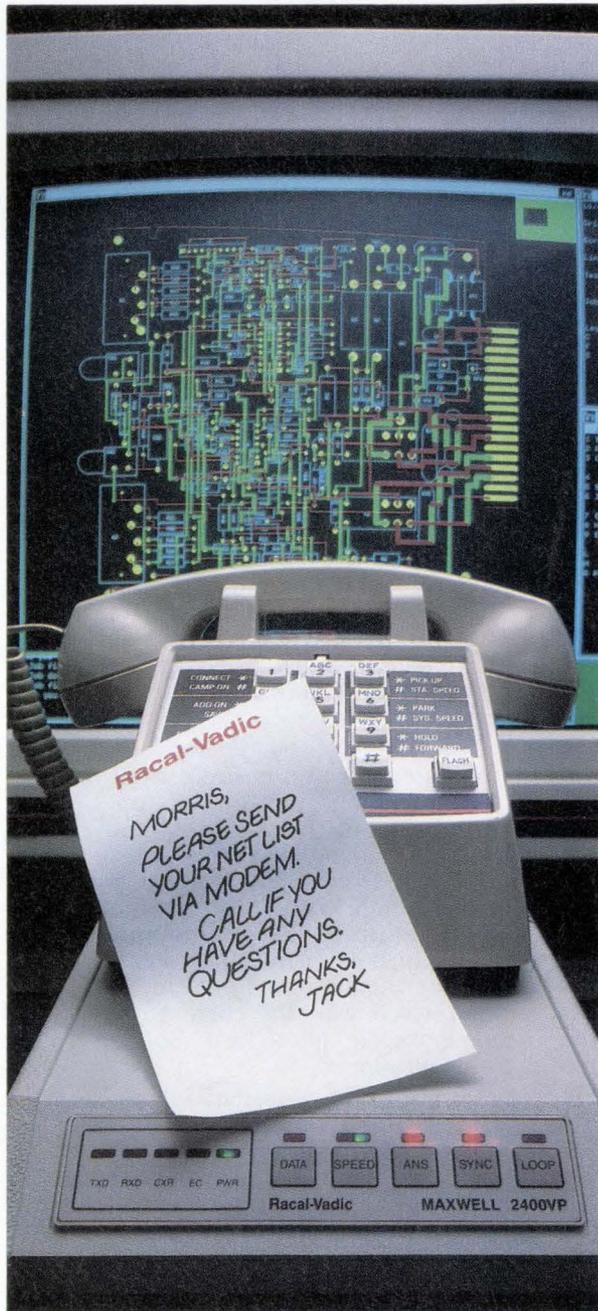
ACCESS THE CULLINET FINANCIAL SYSTEM. RACAL-VADIC DID.



"Having pioneered the development of modems, we can appreciate a truly innovative information technology. In our opinion, the Cullinet Financial System is just that. We feel certain that CFS will serve our needs well into the future."

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.

For more information on how your company can access the Cullinet Financial System, call toll-free 1-800-551-4555. Or write to Cullinet Software, Inc., 400 Blue Hill Drive, Westwood, MA 02090-2198.

Cullinet

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

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)

CA-Opera. The Unattended Data Center. A Decade-Long Dream. CA Has It Now.

A unique, unequalled knowledge-based software system.

After thousands of hours of on-the-job and on-site development, Computer Associates has now achieved something no one has even attempted before. Now the skill, knowledge and experience of hundreds of senior operators and systems analysts is harnessed in the incredible CA-OPERA™ software. And now, lights-out processing finally becomes possible.

Efficiency and productivity like never before.

CA-OPERA, the most advanced interactive message processor ever created for MVS greatly increases the productivity of operators and of their hardware, too. All messages are processed instantaneously, accurately and with far greater reliability.

Message madness and console clutter gone forever.

Only the most critical WTOs and WTORs reach the screen with about 80% of all messages being handled without operator involvement. For messages requiring a response, no one needs take the time to seek the answer elsewhere. CA-OPERA supplies the correct response automatically.

Now, with CA-OPERA, Computer Associates can meet
GUIDE's definition of unattended operations:

GUIDE's Definition	CA's Solution
Automated Production Control:	CA-SCHEDULER® (MVS)
Restart Management:	CA-SCHEDULER® (MVS)
DASD Management System:	CA-DYNAM®/DASD
Report Distribution:	CA-DISPATCH™
Online Monitoring:	CA-JARS™/CICS
Operator Command Assistance:	CA-OPERA™

For more information, write today or call
Dana Williams: 1-800-645-3003.
Computer Associates
711 Stewart Avenue, Garden City, N.Y. 11530-4787

© 1987 Computer Associates International, Inc.

Photo: Baxter Tavenol Laboratories, Inc. Data Center, a CA-OPERA user.

**COMPUTER
ASSOCIATES**
Software superior by design.

Resource & Operations Management • DBMS • Financial • Graphics • Spreadsheets • Project Management

- World's leading independent software company.
- Broad range of integrated business and data processing software for mainframes, minis and micros.
- Worldwide service and support network of more than 70 offices.

CIRCLE 8 ON READER CARD

Look Ahead

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.

ORACLE, YOUR HARDWARE-INDEPENDENT SOFTWARE SOLUTION

With the ORACLE® distributed relational DBMS, you'll never be locked into a specific hardware technology.

In this year's Software User Survey,* one company made history in all three categories of DBMS user preference.

For minicomputers, Oracle is the number-one independent software vendor for the second year in a row. *Digital News*†

ranks Oracle as the number-one overall software vendor in the entire DEC marketplace. So does The Gartner Group.‡

Oracle tied for mainframe honors with the former champion of independent software companies. In the MVS and VM world, ORACLE is second to no one.

And Oracle made the Top-5 list in the most competitive arena of all: microcomputers. This is especially significant, since the voting was done BEFORE the newest version of the ORACLE relational DBMS was announced for 286/386-based PCs. Now you can write OS/2 applications without waiting for OS/2.

Mainframes, minis and micros — all running the same ORACLE. Not just compatible. Not downsized subsets. They all run THE SAME ORACLE.

The market has voted for ORACLE, the hardware-independent software solution.

We've been saying SQL compatibility, portability across micros/minis/mainframes and



SQL*Star's distributed-architecture connectivity make ORACLE a triple-crown winner in your company's DBMS strategy. Now, the users are saying it, too.

Don't settle for anything less than ORACLE hardware independence. Find out what ORACLE could mean in your own future. Call 1-800-345-DBMS today and register to attend the next ORACLE seminar in your area. Or fill out the attached coupon.

Attn: National Seminar Coordinator • Oracle Corporation • One Oracle Parkway • Belmont, CA 94002

- Please enroll me in the **FREE** ORACLE seminar to be held at _____ on _____
- Please inform me about Oracle's 10th anniversary celebration at ORACLE WEEK from September 27 thru 30 in Washington, D.C.
- I can't attend your seminar, but I'd like ORACLE on my 286/386 PC immediately. Please send me the products checked off below, now.
- Professional ORACLE. \$1,295. Requires IBM PC/AT, Compaq 386, or 100% compatible, DOS 3.1+, and 1.5MB of RAM. Includes the SQL*Forms™ 4GL application builder, SQL*Plus™ language, SQL*Report™ generator and the SQL*Calc™ 1-2-3-like spreadsheet. Precompilers included for Microsoft C and Lattice C.
- Precompiler for Realia COBOL. Add \$395.
- Networking option with all available protocols. Add \$395.

Prices shown include UPS shipping charges if the order is pre-paid. Since Oracle Corporation has offices everywhere, add local and state taxes to the amount below:

\$ _____ Amount of purchase checked above.
 + _____ State and Local Sales Taxes.
 = _____ Authorized Total (For purchase orders, shipping charges will be added to your invoice.)

Name _____ Title _____
 Company _____
 Address _____ City _____ State _____ Zip _____
 Phone _____

Enclosed is a check, a purchase order or credit card for VISA, MC or AMEX.

Credit card or P.O. number _____ Card Exp. Date _____ Order Date _____
 Authorizing Signature _____

U.S. SEMINARS

AK Anchorage Sep 9	GA Atlanta Jul 8, Sep 16	MA Boston Jul 16, Aug 25, Sep 10	OR Portland Jul 9, Aug 6, Sep 15
AL Huntsville Jul 9, Sep 17	GA Macon Aug 13	MA Burlington Sep 30	PA Harrisburg Aug 4, Sep 15
AR Little Rock Jul 7, Sep 16	IA Des Moines Jul 15, Sep 17	MA Springfield Sep 16	PA King of Prussia Jul 16, Sep 17
AZ Phoenix Jul 14, Aug 27, Sep 24	IL Chicago Jul 14, Aug 19, Sep 15	MA Worcester Aug 5	PA Philadelphia Jul 9, Aug 6, Sep 10
CA Tucson Aug 26	IL Springfield Aug 11	MD Baltimore Jul 28, Sep 3	RI Providence Aug 8
CA Lafayette Jul 30, Sep 24	IN Indianapolis Jul 21, Aug 12, Sep 24	MD Bethesda Jul 28, Aug 6, Sep 8	SC Charleston Aug 12
CA Los Angeles Jul 16, Aug 13, Sep 8, Sep 30	KS Wichita Aug 4	MI Detroit Jul 14, Aug 11, Sep 15	TN Memphis Jul 29
Newport Beach Jul 21, Sep 17	KY Louisville Sep 10	MI Grand Rapids Jul 8	TX Austin Aug 12
Sacramento Aug 13	LA Baton Rouge Jul 23	MI Traverse City Jul 28	TX Dallas Jul 14, Sep 9
San Diego Jul 30, Sep 10	LA New Orleans Aug 21	MO Kansas City Jul 23, Sep 22	TX Houston Jul 9, Aug 6, Sep 18
San Francisco Jul 21, Aug 18, Sep 15	MA Boston Jul 16, Aug 25, Sep 10	MO St. Louis Jul 16, Aug 18, Sep 16	TX Lubbock Aug 4
San Jose Jul 9, Aug 6, Sep 2	MA Burlington Sep 30	NC Charlotte Jul 22, Sep 23	TX San Antonio Aug 13
CO Colorado Springs Jul 16, Sep 17	MA Springfield Sep 16	NC Raleigh Jul 15, Sep 16	
CT Hartford (Farmington) Jul 23	MA Worcester Aug 5	NE Omaha Jul 9	
New Haven Jul 28	MD Baltimore Jul 28, Sep 3	NH Manchester Aug 7	
DE Wilmington Jul 9, Sep 1	MD Bethesda Jul 28, Aug 6, Sep 8	NH Nashua Aug 13	
FL Ft. Lauderdale Jul 16	MI Detroit Jul 14, Aug 11, Sep 15	NJ Cherry Hill Jul 30, Sep 9	
Jacksonville Sep 9	MI Grand Rapids Jul 8	NJ Iselin Jul 15, Jul 23, Aug 5, Aug 18, Sep 16, Sep 29	

MN Minneapolis Jul 28, Aug 26, Sep 29	OH Cincinnati Aug 5	UT Salt Lake City Jul 28, Sep 29
MO Kansas City Jul 23, Sep 22	OH Cleveland Jul 16, Aug 13, Sep 17	VA Norfolk Aug 14
NC Charlotte Jul 22, Sep 23	OH Columbus Aug 4, Sep 30	VA Richmond Jul 8, Sep 8
NC Raleigh Jul 15, Sep 16	OH Dayton Jul 21, Aug 18, Sep 22	VA Virginia Beach Jul 23
NE Omaha Jul 9	OK Oklahoma City Jul 21, Sep 15	VT Burlington Sep 2
NH Manchester Aug 7	OK Tulsa Aug 11	WA Seattle Aug 6, Sep 3
NH Nashua Aug 13	OR Portland Jul 21	WI Green Bay Aug 10
NJ Cherry Hill Jul 30, Sep 9	PA Harrisburg Aug 4, Sep 15	WI Madison Aug 20
NJ Iselin Jul 15, Jul 23, Aug 5, Aug 18, Sep 16, Sep 29	PA King of Prussia Jul 16, Sep 17	WI Milwaukee Jul 22, Sep 3
NC Charlotte Jul 22, Sep 23	PA Philadelphia Jul 9, Aug 6, Sep 10	
NC Raleigh Jul 15, Sep 16	PA Pittsburgh Sep 10	
NE Omaha Jul 9	RI Providence Aug 8	
NH Manchester Aug 7	SC Charleston Aug 12	
NH Nashua Aug 13	TN Memphis Jul 29	
NJ Cherry Hill Jul 30, Sep 9	TX Nashville Aug 6	
NJ Iselin Jul 15, Jul 23, Aug 5, Aug 18, Sep 16, Sep 29	TX Austin Aug 12	
NC Charlotte Jul 22, Sep 23	TX Dallas Jul 14, Sep 9	
NC Raleigh Jul 15, Sep 16	TX Houston Jul 9, Aug 6, Sep 18	
NE Omaha Jul 9	TX Lubbock Aug 4	
NH Manchester Aug 7	TX San Antonio Aug 13	
NH Nashua 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

ORACLE®

COMPATIBILITY • PORTABILITY • CONNECTABILITY

One Oracle Parkway • Belmont, CA 94022 • World Headquarters (415) 598-8000
 Calgary (403) 265-2622 • Ottawa (613) 238-2381 • Quebec (514) 337-0755 • Toronto (416) 596-7750
 ORACLE-UK (SURREY) 44-1-948-6976 • ORACLE-EUROPE (NAARDEN, THE NETHERLANDS) 31-2159-49344

Call 1-800-345-DBMS today.

* 1987 Software User Survey, published by Software News. © 1987 by Sentry Publishing Company, Inc.
 † Digital News, December 1, 1986.
 ‡ Gartner Group currently available research.
 © 1987 by Oracle Corporation. ORACLE® is a registered trademark and Professional ORACLE, SQL*Forms, SQL*Star, SQL*Report and SQL*Calc are trademarks of Oracle Corporation. The other companies mentioned own numerous registered trademarks.
 TRBA

DON'T WASTE TIME WITH DESKTOP PUBLISHING.



You won't have to with our new Silentwriter™ LC890 page printer.

It's the desktop publishing printer with more than twice as much memory as an Apple® Laserwriter™, for example. Which means it puts information together faster—and saves valuable minutes every time you create a new page of graphics or text. And the more complex the page, the more time saved.

The Silentwriter LC890 is also one of the least expensive printers that uses Adobe PostScript® page description language. Which lets you combine text, line art, and even digitized photographs on the same page.

Of course, you may not need all this pizzazz for

your printed pages. Then you should look into our Silentwriter LC860 Plus or our Silentwriter LC850, which are ideal for text and less complex graphics applications.

Our Silentwriter series will also keep you from wasting time with breakdowns and service. Because every Silentwriter printer has a life of about 600,000 pages—more than twice as much as ordinary lasers.

So if you want to make the most out of desktop publishing, don't waste a minute. Call 1-800-343-4418 (in MA 617-264-8635). Or write: NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.

**NEC PRINTERS. THEY ONLY STOP
WHEN YOU WANT THEM TO.**

NEC
NEC Information Systems, Inc.

C&C Computers and Communications

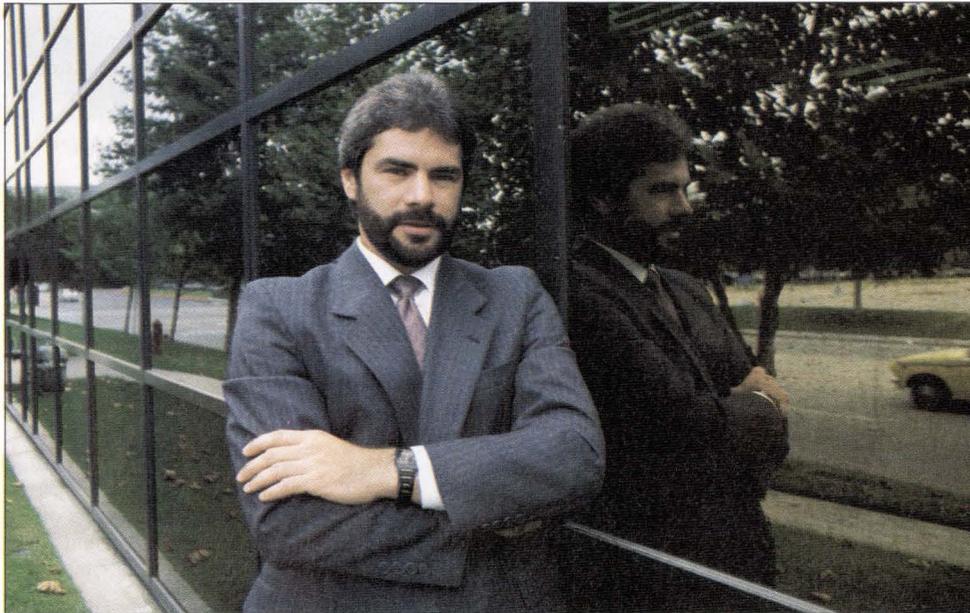
CIRCLE 10 ON READER CARD

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."

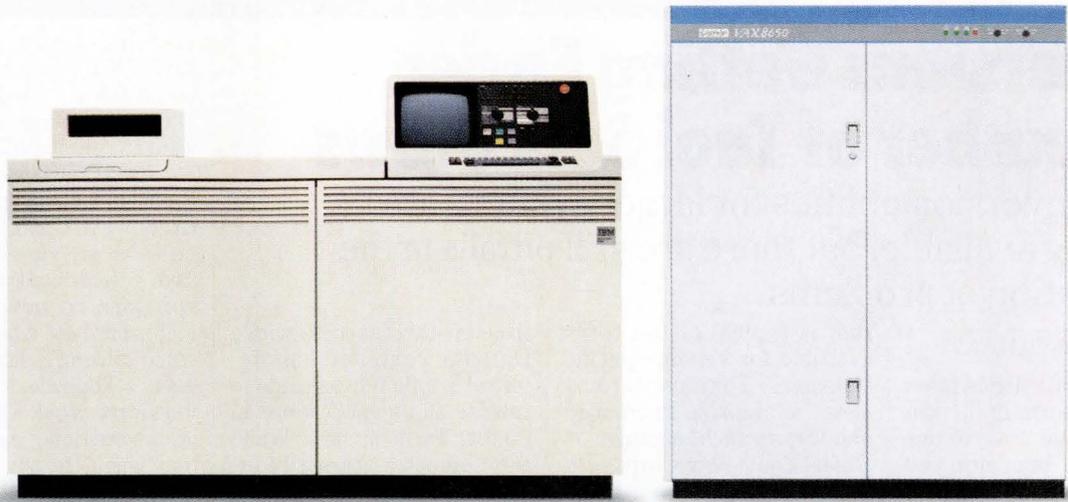
In contrast, he warns that the Japanese have a much more pragmatic approach. "They're saying, 'Let's use the measures we have now and be learning from them—even just counting lines of code is better than nothing.'" More than 100 companies have banded together in Japan to form the Joint Systems Development 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 "hand-work" 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. ■



EIGHT YEARS AGO, WE SAW THAT THEIR POTENTIAL WAS ANYTHING BUT MINI.

Today everyone's on the minicomputer bandwagon. But the mini wasn't always fashionable.

Eight years ago, we were a lonely voice in the crowd. Quietly developing the financial software, service and support for the day when minicomputers would become a major force in the corporate flow of business information.

Now that day is here. It seems like it happened almost overnight.

But for the benefit of those minicom-

puter users who are presently evaluating software vendors, we'd like to point out a few things that didn't happen overnight. Good things people automatically enjoy when they do business with McCormack & Dodge.

Our minicomputer products have stood the test of time. All over the world, they've shown they can deliver the same outstanding results as M&D mainframe software.

What's more, our systems are supported worldwide by top minicomputer pro-

fessionals—seasoned application, technical, and training specialists.

And good as our products are, they perpetually get better. Enhancements flow regularly from a long-established R&D program, generously funded through Dun & Bradstreet resources.

With all the good hardware available, choosing your brand of minicomputer may be difficult.

Fortunately, your software choice is a whole lot easier.

McCormack & Dodge

DB a company of
The Dun & Bradstreet Corporation

Financial, human resource, manufacturing, and application development software for multiple computing environments. Call 1-800-343-0325.

© 1987

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.

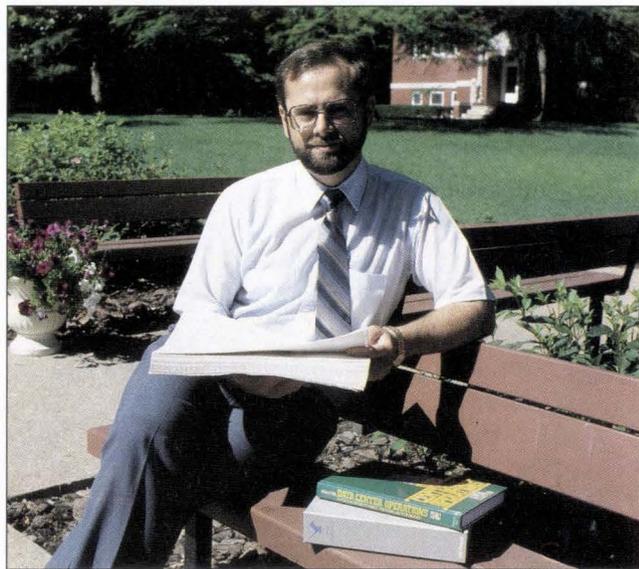
Turnock obtained a language compiler for his mini-

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

Recent PC
announcements
have left
Compaq
in an
enviable
position.

Compaq still

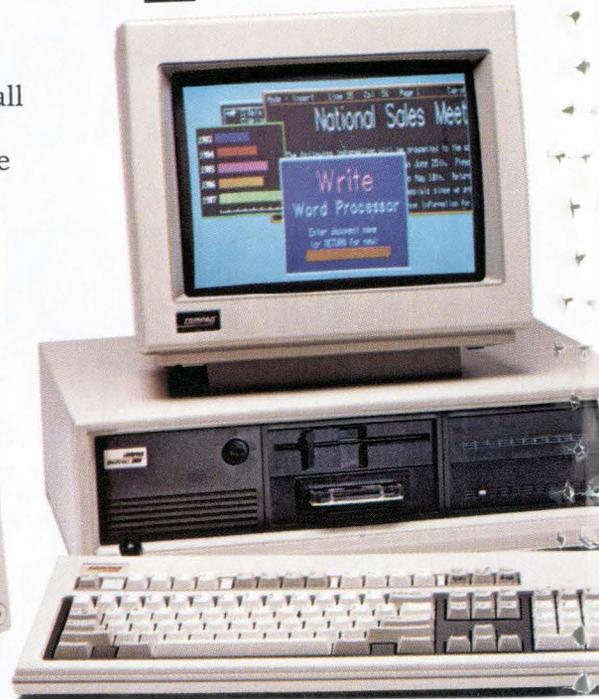
In the midst of the clamor surrounding the new IBM® PS/2 personal computers, one thing is perfectly clear to people who really know PC's. COMPAQ® personal computers still work better. They enhance your productivity *within* the industry standard, and give you maximum performance from the world's largest library of business software.

different storage devices on all COMPAQ desktops.

Examine compatibility. We let you use all the industry-standard software and expansion boards that you already own.



The 12-MHz COMPAQ PORTABLE III is the smallest, most powerful full-function portable there is.



Demand for the 12-MHz COMPAQ DESKPRO 286 has nearly doubled since the PS/2 introduction.

Still the performance leader

COMPAQ personal computers prove superior in overall performance.

Take speed. The COMPAQ DESKPRO 286® runs your software up to 20% faster than its PS/2™ counterpart. And, the COMPAQ DESKPRO 386™ sets all records for speed in advanced-technology, industry-standard personal computers.

Consider flexibility. Compaq offers 5¼" diskette drives, and allows you to add 3½" drives. In fact, you can add up to four

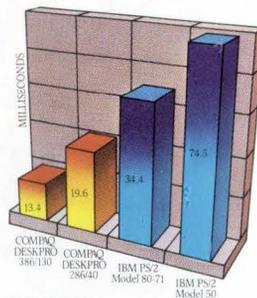
Look at expandability. Our industry-standard slots enable you to add many extra functions. So you can configure your system exactly the way you want it.

Finally, compare portability. You can't. The 12-MHz 80286-based COMPAQ PORTABLE III™ is the undisputed leader. It offers the

performance of a desktop without any of the compromises you'll find

in other portables.

Compaq applies innovative technology within the industry standard, *without* sacrificing compatibility.



COMPAQ fixed disk drives can access data up to 2½ times faster than PS/2 drives.

Earn higher returns on your investment

American business has \$80 billion invested in

It still simply works better.

works better.

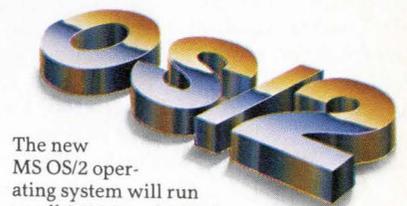
Two-way compatibility

Compaq has become famous for its legendary compatibility and connectivity. Our personal computers will run thousands of pro-

grams, without modification, far faster than other computers. And they work with all the other compatible computers in your office, without time-consuming diskette conversions.

We don't burn bridges, we build them

grams, without modification, far faster than other computers. And they work with all the other compatible computers in your office, without time-consuming diskette conversions.



The new MS OS/2 operating system will run on all 80286- and 80386-based COMPAQ personal computers.

COMPAQ computers let you incorporate developing technology, and take advantage of the latest technology in a way that's fully compatible with the hardware, software and add-ons you already own. So Compaq protects your investment.

These are all reasons why recent surveys show COMPAQ owners are the most satisfied personal computer users.

Call 1-800-231-0900, operator 39, for information and the location of your nearest Authorized COMPAQ Computer Dealer. In Canada, call 416-449-8741.

The COMPAQ DESKPRO 386 sets the standard for high-performance, advanced-technology desktop computing.

grams, without modification, far faster than other computers. And they work with all the other compatible computers in your office, without time-consuming diskette conversions.

As for the future, all 80286- and 80386-powered COMPAQ personal computers will run the new MS OS/2 operating system, allowing you to directly access up to 16 mega-

the current PC standard, including 72 million software and hardware products, and hundreds of millions of hours in training.

Compaq designs its computers to protect your investment. And because they do more, they also maximize it.

COMPAQ[®]

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. ■

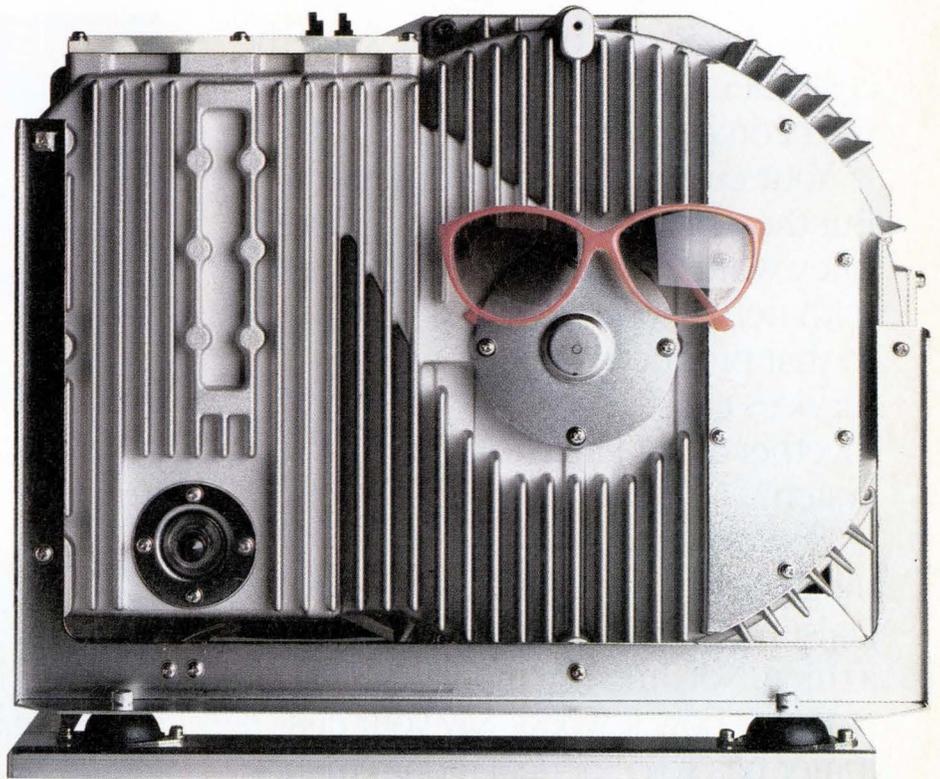
MORE VENDORS ARE OPENING CONVERSION CENTERS.

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-

How our storage products' technology can boost your systems' productivity. No. 4 in a series.

"My disks are sealed."



"And I'm a lot more reliable as a result"

You're looking at a direct access storage device (DASD) head disk assembly that's unique in one all-important respect:

Its disks are completely sealed inside their enclosures.

So they're less susceptible to environmental contamination... and more reliable as a result.

That's just one reason why our DASDs can boost your systems' productivity. Here are others.

They save floor space.

Thanks to smaller, denser disks, our DASDs' footprints are up to 40% smaller than their rivals'.

They can be serviced fast.

Components are light and easy to access. So downtime goes down, availability goes up.

It all adds up to greater productivity.

That's our DASD technology's ultimate value to you. And you can't get it anywhere else.

For specs on our full line, call your local Amdahl representative.

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, CA 94088-3470

amdahl
The VALUE Choice

CIRCLE 13 ON READER CARD

How a vendor get without lift

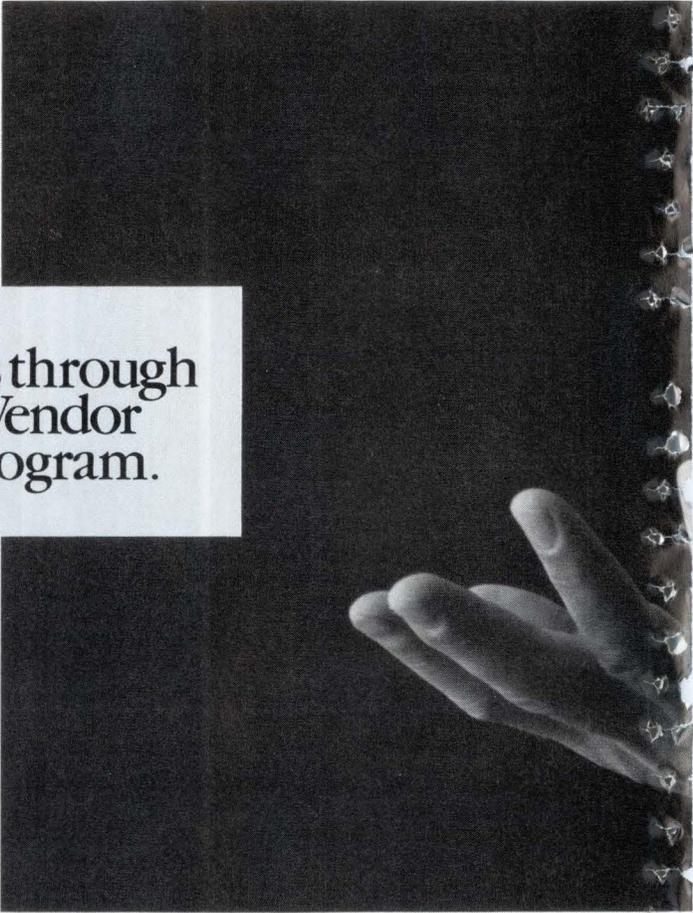
It's a basic rule of business: keep the customer satisfied. Either you do it or your competition will.

Your customers want equipment. But they also want something more. They want to combine new equipment with network services so that products and services can work together as a complete system.

Now you can get the upper hand with the AT&T Vendor Liaison Program. And it won't cost you a thing. Not time. Not money. Not effort.

Here's how it works. Say your customer has voice or data requirements. Or both. We'll prepare a complete AT&T network proposal that includes detailed information on design, pricing and availability. This means you can offer your customers information on a whole range of AT&T services. Everything from high-capacity digital services (the AT&T ACCUNET[®] Family) to an easy-to-use 800 service for small business (AT&T READYLINESM).

And we don't just hand it over to you. We'll be your personal consultants



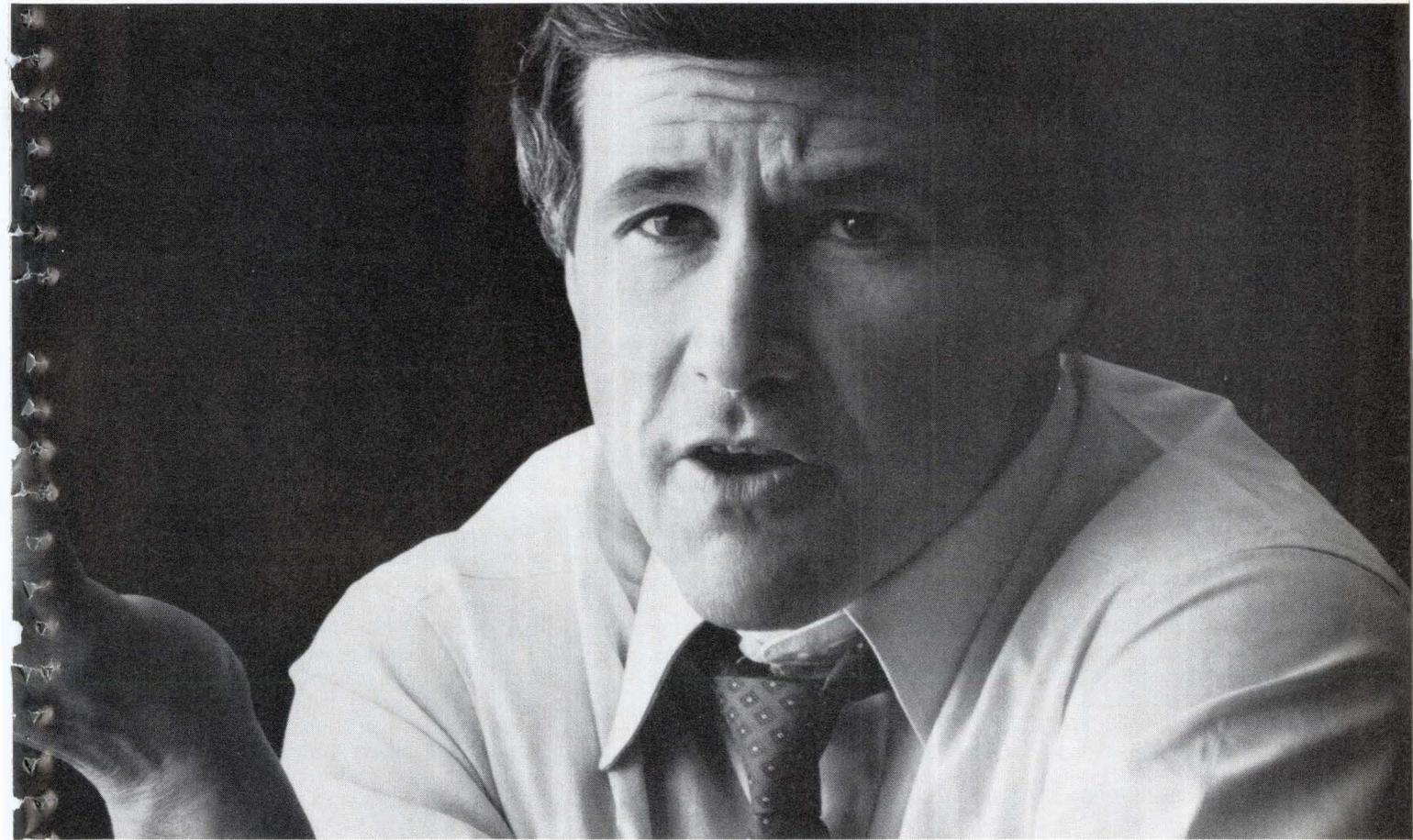
**AT&T comes through
with the Vendor
Liaison Program.**

before, during and after your sale.

All in all, the AT&T Vendor Liaison Program can help you make a sale faster because we can help you make your proposal more competitive.

And just think of it, you won't even have to lift a finger. Except to call an AT&T Vendor Liaison Manager at 1 800 225-5856, Ext. 5000.

s the upper hand ing a finger.



AT&T

The right choice.

For more information on the AT&T Vendor Liaison Program,
mail to: AT&T Vendor Liaison Program
P.O. Box 419160
Kansas City, Missouri 64141

Name _____ Title _____

Company _____

Business Address _____

City _____ State _____ Zip _____

() _____

Telephone _____

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

Photograph by Steve Weir/Black Star

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*.

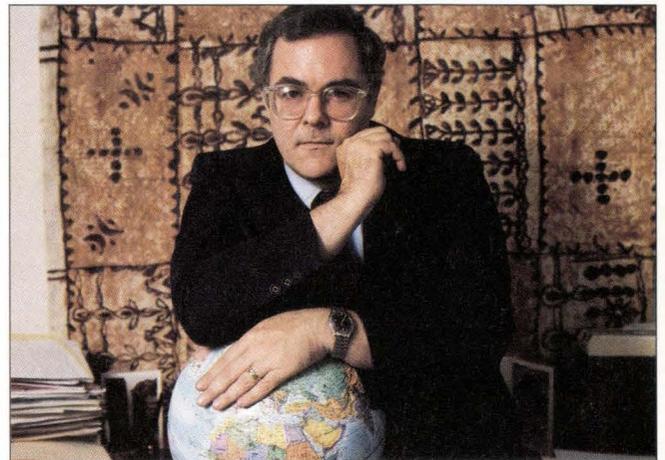
IBM last year sold its business interest to its employees. The new owners then formed a new, totally inde-

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. ■

ing -
If only I could
access my data
on the road.
Got a suggestion?

The Hall-Mark solution:



Toshiba's T1100 PLUS and T3100 Portable Personal Computers.

Toshiba brings power to the portable PC with the T1100 PLUS and the T3100. Both computers are fully IBM-compatible, allowing you to run popular software like Lotus 1-2-3®, WordStar® and dBase III®. And both allow you the freedom to access data anywhere, anytime.

Weighing less than 10 pounds, the T1100 PLUS has 640K of RAM with the serial, parallel and CRT ports as standard built-in features. The 80C86 microprocessor allows for faster speed, and it runs on built-in rechargeable batteries.

The T3100 is designed for serious users, with the same 80286 microprocessor as a full-sized IBM PC-AT in a readily portable, 15-pound package. You get a 10MB internal hard disk, full-sized keyboard, expansion capabilities and a dual-voltage power supply which allows you to plug in and work almost anywhere.

Call Hall-Mark today. We have the solutions to your computer systems needs.

HALL-MARK
25 YEARS

Aircraft courtesy of Million Air.
© 1987 Hall-Mark Electronics Corp./254-1020
Hall-Mark Electronics is a subsidiary of the Tyler Corp.

Alabama
Huntsville (205) 837-8700

Arizona
Phoenix (602) 437-1200

California
Bay Area (408) 946-0900
Orange County (714) 669-4100
Sacramento (916) 722-8600

San Diego (619) 268-1201
San Fernando Valley (818) 716-3300

West Los Angeles (213) 217-8400

Colorado
Denver (303) 790-1662

Connecticut (203) 269-0100

Florida
Ft. Lauderdale (305) 971-9280

Orlando (305) 855-4020
Tampa Bay (813) 855-5773

Georgia
Atlanta (404) 447-8000

Illinois
Chicago (312) 860-3800

Indiana
Indianapolis (317) 872-8875

Kansas
Kansas City (913) 888-4747

Maryland
Baltimore (301) 988-9800

Massachusetts
Boston (617) 935-9777

Minnesota
Minneapolis (612) 941-2600

Missouri
St. Louis (314) 291-5350

New Jersey
Fairfield (201) 575-4415

New York
Long Island (516) 737-0600

North Carolina
Raleigh (919) 872-0712

Ohio
Cleveland (216) 349-4632
Southern Ohio (614) 888-3313

Oklahoma
Tulsa (800) 231-0253

Pennsylvania
Philadelphia (215) 355-7300

Texas
Austin (512) 258-8848
Dallas (214) 553-4300
Houston (713) 781-6100

Utah
Salt Lake City (801) 972-1008

Wisconsin
Milwaukee (414) 797-7844

CIRCLE 15 ON READER CARD

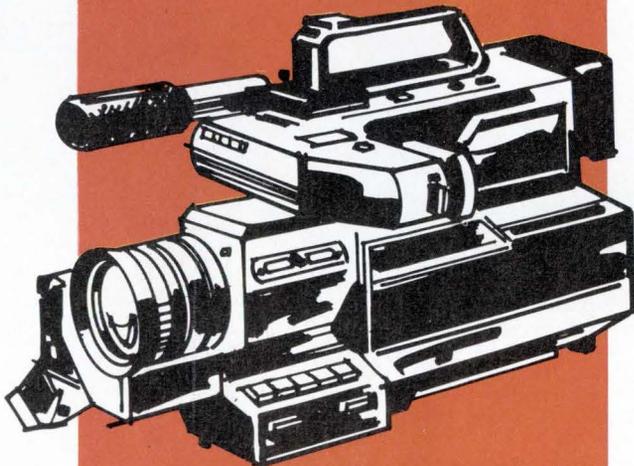
**CAST
YOUR
VOTE**

**BE A WINNER.
MAIL THE CARD AND
CAST YOUR VOTE TODAY.**

**AND WIN
VALUABLE
VIDEO
PRIZES.**

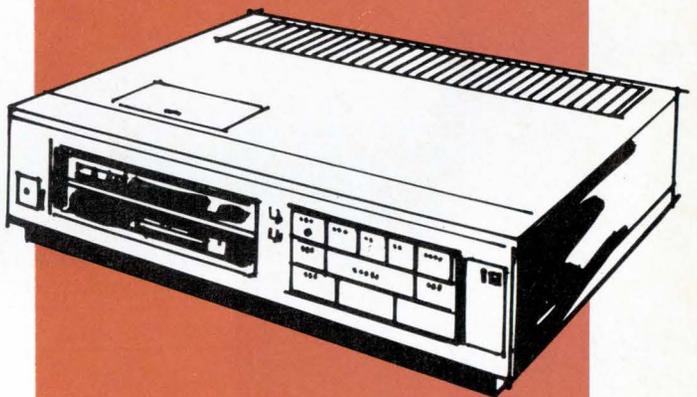
DATAMATION ANNOUNCES ITS FIRST EVER READER VOTE CONTEST.

GRAND PRIZE



**VIDEO
CAMCORDER**

4 FIRST PRIZES



**VHS VIDEO
CASSETTE RECORDER**

Enter the *Datamation* Reader Vote Contest and you may win a valuable video camera or VCR worth hundreds of dollars.

It's easy to enter. Just follow these three simple steps:

1. Select the 5 ads in the *AUGUST 15TH ISSUE* of *Datamation* that you think your fellow readers will choose as being the *most helpful* and *most informative*.
2. List your selections on the entry card provided in the *AUGUST 15TH ISSUE*.
3. Mail your entry card by September 19, 1987.

CONTEST RULES

1. List your top 5 ads in rank order on the entry card provided in the *AUGUST 15TH ISSUE* of *Datamation*. Indicate the name of the advertiser (company or organization) and the page number. (Ads placed by Cahners Publishing Company, *Datamation* or other Cahners publications cannot be considered in this contest.)
2. No more than one entry may be submitted by any one individual. Entry blank **MUST** be filled in completely or it will not be considered.
3. To qualify, you **MUST** be engaged in information processing, supervising or managing MIS/DP personnel, or setting standards for selection of information

processing or telecommunications hardware, software or services.

4. Contest void where prohibited or taxed by law. Liability for any taxes on prizes is the sole responsibility of the winners.
5. Entries that most closely match the rank selected by *Datamation* readers will be declared winners.
6. Entry cards must be postmarked before September 19, 1987.
7. In case of a tie, the earlier postmark will determine the winner. Decisions of the contest judges will be final.
8. In the event that a prize is not available, the publisher may substitute an alternative prize of equal value without prior notice.

DATAMATION

Cahners Publishing Company
A Division of Reed Publishing USA

The TeleVideo 955. Seeing is believing.

WYSE WY-50
(Unretouched photo)

TELEVIDEO 955
(Unretouched photo)

SALES ANALYSTS

LATEX SPECIALTY PRODUCTS INC.

PERIOD: Q3, 1985

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

TELEVIDEO 955 VS. WYSE® WY-50™		
FEATURES	TVI 955	WY-50
Display Memory	Up to 4 pages	1 page
Programmable function keys	64	32
Dynamically allocated non-volatile function key memory	512	128
Maximum non-volatile bytes per function key	256	4
High contrast super dark Matsushita screen	Yes	No
List price	\$499	\$499

Sure, most \$500 terminals can scrunch 132 columns onto a 14" screen. But you need a magnifying glass to read them.

Not so with the TeleVideo® 955. We redesigned the proportion of our characters and put more space between them. And put them on a high contrast, super dark screen. The result is the most readable 132 column ASCII display available.

But there's more to the 955 than meets the eye.

Like our tilt-and-swivel positioning. The screen rotates through a full 270 degrees right and left, and from -5 to +15 degrees up and down. (Which makes

backs and necks feel a lot better.)

We put all this in a machine with an incredibly small 9"x12" footprint. The result is a terminal that meets all the human factors standards recommended for adoption by the American National Standards Institute. All that, plus TeleVideo's full one-year end-user warranty.

For more information call your TeleVideo representative today. Or call us at 1-800-835-3228, Dept. TM6.



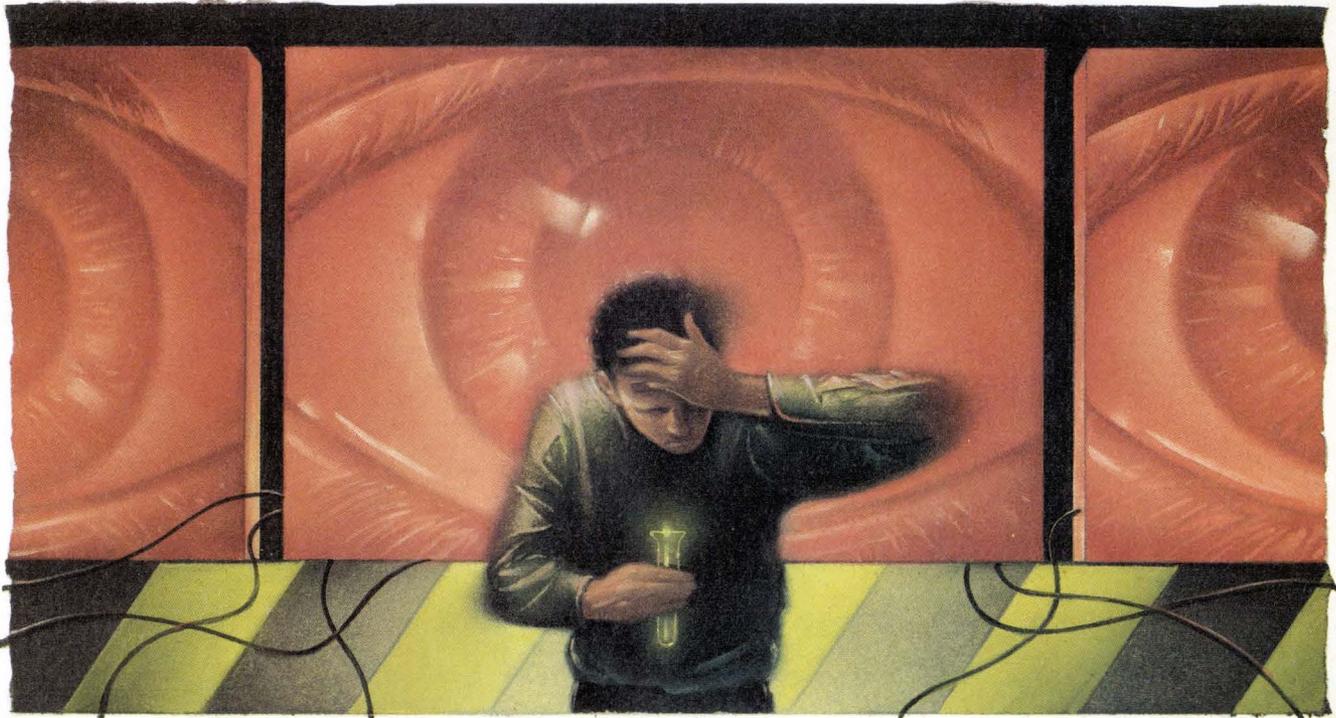
TeleVideo®
THE VISION YOU NEED TO SUCCEED.

TeleVideo Systems, Inc., 1170 Morse Avenue, Sunnyvale, CA 94088-3568, (408) 745-7760. Regional offices: West (408) 745-7760; Southwest (714) 476-0244; South Central (214) 550-1060; Southeast (404) 447-1231; Midwest (312) 397-5400; East (516) 496-4777; Northeast (617) 890-3282. Latin America/Pacific (408) 745-7760 Extension 511. European offices: Amsterdam 31.2503.35444; Paris 33.1.4687.34.40; London 44.9905.6464. © 1987 TeleVideo Systems, Inc. WYSE is a registered trademark, WY-50 is a trademark of Wyse Technology.

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

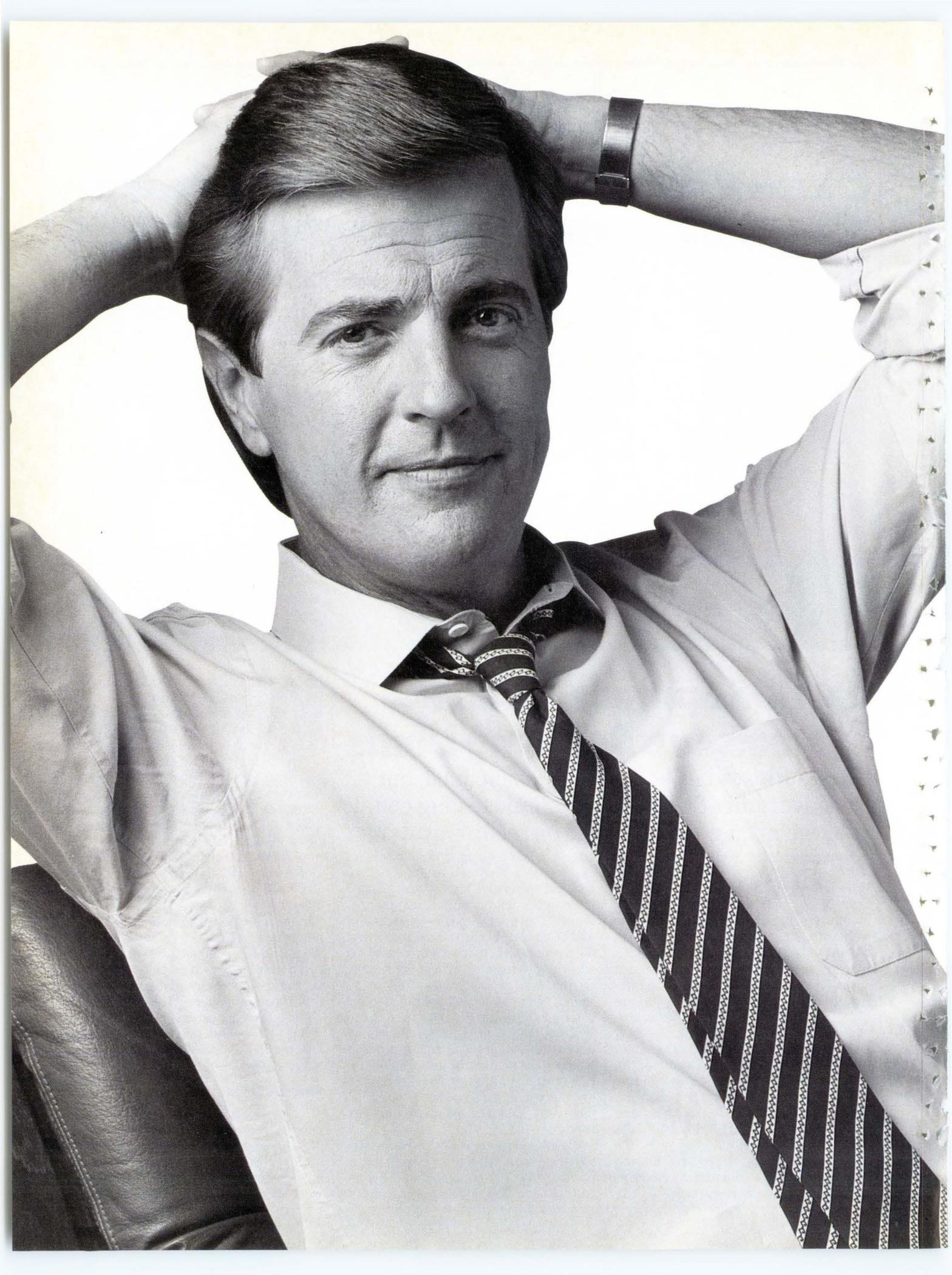
state's rapidly expanding number of AIDS cases and positive test results. The system had to receive and analyze test results and demographic information from test sites all over the state—and do it on a tight budget. Perhaps most important, the system had to ensure the complete security of sensitive 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.

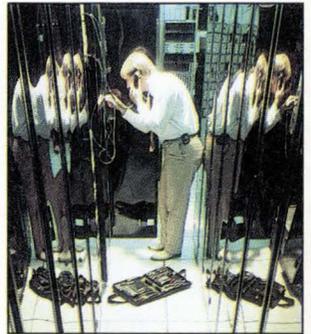
Successes Despite Weaknesses

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-



WE'VE GOT WHAT YOU NEED

Relax. You'll be in control with unequalled performance from the nation's largest, independent computer service organization. In fact, under many programs Intelogic Trace **offers guaranteed response times.**



IT provides high quality, dependable service around the clock for a host of micro and mini computers, peripherals, communication devices and LANs.

IT is not a subsidiary of a manufacturer or larger corporation.

Independence makes us better because service is our only business and customer satisfaction is our primary goal.

Get the peace of mind you deserve. Call **IT** at 1-800-531-7186.



We are **IT**SM

The largest, independent single source for computer support and service.

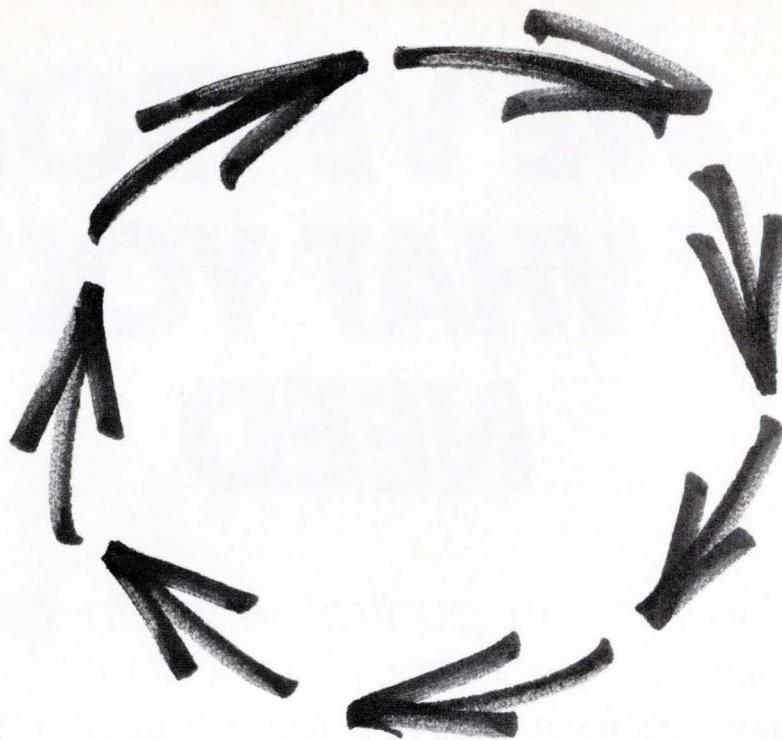
1-800-531-7186

Turtle Creek Tower I
San Antonio, TX 78229
(512) 699-5700

IT INTELOGIC
TRACE, INC.

IT is the registered trademark of Intelogic Trace, Inc.

CIRCLE 17 ON READER CARD



WITH THE RIGHT LOCAL AREA NETWORK, YOU CAN REALLY GET SOMEWHERE.

It's amazing how the right local area network can help your company gain a competitive edge by allowing you to share and exchange more information, faster and more cost-effectively than ever before.

With the right LAN, your company will have an information pipeline. Your computers will all be tied together, whether they're across the hall from each other, across the street, or across your company's entire network. Allowing you to share databases...leverage already developed applications and systems as tools, for both branches and headquarters.

And NYNEX now offers you a choice of an additional two leading LANs. First, a 3Com system that connects your PCs into a powerful network that allows you to share programs across PCs. Then there's the Bridge system which provides total connectivity and access between any combination of multi-vendor and multi-media networks. Connectivity that ranges from micros to host computers.

Of course, the best hardware and software is only part of the right LAN solution. At NYNEX, your system will be designed, installed, and maintained by the network specialists with a 100 year heritage in business communications.

So if you want the right local area network, make sure you head in the right direction. To NYNEX.

1-800-346-9X9X.

NYNEX

Business Information Systems 

CIRCLE 18 ON READER CARD

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





HP Networking.
We connect offices,
cities or countries.
Like clockwork.

An integrated business system is only as good as its connections. To other departments or offices. Or branch offices. Or even international offices.

At Hewlett-Packard, we've spent ten years designing and supporting a wide variety of local-area, wide-area and office networking solutions. All connectible to SNA-based systems. All high-performance and cost-effective. All based on OSI industry standards—so they're all compatible with other vendors. And they'll grow as you grow.

When you consider also that these solutions come from the company that never stops asking "What if...", you may wish to make a connection with us. At 1 800 367-4772, Dept. 275R.

*we never
stop
asking*

"What if..."

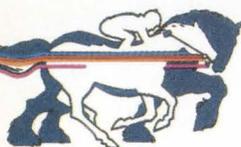


Business Computing Systems

CIRCLE 19 ON READER CARD



Team Your IBM System With a Thoroughbred!



NEW!
Powerful Printers
For Your IBM 3X or 3270!

- 850 cps (240 lpm throughput)
- Twin-ax and Co-ax Models
- 100% duty cycle to keep your jobs running day and night.
- On site service available*

The New TriMatrix™ 888XL And 889XL Printers.

They're brand new from Output Technology... the American company with the world's fastest serial dot matrix printers! Incredibly powerful partners for your IBM mini and mainframe systems.

The 888XL features an internal protocol converter for twin-ax connection to IBM 3X systems, while the 889XL offers co-ax (IBM 3270). A parallel port is also standard on both models.

A Myriad of Applications:

- Data Processing
- Financials
- Spreadsheets
- Bar Code
- Near-Letter-Quality
- Graphics



CIRCLE 52 ON READER CARD

More Features Than Ever Before!

- 888XL emulations: IBM 5224, 5225, 5256, and EPSON.
- 889XL emulations: IBM 3287, and EPSON.
- Full international character set
- Front panel menu programming (no DIP switches).
- Front and bottom paper feed
- 8K data buffers
- 5 to 18.2 pitch printing

Over 120 Service Centers in the U.S. and Canada.*

Team Your IBM With OTC's Champion Performers!

OTC's unique printing mechanism distributes the work load over three print heads for reliability you can trust. Premium performance and speed... all at a competitive price!

To put our team to work for you, call today!

1-800-422-4850 (8 a.m. - 5 p.m. PST)

E. 9922 Montgomery, Suite #6, Spokane, WA 99206
(509) 926-3855, 800-422-4850
Telex #15-2269 OUTPUTSPOK FAX #922-4742

*Call for availability in your area.

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

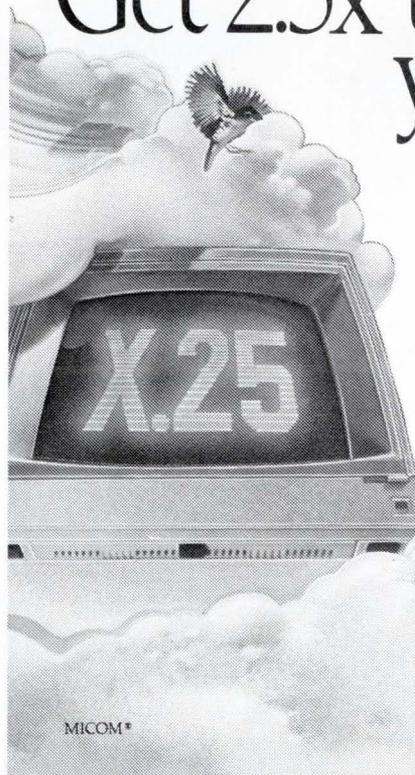
tried passing legislation forbidding insurance carriers from asking for or using AIDS-related information in making underwriting decisions. California, New York, Massachusetts, Wisconsin, and Washington, D.C., have such laws. Other states, including Washington, New Jersey, and Maine, prohibit discrimination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

MICOM X.25 access equipment.

Get 2.5x the X.25 for your money.



As packet switching networks grow in number, so does the number of X.25 access equipment vendors. But only MICOM has enough X.25 experience and manufacturing capacity to provide a full line of components at a 2.5-to-1 price performance edge. Which means better margins for OEMs.

MICOM X.25 access equipment is in use on virtually every public X.25 network in the world. So if it's not on yours, just give us a call toll free.

And let us show you how we can turn your current X.25 vendor into an ex-25 vendor.

1-800-MICOM-US



MICOM Systems, Inc., 4100 Los Angeles Avenue,
Simi Valley, CA 93063-3397

Think smaller.
Think faster.
Think versatile.



The Hall-Mark solution:



The Unisys PC/microIT Personal Computer.

The Unisys PC/microIT is ideal for users who require high performance and quick response. Now with its new 40 mb hard disk, it holds even more information than before and works much faster. The PC/microIT occupies slightly more than a square foot of space on your desk but is built with a broad range of configurations.

The powerful yet compact PC/microIT combines the speed and features necessary to operate either as a stand-alone personal computer or as an intelligent workstation attached to the Unisys USERNET system.

The PC/microIT can handle the growing demand for communications, graphics, data processing and office automation, as well as engineering and business analysis applications.

Call Hall-Mark today for more information on the Unisys PC/microIT. We have the solutions to your computer systems needs.



© 1987 Hall-Mark Electronics Corp./211-1027
Hall-Mark Electronics is a subsidiary of the Tyler Corp.

Alabama
Huntsville (205) 837-8700
Arizona
Phoenix (602) 437-1200
California
Bay Area (408) 946-0900
Orange County (714) 669-4100
Sacramento (916) 722-8600

San Diego (619) 268-1201
San Fernando Valley (818) 716-3300
West Los Angeles (213) 217-8400
Colorado
Denver (303) 790-1662
Connecticut (203) 269-0100
Florida
Ft. Lauderdale (305) 971-9280

Orlando (305) 855-4020
Tampa Bay (813) 855-5773
Georgia
Atlanta (404) 447-8000
Illinois
Chicago (312) 860-3800
Indiana
Indianapolis (317) 872-8875

Kansas
Kansas City (913) 888-4747
Maryland
Baltimore (301) 988-9800
Massachusetts
Boston (617) 935-9777
Minnesota
Minneapolis (612) 941-2600

Missouri
St. Louis (314) 291-5350
New Jersey
Fairfield (201) 575-4415
New York
Long Island (516) 737-0600
North Carolina
Raleigh (919) 872-0712

Ohio
Cleveland (216) 349-4632
Southern Ohio (614) 888-3313
Oklahoma
Tulsa (800) 231-0253
Pennsylvania
Philadelphia (215) 355-7300

Texas
Austin (512) 258-8848
Dallas (214) 553-4300
Houston (713) 781-6100
Utah
Salt Lake City (801) 972-1008
Wisconsin
Milwaukee (414) 797-7844

CIRCLE 14 ON READER CARD

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-

MICOM MODEM Dial Series.

Stop making dirty phone calls.



Dirty telephone networks upset modem communications. And datacomm managers.

Now you can clean up your act with MICOM's Dial Series 2400 bps modems. Error free data transmission using MNP.™ Leased line quality and performance. Compatibility with Hayes, CCITT and Bell standards. And that's just for starters.

To find out more, just call us toll free.

And let us show you how to hang up on dirty communications.

1-800-MICOM-US



MICOM Systems, Inc.,
4100 Los Angeles Avenue,
Simi Valley, CA 93063-3397
MICOM® MNP is a
trademark of Microcom.

A manufac system shou make things Like prof

And deadlines.
And decisions.

For years, mid-sized manufacturers have needed a practical, comprehensive management system. One that would give them a few of the advantages their larger competitors take for granted.

Honeywell Bull has one. We call it the HMS/7 manu-

facturing management system. You'll call it the edge.

Because whether you have a computer department or not, HMS/7 will let you automate with a single database. From shop floor functions all the way to top management. Getting you to market fast while ensuring quality every step of the way.

HMS/7 includes workhorse DPS 7000 hardware

Customers are more imp

turing
ld help you

•
its.

and software. As well as field-proven MRP II applications software to give you minute-by-minute control of your manufacturing operations.

Honeywell Bull has been helping the world's largest manufacturers for a long time. With HMS/7, we're bringing everything we've learned to mid-sized companies. Complete with education, training, service, and support.

For more information call 1-800-328-5111, ext. 9705, or write: Honeywell Bull Inc., Plant Manufacturing Systems, MS440, 200 Smith Street, Waltham, MA 02154.

Honeywell Bull

ortant than computers.

Behind the News

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. ■





**EMULEX® DELIVERS
THE ONE THING
YOU'VE WANTED IN
DATA COMMUNICATIONS...**

M



Emulex introduces the 36-hour day.

Not enough hours in the day?

Emulex's Performance 1000/14.4Kbps leased line modem can give you more.

It's fifth grade arithmetic. Replacing your 9600bps modem with one that runs 14,400bps is like installing a bigger pipe to carry 50% more data in the same number of hours... or like having 50% more hours in the day.

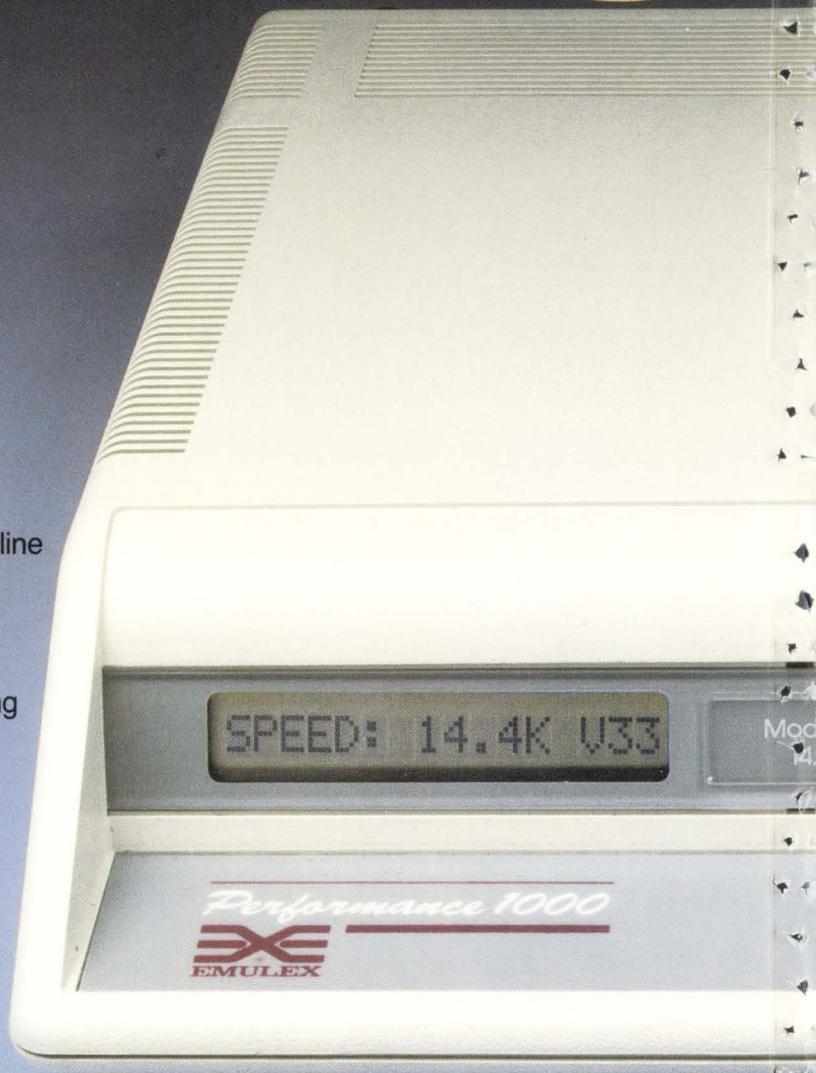
Adding that much more throughput to your existing lines means you can cancel your telco order for more. It also means faster response for your users. So why hasn't everyone already upgraded to 14.4? Because until now, 14.4Kbps modems have been very expensive—typically over \$3,000 each and sometimes much more, depending on features.

It couldn't stay that way forever; technology just can't seem to leave well enough alone. The Performance 1000 is a classic case.

More Performance for the money.

An advanced design constructed around a few key proprietary VLSI chips, the Performance 1000 is changing the rules of the game for modems, as new technologies always do. Priced at \$1795, it delivers 14.4 performance at a price we paid for 9600 not long ago. In a package about half the size of its competitors.

Given that low cost, 14.4 now will begin to replace 9600 as the industry standard just as 9600 displaced 4800 four or five years ago. At \$1795, the Performance 1000 can pay for itself in leased line savings in relatively few months, and that's what it's all about. Technology may make it possible, but economics is what really forces change.



PerformanceTM 1000

Automatic speed adjustment both ways.

The smaller package packs more benefits too, including automatic speed adjustment. The CCITT V.33 spec calls out trellis coding for 14.4Kbps transmission and for its primary fallback rate of 12Kbps. The Performance 1000 extends that to 9600bps—for lines that are acting like barbed wire—to deliver *an error rate 100X better than a V.29 modem would* at the same speed.

The fallback can happen automatically if the

RE.



Actual Size

14.4Kbps Modem

user chooses, and when the barbed wire starts acting like a telephone line again, the Performance 1000 can automatically speed up.

Don't leave home with it!

Modems with straps to connect and internal switches to set now will begin to look like antiques. Operating speeds and fallbacks and other parameters are set in the Performance 1000 by selecting from among English-language options displayed on its front panel.

What's more unusual, the *remote* unit also can be configured and tested through the local modem's front panel, without operator intervention at the far end. This can be especially useful, considering that no matter how many hours there are in a day, some of them will wind up being in the middle of the night.

Want to reconfigure the remote's fallback speed? Simply bring up the speed in the display and press ENTER.

```
FB: 12.0K U33
```

Then bring up the download command and press ENTER a second time.

```
REMOTE: DOWNLOAD
```

Want to see it again?

9.6 is enough?

There *may* be applications which can't take advantage of more speed, but could use more functions. For these, there's the Performance 1000/9.6, with almost all of the features of the Performance 1000/14.4—but for \$500 less.

More to follow.

Emulex is one of the U.S.' leading manufacturers of high performance computer products, including disk and tape controllers, disk and tape subsystems, communications multiplexers, and others. The Performance 1000 is only one of a new series of end-user data communications products we're introducing. Watch for more. *Soon.*

For information, call our toll-free number.

Communications
by 
EMULEX

Performance™ 1000 Specifications

Application:

Full-duplex or half-duplex
synchronous transmission on
point-to-point leased lines

Analog line:

3002 unconditioned, 4-wire

Digital interface:

EIA RS232C, CCITT V.24/V.28

Data rates:

Performance 1000/14.4

14,400bps, 12,000bps, 9600bps
CCITT V.33 trellis coded
9600bps, 7200bps, 4800bps
CCITT V.29 QAM

Performance 1000/9.6

9600bps, 7200bps, 4800bps
CCITT V.29 QAM

Carrier frequencies:

Performance 1000/14.4

V.33 1800±1Hz (opt. 1700±1Hz)
V.29 1700±1Hz

Performance 1000/9.6

V.29 1700±1Hz

Transmit level:

0 to -15dBm (in 1dB steps)

Receive level:

0 to -43dBm

Clock:

Internal, external, receive

Equalization:

Automatic adaptive

LED displays:

RTS, CTS, SD, CD, RD, DSR, TM,
Power

Command display:

16-character liquid crystal

Options:

Call about rack-mounting, dial
back-up and related features.

Commands:

Configuration setting	(Lock/Unlock)
Save configuration setting	(No/Yes)
Remote configuration	(View/Download)
Operating mode	(Data/Diagnostic)
Speed	(4.8Kbps to 14.4Kbps, or Automatic)
Fallback speed	(4.8Kbps to 12.0Kbps)
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
Loopbacks:
Local Analog Loopback
Local Line Loopback
Remote Analog Loopback
Local Digital Loopback
Remote Digital Loopback
Bilateral Digital Loopback
Local Analog Loopback with
test pattern
Remote Analog Loopback
with test pattern
Remote Digital Loopback
with test pattern

Physical:

8½ x 11 x 2½ inches
(21.6 x 27.9 x 6.4 cm)
3 lb 1 oz (6.8 Kg)

Electrical:

115VAC, 47 to 63Hz, 15 watts

Operating Range:

0° to 50°C

Communications
by 
EMULEX

Emulex Corporation 3545 Harbor Blvd., Costa Mesa, California 92626
(800) EMULEX-3 or (714) 662-5600 in California

Regional Offices: Costa Mesa, CA (714) 662-5600, Chicago, IL (312) 490-0050,
Teaneck, NJ (201) 836-3717, Toronto, Ontario (416) 673-1211

Send me **MORE** information on the Performance™ 1000

Name _____

Title _____

Company _____

Street _____

City, State, Zip _____

Phone _____

I'm interested in: End-user versions OEM versions

Please have a salesman call

Mail to: Emulex Corporation, 3545 Harbor Blvd., Costa Mesa, CA 92626

DTM-1

NOW SHIPPING!

80386

Imagine the speed and power of a \$100,000 minicomputer in a desktop PC costing under \$7,000. Now imagine all that power going to waste because the operating system you chose was never meant to take advantage of a computer this powerful. It will take more than just a "window environment" or an outdated operating system to unlock the 80386.

It will take PC-MOS/386™. **The First 80386 Operating System.** Specifically designed for the 80386 computer, PC-MOS/386™ opens doors. Doors to more memory and multi-tasking. Doors to thousands of DOS programs as well as upcoming 80386-specific software. It's the gateway to the latest technology..., and your networking future.

Memory Management Without Boards. PC-MOS exploits the memory management capabilities built into the 80386. So, up to four GIGABYTES of memory are accessible to multiple users and to future 80386-specific applications requiring megabytes of memory.

Multi-Tasking, Multi-User Support for One, Five or 25 Users. PC-MOS/386™ allows up to 25 inexpensive terminals to be driven by a single 80386 machine. So the features of the 80386 can be utilized at every terminal. And it comes in three versions so you can upgrade your system as your company grows...without having to learn new commands or install new hardware.

UP TO 25 USERS.

MADE FOR THE 80386.

RUNS DOS PROGRAMS.

MULTI-TASKING



Software Support for Thousands of DOS Programs. Although PC-MOS/386™ totally replaces DOS, it doesn't make you replace your favorite DOS programs. So you can run programs like Lotus 1-2-3, WordStar, dBASE III, and WordPerfect on the 80386. Best of all, it uses familiar commands like DIR and COPY—so you'll feel comfortable with our system.

The Gateway to Endless Features. Distinctive characteristics like file/system security, remote access, file/record locking, and built-in color graphics support for EACH user set PC-MOS/386™ apart from all previous operating systems.

Open the Doors to Your Future TODAY! Call The Software Link TODAY for more information and the authorized dealer nearest you. PC-MOS/386™ comes in single, five & 25-user versions starting at \$195.

PC-MOS/386™
MODULAR OPERATING SYSTEM

THE SOFTWARE LINK
Developers of LANLink™ & MultiLink™ Advanced

3577 Parkway Lane, Atlanta, GA 30092
Telex 4996147 SWLINK
FAX 404/263-6474

For the dealer nearest you,

CALL: 800/451-LINK
In Georgia: 404/448-LINK

OEM/Int'l Sales: 404/263-1006
Resellers/VARS: 404/448-5465

OEM/Dealer Inquiries Invited

THE SOFTWARE LINK/CANADA CALL: 800/387-0453

CIRCLE 24 ON READER CARD

More Than Just Windows, We've Opened Doors.

TRADEMARK ACKNOWLEDGEMENTS: MultiLink® is a registered trademark of The Software Link. PC-MOS/386™ MultiLink® Advanced, and LANLink™ are trademarks of The Software Link. Lotus 1-2-3, WordStar, dBASE III, & WordPerfect are trademarks of Lotus Development Corp., MicroPro, Ashton-Tate, & WordPerfect Corp., respectively. Prices and technical specifications subject to change.

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-

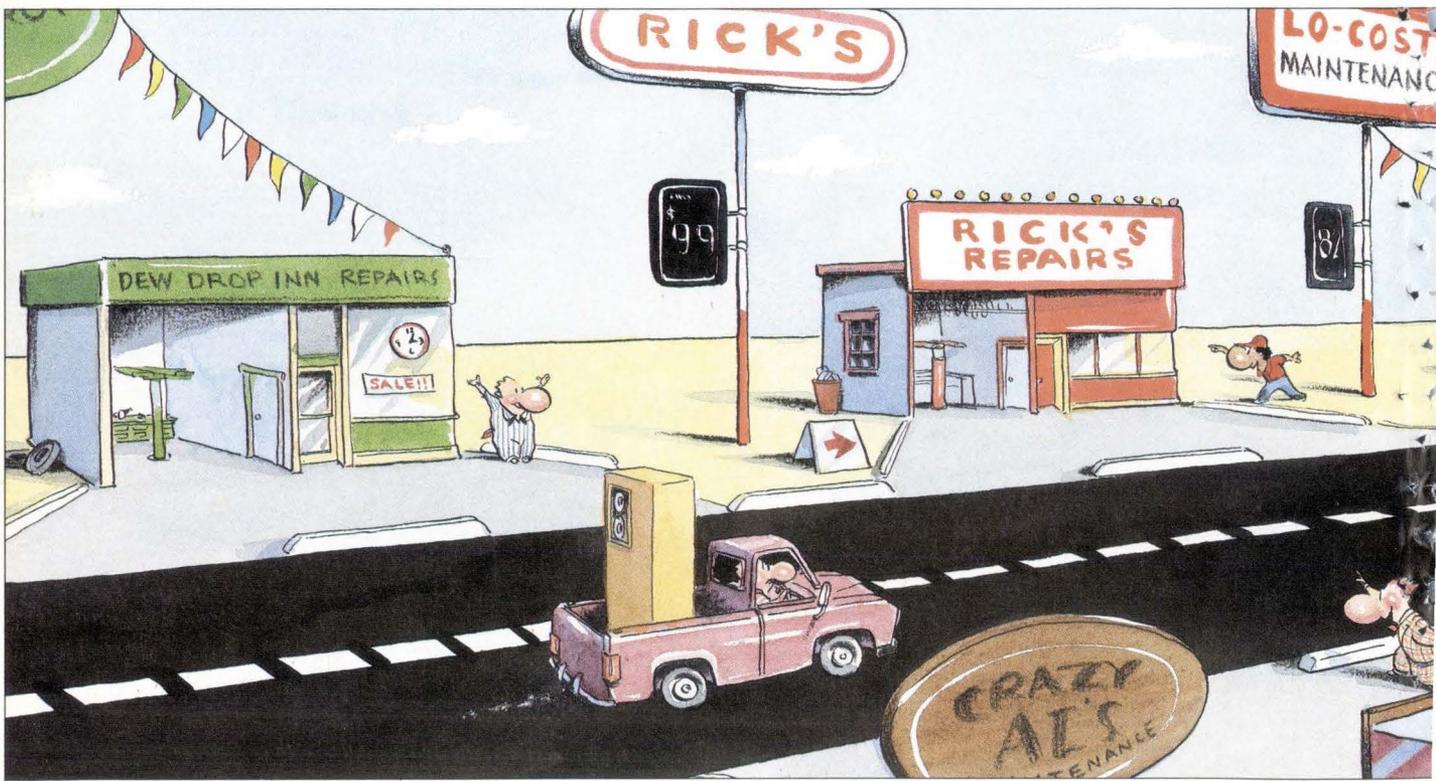


Illustration by Michael Witte

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

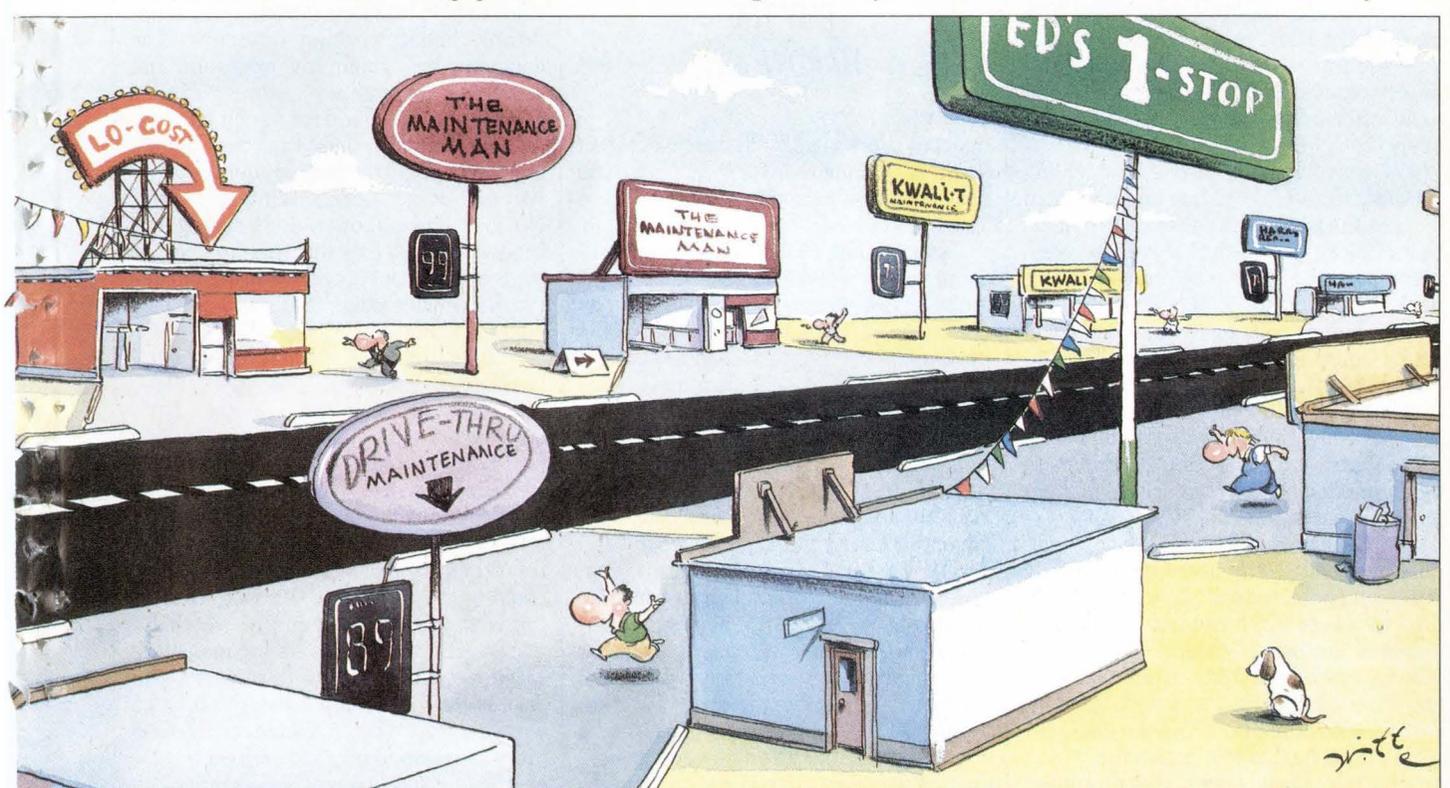
While cost is important, it is not the only factor in the maintenance equation. Quality is also a key issue. Nobody wants to sacrifice quality service just to save a few bucks. You want quick response no matter when or where equipment fails, regardless of price. You also want coverage of all installed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

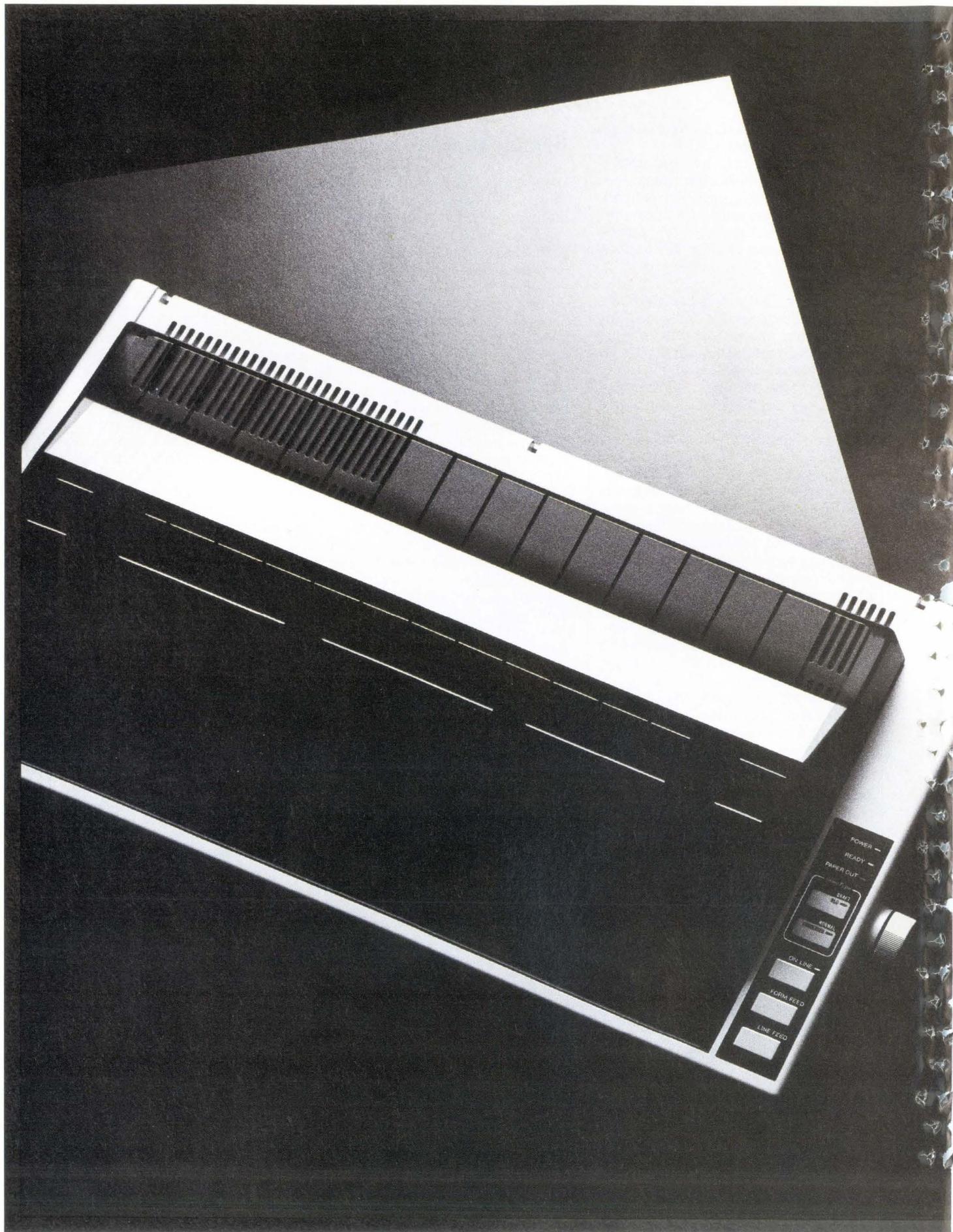
Having technicians permanently on-site is expensive, so the costs saved by this approach are obvious. In fact, many user problems can be solved without an engineer ever visiting the location, and, by diagnosing the trouble beforehand, service technicians are likely to have the correct parts when they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



Epson is a registered trademark of Seiko Epson Corporation. Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505. (800) 421-5426.



Epson printers have been in business longer than most printer companies. In fact, in every size and type of business, you'll find Epson® printers of every type and size.

Everything from our 9-pin workhorses; the legendary FX and new EX Series. To the professional print quality of our 24-pin LQ Series. To an astonishing laser printer that's as affordable as it is powerful.

Our printers come loaded with all the features your users want and all the reliability you've come to expect from Epson. All this has made Epson the leading name in printers, twenty years running.



EPSON

**WHEN YOU'VE GOT AN EPSON,
YOU'VE GOT A LOT OF COMPANY.™**



Getting a Hand On Maintenance Costs

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

Xerox Corp.
Business Products & Systems Group
P.O. Box 1600
Stamford, CT 06904
Territory: U.S.

CIRCLE 173



Nothing scares Sorbus[®] people.

Whatever it takes to exorcise your system's demons, you can count on Sorbus. After all, we have the best-trained field sales force anywhere, with an average 20,000 class days every year. (Which makes our people anything *but* average.)

And we support them with a 230,000 part-number inventory—including more than 6.2 million individual parts, at last count. And we stock them nationwide, so the part you need is usually nearby. Our elaborate parts testing program assures performance, too.

No wonder our people are fearless.

Our customers are, too. In fact, a recent survey by *Data Communications* rated us the "Best Service Organization." And we've come out on top in *Datamation* and *Computer Decisions* surveys, too—for eleven and eight consecutive years, respectively.

Don't get scared. Get Sorbus. Call today. 1-800-FOR-INFO.

Sorbus[®]
A Bell Atlantic[™] Company

50 E. Swedesford Road
Frazer, PA 19355

A C C E S S

MCI'S COMM Desk.™ Innovative software that lets your PC speak with the world.

MCI's COMM Desk software can put you in touch with the world. Just insert COMM Desk into any IBM PC or compatible and you have reliable, cost-efficient access to MCI's international messaging and telex services.

Like MCI's SAFE®, the world's most advanced, feature-rich, controlled telex system. You electronically forward your messages to MCI, and we dispatch them to more than 200 countries worldwide—24 hours a day! MCI's IN-SAFE® that efficiently manages the flow of all *incoming* messages to virtually eliminate busy signals. Or MCI MAIL® that can give your firm the option of electronic or hard-copy messaging to practically anywhere in the world.

With MCI's COMM Desk, you can automatically send and receive messages at your PC while you work on other PC applications. You can set up archiving and message journals for effective traffic management. And you've always got help—with easy-to-read help screens and our toll-free "hotline" support center.

Let your PC speak with the world. See the details below on how to receive your COMM Desk demo disk.



MCI
COMMUNICATIONS
FOR THE NEXT 100 YEARS.™

Send \$5.00 for your COMM Desk Demo Disk
To: MCI International Marketing Department,
2 International Drive, Rye Brook, New York 10573.

Name _____
Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Telephone Number _____

*MCI, the MCI logo, SAFE, IN-SAFE and MCI Mail are registered service marks of MCI Communications Corporation (MCIC). SMC COMMUNICATIONS FOR THE NEXT 100 YEARS is a service mark of MCIC. COMM Desk is a trademark of MCIC. © MCIC: June 1987. IBM is a registered trademark of the International Business Machines Corporation.

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.

You'll see a lot of this family on the IBM Channel.

Catch IBM Channel errors in the act.



DW300 Channel Monitor

The DW300 Channel Monitor is a unique logic analysis tool designed especially for monitoring the IBM and compatible mainframe I/O Channels.

The DW300 attaches quickly and safely with standard Bus and Tag serpentine connectors. It includes predefined protocol triggers and also allows user-defined triggers to speed your error tracing. The DW300 can be operated remotely for Field Service, thus eliminating costly travel expenses. Other applications include Design and Manufacturing.

This is an IBM 370 channel. (Just ask any peripheral.)

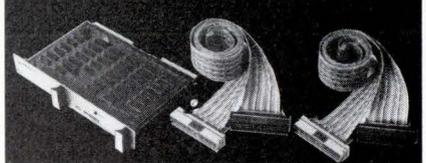


DW110 PACE Channel Simulator System

The PACE is a compact simulation system which emulates an IBM mainframe I/O channel.

The PACE runs at full channel speeds and allows you to test 370-compatible peripherals quickly and easily, without tying up a large, expensive mainframe. PACE is user-programmable and executes its own CCWs. Applications include Design, Manufacturing, QA, Field Service, and Trade Shows/Product Demos.

Best deal yet in channel/controller cards.



DW500 VMEGATE

The DW500s are a set of card-level IBM-compatible control units or I/O channels for OEMs.

The DW50X provides an off-the-shelf, high-performance solution for direct attachment to IBM mainframe I/O channels. Device emulation is accomplished by microcode. The DW55X provides an I/O channel to attach to IBM-compatible devices.

VMEbus card sets are available now with other popular buses to follow.

data|ware
DEVELOPMENT, INC.

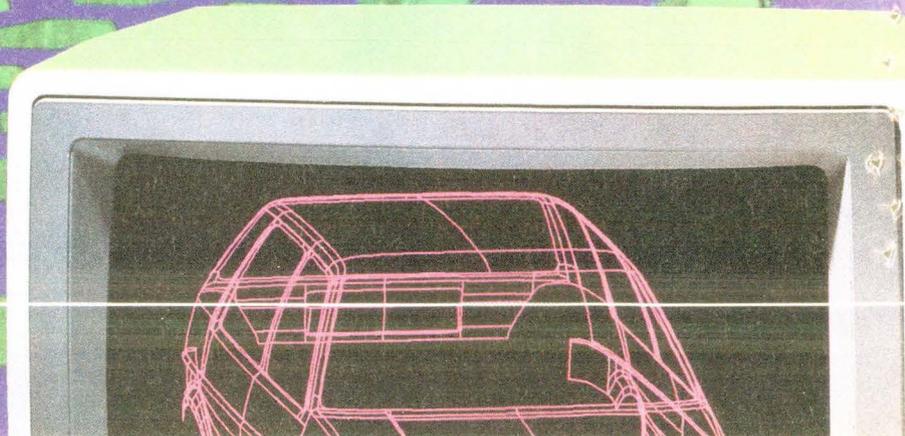
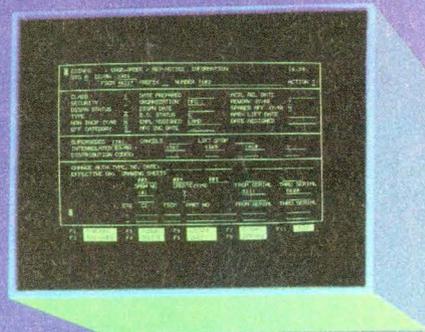
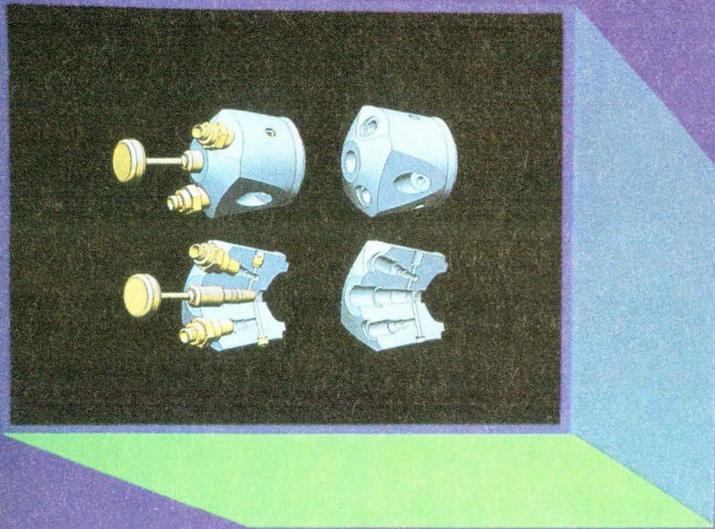
4204 Sorrento Valley Blvd., San Diego, CA 92121 Tel: (619) 453-7660 TWX: (910) 335-2066

IBM is a registered trademark of International Business Machines Corporation.

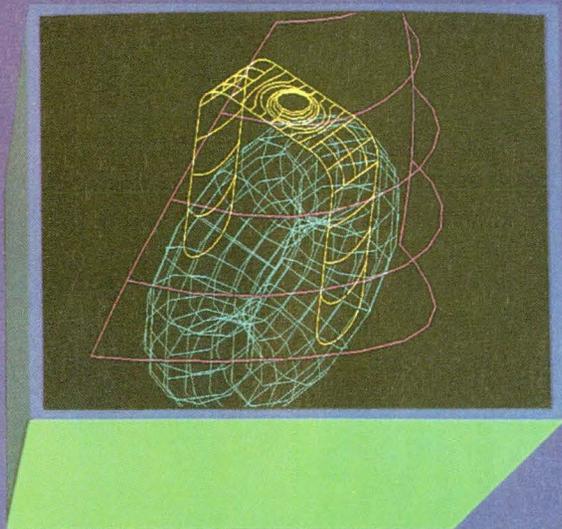
CIRCLE 28 ON READER CARD

DATAMATION □ AUGUST 15, 1987 71

WHETHER YOU SHAPE METAL OR MOLD PLASTIC...USE CAD OR CAM...



MANAGE DATA OR DOLLARS...SUPPORT 1 USER OR 10,000...



WE OFFER YOU INTEGRATION ABOVE THE NEED, BEYOND THE NORM.

We offer a CIM solution called ICEM: Integrated Computer-aided Engineering and Manufacturing.

ICEM is integrated by Control Data's advanced information management capability and powered by CYBER computers.

Our processing power reaches from the CYBER 910 workstation and CYBER 930 departmental computer all the way to the supercomputing level.

The CYBER line supports one, one hundred or thousands of users in your multivendor environment. It meets and then exceeds the need.

As does the ICEM software suite. It offers a complete package of tools for design and drafting, geometric modeling, finite element modeling and analysis, and numerical control—for both metal and plastics.

And they're all integrated by the ICEM Engineering Data Library, creating a total engineering environment.

Comprehensive, systemwide integration. If that's what you seek, look above and beyond the norm—to ICEM.

Call 800-233-3784 ext. 930 for complete information. In Minnesota call 612-853-3400 ext. 930. In Canada call 800-387-8208.



CD 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.

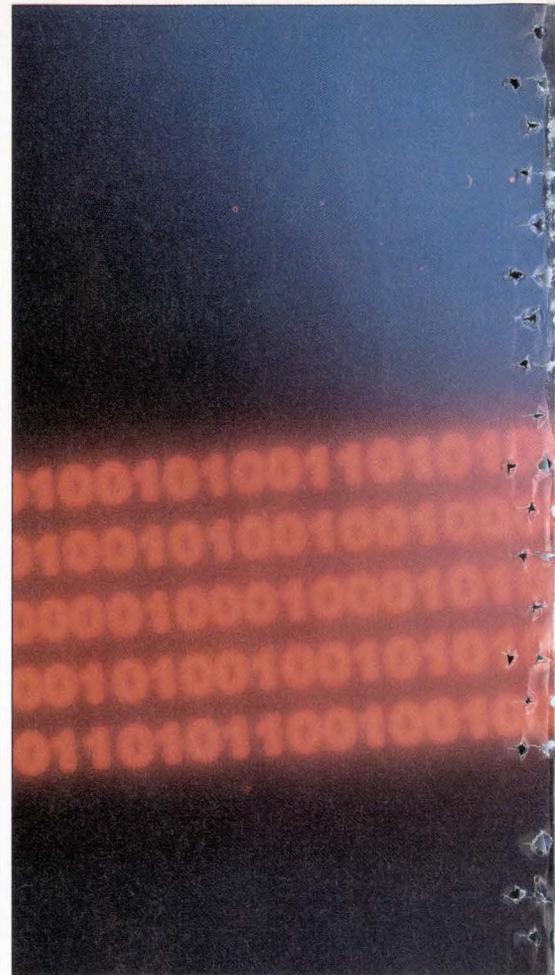
Ceramic Oxide Found Intriguing

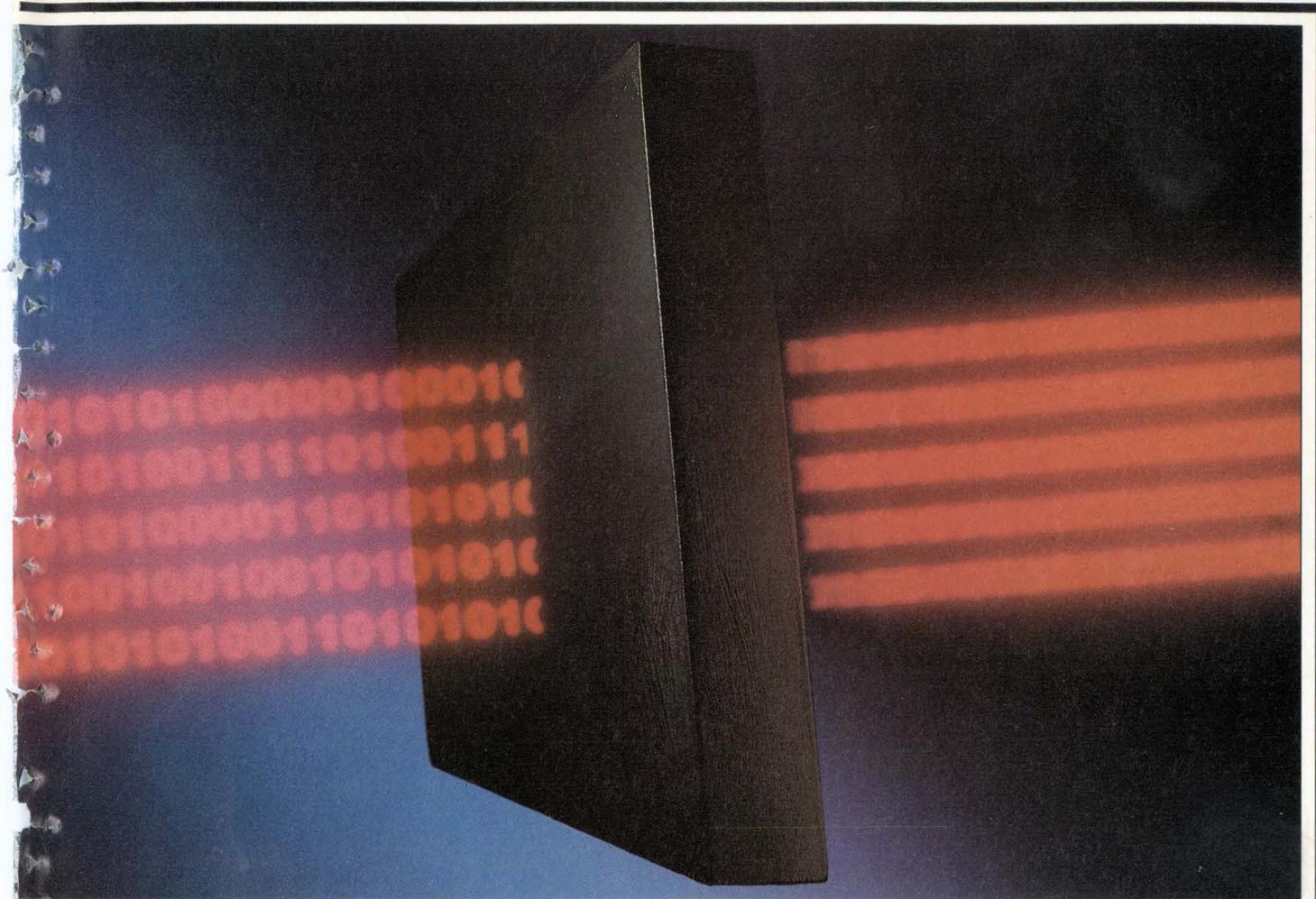
In the early 1980s, however, two scientists at IBM's Zurich Research Lab in Switzerland began looking for superconductivity in a different class of com-

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.

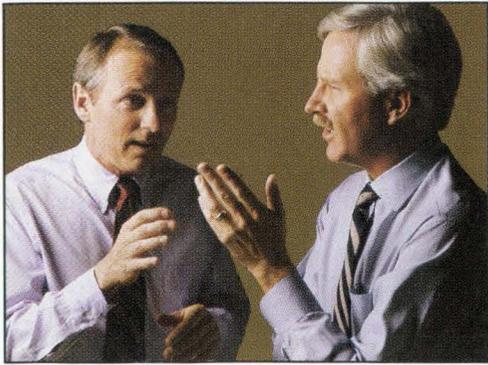
"My guess is that the new materials might show up in instrument devices first," Cutler says. "An analog-digital convertor, high-speed samplers, and the

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-

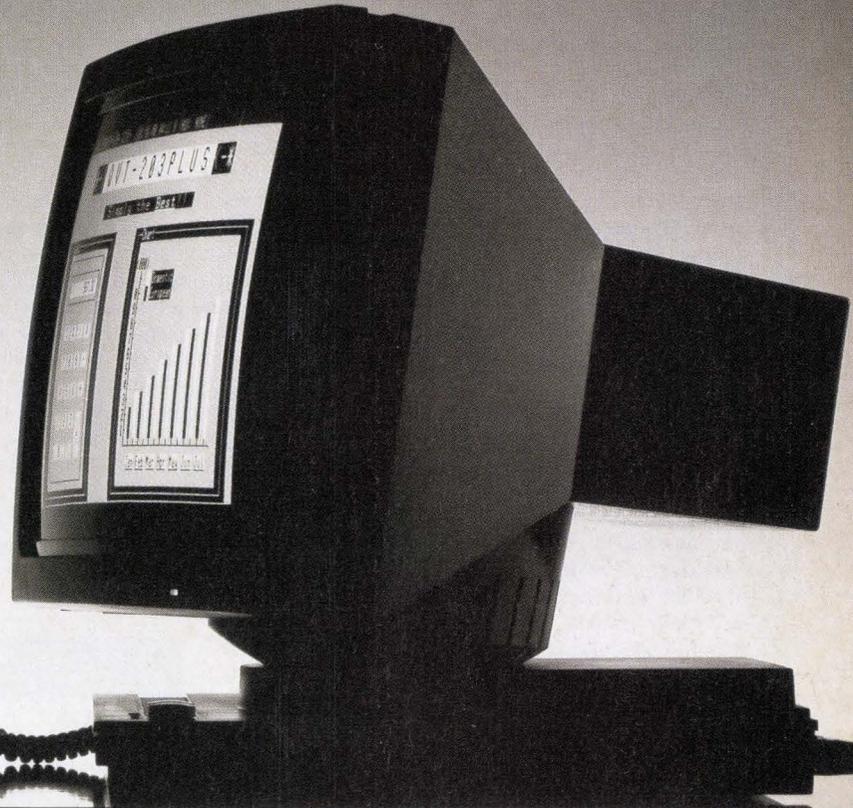


"We need terminals that deliver full performance and still enhance the look of our systems."

Director, Information Systems

"Let's not forget about reliability. Our terminals need to be cost-effective and offer a good return on our investment."

Manager, Corporate Finance



Introducing the QVT[®] PLUS family. Because you *can* please all of the people all of the time.

Creating a new family of terminals to meet the growing demands of business today is no easy task.

It takes experience.

It demands innovation—and attention to detail.

Most of all it requires listening to our customers. Interaction between us and you, the people who buy and use QUME[®] products.

And our listening has paid off.

Now, with over one million QUME products installed worldwide, we have the right terminals for virtually every business application.

QUME's QVT[®] PLUS line of terminals offer the ultimate combination of form and function.

Take the QVT 203 PLUS. Our high-performance, fully DEC-compatible ANSI terminal.

The QVT 119 PLUS. For high-end, full-function ASCII environments.

And the QVT 101 PLUS. The cost-effective choice for business applications.

The QVT PLUS family line. Because we listen. For more information, call QUME today at (800) 223-2479.

Find out how far we'll go to please you.

Qume[®]

2350 Qume Drive
San Jose, California 95131

THE COMPANY WITH PERIPHERAL VISION.™

©1987 QUME Corporation. DEC is a trademark of Digital Equipment Corporation. ANSI is designed to American National Standards Institute, Inc., ANSI X3.64-1979 guidelines.

CIRCLE 30 ON READER CARD

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

NOW YOU CAN HAVE THE MODEM YOU'VE ALWAYS WANTED AT A PRICE YOU NEVER DREAMED YOU COULD GET.

At Hayes we just found a way to make the best-selling PC modems in the world even better. We lowered their price. From now on our Smartmodem 2400,[™] Smartmodem 2400B,[™] Smartmodem 1200,[™] Smartmodem 1200B,[™] Smartmodem 1200C,[™] and our new Smartmodem 1200A,[™] will cost considerably less. Up to one-third less.*

So if you've always wanted a Hayes modem, external or internal, for an IBM[®] PC or compatible, IBM PC Convertible, Apple[®] Macintosh,** Apple II, or almost any other PC, now you don't have to settle for less. Just pay less.

Hayes[®]

SMARTMODEM 2400

 Hayes[®]

HS

AA

CD

OH

RD

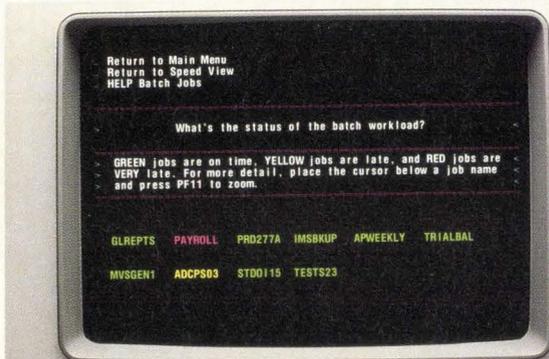
SD

TR

MR

Important Breakthroughs From Candle

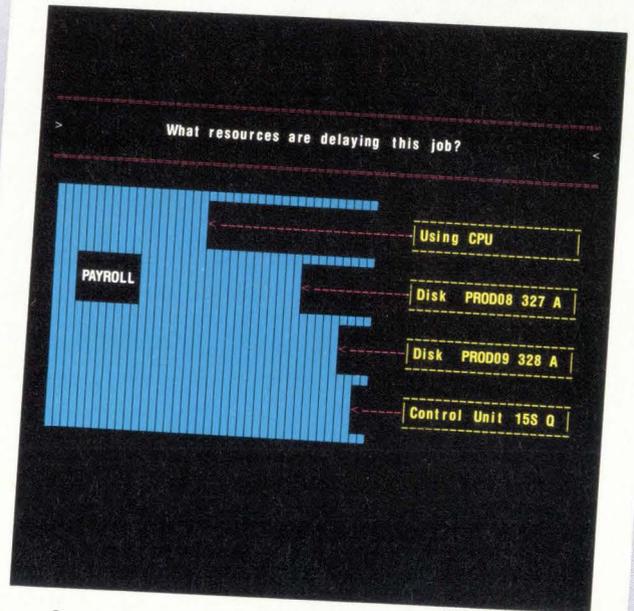
Get Solutions To Complex As Easy As



1. Identify overdue jobs with WPF.

Face it. You've got a tough job. It's not easy to maintain overall system productivity and manage an ever increasing number of individual jobs. But now you can optimize your resources to do both—if you've got the latest release of Candle's MVS performance products.

Breakthrough features in this integrated family of products make it as easy as 1,2,3 to find out which resources are impacting MVS and impeding system performance. So you can take action fast and avoid customer complaints.



2. Locate the resource problem with Impact Profiles.

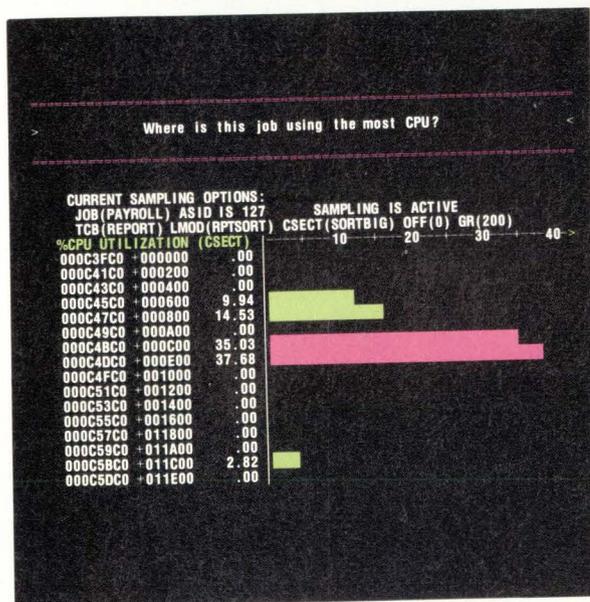
WPF

Workload Profiling Facility (WPF)* of OMEGAMON® automatically warns you about a job that's taking longer than usual. So you can identify a production job in trouble and take action before customers complain or deadlines are missed. What's more, WPF actually sets your job thresholds for you.

Resource Impact Profiles

A second breakthrough tool called Impact Profiles

MVS Performance Problems 1, 2, 3.



3. Identify programming statements consuming CPU.

Identifying the Cause of High CPU Consumption

A unique new tool from Candle enables you to identify the source of excessive CPU consumption in an individual address space—in a TSO session, for example, or in your systems software. And you can do so at a moment's notice. Without any code or JCL changes! As a result, performance analysts can clearly see where to make corrections because our latest technology pinpoints the actual set of program instructions responsible for high CPU consumption.

Think of the advantages... System programmers can evaluate new software—or software they're about to purchase—and identify problems even without source code. And applications programmers can debug new or recently changed applications with ease.

Why not see for yourself? Simply call Terry Forbes at (800) 843-3970 for all the details about the latest breakthroughs in the Candle family of fully integrated MVS performance management products. Because when it comes to solving complex MVS performance problems—or those in CICS, IMS, or VM—Candle makes it easy as 1, 2, 3.

* Requires Candle's historical product, EPILOG[®] for MVS.

lets you press a key and, in seconds, pinpoint which resources are impacting MVS. No more guesswork!

Now members of your DP team will get the information they need to head off performance problems. Operations gets instantaneous answers to: what is slowing down batch jobs or TSO? System programmers get equally rapid responses to: how are the CPU, I/O and memory impacting MVS performance?

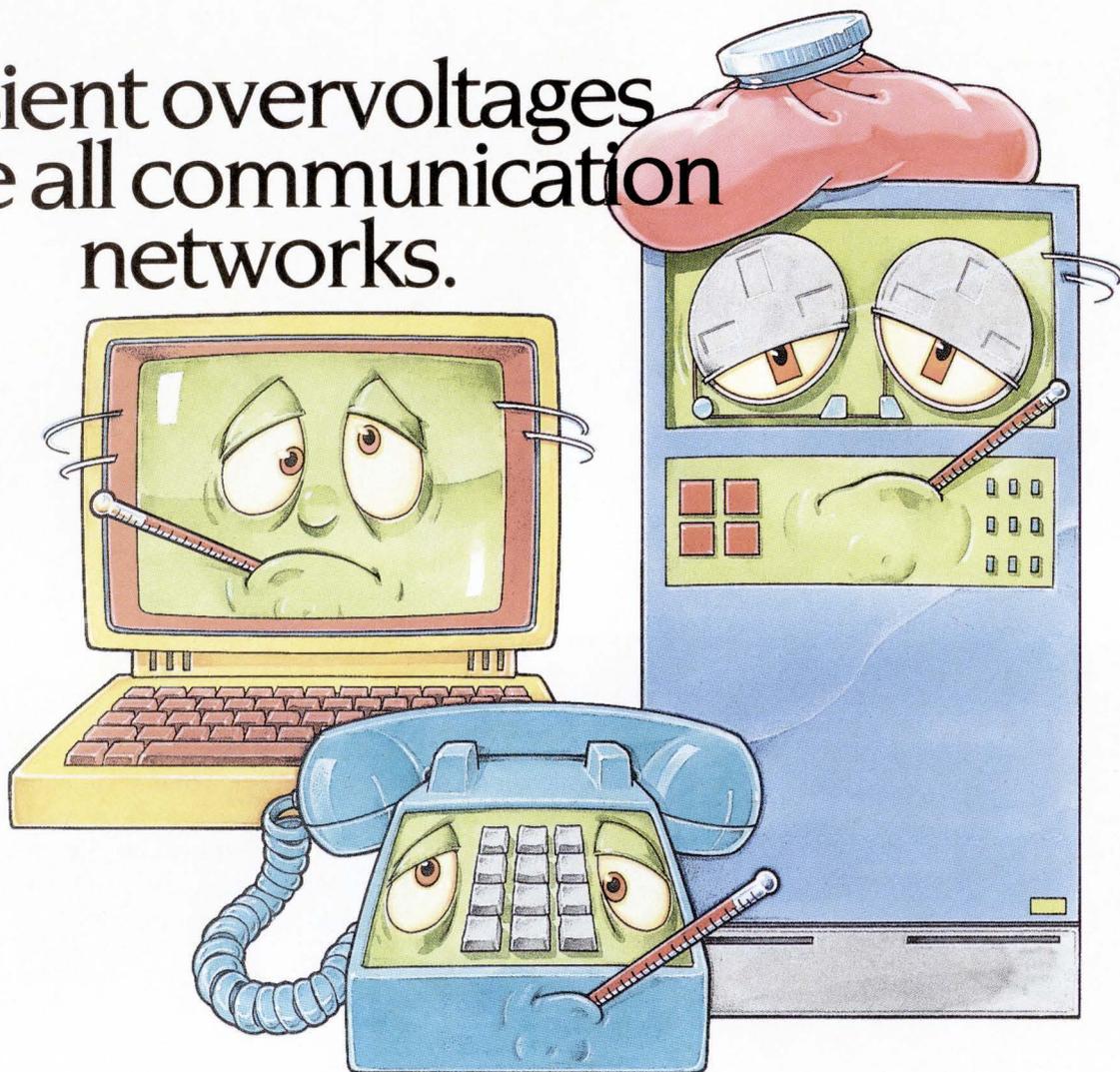
!Candle[®]

Candle Corporation
1999 Bundy Drive, Los Angeles, CA 90025

Copyright © 1987 Candle Corporation. All rights reserved.

CIRCLE 37 ON READER CARD

Transient overvoltages plague all communication networks.



Cylix is the cure.

It can happen to any of the links in your communication network, anywhere, at any time.

It can be caused by lightning, electrostatic discharge, or even just ionized air.

In fact, the only certain thing about transient overvoltages is their high cost — which, including downtime, servicing and employee salaries, can run as much as \$10,000 an hour for a medium-sized company with a modern data communication network. Not to mention the damage to company equipment and reputation.

But have no fear. The Cylix Corporation provides an extremely effective remedy for the overvoltage ills. The Cylix line of Transient Surge Protectors.

Combining avalanche diodes for speed and gas tubes for sheer power, Cylix protectors provide maximum security in nanosecond response time. And, unlike similar products on the market, our components are modular and easily replaceable. Which means that, whether you're an OEM or an end user, you get convenient, custom-tailored protection. For anything from single sites to entire networks.

Available in a variety of models to fit every need, Cylix protectors are just what it takes to keep your equipment — and your business — in good health. For more information, contact us at (408) 988-4645, or write: The Cylix Corporation, 2637 Townsgate Road, Suite 200, Westlake Village, CA 91361.

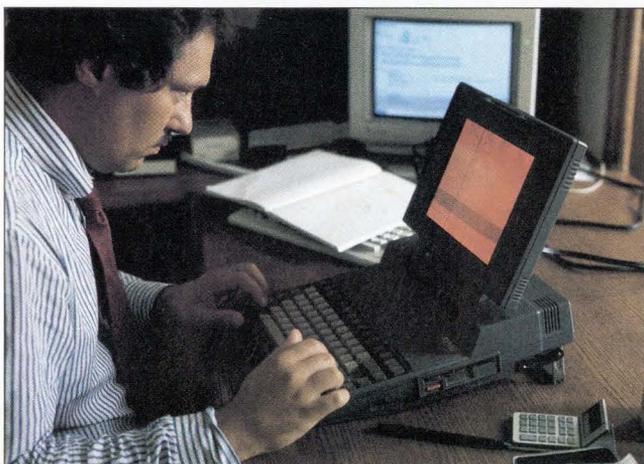


Once deemed little more than an expensive executive's toy, necessary only for traveling reporters, laptop computers have gained acceptance in the corporate world. Their biggest fans are sales reps and sales managers, particularly those who sell high-priced, high-tech goods. While there are still some 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.

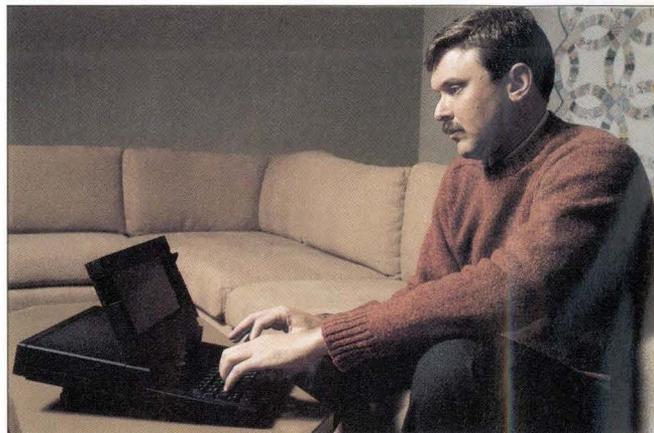
"The district managers have become business consultants, not order takers," continues Berrigan, who conceived the laptop system and then worked with Chrysler's internal departments to implement it. The GridCase was selected after extensive evaluation, and, despite the spate of new laptops, Berrigan says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

Sooner or later...



everyone leaves the nest.

Discover the benefits of TRW's quality maintenance and repair services for your IBM systems. Mainframes. Minis. Micros. And compatible peripherals. You'll find true security with TRW's expert and remarkably cost-effective service programs.

TRW's nationwide network of service professionals, thoroughly trained in maintaining IBM systems, are dedicated to keeping your equipment in prime operating condition. Whether it's preventive maintenance or emergency

repair of an occasional malfunction, we'll keep downtime low so that your productivity remains high. With guaranteed fast response. 24 hours a day if necessary.

There's an economical, comprehensive TRW Service Program that's just right for your equipment and your requirements. Call 1-800-257-7464 today for all the facts. Take wing with TRW and discover the advantages of independence.



**Third Party Maintenance
From A Company Called TRW**

CIRCLE 33 ON READER CARD

CLIP AND SEND!

D 8/87

**It's about time I leave the nest, also.
Please send me more information.**

Name

Company

Address

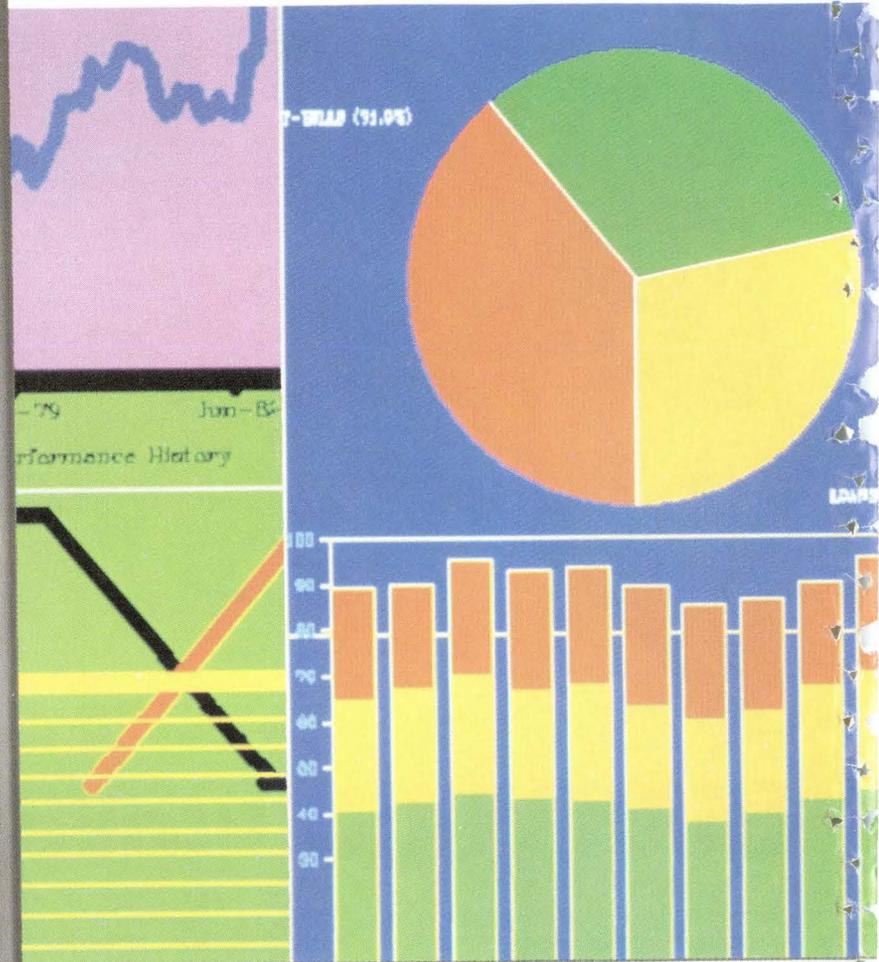
City

State Zip

Phone

**TRW Customer Service Division
Dept. 845, 15 Law Drive
Fairfield, NJ 07006**

AT&T Power Protection Systems: Your best security against costly downtime.



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

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

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

The protection solution.

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

A 50-year advantage.

Why specify AT&T's power protection equipment over that of other manufacturers? Because AT&T has an unmatched 50 years of

experience in manufacturing power equipment. And, because AT&T also designs and manufactures computers, we have a unique understanding of what should go into a superior power protection product.

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

Easy does it.

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

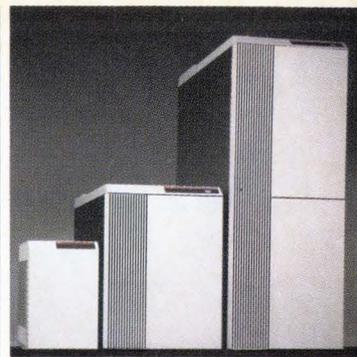
Furthermore, AT&T backs you with an unequalled nationwide service network and a 24-hour toll-free number for technical service support.

Fast delivery.

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

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

© 1987 AT&T



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

AT&T Power Protection Systems
Dept. 203130-LEADS, 555 Union Blvd., Allentown, PA 18103
Please send me more information on UPS and PLC.

DTA 8/15/87

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

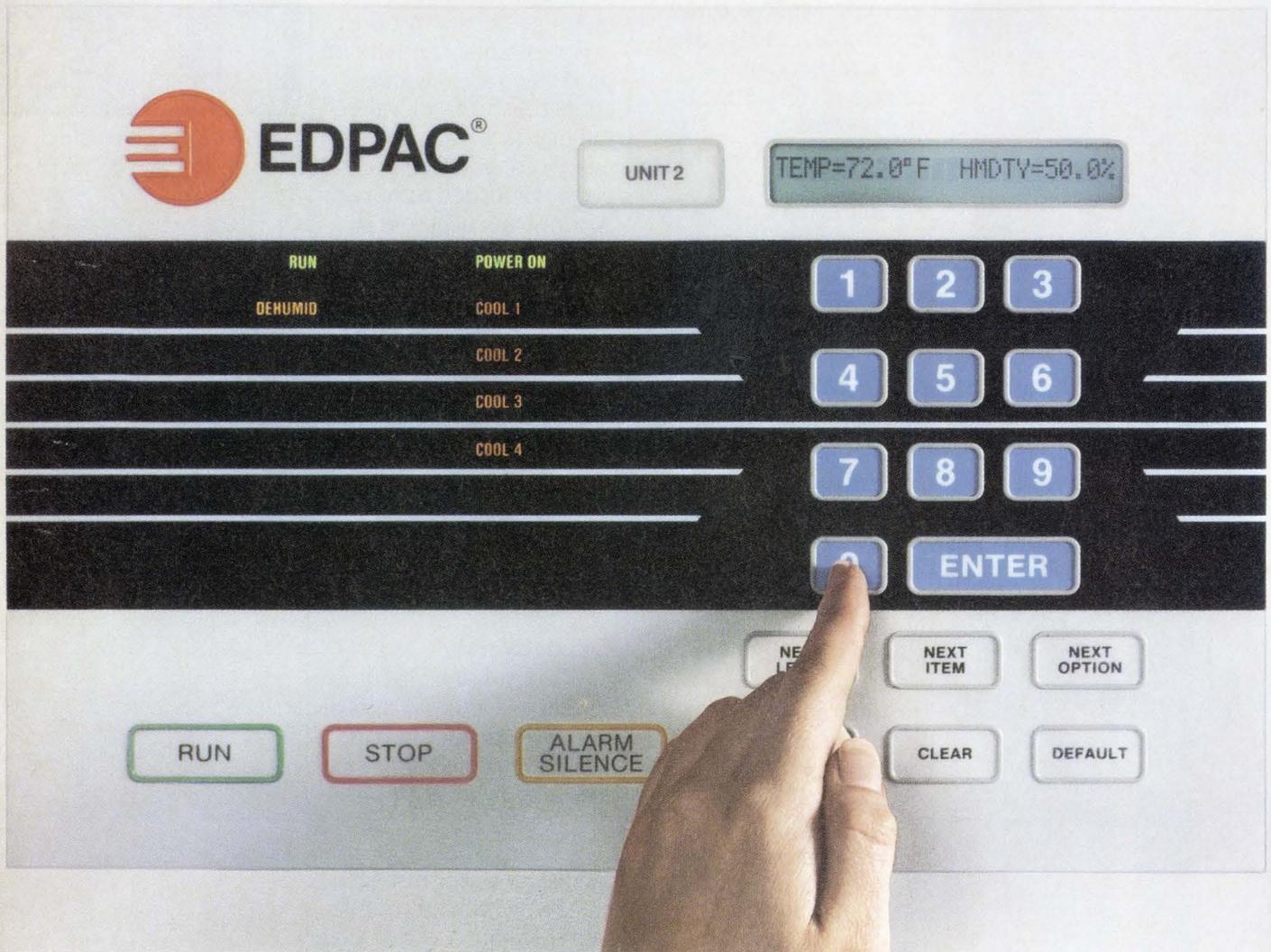
Phone (____) _____



AT&T

The right choice.

Introducing the EDPAC "Einstein" controller.



Superior brainpower to control your computer's environment.

Our brainy new EDPAC "Einstein" controller gives you maximum flexibility in climate control management and surveillance. And its high level of sophistication can be applied to EDPAC Tech 80, Minitech 90 and Twin Chiller Systems.

It's user-friendly — to authorized users only — with four levels of data entry/reporting as standard: Basic Commands, System Set Up, Device Run Times and Service Access. And its solid state sensors for temperature and humidity offer accuracy and reliability not possible with electromechanical devices.

Other "Einstein" features include special battery backup and retrieval systems, alarms, auto-sequencing of

components, fault detection, and the ability to integrate up to 200 individual HVAC units into a single remote monitoring and control system.

For complete details, contact your EDPAC representative, or: EDPAC, A Subsidiary of EPE Corporation, 200 Welsh Road, Horsham, PA 19044 (215) 657-8030.



EDPAC®

Environmental Technology
for the Information Age.

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.

What can you expect from the new LaserJet Series II Printer?

Everything.

Because the LaserJet Series II Printer from Hewlett-Packard is the product of experience.



It's a second generation printer from the company with the world's largest installed base of laser printers.

Whatever your company's needs, the LaserJet Series II will deliver the performance you expect, at up to 8 pages/minute.

Take a simple memo like the Soup letter we created with Microsoft Word. As you can see, you can print in a variety of formats and type styles with our wide selection of LaserJet fonts.

Or you can create a sophisticated combination of text and graphics. With additional plug-in memory, you can also produce full-page 300 dpi graphics, like our Nuts form shown

below. To do this, we used HP's new ScanJet desktop scanner, Microsoft Windows and Pagemaker® from Aldus.

With support by more than 500 of the most popular software packages, the LaserJet Series II Printer can produce whatever type of business document you need. And LaserJet Series II works with all popular PCs so it can easily be integrated into your existing system.

In fact, only the price is unexpected—starting as low as \$2,595.*

For the authorized dealer nearest you, call us at 1 800 367-4772, Ext. 900A.



Microsoft is a registered trademark of Microsoft Corp. Pagemaker is a U.S. registered trademark of Aldus Corporation.

*Suggested U.S. list price. © 1987 Hewlett-Packard Co. PE12701

we never stop asking

What if...

CIRCLE 36 ON READER CARD

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.

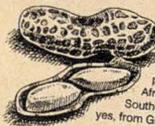
Sincerely,

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

NUTS

Deluxe Assortment

Spring 1987



Peanut

A tasty, unique assortment from plantations in Africa and Southeast Asia. And, yes, from Georgia too!

Brazil Nut

Exclusively from South America, these Brazils are fat, hard-shelled and delicious. They'll be much in demand.

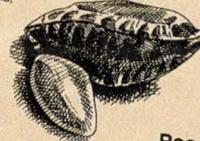


Hazelnut

Cakes, cookies, ice cream, chocolate, salads. They'll never taste better than with this delicious French variety.

Almond

They're popular and they're versatile. Available whole, sliced or chopped, they're equally at home in Mom's favorite recipes.



Pecan

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



Walnut

Blond English Walnuts are just one of the many varieties available, in the best nutcracking tradition.



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.

Call 1-609-520-4664 today!

Dow Jones News/Retrieval®

Post Office Box 300, Princeton, NJ 08543-0300

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.



ASCII PRINTER INTERFACES

IBM 34/36/38 Interface

Impact provides emulations for IBM 5219, 5224, 5225 and 5256 printers.

Device addresses can be set on the interface and the interface supports cable through or terminate designations.

IBM 3274/3276 Interface

Impact's 3274/3276 interfaces provide complete IBM 3287 printer emulations.

Interface Design

Impact's interfaces are available in small robust external interface boxes or alternatively very practical slim line interfaces that have a large

base plate that supports the footprint of most printers minimizing the amount of desk space required.

Impact

Impact is an Australian company whose R&D activities commenced in 1977. The Company has powerful shareholders like Citicorp, Westpac, Aetna Life Insurance, Security Pacific Bank, BT, Pratt, Ensign Investments, Koitaki and Macquarie Bank.

Impact Systems Inc.
Suite 250, 535 Middlefield Road
Menlo Park, CA 94025.
Telephone: (415) 324-3344.
Facsimile: (415) 324-3368.

* IBM is a registered trademark of IBM Corporation, Inc.

Manufactured by: Impact Systems Limited, 7 Gibbes Street, Chatswood, Sydney 2067, Australia.
Telephone: (61-2) 406-6611. Telex: AA176123. Fax: (61-2) 406-6218.



TECHNICAL EXCELLENCE FROM DOWNUNDER

CIRCLE 38 ON READER CARD

SQL/DS . . . THE EASY WAY

Now SQL/DS database management can be easier and more powerful with VMSQL/EDIT—the new multi-function table editor from VM Software, Inc.

With VMSQL/EDIT's full-screen display, even non-experienced SQL users can easily update data stored in SQL/DS tables.

VMSQL/EDIT gives you a more powerful way to work with tables including the ability to update, insert, delete, and review on both single and multiple rows of tables. It also includes a powerful macro facility that dramatically reduces the time needed to build ad hoc data entry applications.

To find out exactly how easy SQL/DS databases really can be with the right help, call today. We'll send you a free copy of the new SQL/DS Quick Reference Handbook just for calling.

Applied Relational Technology

A division of VM Software, Inc.

To get your free SQL/DS Quick Reference Handbook that gives you a complete listing of system catalog names, SQL commands, built-in functions, as well as data type definitions and expression syntax, call today.

800-562-7100 or 703-264-8000



1800 Alexander Bell Drive
Reston, VA 22091

Available only in U.S. and Canada.
1-DTM-870815

**At last,
professional
support for
SQL/DS
users.**

CIRCLE 39 ON READER CARD

DATAMATION □ AUGUST 15, 1987 93

Digital
has
it
now.

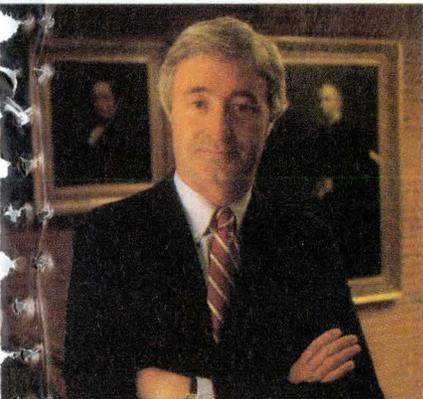


When The Johns Hopkins University decided to launch an ambitious fund-raising campaign, its Development and Alumni Services Department decided to do something even bolder — break away from the administration's traditional mainframe environment. And go with a system from Digital.

"We needed control of our own priorities," says Mel Vogelsang, Director of Development and Alumni Services. "Our old system was too difficult to access. It could never have handled the new demands."

Digital's open architecture made it easy. Now they can quickly move up to more powerful, faster processors. And still keep the same software and operating system. What's more, their new system can run all sorts of software. From Digital's to a third party's to Hopkins' own.

Digital service even helps with customization of that software. Not to mention lots of upgrades. "The demands of my users are more insatiable than ever: more applications, faster



"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."

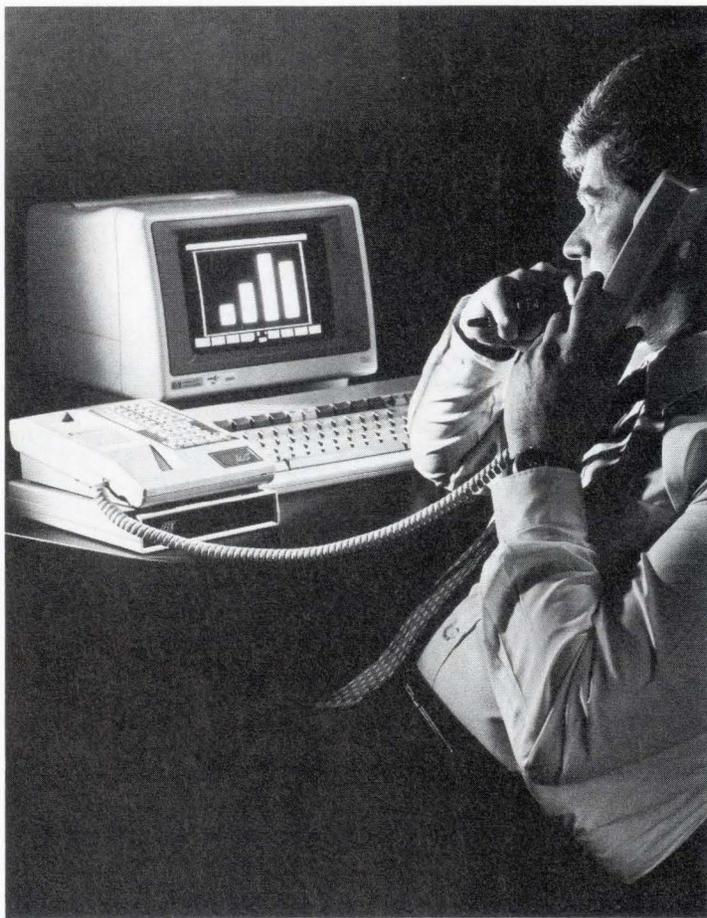
How successful is the department? According to Vogelsang, "We've cut response time from three weeks to three days. And when needed, to three hours. In fact, we've tripled the work processed. Now, we have time to branch out into event management, alumni networking. Even a little PR.

"I feel like we've become real contenders in the very competitive world of fund-raising."

To find out how we can give you a competitive edge, write: Digital Equipment Corporation, 200 Baker Avenue, West Concord, MA 01742. Or call your local sales office.

digitalTM

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



They're all talking about the IBX[®], the first integrated voice/data switching system.

The IBX (Integrated Business Exchange) is proven, leading edge technology. It gives users a unified network for the sharing of hosts, voice and data devices, and applications. Already it's become the communications core for companies and organizations like PPG Industries, Monsanto, Union Bank, Air Products and Chemicals, Inc. and Lehigh University.

No matter what computer system you're using, no matter what information you need, the IBX can improve your communications network at every level.

For a customized demonstration, or for more information on the IBX and other InteCom products, call 1-800-INTE-800. In Texas, 214-727-9141, ext. 2661.

The Formula for Integration.

INTECOM INC.

A SUBSIDIARY OF **WANG** LABORATORIES

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

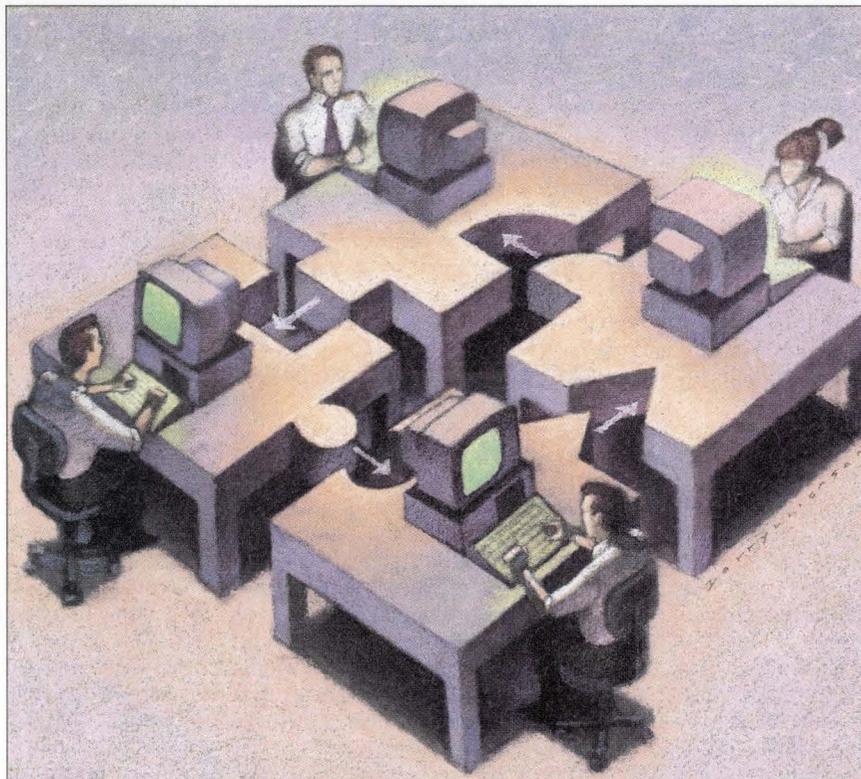


Illustration by Dorey Ligason

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.

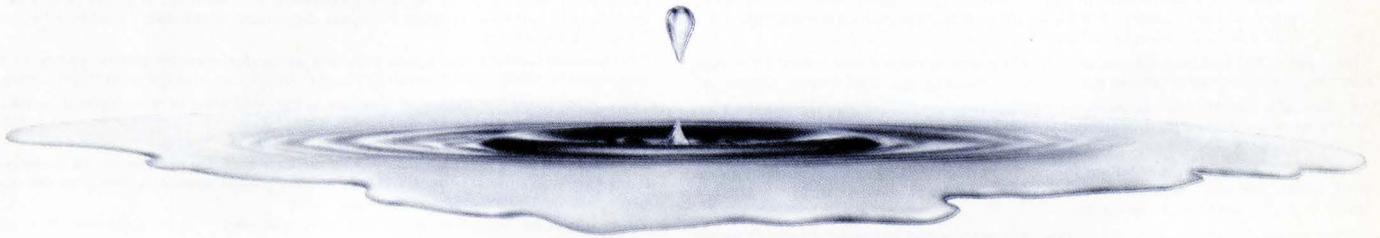
An easy way to identify a transaction processing system is to determine if the primary function of the system is to add, delete, or change records. Transaction processing applications are design intensive, and technology plays an important role in their development.

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

YOU MAY BE ABSORBING EVERY DROP OF INFORMATION THAT COMES ALONG



BUT CAN YOU DO THIS?

Can you find a specific drop again when you need it? Or every other drop like it? Can you edit it, manipulate it and guarantee its security? Can you design an application for it? Can you make it *profitable*?

TextDBMS™ can.

TextDBMS gives you complete control over every document, every record, every word, every drop of information you accumulate. TextDBMS works with three fully integrated software modules: TextBUILDER™ is the tool for creating custom text management applications. TextSEARCHER™ offers complete search and retrieval capability with online updating for immediate, updated information access. And TextCOMPOSER™ prepares typecomposed documents for publication.

Frankly, TextDBMS does more to convert bulk information into secure, usable, profitable knowledge than we could ever say in this ad. So call us about TextDBMS for your IBM® CICS pseudo-conversational environment (MVS or MVS/XA operating systems) and the DEC® VAX/VMS™ environment.

Master the flow of information in any direction.

Let's talk. 414-355-5900, 800-822-TEXT



DataRetrieval

Data Retrieval Corporation • 8989 North Deerwood Drive • Milwaukee, Wisconsin 53223 • A wholly owned subsidiary of West Publishing Company
DEC is a registered trademark of Digital Equipment Corporation. IBM is a registered trademark of International Business Machines Corporation.

CIRCLE 42 ON READER CARD

**You are
cordially
invited to
attend the**

14TH ANNUAL Computer Security

When we say 'Event of the Year' . . . it's for good reason . . .

**Here's a small sample* of what attendees said
about past Conferences:**

MANUFACTURING

"By far the most important source of security information & training in one place, in the industry. A must for the computer security professional." John T. Devall, Jr., Sr. Security Spec., Tenneco Oil Exploration/Production

"How you [CSI] can improve on an incredibly well managed and informative conference year after year is beyond me." Melvin T. Swanson, Mgr. Data Security, Borden, Inc.

"A veritable 'wealth' of knowledge and insight is available. The workshops I attended were conducted by exceptional people. All were great communicators!" John Bjostad, CS Admin., Land O'Lakes, Incorporated

"Outstanding! Offered an excellent forum for both gathering and exchanging ideas. Well worth the trip. A must for anyone interested in data security." Vincent J. Spagnolo, EDP Audit Mgr., M/A-Com, Inc.

"Great general sessions. Overall — best informative and balanced seminar I've attended." Tony Smith, Systems Eng., Frito-Lay, Inc.

"Superb! A professional meeting for information system security professionals!" Richard Otte, President, Gordian Systems

"I've been attending since 1978, each year you get better and make me want to return for the next conference." Thomas R. Peltier, Info Security Off., CPC Engineering, General Motors

"At the risk of repeating myself, once again you, CSI, have done an excellent job of creating a thought-provoking informative, and motivational event. I needed a gentle kick-in-the-butt to get on with our security program. You've done just that! Thanks!! Glad you are out there." William Gieske, MTS, AT&T Bell Laboratories

"Superb job! I learned a lot. Got to see plenty and will definitely try to do this again." Charles A. Russell, EDP Security, Newport News Shipbuilding

"Best I have attended." Robert Pettersen, Consultant, Union Carbide Corp.

"Last year's conference was very good, this year's was excellent. It is amazing that as the conference gets larger it becomes better managed and of greater value." Ron Hale, DS Admin., Northrop Corporation

"Quite frankly, there was a lot to take in (it was my first year at CSI) and I was a bit awed by it all." Shirley Jeffrey, Security Coord., PACCAR Inc

"Very well run, outstanding speakers. Workshop leaders were extremely professional. Great opportunity to make contacts." Richard Copeland, Sr. Systems Eng., Corning Glass Works

SERVICES

"Another super conference — A chance for data security professionals to recharge their batteries!" Brad S. Feldser, Mgr., BellSouth Services

"Fascinating. Stimulating. Without question a required event for anyone charged with information security responsibilities." G. Mark Hardy, Sr. Consultant, Booz Allen & Hamilton

"... THE source for frontline computer security information!" Richard W. Hoffman, Dir. Marketing, Data Guard Inc.

"It amazes me how you people can continue to improve on excellence!" M. W. Pretner, Mgr., BellSouth Services

"Good mix of people, occupations, responsibilities. Excellent variety in workshop subjects. Good opportunity to advance your knowledge year by year through workshop selection." Dan Taylor, Data Security Mgr., Pacific Northwest Bell

"Another 'Annual Super Success' for CSI." F. Wayne Barnett, Mgr. MIS Security, Sonat, Incorporated

"The level of excellence far exceeded my expectations. This is my first year of attendance — it will not be my last." Robert Bradee, Data Security, National Car Rental System Inc

"This has been a great opportunity to gain information on security issues. The conference was well organized & topics were on target." Thomas A. Gelbmann, Dir. Security Consulting, Cap Gemini America

"Excellent conference. State of the art for Data Security Managers." Anthony J. Dragoni, Jr., Systems Analysis Mgr., Bell of Pennsylvania

"A necessary event to keep aware of current and future security concerns and the state of the art technologies and methods of addressing them." James W. O'Connor, Staff Mgr., New York Telephone

"Very impressed! My 1st year and I have gained so much & made so many contacts to help me out." Karen Hoelting, Coord. Disaster Recovery, Comtel Service Corporation

"A necessity for security professionals." John Miller, Security Admin., General Dynamics

FINANCIAL INSTITUTIONS

"Excellent! Best computer security conference I've been to. If I had to choose to come to only one security event each year this would be the one." Graham J. DeGottal, DS Analyst, Chemical Bank

"Tremendous insight was again provided on major security issues scheduled for resolution in 1986. Thank You!!!" James E. Duffy, Asst. Vice President, Peoples Bank

"One of the conferees indicated that this is the 'Cadillac' of security conferences. I would agree completely with that assessment." Richard F. Perry, Mgr. Internal Auditing, State Mutual Life Assurance Co.

"You are providing a valuable service to the data security profession. So many conferences are narrow in scope. Yours is a truly global approach. Keep up the good work." William Faller, Systems Officer, City Trust

"Best forum on computer security I have attended." Bruce Goldstone, Mgr. Data Security, Databank Systems Limited

"Excellent! I am amazed at how well this large conference is run. There are always several tangible 'to-do' items that come from the conference." Ray Evans, Asst. Vice President, SunTrust Service Corporation

"Excellent topics! Impressive variety — truly something for everyone." Connie Brock, DSO & Vice President, Quality Assurance, Norwest Information Services

"Very well managed — excellent educational session, differing points of view fairly represented — very worthwhile" Suzanne Berger, Asst. Vice President & Mgr., Rainier National Bank

"How CSI could exceed the excellence of last year's meeting was unimaginable. You did. Great speakers, relevant topics, and great participant interchange exceeded all my expectations (which were for an excellent meeting). It will take more than one year to implement the good ideas I got from this conference." John Kiely, Mgr. DS, Central Fidelity Bank

"Conference format allows maximum interchange between attendees. I've never failed to bring home one or more ideas or solutions that more than covers the time/expense investment." Nicholas M. Saxonis, Fac. Services Off., New England Mutual Life Insurance Co.

"A very informative and well organized conference, great speakers." Monique C. Lengyel, Vice President, Sovran Bank, N.A.

"Informative, interesting and entertaining — well worth the time and effort to attend." Allan T. Weatherwax, Vice President Data Security, Long Island Trust Company

GOVERNMENT

"This conference is the most information-packed, valuable and focused I have ever attended. Almost too much input to process! Keep up the good work." Claudia Deaton-Glover, Computer Security Analyst, General Services Administration

"CSI — I salute you! Thanks for an impressive & super professional conference. You gave us what we needed and it was the best ever." Amalia S. Jones, Security Off., U.S. Air Force Weapons Lab/SP

"After three years, it is still the best conference (each better than the last and better than anything else I have attended.)" Robert P. Bell, ADP Security Off., Naval Supply Systems Command

"Well prepared and well presented with interesting speakers and workshops. The conference has it all, there is something there for all practitioners in the security field." Dennis A. Clark, ADP Security Officer, USDA Agricultural Research Service

"It's one of, if not the best conference that enables representatives from government, industry & education to gather & exchange ideas and goals." Leon Cooper, Computer Security Spec., National Computer Security Center

"Best I have ever attended of any kind." Sherman Howell, Computer Systems Analyst, Pension Benefit Guaranty Corp.

"Always a superb conference with tremendous interchange and great learning experiences." Leo G. Miller, Computer Systems Security Off., AFAC/SISO

"The computer security knowledge gained in just three days was much greater than anticipated. The conference was well organized, the speakers were exceptional." Arthur F. Steinke, Security Off., U.S. RR Retirement Board

"First conference — just great, the amount of security knowledge that surrounds you during the entire conference. One can't help but leave it computer security 'smarter.'" Leslie W. Probst, Security Off., Pennsylvania Dept. of Transportation

"Excellent as usual! Having been an attendee for 6 years I'm beginning to feel that the conference is like a family reunion." Roy E. Silverman, Computer Security Spec., U.S. Navy, Aviation Supply Off.

*** There's much more! For another 100 testimonials and full details, contact:**

Computer Security Institute, 360 Church Street, Northborough, MA 01532, (617) 393-2600.

November 9-11, 1987
Anaheim Hilton

Conference

GENERAL SESSIONS . . . Conference Chairman this year is Jerome Lobel of Honeywell. Nine speakers will address the Conference in general session.

THE "GRADUATE PROGRAM" FOR ADVANCED PRACTITIONERS . . . A special 2-day program designed to meet the needs of the advanced computer security professional with at least 5 years experience. There is no extra cost for this program, but only a limited number of spaces are available.

Plus this year's program enhancements . . .

- **Security Software Tracks** — ACF2, RACF, CA-Top Secret will be covered in six workshops.
- **All activities "under one roof"** — i.e., all workshops, general sessions, the Graduate Program, and the Exhibition.
- **More hotel rooms** — over 1,400 reserved at the Hilton.
- **Economy** — we've negotiated hard to keep your costs way down. Hotel rates are exceptionally low. A BEST BUY: Fly United Airlines and you'll receive a minimum discount of 50% . . . with no restrictions! And the Spouse's Program offers 2 1/2 days of fun.

NATIONAL COMPUTER SECURITY EXHIBITION . . . At the world's largest computer security show, you'll see the very latest in products and services.

AND A HOST OF "EXTRAS" . . . A hospitality hour, luncheon every day, frequent coffee breaks, a streamlined registration process, and your own individualized schedule for the entire conference.

OPTIONAL SEMINARS . . . You can attend one or two of the optional full-day seminars offered Sunday and Thursday, November 8th and 12th . . .

1. Introduction to Computer Security
2. Computer Security Basics for the Business Professional
3. How to Become a More Effective Data Security Officer
4. A Blueprint for Establishing Security Policies, Standards, & Guidelines
5. How to Conduct a Security Review of the DP Function
6. Introduction to Communications Security
7. Workstation Security
8. Computer Crime Investigation: A Practical Approach
9. Network Security in a Digital Environment
10. EDP Disaster Recovery Planning
11. Building Information Security Awareness
12. Computer Security for the Auditor



WORKSHOPS

1. Developing & Implementing a Successful Data Security Policy
2. New Security Strategies for Computers & Networks
3. Developing a Data Processing Security Manual
4. Tying Access Control into Overall DP Security
5. ACF2, Part I: An Introduction
6. Computers and Your Legal Liability
7. Principles of Secure Operating Systems
8. AT&T's Security Compliance Program
9. State-of-the-Art Facility Design
10. Planning the Organization's Recovery: Not Just DP
11. Information Classification
12. A "Single-Point" Security Approach for the LAN
13. Administrative Policies and Standards for Access Control Systems
14. Building Security into the Application Development Process
15. RACF, Part I: An Introduction
16. VAX/VMS Security Techniques
17. Software Sabotage — Viruses, Trojan Horses, & Logic Bombs
18. Recent Developments in Database Security
19. Auditing Data Security — "Win-Win" for the Auditor & Auditee
20. End-User Responsibilities in a Recovery Operation
21. On Making Data Security a "Standard Operating Procedure"
22. Communications Security in the Information Age
23. Managing Dial-Up Access
24. An Overview of Risk Management Tools
25. CA-Top Secret, Part I: An Introduction
26. Security and Audit Considerations in the DB2 Environment
27. MVS Systems Programming "Secrets": Loopholes and Safeguards
28. Security Standards for the Civil & Private Sectors
29. The Impact of International Terrorism on Information Security
30. How to Choose a Disaster Recovery Services Vendor
31. Career Planning for Information Systems Security Officers
32. PC Security: A Primer
33. Applying Policies and Procedures in a Small Systems Environment
34. Computer Crime Legislation
35. ACF2, Part II: Advanced Topics
36. Ethernet Security
37. The State-of-the-Art in Information Security Technology
38. Computer Security in the Academic Environment
39. A Case Study in Data Center Design & Relocation
40. Strategies for Negotiating a Disaster Recovery Backup Contract
41. Lessons Learned, and Other "Pearls," from a Veteran DSO
42. Security in Open Systems Interconnection (OSI) Networks
43. Decentralization of Computer Security Management
44. Implementing a Microcomputer Security Program
45. RACF, Part II: Advanced Topics
46. Wang System Security
47. Audit, Control, and Security of MVS System Software
48. Advanced Security Awareness Techniques
49. Personnel Security — Pre- & Post-Employment Safeguards
50. Planning and Executing a Mock Disaster Drill
51. A Comprehensive Information Protection Program
52. Securing the Micro-to-Mainframe Link
53. New Issues & Technologies in the Banking Industry
54. Passwords & Encryption — The Heart of Effective Security
55. CA-Top Secret, Part II: Advanced Topics
56. DECnet Security
57. AI: Using an Expert System for Data Security
58. Developing Awareness of Computer Ethics
59. New Audit Tools & Techniques
60. Conducting the Largest-Ever Disaster Recovery Test

ACTION — For an immediate registration, or to get more information, call Computer Security Institute at (617) 393-2600 and ask for Diane Monroe, or write to her at the address shown at the bottom of the facing page.

Most people still believe only DECTM is schooled to service their computers.



At Control Data, we never stop teaching our people to service DEC equipment, as well as our own. In fact, our customer engineers spend an average of 188 hours a year learning to maintain everything from PCs to mainframes.

Add that to the fact that we've been in the computer maintenance business for 25 years, and you'll see there really is an alternative to DEC.

So shake the sand out of your ears. And call 1-800-828-8001, ext. 58L.
In Minnesota, 612-921-4400, ext. 58L.

 CONTROL DATA

Why Software Prototyping Works

of wage negotiations with a new union; predicting inventory demand for a new product line; and assessing the impact of a government pronouncement related to minority hiring and recruiting.

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.

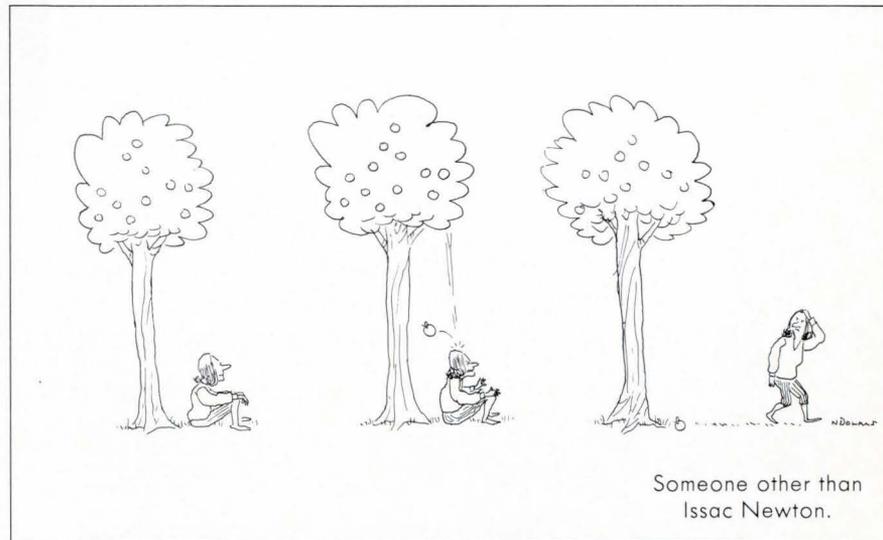
Decision support systems characteristically require an iterative and shortened development environment. Requirements uncertainty is quite high, and the implementation of a system redefines and redirects problem definition, analysis, and design. As noted earlier, a learning process is basic to developing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



UNIGKS 4.0



UNIGKS 4.0 is the UNIRAS implementation of the Graphical Kernel System (GKS) according to the 1985 ISO/ANSI/DIN standard.

UNIGKS 4.0 has obtained the world's first extended DIN/GMD certification valid for Germany, France and the UK.

UNIGKS 4.0 complies with the basic UNIRAS philosophy of device independence by simulating in software any GKS input class and any GKS output attribute not implemented in hardware. CPU independence is ensured by using only standard FORTRAN 77 throughout the code. The user interface conforms to the FORTRAN 77 language binding (ISO/DIS 8651/1).

Our unique new multidriver concept gives you open-endedness, ease of maintenance and savings in memory requirements.

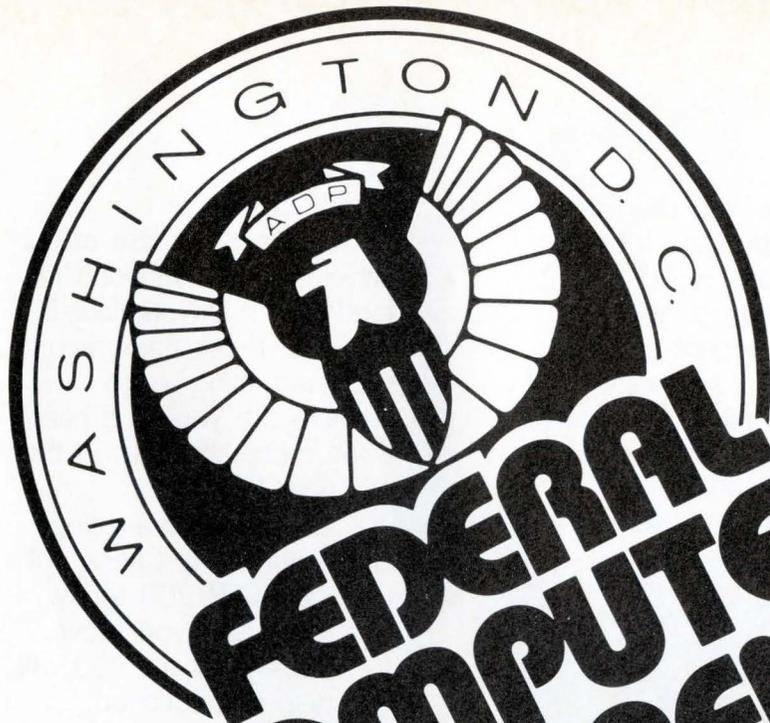
UNIGKS 4.0 supports the standard GKSM metafile. In addition, a driver for the UNIRAS metafile 'UNIPCT' provides access to the whole world of UNIRAS raster drivers, including electrostatic plotters, inkjet plotters, etc.

Call us today and let us show you how UNIRAS software can help you implement your graphics environment.

Copenhagen (01) 67 22 88
Dusseldorf (0211) 596 1017
London (0753) 79293
Paris (01) 4225 3314
Dallas (214) 980 1600
Boston (617) 272 7260
Chicago (312) 576 0055
Los Angeles (818) 407 1711



UNIRAS



Catch Up On
What's New
... Prepare
For What's
Ahead.

FEDERAL COMPUTER CONFERENCE®

A new era dawns in ADP

This is your once-a-year opportunity to learn from nationally recognized consultants, distinguished industry leaders and well known authorities from both the public and private sectors.

- All day Professional Enhancement Seminars plus a two day Main Conference Program that includes:
 - Microcomputer Workshops
 - Software Strategies
- Networks Update
- Management Workshops
- Technology Assessments
- DOD Track: Putting AI to Work in the military

The 1987 Federal Computer Conference celebrates its 10th anniversary as the Federal ADP community's most complete learning experience... and the most cost effective.

Call or write for information now, and join your colleagues at the Federal ADP community's major annual event!

Sept. 29-
Oct. 1, 1987
Washington
Convention Center,
Washington, D.C.

800-343-6944
FEDERAL COMPUTER CONFERENCE
P.O. Box N
Wayland, MA 01778

Check (1) box in each appropriate section.

GS, SES, OR MILITARY LEVEL: <input type="checkbox"/> A. SES LEVEL <input type="checkbox"/> F. GS-11 <input type="checkbox"/> K. 06 <input type="checkbox"/> B. GS-15 <input type="checkbox"/> G. Other <input type="checkbox"/> L. 05 <input type="checkbox"/> C. GS-14 <input type="checkbox"/> H. 09-10 <input type="checkbox"/> M. 04 <input type="checkbox"/> D. GS-13 <input type="checkbox"/> I. 06 <input type="checkbox"/> N. 03 <input type="checkbox"/> E. GS-12 <input type="checkbox"/> J. 07 <input type="checkbox"/> O. Other	JOB TITLE: <input type="checkbox"/> P. Pres./Owner <input type="checkbox"/> Q. V.P./Director <input type="checkbox"/> R. MIS Mgr.	<input type="checkbox"/> S. Technical Systems Staff <input type="checkbox"/> T. Communications Mgr./Specialist <input type="checkbox"/> U. Other	Influence the annual purchases of OA products and services: <input type="checkbox"/> 5. Above \$10 million <input type="checkbox"/> 8. Above \$1 million <input type="checkbox"/> 6. Above \$7 million <input type="checkbox"/> 9. Above \$500,000 <input type="checkbox"/> 7. Above \$4 million <input type="checkbox"/> 10. Above \$100,000
--	--	--	--

NAME _____

TITLE _____ TELEPHONE _____

ORGANIZATION _____ MAIL STOP/BLDG _____

ADDRESS _____

CITY _____ STATE ZIP _____

SO FAST

The ACER 900 personal computer. At 10MHz, it's designed to put you ahead in business – faster

Inundated with a flood of choices, the ACER 900 is your best bet in choosing a personal computer to cope with power-hungry demands.

Dubbed "the AT standard to beat" by Computer Currents, the ACER 900 is designed for those who expect more of a personal computer. At less of a price.

Speed – the essence

At 10MHz, the ACER 900 charges through all the software written for Big Blue. At 25% faster than the industry standard PC/AT. Naturally, this speed can also be switched down to 6MHz by way of keyboard or software, for programs that need to operate under 10MHz.

With its true blue software/hardware compatibility, blazing speed and superior functional design, the ACER 900 can give your business the power edge you've been looking for.

Form follows function

LED indicators for high

speed or hard disk, and reset button are located within easy reach on the front panel. For total security, we designed a keylock which simultaneously locks keyboard and reset button.

One more thing, no matter where you are, we guaran-



From home computers to super-micros – meet the Multitech team of PC's.

tee after-sales service through our worldwide distribution network.

Success breeds success

At Acer Technologies, our commitment to research and development has enabled us to build better, more affordable machines. From home computers like our ACER 500 to the world's fastest 8088-based machine, the ACER 710, and the revolutionary 80386-based ACER 1100 – the fastest personal computer in the

world, to date.

Proud as we are of our achievements, we don't intend to rest on our laurels.

And if our track record is anything to go by, chances are you'll be hearing more about us in the near future.

So what are you waiting for? Check out the ACER 900 today. The faster you move, the sooner the 900 will help you succeed.

SO GOOD



Technical Specifications

ACER 900B CPU 80286, 6/10MHz switchable. Socket for 80287 math coprocessor. 8 expansion slots. RAM 512KB, expandable to 1MB. 1FDD, 1.2MB. Microsoft® MS-DOS® 3.2.

ACER 900E As 900B plus 1 WDD, 40MB, 40ms.

Microsoft MS-DOS is a registered trademark of Microsoft Corporation.
PC-AT is a registered trademark of International Business Machines Corporation.

ACER

Silicon Valley • Dusseldorf • Tokyo • Taipei

Acer Technologies Corporation
401 Charcot Avenue, San Jose, CA 95131.
Tel: (408) 922-0333. Fax: (408) 922-0176.
Toll-free nos: (800) 782-1155 (CA only), (800) 538-1542.

Fomerly Marketed by

 **Multitech Electronics Inc.**

Real Time

OFF-LINE

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.

SLIP YOUR DISKS TO ICELAND.



Exporting your computer technology to Iceland shouldn't seem so slippery. Exporting means business. Increased sales for your special video cards, diskettes, word processors, index systems, and more, all over the world. Don't miss the boat. Call U.S. and Foreign Commercial Service. And discover the profits in exporting now. Dial 1-800-343-4300* Operator 199.



*In Alaska call 1 800-331-1000

Advertisers' Index

Marketplace

Circle	Page
13	Amdahl Corporation31
—	AST Research Inc.1
—	AST Research Inc. 17-22
—	AT&T Business Marketing Group 32-33
34	AT&T Technologies 86-87
37	Candle 80-81
—	Cahners Expositions Group 128, 116-117
5	Cincom5
12	Compaq Computer Corp. 27-29
8	Computer Associates11
6	Computer Language Research, Inc. 6-7
—	Computer Security Institute100-101
44	Control Data Corp.102
29	Control Data Corp. 72-73
7	Cullinet8
32	Cylix82
42	Data Retrieval Corp.99
28	Data/Ware Development, Inc.71
—	Digital Equipment Corp. 94-95
—	Dow Jones News92
2	Duquesne Systems Inc.C3
35	Edpac88
101 ..	Emulex Corp. 57-60
—	Epson America 66-67
—	Equinox Systems Inc.C4
20	Facit122
—	Federal Computer Conference ...105
15	Hall-Mark/Toshiba37
14	Hall-Mark/Unisys52
31	Hayes Microcomputer79
19	Hewlett-Packard 48-49
36	Hewlett-Packard91
—	HoneyWell Bull 54-55
38	Impact Systems Ltd.93
54	Informix Software, Inc.125

Circle	Page
17	Intelogic Trace, Inc. 44-45
49	Interface Group, Inc., The115
51	Landmark Systems Corporation121
—	**Leasametric, Inc.76a-76j
27	MCI Communications Corp.70
50	McDonnell Douglas/Tymnet118
11	McCormack & Dodge25
—	Micom Systems, Inc.51, 53
48	Multitech106
10	N.E.C. Information Systems14
18	Nynex Business Info Systems46
—	Oracle Corp.13
52	Output Technology50
200 ..	*Precision Data Products113
201 ..	*Qualstar Corporation113
30	Qume77
—	SAS Institute, Inc.C2
53	Software Quality Engineering ...124
26	Sorbus69
24	Software Link61
55	Tandem Computers127
16	TeleVideo42
33	TRW85

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



Now you can exchange data files between your IBM PC and any mainframe or mini-computer using IBM compatible 1600 BPI 9-Track tape. Unit can also be used for disk backup. Transfer rate is up to 4 megabytes per minute on PCs and compatibles. Subsystems include 7" or 10 1/2" streaming tape drive, tape coupler card and DOS or XENIX compatible software.
Prices start at \$2,995.

QUALSTAR

9621 Irontdale Ave., Chatsworth, CA 91311
Telephone: (818) 882-5822

CIRCLE 200 ON READER CARD

**HIGH QUALITY
LOW PRICE**

5 1/4" DISKETTES

MADE IN U.S.A.

- 80% Clipping Level
- Sturdy Blank PVC Jacket
- Lifetime Warranty
- Error Free
- With ID Label
- With Write Protect Tabs
- With Envelopes
- In Factory Sealed Poly Packs

36¢ EACH	89¢ EACH
Double Side Double Density (W. HUB RINGS)	Double Side High Density

SOLD IN LOTS OF 100

**CALL FOR
FREE
SALES
CATALOG!**

**SONY POLYPACK
3 1/2" DISKETTES**

\$1.09 EACH	\$1.21 EACH
SS 135TPI	DS 135TPI

SOLD IN LOTS OF 50

Min. Order \$25.00. S & H: Continental USA \$4.00/100 or fewer disks. Foreign orders, APO/FPO, please call. MI residents add 4% tax. Prices subject to change without notice. Hours: 8:30 AM-7:00 PM ET.

Precision Data Products™
P.O. Box 8367, Grand Rapids, MI 49518
(616) 452-3457 • Michigan 1-800-632-2468
Outside MI 1-800-258-0028
FAX: (616) 452-4914

CIRCLE 201 ON READER CARD

Circle	Page
45	Uniras104
39	VM Software93
41	Wang Labs96
*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.

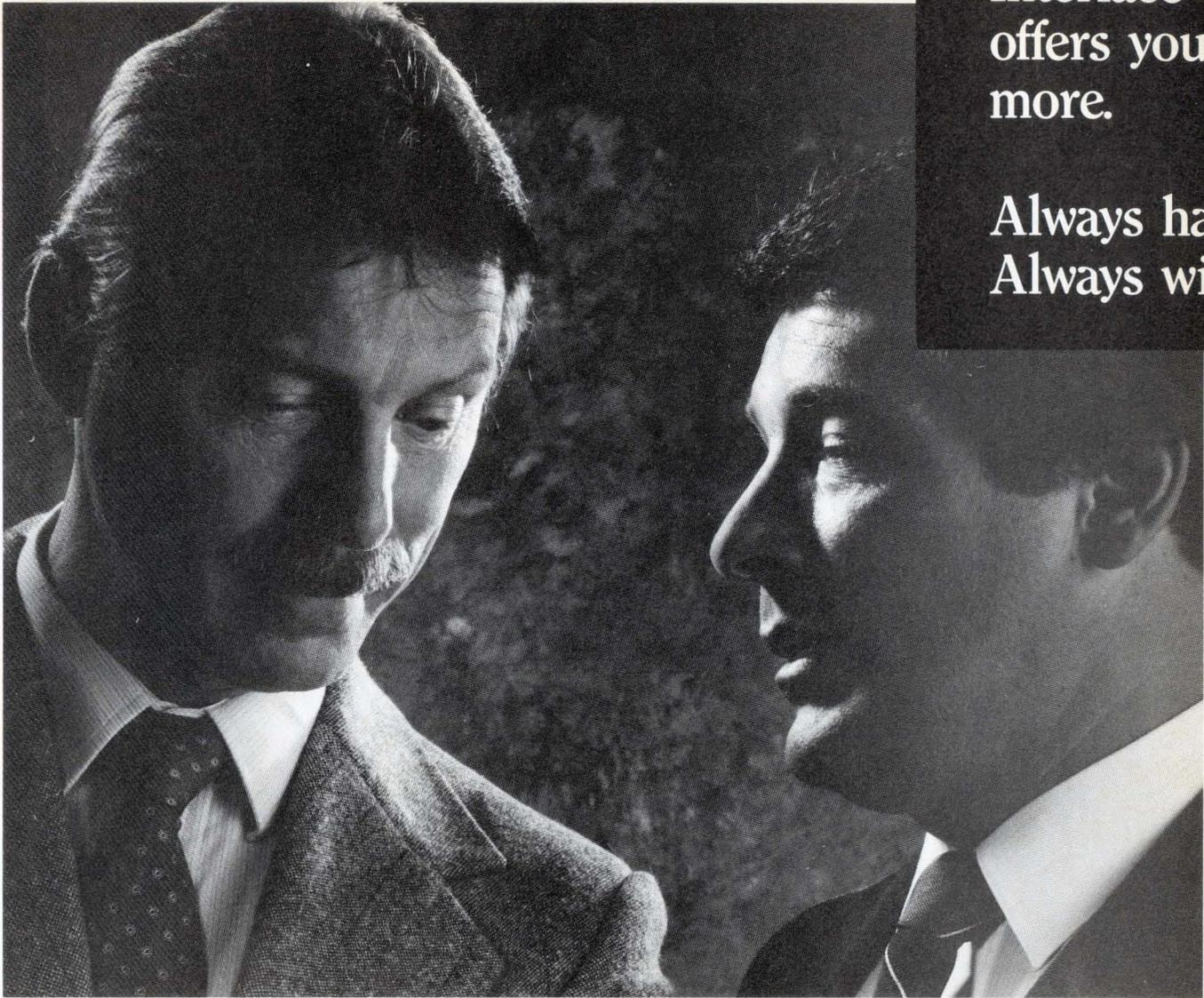
The PaintJet is available now, priced at \$1,395; cartridges are \$27.95 for black and \$34.95 for color. HP offers its own paper for \$14.95 per box of 250 sheets, if eight or more packs are purchased. HEWLETT-PACKARD, Palo Alto. **CIRCLE 255**

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**





Interface
offers you
more.

Always has.
Always will.

Interface '88 will attract the most qualified attendees of any communications and networking show in the world! Because for the sixteenth consecutive year, Interface will offer them *more...*

More exhibitors than any other show in the industry! *More* conferences, with *more* leading presenters than any other communications/networking event! *More* new product introductions than any other industry forum! *More* opportunity to find solutions to their growing challenges!

For your company, that means *more* opportunity to meet and sell to the executives who plan, purchase and manage sophisticated communications and information networking systems for their organizations!

Interface '88 will be held in Chicago, one of the nation's most concentrated business centers. Offering easy access from around the world for professionals who rely on Interface for the products, information and ideas they need to succeed.

And since Interface '88 will be held concurrently with the first World Congress on Computing, you'll gain even greater opportunity for industry-wide marketing impact.

Join hundreds of leading manufacturers who have already reserved their exhibit positions. Call Interface '88 Exhibit Sales today at (617) 449-6600, Ext. 4013.

INTERFACE '88

March 28-31, 1988 • McCormick Place • Chicago, Illinois

Co-sponsored by
BusinessWeek and **Data Communications** Magazines

I'm ready for more at Interface '88!

- Send me complete exhibitor kit, including brochure, floorplan and contracts.
- Have a Sales Representative call me immediately!
- Send me a profile of Interface '87 attendees.

Name _____

Title _____

Company _____

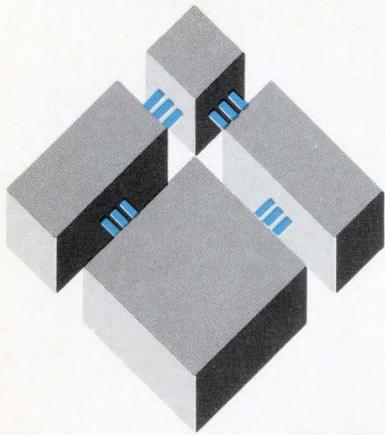
Address _____

City _____ State _____ Zip _____

Telephone (_____) _____

Return to: Interface '88, The Interface Group, 300 First Avenue, Needham, MA 02194
Or call (617) 449-6600, ext. 4013.

DT 81587



Connect '88

*The Technical Conference and Exposition
for the MIS/DP Professional*

March 8-10, 1988

**Jacob K. Javits Convention Center
New York, N.Y.**

Co-sponsored by:



GARTNER GROUP, INC.

DATAMATION



Connecting dissimilar systems into a coherent whole is the primary mission of today's MIS/DP professional. "Connect '88" is geared to enterprises employing large-scale information systems, providing an intensive environment where products, services and technology can be efficiently presented to and evaluated by professional end users.

"Connect '88" will focus on both IBM and non-IBM connectivity solutions for the large-scale enterprise.

The event will be the premier showcase for the integration of departmental solutions, distributed processing and information centers in an IBM/DEC environment, typically an S/370 or PCM host, and often an SNA or OSI network.

It will highlight a full range of offerings—networking, datacomm equipment, software, services and peripherals—available to MIS professionals, in-house systems integrators and value-added resellers.

This three day event will feature:

- Symposium on strategic futures
- Conference sessions on implementing currently available technologies
- Vendor technical seminars
- Exhibition of product/system technologies

Plan now to participate.

Mail to:

Connect '88

Cahners Exposition Group
999 Summer Street
P.O. Box 3833
Stamford, CT 06905-0833

- Yes**, I'm interested in attending the "Connect '88" conference and technical showcase. Please send me full details.

Name _____

Company _____

Position _____

Address _____

City _____

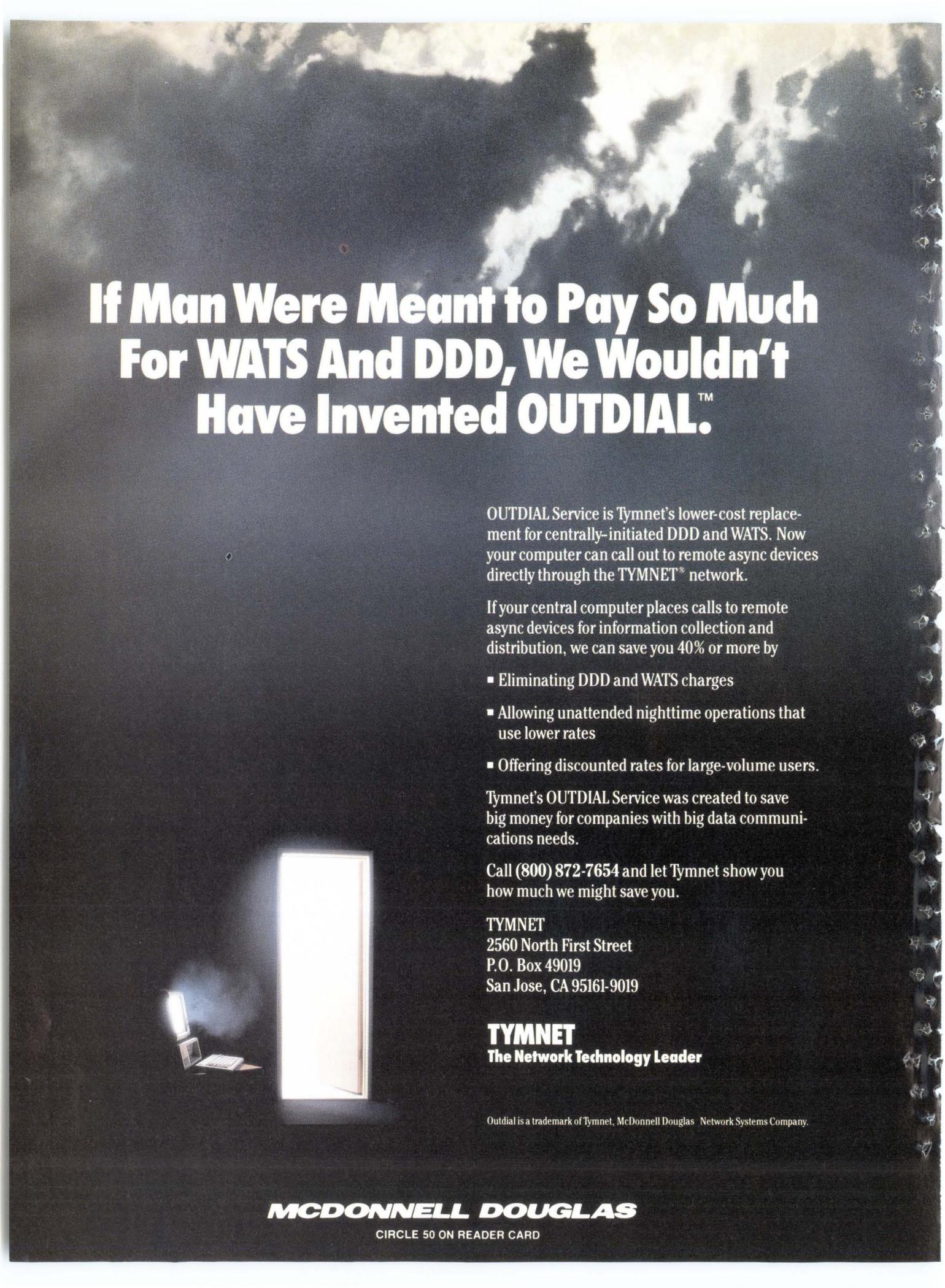
State _____

Zip _____

Telephone _____

- Please send me information on being an exhibitor at "Connect '88."

XD

A dark room with a bright doorway in the center. To the left of the doorway, a laptop is open and glowing. The background is a dark sky with white clouds. The text is in white on a dark background.

If Man Were Meant to Pay So Much For WATS And DDD, We Wouldn't Have Invented OUTDIAL.™

OUTDIAL Service is Tymnet's lower-cost replacement for centrally-initiated DDD and WATS. Now your computer can call out to remote async devices directly through the TYMNET® network.

If your central computer places calls to remote async devices for information collection and distribution, we can save you 40% or more by

- Eliminating DDD and WATS charges
- Allowing unattended nighttime operations that use lower rates
- Offering discounted rates for large-volume users.

Tymnet's OUTDIAL Service was created to save big money for companies with big data communications needs.

Call (800) 872-7654 and let Tymnet show you how much we might save you.

TYMNET
2560 North First Street
P.O. Box 49019
San Jose, CA 95161-9019

TYMNET
The Network Technology Leader

Outdial is a trademark of Tymnet, McDonnell Douglas Network Systems Company.

MCDONNELL DOUGLAS

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

```

FILE: QNCDEMO          PRINT SELECTION
TYPE A NUMBER IN THE 'ORDER' COLUMN OPPOSITE THE FIELDS TO BE INCLUDED
IN THIS REPORT. TYPE 1 FOR THE LEFTMOST COLUMN, 2 FOR THE NEXT COLUMN, ETC.
IF A FIELD IS NOT TO APPEAR ON THE REPORT, LEAVE THE ORDER COLUMN BLANK.
-----
ORDER  FIELD      TYPE      HEADING
  2    DEPTNO     NUM      DEPT NMBR
  1    GRADE      CHAR
  1    NAME       CHAR      EMPLOYEE
  3    SALARY     NUM      SALARY
***** END OF DATA NAMES *****
-----
PF1/13 HELP      PF10/22 PRIOR MENU  PF11/23 NEXT MENU  PF12/24 MAIN MENU
                  PF7/19  PRIOR WINDOW     PF8/20  NEXT WINDOW   PF6/18  INDEX MENU
    
```

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

IBM's System/370 extended architecture processors. New VM/CMS functions include support for concurrent operations of S/370 and extended addressing. IBM says VM/XA SP also supports up to four times as much central storage and twice as many channels as the previous VM operating system.

When used with the new 3090 E series feature, Multiple High Performance Guests Support, VM/XA SP allows up to four preferred guest operating systems to run concurrently on E series processors. New interfaces allow the development of VM applications, which are portable between S/370 and S/370 extended architecture environments running under VM/XA SP. Native support for IBM's SNA is provided.

VM/XA SP will be available in March 1988 for a monthly license charge of \$4,500. A new release of VM/ISF will be available in the fourth quarter of this year for a \$2,100 license charge. The new release allows four mainframes to be loosely coupled for resource sharing. A new release of VM/XS System Facility, with additional printer, display, and storage device support, is available now for a monthly license charge of \$4,110. IBM, Information Systems Group, Rye Brook, N.Y. CIRCLE 257

Mainframe Expert System

Cullinet Software releases development tool for IBM mainframes.

Cullinet Software has just released its Application Expert (A/E) expert systems development tool for the IBM mainframe environment. The product was initially released in April for use on Digital Equipment Corp.'s VAX line of computers.

The product is now available for the IBM mainframe in CICS/VSAM. Cullinet says an IDMS DB/DC version will be ready by the year's end. Cullinet has used A/E to create its EXL series of applications, including Order EXL and Voice EXL.

The price for A/E ranges from \$35,000 for the MicroVAX to \$95,000 for an IBM mainframe. CULLINET SOFTWARE INC., Westwood, Mass. CIRCLE 258

Spreadsheet Compiler

For distributed spreadsheet applications.

SoftLogic Solutions Inc. has introduced @Liberty (pronounced At Liberty), a spreadsheet compiler that enables software developers to create and distribute

executable spreadsheet applications that can run without the original spreadsheet program.

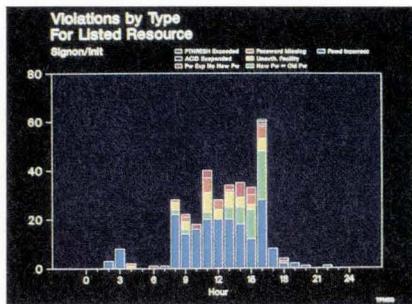
Two programs—Prepare and Run—comprise @Liberty. Prepare compiles worksheet files from a spreadsheet developed using Lotus 1-2-3, for example, into a computer program that does not need the source program. SoftLogic claims that the @Liberty spreadsheet looks and operates like the original version. The Run program allows developers to distribute @Liberty spreadsheets. Users cannot use @Liberty to create a spreadsheet, but they can enter new data as well as modify existing data, calculate, and export back to the developer.

@Liberty works with Lotus 1-2-3-compatible packages and runs on IBM PCs and compatibles with 256KB of RAM and PC/DOS or MS/DOS version 2.0 or higher. It does not work with all Lotus 1-2-3 release 2.0 functions. The price is \$99.95. A license for 15 additional users can be purchased for another \$99.95. SOFTLOGIC SOLUTIONS INC., Manchester, N.H. CIRCLE 259

Two from CA

Enhancements to SuperCalc/MF and CA-Unicenter products.

In addition to changing the name of its IBM mainframe spreadsheet product from CA-MegaCalc to SuperCalc/MF, Computer Associates (CA) has announced a SuperCalc/MF interface to



IBM's DB2 database. The DB2 interface is said to provide complete access to IBM mainframe DB2 files from within SuperCalc/MF and to function in the MVS environment.

The DB2 interface has a fill-in-the-blanks full-screen format and supports password security. SuperCalc/MF can access corporate data from databases, financial systems, spreadsheets, sequential files, and VSAM files. Database files can be accessed from within SuperCalc/

MF, and it can import microcomputer spreadsheet files. The license fee for a single copy of SuperCalc/MF ranges from \$9,600 to \$44,000, depending on the operating environment.

CA has also come out with a graphics reporting option (GRO) for the IBM MVS version of its CA-Unicenter and for its CA-Top Secret, CA-JARS, CA-Dynam/TLMS, CA-Dispatch, and CA-Scheduler. CA says the new graphics capability is an extension of its CA-Unicenter concept, which it first introduced in June 1985. With the enhancement, users can create color graphic output, including bar charts, pie charts, plot graphs, and tables for resource and statistical information.

GRO is available now at a price of \$5,550 for individual components. COMPUTER ASSOCIATES INTERNATIONAL INC., Garden City, N.Y. CIRCLE 262

MS/DOS for Oems

Microsoft announces availability of MS/DOS Manager.

Microsoft's MS/DOS Manager is a user interface that provides a substitute for the standard MS/DOS command line processor and is geared toward users of less powerful IBM PC configurations. It's designed to work as an MS/DOS application program on any PC-compatible microcomputer.

Microsoft says MS/DOS Manager offers some of the features of the MS/DOS Executive application within Microsoft Windows, including an MS/DOS file management capability. The user interface features pull-down menus, dialog boxes, and mouse support.

The function keys, menu structures, and terminology are claimed to be similar to those of Windows. In addition, Manager allows users to load applications from within the MS/DOS Manager environment and return to this environment automatically upon exiting an application.

The first oem to license MS/DOS Manager is Zenith Data Systems, which is offering it with all of its eaZy pc systems. Minimum system requirements for MS/DOS Manager are a PC or compatible, MS/DOS 3.0 or higher, and a single disk drive; 512KB of RAM is recommended by Microsoft. MS/DOS Manager runs on monochrome, CGA, CGA Plus, and EGA adapters. It also supports the Microsoft Mouse. The oem pricing is negotiated individually. MICROSOFT CORP., Redmond, Wash. CIRCLE 260

From OUTSIDE CICS: Multiple Region Monitoring with a Single Terminal!

The new

MONITOR for CICS

1. NEW!

Simultaneously Monitor All Your CICS Regions.

The Monitor runs as a VTAM task in its own address space. It automatically pinpoints all stressed or hung regions at a glance.

And

you can monitor all your CICS regions *simultaneously on one screen!*

2. NEW!

Intervene in CICS Crises Quickly and Easily.

Even locked regions can't stop the Monitor now—It's totally independent of CICS! With just a few keystrokes, you can find and cancel problem tasks.

Menus and help screens guide your analyses to make *crisis intervention quick and easy!*

3. FREE!

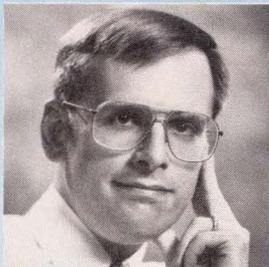
Get a 30-day trial in your shop.

Compare the new Monitor with the CICS performance monitor you have now!

Call 800-227-8911 for a free, 30-day trial (in VA 703-922-7101).

(New features available for MVS/SP or XA only.)

DON'T TAKE OUR WORD FOR IT:



“When CICS crashes, I get the heat. With the new Monitor I can spot problems fast. I just look for the red line, go right to the problem, and fix it.”

Dennis Conley
Computer Data Systems, Inc.
Sr. Systems Programmer
Rockville, Maryland

The Monitor for CICS is the most powerful CICS performance monitor on the market today. It runs online or batch, aids in debugging transactions in test or production, and even monitors tasks as they run. It also supports 4GLs and DBMSs, and eliminates dependency on CMF and CICSPARS/MVS!
Call 800-227-8911 or clip the coupon below today!

THE
MONITOR
FOR CICS

Now Serving Over 1500 Sites Worldwide!

International Agents in:

Australia/New Zealand—Optimum Software
Benelux—Emerald Software Int'l BV
France—Technologies Systems
Germany—Emerald Software Int'l GmbH
Israel—SITAV Software Ltd.
Italy—Software Technology

Japan—K.K. Ashisuto
Scandinavia—WSA Scandinavia
Southeast Asia—Infotech Consultants
Switzerland/Austria—Performance Software
United Kingdom—Systems Resources Ltd.
Venezuela—ENIAC, C.A.

Landmark Systems Corporation
6551 Loisdale Court
Springfield, VA 22150

THE
MONITOR
FOR CICS

- Please send more information Please send free 30 day trial
 Please send the Datapro Report on the Monitor for CICS
 I'm interested in attending a free seminar on
The Monitor for CICS

Name _____

Title _____

Company _____

Address _____

City _____ St _____ Zip _____

Phone (_____) _____

Operating System _____

S7D73

Enhance your laser printouts

The Facit Opus 2E sets entirely new standards in laser printing. It offers a superior printout economy compared with low volume laser printers, plus several enhancements in terms of memory capacity, interface options and operator convenience.

Three different command set emulations are provided as standard - Diablo 630, HP Laserjet and IBM Proprinter complete with all graphics functions.

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

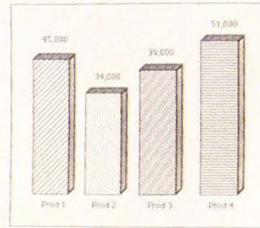
The big investment in Research and Development should pay off here this year with the introduction of the 8th product range. Risk will be reduced end of next quarter.

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

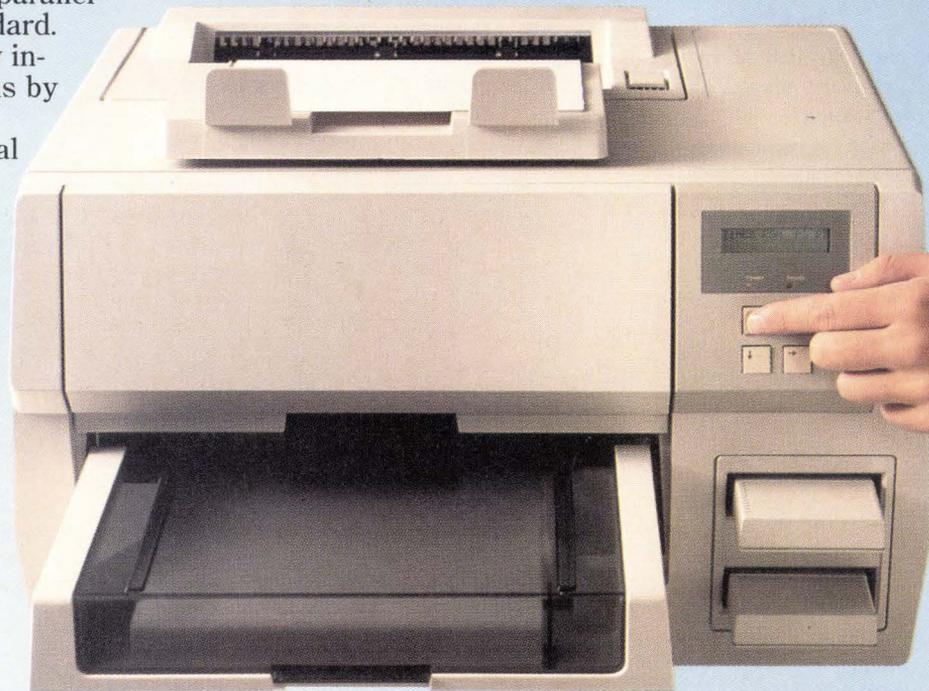
The benefits of our new fully automated plant are obvious, as production are manufactured just in time or ordered by our customers. According to our plans, two more plants will be constructed to this technology next year.



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.



FACIT

Head Office: Facit AB, S-172 91 Sundbyberg, Sweden. Phone: 468 764 30 00. USA: Facit Inc. P.O. Box 334, Merrimack, NH 03054. Phone: (603) 424-8000

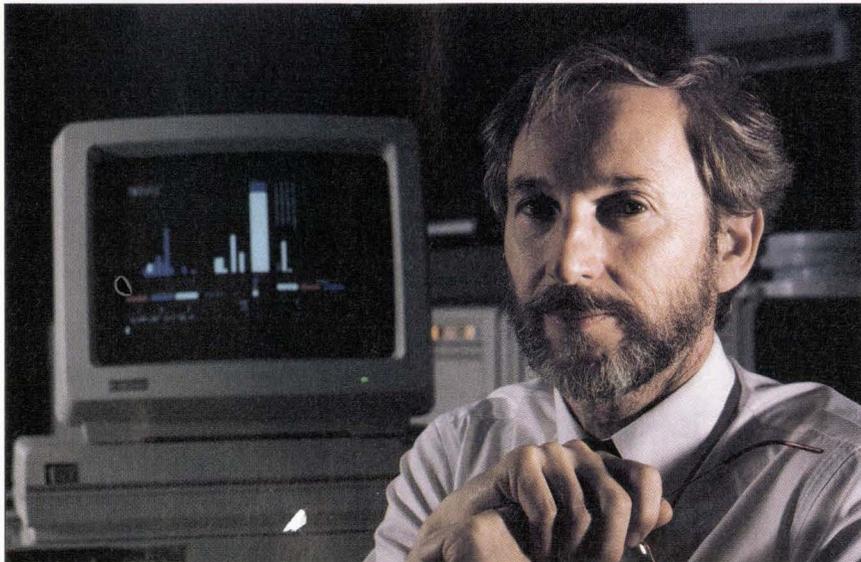
AUSTRALIA: EAI Electronics Associates Pty Ltd., 427-3322. AUSTRIA: Ericsson Information Systems GmbH, 0222-613 641. BELGIUM: Ericsson S.A., 02-243 82 11. CANADA: Facit Canada Inc., 416-825-8712. CYPRUS: LBM (Lillytos) Ltd 516 46 34. DENMARK: Facit A/S, 02-63 33 11. FINLAND: OY Facit, 90-420 21. FRANCE: Facit S.A., 1-4780 7117. GREAT BRITAIN: Facit 0634-40 20 80. GREECE: Computer Application Co. Ltd., 01-671 97 22. HONGKONG: Gilman & Co. Ltd., 5-893 00 22. ICELAND: Gisli J. Johnsen HF 354-64 12 22. INDIA: Forbes Forbes Campbell & Co. Ltd., 22-20 48 081. IRELAND: Ericsson Information Systems Ltd., 75 30 93. ITALY: Facit Data Products S.p.A., 039-63 63 31. JAPAN: Electroflux (Japan) Ltd., 03-479-7570. KOREA: True Trading Co. Ltd., 2-783-3855-7. THE NETHERLANDS: Facit B.V., 3480-21784. NEW ZEELAND: Northrop Instruments and Systems, 501-801, 501-219. NORWAY: Ericsson Information Systems A/S, 02-35 58 20. PORTUGAL: Regisconta Sarl, 1-56 00 91. SINGAPORE: Far East Office Eqpts Pte Ltd., 745 82 88. SPAIN: Perifericos S.A., 4-57 90 81. SWEDEN: Ericsson Information Systems Sverige AB, 08-28 28 60. SWITZERLAND: Ericsson Information Systems AG, 01-821 59 21. USA: Facit Inc., (603) 424-8000. WEST GERMANY: Facit GmbH, 0211-61 090.

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.

WHAT'S A GOOD TEST

Isn't it about time you knew?

SYSTEMATIC SOFTWARE TESTING

Choose from one of these seminar locations:

New Orleans	Aug. 17-20	St. Louis	Oct. 13-16
San Francisco	Aug. 24-27	Los Angeles	Oct. 26-29
New York	Sept. 14-17	Orlando	Nov. 2-5
Washington, D.C.	Oct. 5-8	Hartford	Nov. 9-12

SYSTEMATIC SOFTWARE TESTING is a seminar that presents a proven methodology based on national consensus testing standards that has been accepted as the foundation for software testing in many of this country's largest corporations.

Software Quality Engineering



3015 Hartley Rd. Suite 16
Jacksonville, FL 32217

Call 800-423-TEST

In Florida 904-268-8639

LIMITED TIME OFFER

Read This New Study Before You Make Another Marketing Decision —

Datamation's 1986 Mainframe/Minicomputer Purchasing Study

can help you assess your company's . . . and your competitors' . . . present and future growth.

End User and OEM buyers of 26 categories of mainframe and mini equipment and software report in detail what, how much and from whom they bought during 1985.

You'll receive invaluable inside information, including:

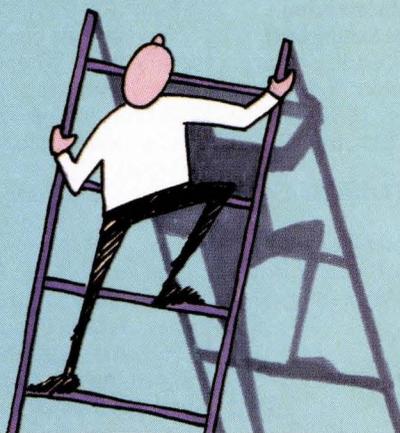
- ▶ pricing and unit volume data
- ▶ share-of-market as percent of dollar volume
- ▶ geographic breakout of purchases
- ▶ demographic profile of buyers

Order your copy now!

Send your company purchase order or check for **\$250 per copy** to: *Datamation/Cahners Publishing*, Attention: Mary Connors, 249 W. 17th Street, New York, NY 10011. Or call Mary at (212) 645-0067 for more information.

DATAMATION

CIRCLE 53 ON READER CARD



The problem with most 4GLs is they're finished before you are.

And where does that leave you?

With the final, tricky ten percent of your application yet to write, and no 4GL left to write it with. Sound familiar?

If so, try INFORMIX®4GL.

Never again will you have to switch to C or COBOL to truly customize your application. Instead, INFORMIX-4GL provides an all encompassing syntax for every aspect of your application building.

So once you're programming in INFORMIX-4GL, you never have to leave it. And considering all it can do, you may never want to.

Now, for instance, you can write in just ten to twenty pages of 4GL code, applica-

tions that would take hundreds of pages with C.

That's because INFORMIX-4GL was designed from the start to be an application building language. It's built around the full implementation of ANSI Standard SQL. And features Custom Screen Generation, Custom Menu Building, a built-in Report Writer and Windows.

What's more, INFORMIX-4GL works with UNIX,[™] MS[™]-DOS and Networked DOS operating systems. And, of course, it's compatible with INFORMIX-SQL—our popular, proven DBMS. So files you build with one, you can access with the other.

For more information and our free booklet, "A 20-Minute Guide to INFORMIX-4GL," call 415/322-4100.

Or write Informix Software, 4100 Bohannon Drive, Menlo Park, CA 94025.

And start taking your applications to even greater heights.



The RDBMS for people who know better.[™]

INFORMIX is a registered trademark of Informix Software, Inc. Other names identified by TM are tradenames and/or trademarks of their respective manufacturers. © 1987, Informix Software, Inc.

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.

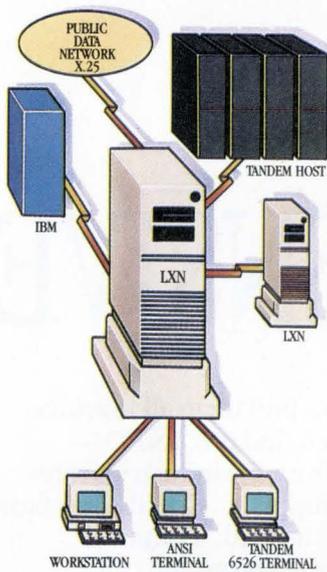
Reprints of all DATAMATION articles are available. Details may be obtained by writing to DATAMATION, Cahners Plaza, 1350 E. Touhy Ave., P.O. Box 5080, Des Plaines, IL 60013.

LXN.™

Our lowest-cost system integrates UNIX™ into the Tandem OLTP network.

GOOD CONNECTIONS.

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



both Tandem host applications and UNIX applications, as well as other hosts through SNA or X.25. You can connect PCs to LXN through Ethernet LANs,

then LXN to other systems. A MS-DOS file server provides availability benefits of LXN to PC users.

HIGH AVAILABILITY.

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

APPLICATION POWER AND PORTABILITY.

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

and a 60-megabyte streaming cartridge tape drive.

EASY TO EXPAND.

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

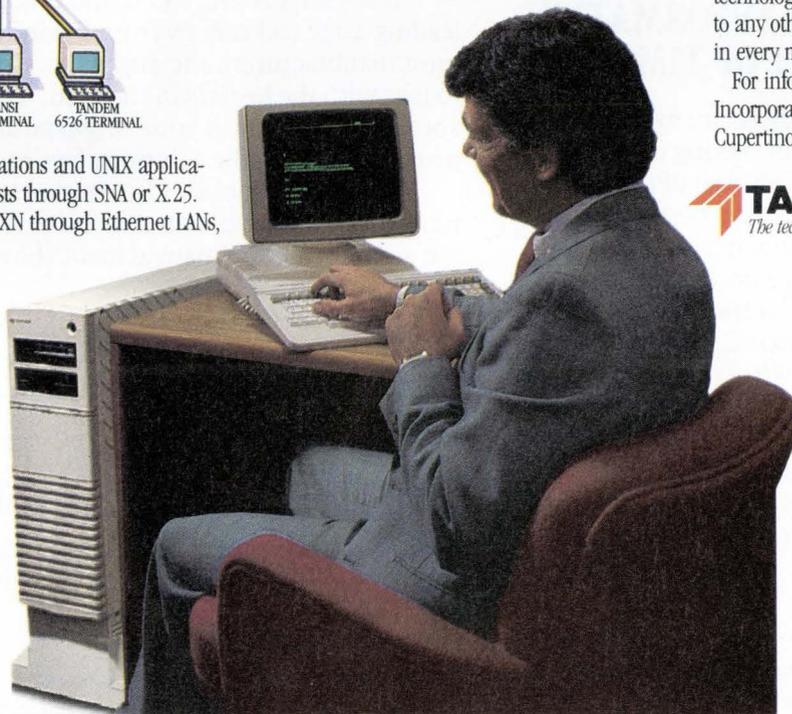
EASY TO SERVICE.

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

EXTEND YOUR TANDEM NETWORK OR START ONE.

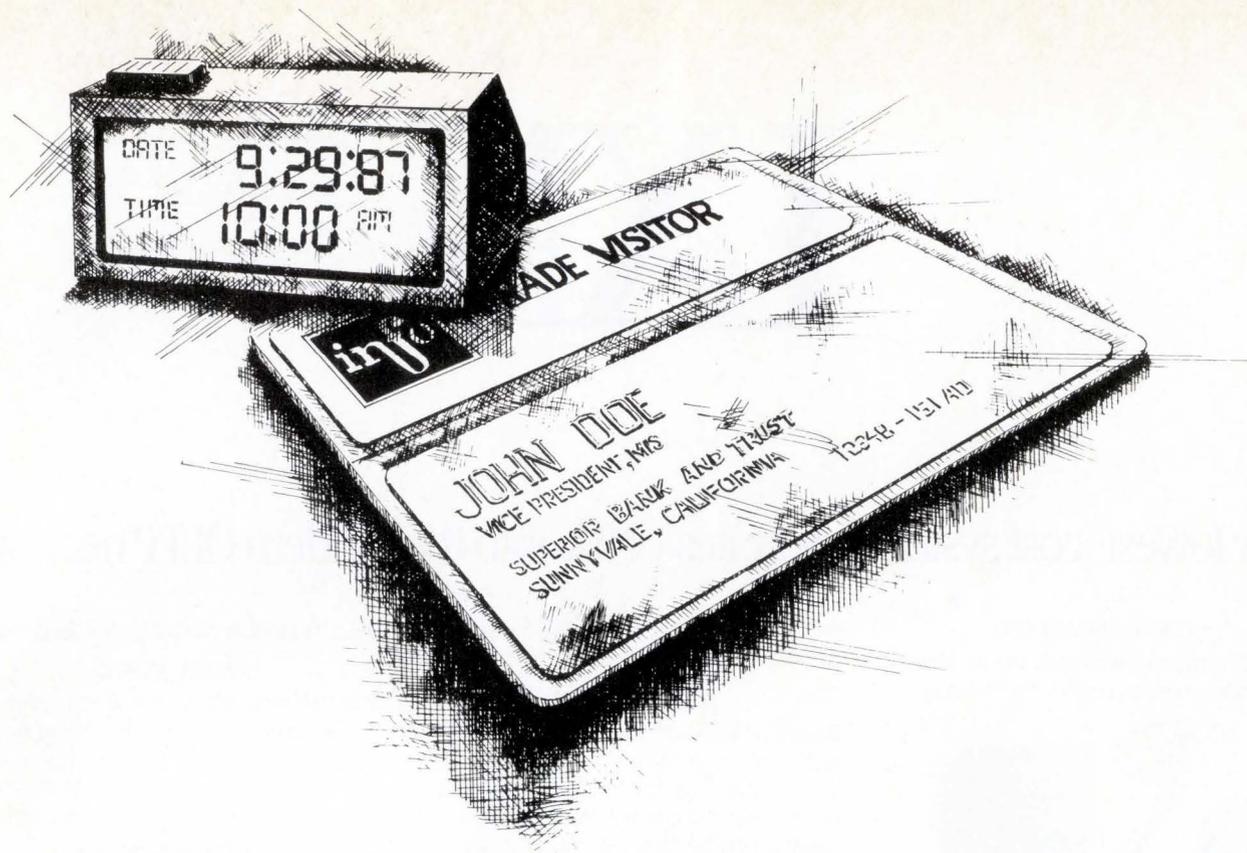
Now it's easily affordable. Whenever there's a need for constantly current information, efficient expandability and unbeatable price performance, Tandem technology proves consistently superior. Compare us to any other OLTP system. You'll see why companies in every major industry choose Tandem.

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



UNIX and UNIX System V are trademarks of Bell Laboratories. Ethernet is a trademark of Xerox Corporation. MS-DOS is a trademark of Microsoft Corporation.

TANDEM COMPUTERS
The technology leader in on-line transaction processing.



INFORMATION INTENSIVE.

FOR THE MIS/DP PROFESSIONAL: THE MOST TECHNICAL INFORMATION IN THE LEAST AMOUNT OF TIME.

When it comes to comparing major systems and products — and making the right buying decisions, it's an ongoing challenge to stay abreast of the latest changes... which is why INFO is so crucially important for MIS/DP professionals.

Only with your INFO badge do you gain access to the one event that delivers *all* of the latest advances in information management systems. Only with your INFO badge can you find what you need to know in one place, at one time.

Micros. Minis. Mainframes. Multi-faceted peripherals. Telecommunications equipment. Feature-filled software packages. The newest, most powerful systems on the market. Plus, all the prod-

ucts and the information to pull them all together.

If it's important, you'll find it at INFO — leading-edge technology from the industry's foremost manufacturers and suppliers. You'll come face to face with the leaders in the field. Technical specialists who speak your language and can provide you with the solutions you're after.

If you're part of an information intensive business, make it your business to come to INFO. It's the *one* information management show you simply can't afford to overlook.

Invest four days at INFO...get a year's worth of technical solutions.

CLIP THIS AD AND BRING IT TO THE SHOW FOR A \$15 DISCOUNT

Just pick up a registration form at the Javits Center, fill it out and proceed to a cashier with this ad. You'll save \$15 off the regular \$20 admission fee.

Show Dates: September 29-October 2, 1987

Show Hours: 10am-5pm

Registration opens at 7:30am. No one under 18 admitted. For more information, call (203) 964-8287, 9-5 EDT.

XD



The 14th International
Information Management
Exposition & Conference
September 29-October 2, 1987
Jacob K. Javits Convention Center
New York, New York