

THE ABCs OF PRINTING

On May 3, 1983, IBM introduced its 2,000 lpm model 4245 line printer. The product suffered from some engineering problems — problems that came as a surprise since IBM's line printers have almost always been the best in the industry. For two years, IBM tried to mollify unhappy users who complained about the device's print quality and stability, but the reputation of the \$54,500 box was tarnished beyond repair.

Finally, on May 1, 1985, IBM unveiled a new 4245 that offered the old performance specifications at a new low price of \$35,000. A slower version selling for \$28,000 was also announced. The new 4245, which came with a one-year warranty, carried maintenance charges of \$400 a month — more favorable terms than its predecessor, which had a three-month warranty and monthly maintenance fees of \$650. Even though the sales pitch for the revitalized 4245 touted the unit's improved price/performance, the main advantage of the new machine over the old one was its superior quality. Redesigned and repriced, the 4245 won over users in droves (see p. 59).

What could possibly make the Kennedy 1/2" tape hybrid streamer even better? How about...

50 MSEC



Model 9600/9650

Tri-density with 3200 BPI at 100/50 ips

- Low cost storage up to 110 Mb
- High speed streaming
- 50 ips true start/stop
- 800/1600/3200 BPI
- Interfaces: industry standard, SCSI
- Standard 8.75" height
- Front load
- Power up self diagnostics
- Service diagnostics
- Resident tester and exerciser
- Rack mount or cabinet
- 50 MS reposition time in same direction at 100 ips
- 200 MS reposition time in opposite direction at 100 ips
- 12 MS ramp time at 100 ips

Kennedy has long been in the forefront of computer tape peripherals, providing the highest quality 1/2" and 1/4" start/stop and streaming tape drives. That's one reason we can proudly state

Kennedy — twenty-four years of leadership.

KENNEDY

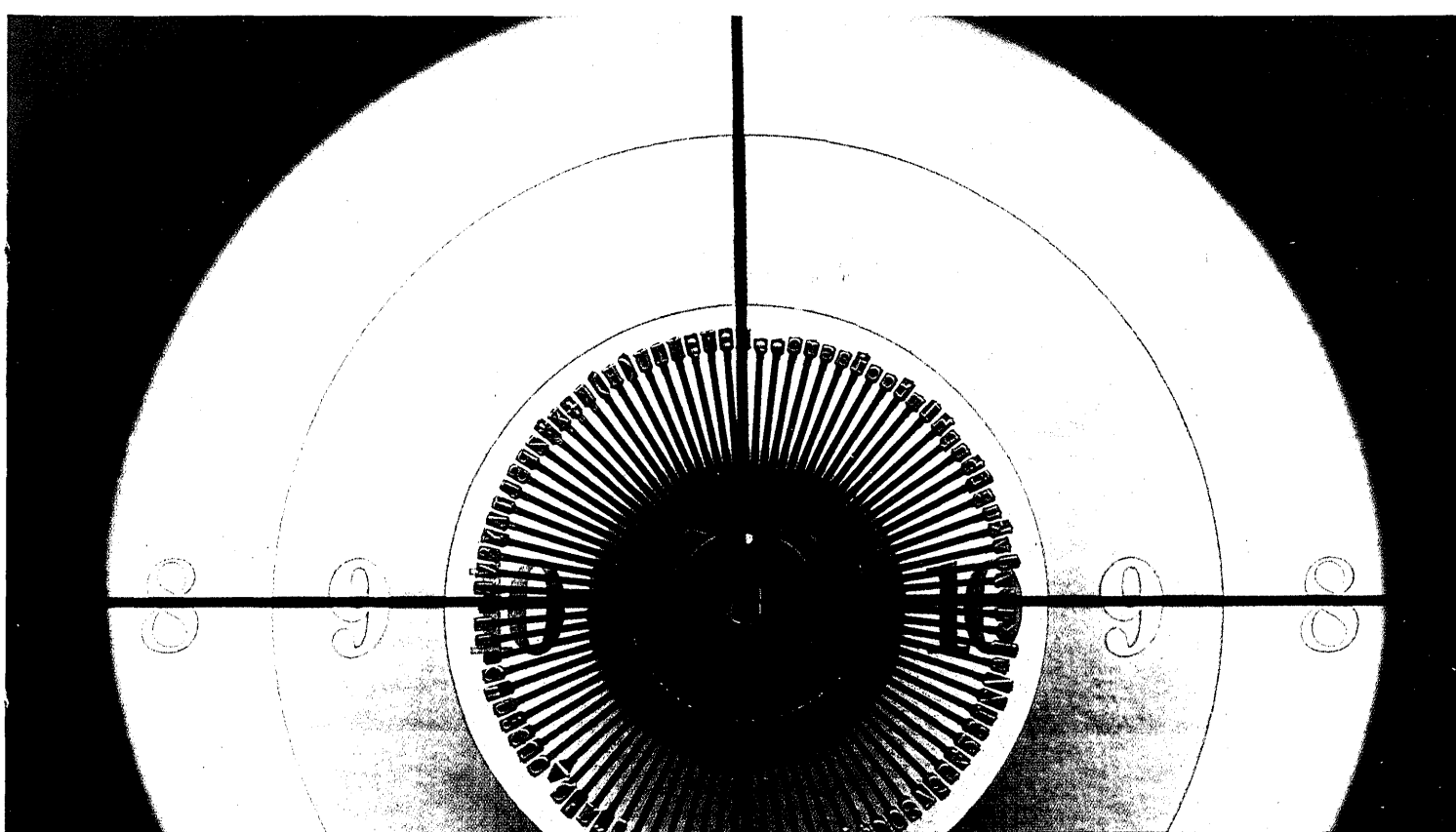
An Allegheny International Company

1600 Shamrock Ave., Monrovia, CA 91016

(818) 357-8831 • Telex: 4720116 KENNEDY

KENNEDY • QUALITY • COUNT ON IT

CIRCLE 1 ON READER CARD



OUR NEW PAGEWRITER 8 AIMS A LOT HIGHER

***Emulate an IBM 5219 with a printer
that blows the petals off any daisy.***

If you pick daisies for your System 3X, you know all about the IBM 5219. So do we. That's why we built the PageWriter 8. It's absolutely plug-compatible with the 5219, and better at just about everything.

Starting with speed. The PageWriter 8 doesn't poke along at a few petal-pushing characters per second. It pumps out a full *8 pages per minute*. That's faster than any printer on wheels.

The PageWriter 8 is quieter, too. While the 5219 sounds like a machine gun, the PageWriter 8 prints in near-silence.

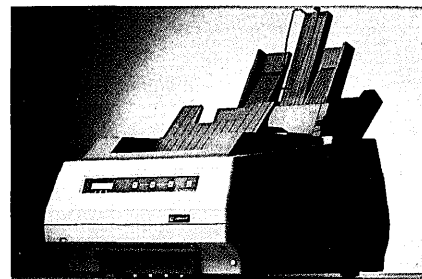
Everything about the PageWriter 8 is designed to make things easy around your office. Take the automatic sheet-feeder. With a 500-page capacity, it can run unattended for half an hour or more. And consider what it takes to change typefaces. The PageWriter 8's LED Array

technology prints a variety of laser-quality fonts under push-button control. You'll never change print wheels again!

Sure, there are other page printers that emulate the 5219. But the PageWriter 8 blows them away too. Its 5000 page monthly duty cycle is 40% better than the competition. And it achieves its compatibility without an outboard protocol converter.

Perhaps best of all, the Pagewriter 8 actually costs less than a 5219. Which is why the 5219 should soon start pushing up daisies.

So aim higher. Set your sights on a PageWriter 8, and call Datasouth today at 1-800-222-4528.



Datasouth
AMERICA'S HIGH PERFORMANCE
PRINTER COMPANY

If You Just Look At The Screen, You're Missing The Picture.

AST-3G Plus™ and AST-3G I/O™

Lots of companies bundle EGA, CGA, MDA, and Hercules™ graphics card capabilities on one board.

AST gives you this and a lot more. Starting with a choice.

AST-3G Plus or AST-3G I/O.

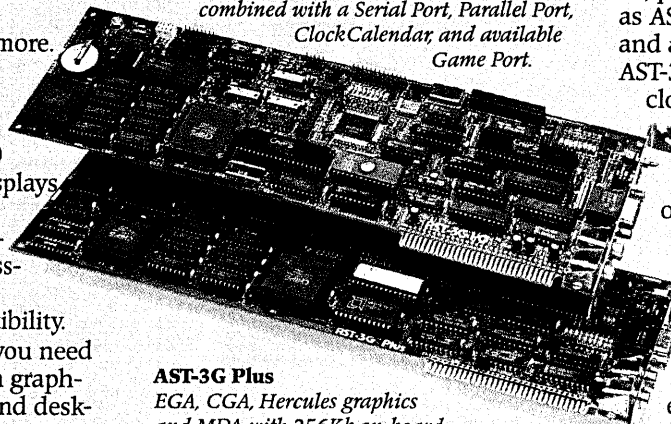
Choose the AST-3G Plus and get high-resolution 640 x 350 graphics, brilliant 16 color displays created from a full-spectrum palette of 64 colors and high-quality text. Giving you across-the-board IBM® PC/XT/AT® applications software compatibility.

So, you'll have all the power you need for business and presentation graphics, CAD/CAM, graphic arts and desktop publishing.

You can even expand the AST-3G Plus

AST-3G I/O

All the graphics and memory of the AST-3G Plus, combined with a Serial Port, Parallel Port, Clock/Calendar, and available Game Port.



AST-3G Plus

EGA, CGA, Hercules graphics and MDA with 256Kb on-board video memory and available Parallel Port.

with an optional parallel port.

Or, pick the AST-3G I/O (formerly known as AST-3G Pak) and get the parallel port and all the graphics capability of the AST-3G Plus, as well as a serial port and clock/calendar with battery back-up.

You can also order an optional game port. Both the AST-3G Plus and AST-3G I/O give you 256Kb of on-board video memory.

So whether you need more powerful graphics, or powerful graphics and more, AST has an EGA solution.

More, An AST Tradition. AST pioneered compatible multifunction expansion boards. For more power.

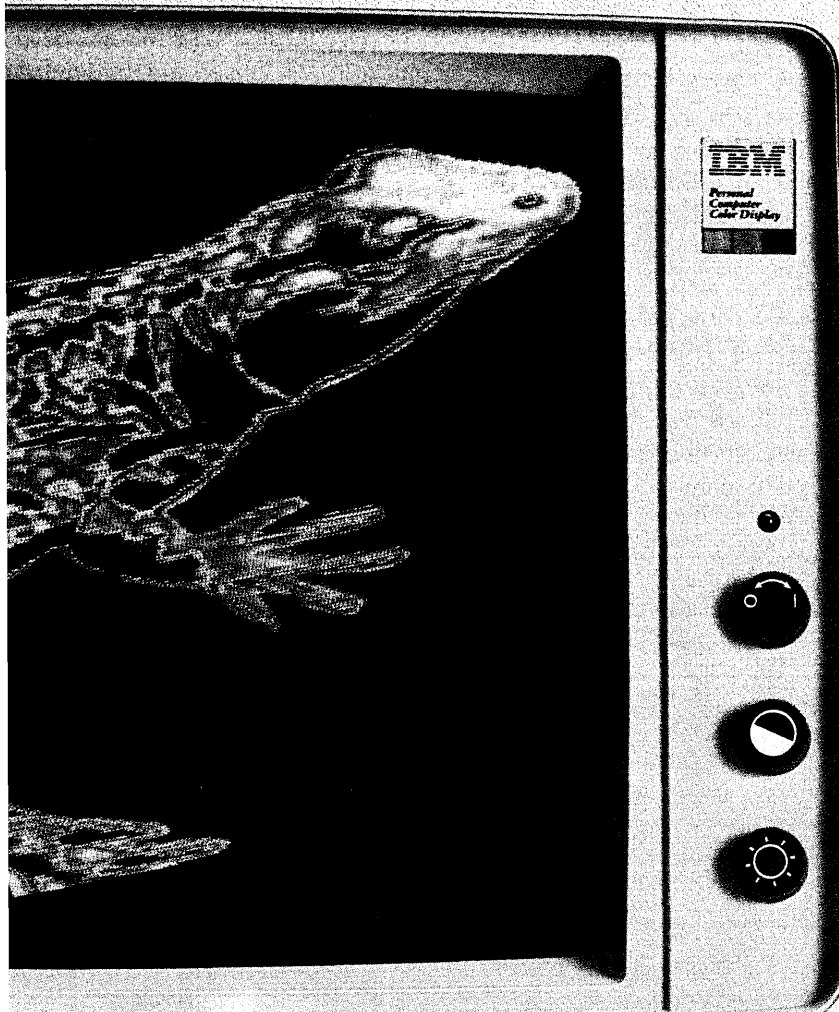
Now we're doing the same with graphic display adapters.

And all AST products are built with front-line components, then burned-in and tested. Again and again. For more reliability.

Get The Whole Picture. Find out more about unleashing the graphics power of your PC, XT, or AT by visiting your local dealer, calling our Product Information Center at 714/863-1480, or mailing the coupon below to AST Research, 2121 Alton Avenue, Irvine, California 92714-4992.

AST-3G Plus and AST-3G I/O trademarks of AST Research, Inc. IBM and AT registered trademarks of International Business Machines. Hercules trademark of Hercules Graphic Products, Inc. Copyright © 1986 AST Research, Inc. All rights reserved.

AST
RESEARCH INC.



Yes, Please send me more information about
AST-3G Plus and AST-3G I/O. 12/1/86

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone () _____

Send to: AST Research, Inc., 2121 Alton Ave.,
Irvine, CA 92714-4992. 01DC068A01FM

DATA MATION

DECEMBER 1, 1986/\$3 U.S.A.
VOLUME 32 NUMBER 23
This issue, 192,210 copies

FEATURES

50 BEHIND THE NEWS

Laptop vendors offer a broader array of features and greater expandability than ever before. Yet, Robert J. Crutchfield writes, prospective buyers aren't "Getting Carried Away" with the little machines.

59 THE ABCS OF PRINTING Hesh Wiener

The will of the market in the printer sector seems to be operating in favor of the processor vendors. That and other observations within.

77 TAMING THE DASD MONSTER John W. Verity

The problem of how to manage those myriad threatening datasets as

they migrate between disk, tape, and future mass storage devices is quickly becoming one of epic proportions.

85 A NEW CLIMATE FOR LEASING

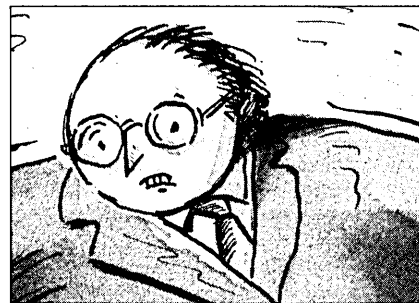
David Stamps

The loss of the Investment Tax Credit benefit is just one of several changes that the new tax code brings to the computer leasing marketplace.

92 DESKTOP PUBLISHING Connie Winkler

Despite the big differences in capabilities between low-end and high-end systems, electronic publishing is one of today's liveliest applications, especially at the desktop level.

NEWS IN PERSPECTIVE



- 18 **OPERATING SYSTEMS**
Unix customers pressure AT&T.
- 20 **ADAPSO**
Battle lines are being drawn.
- 24 **MINICOMPUTERS**
Pyramid hits the skids.
- 28 **VERTICAL MARKETS**
Brokerages discover pcs.
- 35 **ECONOMY**
European forecast: mediocre.
- 44 **SOFTWARE**
IBM pricing irks users.
- 46 **BENCHMARKS**

DEPARTMENTS

- 9 **LOOK AHEAD**
- 15 **LETTERS**
- 80 **MARKETPLACE**
- 101 **PEOPLE**
- 102 **ADVERTISERS' INDEX**
- 105 **HARDWARE**
- 111 **SOFTWARE**
- 117 **READERS' FORUM**

INTERNATIONAL 56-1

(DOES NOT APPEAR IN ALL EDITIONS)

- 2 **AUTOMATING ADMINISTRATIONS**
- 11 **BRITAIN'S TAXING PROBLEM**
- 17 **VIVE LA DIFFERENCE!**
- 23 **PLAYING THE AI GAME**

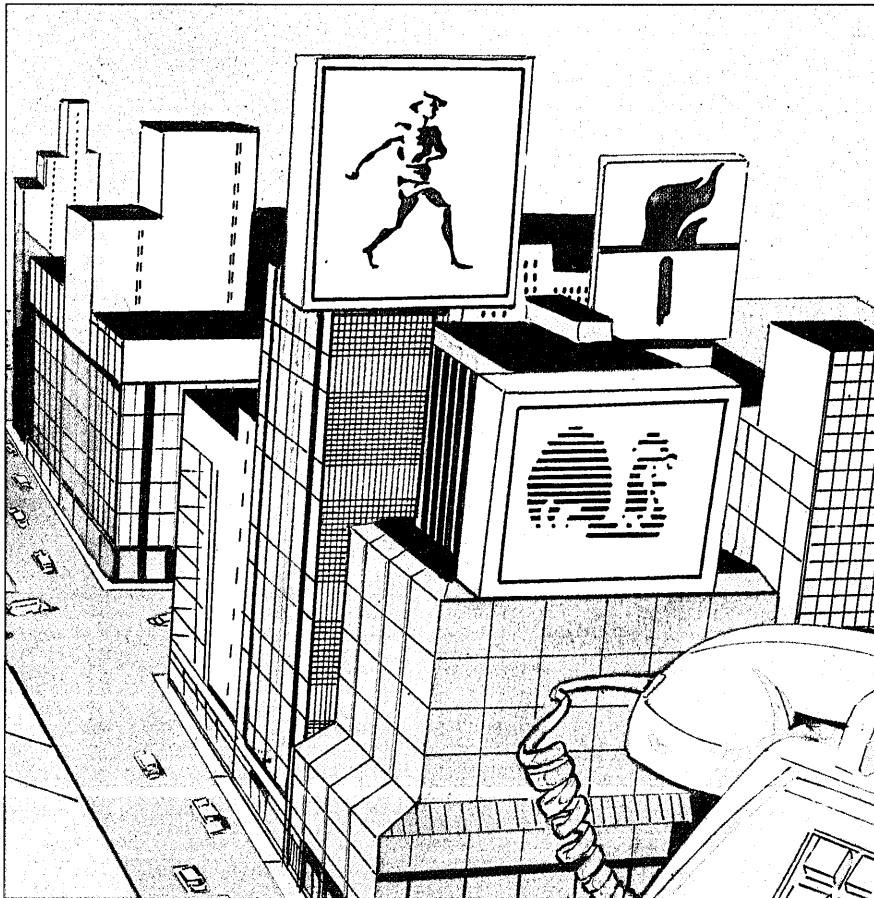
SPECIAL REPORT 56-A

(DOES NOT APPEAR IN ALL EDITIONS)

MANUFACTURING TECHNOLOGY/86

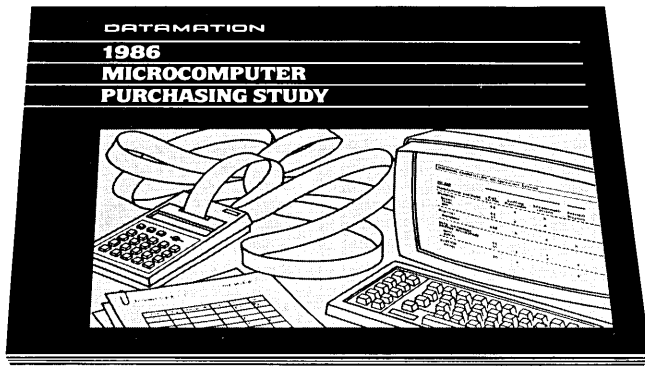
COVER PHOTOGRAPH BY STEVE COOPER;
LOGO CREATED BY ELLIS D. COOPER

Cahners Publishing Company, A Division of Reed Publishing USA. Specialized Business and Consumer Magazines for Building & Construction, Interior Design, Electronics & Computers, Foodservice & Lodging, Manufacturing, Book Publishing & Libraries, Medical/Health Care, Child Care & Development.



**Track the
buying activity of the
micro market:**

**Results of Datamation's
1986 Microcomputer
Purchasing Study
now available!**



**Detailed marketing statistics and growth trends
on hundreds of manufacturers of micro equipment,
supplies and software**

Identify and compare your company's present and future growth with your competitors' by using the detailed purchasing activity and demographic information contained in this compelling new research report. *Datamation's* End User and OEM buyers of micro equipment, supplies and software report what and from whom and how much they bought in 1985 for each of 26 different products.

**Twenty-six different types of microcomputers, related
equipment, supplies and software profiled in detail!**

- Invaluable marketing data on pricing and unit volume
- Share-of-market shown as percent of dollar volume
- Purchases broken out geographically to help you analyze sales territories and plan your marketing strategies

Order your copy today!

The 1986 Microcomputer Purchasing Study is available now for **only \$250 per copy**. Just send your company purchase order or check with complete order information to:

Datamation
Attn: Mary Connors
875 Third Avenue
New York, NY 10022

For additional information, call Mary at (212) 605-9678.

DATAMATION®

Serving the needs of information processing professionals... worldwide.

DATAMATION

Editor-in-Chief	George R. Davis
Editor	Rebecca S. Barna
Senior Editor	Linda Runyan
Managing Editor	Parker Hodges
Assistant Managing Editor	Florence Lazar
Senior Writer	John W. Verity
News Editor	David R. Brousell
International Editor	Paul Tate
New Products Editor	Theresa Barry
Copy Editor	Eric Brand
Assistant News Editor	Karen Gullo
Assistant Features Editor	Stephen G. Davis
Assistant Copy Editor	Steven Korn
Assistant Editor	Mary Kathleen Flynn
Editorial Secretaries	Karen J. Scher, Robbin Pullman
Bureau Managers	
Boston	Ralph Emmett Carlyle
Dallas	Robert J. Crutchfield
Los Angeles	Edith D. Myers
San Francisco	Jeff Moad
	Susan Kerr
Tokyo	Robert Poe
Washington	Willie Schatz
Technology Editor, Europe	Fred Lamond
Associate Editor, Europe	Sarah Underwood
Editorial Assistant, Europe	Lauren D'Attilo
Foreign Correspondents	James Etheridge, Paris
	Peter Hidas, Oslo
	Norman Kemp, Sydney
	Edith Holmes
Oem Correspondent	
Art Director	Kenneth Surabian
Assistant Art Director	Cheryl Storti
Production Editor	Susan M. Rasco
Art/Prod. Assistant	Renée Nied
Contributing Editors	Pamela Archbold, Laton McCartney, Tom McCusker, Hesh Wiener
Advisory Board	Lowell Amdahl, Philip H. Dorn, Joseph Ferreira, Bruce W. Hasenyager, David Hebditch, John Imlay, Irene Nesbit, Angeline Pantages, Robert L. Patrick, Malcolm Peltu, Russell Pipe, Carl Reynolds, F.G. Withington
Publisher	James M. Morris
Operations Manager	Donna O'Meara
Research Director	Laurie Schepf
Production Manager	Anne Earley
Circulation Vice President	Joseph J. Zaccaria
Circulation Manager	Mary Agnes Glenister

EDITORIAL OFFICES

Headquarters: 875 Third Ave., New York, NY 10022. Phone (212) 605-9400; telex 429073. **New England:** 201 Main St., Sandwich, MA 02563, (617) 888-6312; **Washington, D.C.:** 4451 Albemarle St. NW, Washington, DC 20016, (202) 966-7100; **Central:** 9330 LBJ Freeway, Suite 1060, Dallas, TX 75243, (214) 644-3683; **Western:** 1801 S. La Cienega Blvd., Los Angeles, CA 90035, (213) 559-5111; 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.

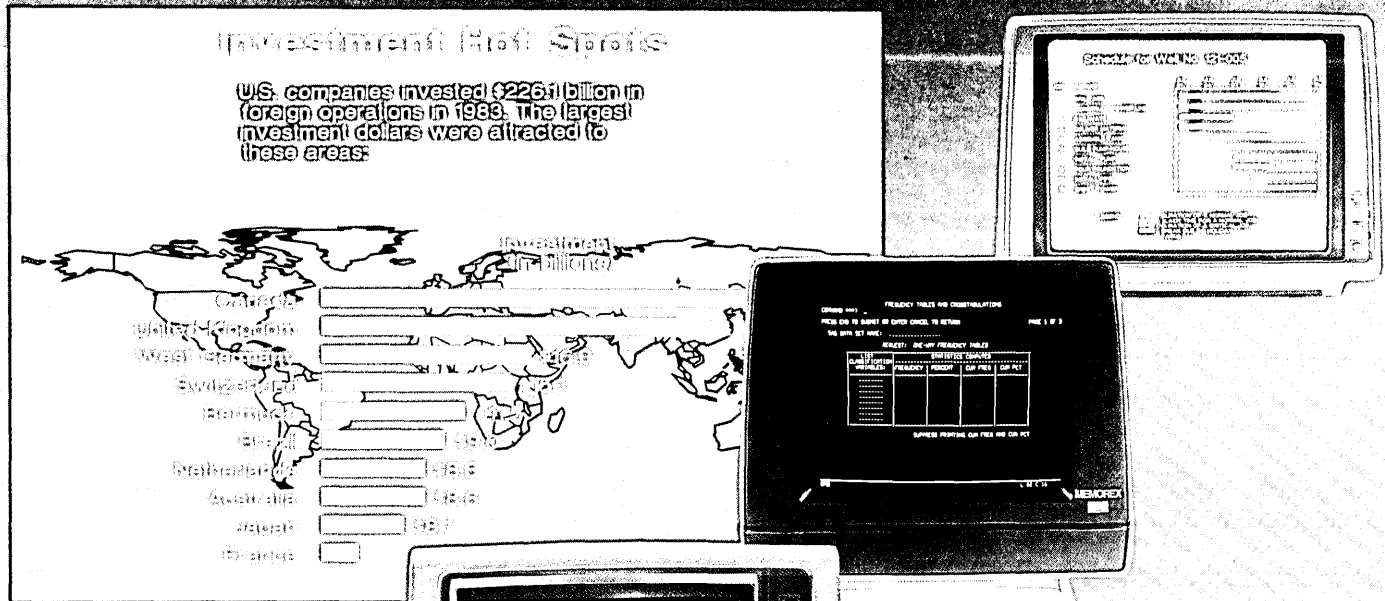
DATAMATION (ISSN 0011-6963) Magazine is issued twice monthly on the 1st and 15th of every month by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington St., Newton, MA 02158-1630. William M. Platt, President; Terrence M. McDermott, Executive Vice President; E.V. Burkholder, 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, 875 Third Ave., New York, NY 10022. Published at East Greenville, Pa. Annual subscription rates: U.S. and possessions: \$50; Canada: \$75; Japan, Australia, New Zealand: \$140 air freight; Europe: \$120 air freight, \$225 air mail. All other countries: surface, \$225 air mail. Reduced rate for qualified U.S. students, public and school libraries: \$38. Single copy: \$3 in U.S. Sole agent for all subscriptions outside the U.S.A. and Canada is J.B. Tratsart, Ltd. 154 A Greenford Road, 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 1986 by Reed Publishing USA; Saul Goldweitz, Chairman; Ronald G. Segel, President and Chief Executive Officer. All rights reserved. **DATAMATION** is a registered trademark of Cahners Publishing Co. Microfilm copies of **DATAMATION** may be obtained from University Microfilms, A Xerox Company, 300 No. Zeeb Road, Ann Arbor, MI 48106. Printed by Brown Printing Co. POSTMASTER: Send address changes to **Datamation**, 875 Third Ave., New York, NY 10022.

▽BPA

ABB

THE SAS[®] SYSTEM

The Fourth Generation Solution That Works for You.



One Solution that's Powerful.

Now there's one software solution for all your Information Center applications. One solution for efficient data management, accurate statistics, easy report writing, and customized graphics. One solution—the SAS[®] System.

You can choose between the simple English-like command language or a front-end menuing system. On-line help facilities make it easy to handle every application, quickly and accurately. You can track sales leads, determine market share, present results. File employee records, analyze benefit programs, manage the payroll. Take orders, keep inventory, produce mass mailings. Schedule projects, determine product mix, make forecasts, produce spreadsheets. All this and more with the SAS System.

One Solution that's Friendly.

It's easy with the SAS System. You can write front-ends for all your applications. And with a few keystrokes, you can change them as your information needs change. A convenient screen manager lets you edit, display, and control your work without ever leaving your desk. And if you need to move between several operating systems, you'll find the language, syntax, and commands the same for the mainframe, minicomputer, and PC SAS System.

The SAS System runs on IBM 370/30xx/43xx and compatible machines under OS, TSO, CMS, DOS/VSE, SSX, and ICCF; on Digital Equipment Corp. VAX[™] 8600 and 11/7xx series under VMS[™]; on Prime Computer, Inc. Prime 50 series under PRIMOS[®]; on Data General Corp. ECLIPSE[®] MV series under AOS/V5; on IBM XT/370 and AT/370 under VM/PC; and on the IBM PC XT and PC AT under PC DOS. Not all products are available on all operating systems.

Whatever your application, the SAS System is your Fourth Generation Software Solution. Call us today.



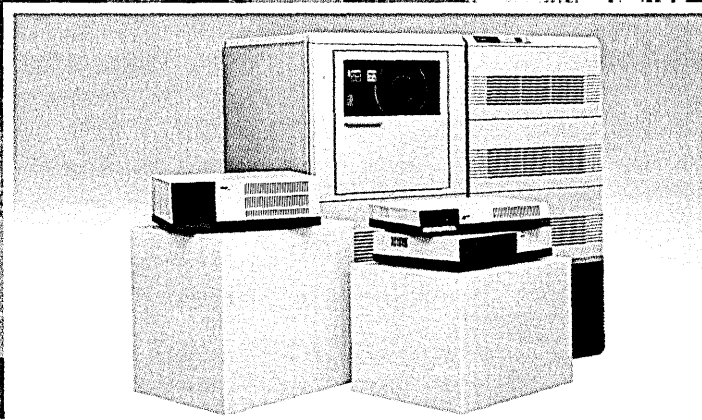
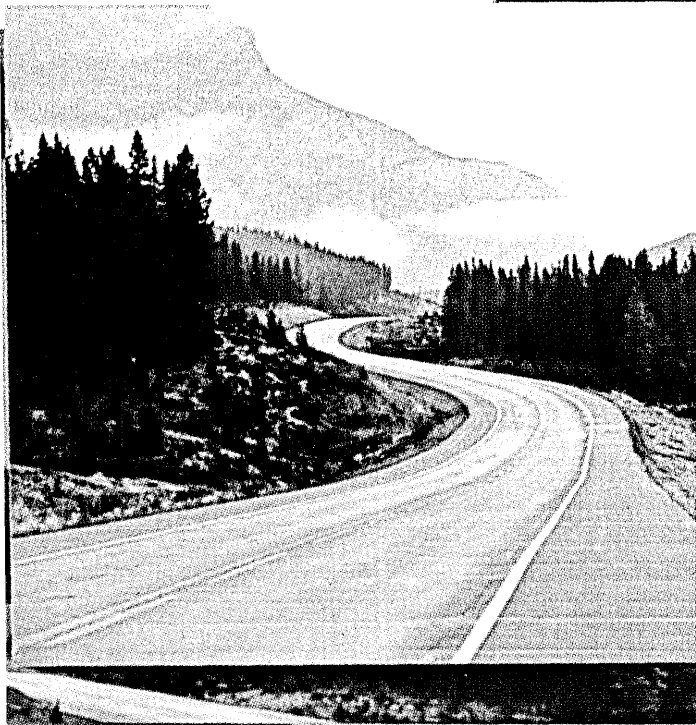
SAS Institute Inc.
SAS Circle, Box 8000
Cary, NC 27511-8000, USA
Telephone (919) 467-8000, x280
Telex 802505

ON AT&T'S "HIGHWAY 3B" THERE ARE NO LIMITS ON WHERE YOU CAN GO WITH COMPUTERS.

Like it or not, the multi-system environment is here to stay. Mainframes will be mainframes. PCs will continue to proliferate like mosquitoes. And user needs will change every day.

It is high time somebody created a family of computers for an evolving mixed-system environment. The time is now. The "somebody" is AT&T.

Our 3B computer family is among the first to blend the technologies of data processing and communications. Result: a unique ability to distribute processing



COMPUTERS WITH THE FUTURE BUILT IN

3B2/310. Supports up to 14 users, 18 RS232C ports. Speed: 1.1 MIPS, 32 bits at a time. All 3Bs are 32-bit machines. Storage: 86MB internal hard disk; up to 516MB with Expansion Modules.

3B2/400. Supports 10 to 25 users, 46 RS232C ports. Speed: 1.1 MIPS. Storage: 172MB internal, to 860MB with Expansion Modules.

3B2 XM. Expansion Module adds 23MB cartridge tape storage and/or 30 to 72MB hard disk storage.

3B15. Serves 16 to 60 users, 128 RS232C ports. Speed: 1.6 MIPS. Supports 8 drives, with maximum storage of 2.7 gigabytes.

Not shown: Other members of AT&T's 3B computer family serve up to 100 users, across a wide range of business needs and environmental conditions.

power across system lines, from user to user, desktop to department, and department to mainframe.

AT&T's 3Bs are easily linked *up* to IBM* mainframes and *down* to any combination of terminals, peripherals, and MS-DOS** PCs. The idea is to open communication between

© 1986 AT&T

systems—without forcing users to give up the applications they know and trust.

In most offices, the effect on productivity is electric.

"THESE GUYS THINK OF EVERYTHING."

The 3B's role in a distributed data processing environment can grow and change as your business evolves. For starters, UNIX™ System V permits the same software to run on a variety of machines, protecting your investment in applications and user training.

On the hardware side, the whole 3B family is like a big set of building blocks. Everything is modular. A system of feature cards and interfaces makes it easy to add functions or peripherals. Or add users. Or boost performance. Or all of the above—in any order, at your own pace.

Example: A 3B "starter" system that is cost-efficient for 6 users can easily grow to serve 60 users—and more—with the same efficiency. By networking 3B to 3B you can support *thousands* of users—like adding beads to a string.

Whether those "beads" are down the hall or an ocean away, AT&T's networking tools can swiftly unite them all into a single, flexible, responsive system.

WHERE ARE YOU GOING?

AT&T's 3B family was created *as a family* to enhance the systems you have today, without imposing limits on where you can go tomorrow.

You can start with the pieces you need to solve today's problem: linking mainframe and desktop, say; or pulling together a department. As your needs and ambitions change, so can your system. AT&T makes the pieces fit.

To learn how much we can do for your company today, and how far we can take you tomorrow, please contact your AT&T Account Executive, authorized supplier, or telephone 1 800 247-1212.

*IBM is a registered trademark of International Business Machines Corp.

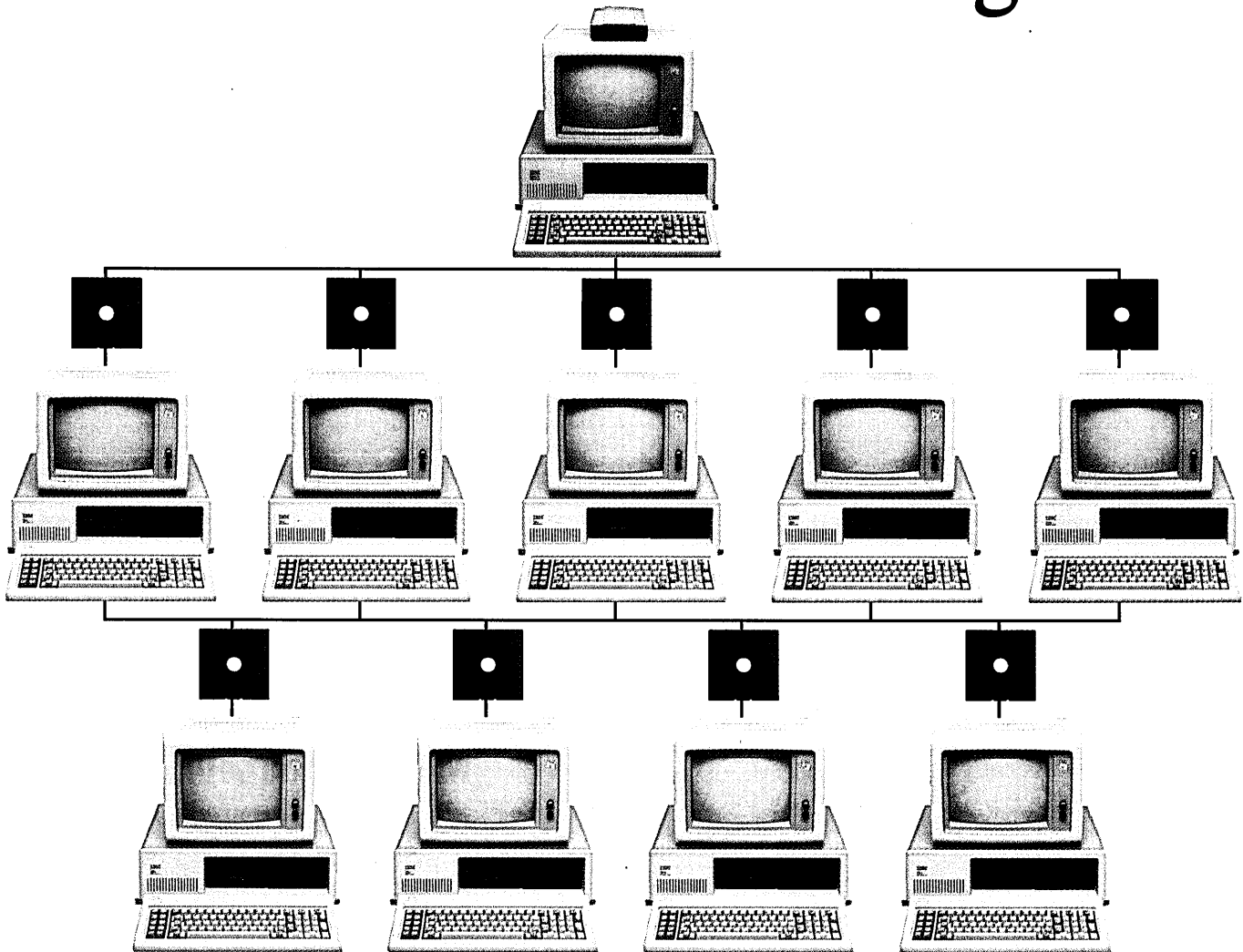
**MS-DOS is a trademark of Microsoft Corporation.



AT&T

The right choice.

If you can't put a Hayes modem on every PC in your IBM network, here's the next best thing.



© 1986 Hayes Microcomputer Products, Inc.

*Manufacturer's estimated retail price.

It's new communications software from Hayes called Smartcom II® for the PC Network.

It lets you share modems. So even PC's without their own modems can communicate outside the network.

Before now, if you needed to communicate outside the network, you had to physically go to wherever the modem was. That, in turn, meant bumping the operator off his modem-equipped PC, so that you could handle your communications.

Hayes Smartcom II for the PC Network puts an end to all the delay and inconvenience. Now, when a PC needs the modem, the user is automatically connected from his own desk. So communications

capabilities are immediately available to everyone on your network, whether their PC has a modem or not.

You only buy one software package per modem. The workstation part of the software can then be duplicated for each PC on the network, at no extra cost. It's better than having a site license!

Each PC can have its own password, define its own log-on procedures, set its own macros, and use

all the other outstanding operating features of our standard Smartcom II while connecting with any of the shared modems on the network.

You get all this for only \$599*! And it's backed by Hayes, the PC communications leader.

So if you currently utilize, or are contemplating adding, IBM PC networks, you should also add Smartcom II for the PC Network. For efficient communications. Without delay.

See your authorized Hayes dealer for details. Or contact Hayes at 404/441-1617.

Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, Georgia 30348.

Hayes®

Say yes to the future

CIRCLE 5 ON READER CARD

LOOK AHEAD

SIEMENS
FLIP-FLOP ON
FUJITSU DEAL?

It looks as if Siemens may be reevaluating its plan to stop reselling Fujitsu's mainframe hardware in Europe. Following Fujitsu's recent introduction of a new operating system, which the company called 90% IBM-compatible, Siemens is expected to sign an agreement to sell up to 50 of Fujitsu's M780 mainframes over the next three years, sources say. Siemens' flip-flop may signal that a settlement of the current IBM-Fujitsu arbitration is near. It's unclear if Siemens has dropped its alternate plan to form a joint pcm venture with BASF, which sells the Hitachi mainframe in Europe.

FUJITSU
TO SETTLE
WITH IBM?

Meanwhile, is there evidence in Fujitsu's dismal profit picture that the company is close to settling with IBM? Tokyo analysts speculate that a mysterious 81.8% drop in Fujitsu's half-year (April 1 through Sept. 29) net profits announced Oct. 29 is an indication that the company is close to settling with IBM over alleged illegal copying of the latter's operating system for mainframes. Since average industry profits are down a mere 40% to 50%, the consensus is that Fujitsu is probably setting aside reserves to cover payments required under a pending settlement. Many feel, however, that Fujitsu would like to delay any such agreement as long as possible. "[Delaying settlement] encourages customers to think that all is well, and keeps the order flow coming," says Philip Townsend of Morgan Stanley. According to another analyst, the company has been taking advantage of arbitration procedures to send group after group of employees to the U.S. for discussions, most recently in Oakland, Calif. The possible settlement amount remains, as always, a matter of pure conjecture, with guesses ranging from a few hundred million to "between \$1 billion and \$2 billion." The amount will most likely never be known, however. Japan's loose reporting requirements mean that it's possible to "bury [the payments] in the books," as one analyst puts it.

CHALK UP
ONE FOR
WANG OA . . .

Wang appears to be winning some lucrative contracts at IBM's expense within the W.R. Grace chemicals conglomerate. The New York-based company is planning to replace a number of IBM systems--mostly minis and a few mainframes--as it sets about the creation of a worldwide OA network based on Wang Office software. In a multiyear, multimillion dollar strategy, Wang's distributed VS minis will be used to complement existing IBM systems and in some cases to replace them. Sources say that a number of IBM System/34 minis are being replaced by Wang VS minis, but it is not known whether this is the first step in the planned obsolescence of

LOOK AHEAD

WHILE SOFTWARE
TOOLS FAIL
TO EXCITE

all of W.R. Grace's 3X Group machines (IBM's Systems/34, 36, and 38). W.R. Grace's MIS director was unavailable for comment at press time.

Wang's efforts to sell advanced programmer workbenches and software development technology to customers of IBM have met with a lukewarm reception. Wang and its partner, the Hartford Insurance Co. spin-off Hitech, are jointly marketing the technology, which was developed within the insurance group's data processing operation at Hartford, Conn. "Though we have four beta sites, the market doesn't seem to be ready for us yet," admits Hitech president Jack Crawford. Many corporations are waiting for IBM to bless an existing programming methodology or to offer a lead with a new one of its own. A number of conflicting tools and theories are now being offered, including the new Information Engineering Facility from Texas Instruments, which fleshes out the methodology of database guru James Martin.

IBM
ON
ISDN

Watch for IBM to get heavily involved in the ISDN technology. In a statement recently issued exclusively to DATAMATION, IBM revealed, "ISDN is one of the basic tenets of IBM's telecom direction. IBM's development and manufacturing divisions have accepted ISDN as a given and will provide hardware and software interfaces for digital access on our future products." IBM's implementation of ISDN will focus on SNA, the Rolm PBX II, and new lines of terminals.

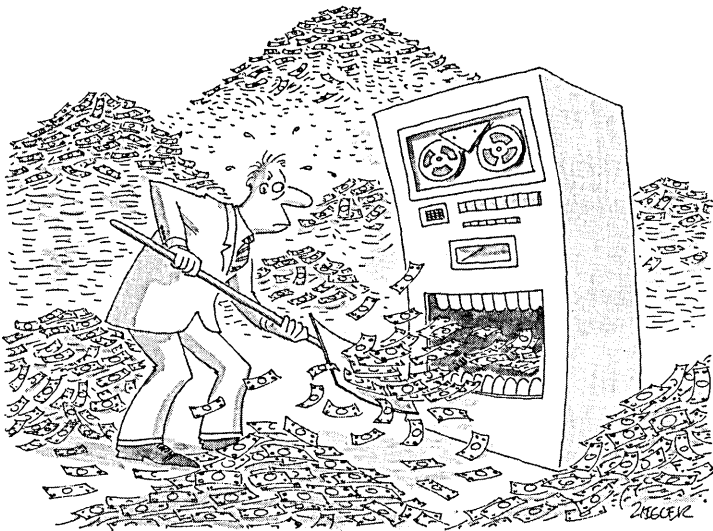
DON'T
CALL US . . .

Another tidbit of information has surfaced regarding Martin Marietta's sale of the former Mathematica and Oxford software products to On-Line Software International Inc., Fort Lee, N.J. (see "Clash of Cultures," Nov. 1, p. 22). Sources tell us that none other than Information Builders, the New York-based developer of Focus, had been interested in acquiring Ramis, Mathematica's chief software product, but that Martin Marietta didn't return phone calls placed by Information Builders. Information Builders is, of course, where the developer of Ramis, Gerald Cohen, is president.

MANY
SUITORS
FOR AION

Boole & Babbage, Sunnyvale, Calif., this week became the first in a series of third-party software companies to integrate the AI run-time system from Palo Alto-based Aion Corp. into its product line. B&B will announce an IBM mainframe performance management product using the Aion technology to provide MIS users with interactive system performance information. The initial product, which focuses on disk and I/O performance, will be delivered beginning in January. Other companies developing products using the Aion technology include MSA and Arthur Andersen.

BETTER SOFTWARE. IT'S A LOT CHEAPER THAN MORE HARDWARE.



Today, managers are asking corporate computer systems to answer the questions they need answered before they make important decisions. And only 4th generation languages and relational data base management systems (DBMS) can give them those answers.

But according to IBM, if you want this new software, you'll probably need to upgrade to their biggest operating system and buy more hardware. Because DB2 won't run on every IBM system and will only run efficiently on their biggest systems.

That's why many companies are buying ADR® software instead.

You see, ADR/IDEAL®, our 4th generation application development system, and ADR/DATACOM/DB®, our high performance relational DBMS, will probably run on the IBM system you already have.

So although ADR software costs more, it ends up costing a company a lot less.

And managers won't have to wait for critical applications. They're written and running in a matter of days instead of months. On average, 10 to 15 times faster than COBOL. Because IDEAL automates the programming process.

And they get the information they need when they need it. They have immediate access to the same current information all the departments use. Because DATACOM/DB is flexible enough for end-users to use and still delivers high volume production performance.

So ADR can probably give you all the benefits of the new relational software on the IBM hardware you're using now. Even though IBM can't.

And the reason for that shouldn't surprise you. After all, ADR isn't in the hardware business.

For more information about ADR software, call 1-800-ADR-WARE. Or mail us the coupon.

Applied Data Research®, Orchard Road & Rt 206, CN-8, Princeton, NJ 08540 1-800-ADR-WARE. In NJ, 1-201-874-9000.

- Please send me more information about ADR® software.
 Please have an ADR Representative call.

Name _____ Position _____

Company _____ Phone _____

Address _____

City _____ State _____ Zip _____

Computer Equipment _____

DM 12/1/86

For information about ADR Seminars call 1-800-ADR-WARE.

ADR

AN AMERITECH COMPANY

BETTER THAN THE SOFTWARE THAT COMES WITH THE HARDWARE.

CIRCLE 6 ON READER CARD

IBM and DB2 are trademarks of the International Business Machines Corp.

Buying a VAX controller shouldn't be any harder than this.

Emulex makes the choice so easy. You can pick the exact disk, tape or communications controller for your VAX computer. Or you can select from many complete subsystems containing controllers and peripherals. All for less cost and all from one convenient source.

DISK AND TAPE PRODUCTS FOR THE VAX UNIBUS...

SC41/MS—This high performance, low cost MSCP controller lets you run large capacity SMD disk drives on any VAX UNIBUS. Supports drives with 2.5 MByte/sec transfer rates and high capacities.

TC13—Tape controller supports industry-standard "Pertec" formatted ½" tape transports, including conventional NRZI, PE, and GCR start/stop units. Features a 3.5 KByte buffer and 800 KByte/sec transfer rates.

VAX-11/750...

SC7002—Powerful Massbus controller, ties directly to the CMI bus and supports up to four industry-standard removable or Winchester SMD drives in mixed configurations of 825 MBytes or more. High transfer rate of 2.5 MBytes/sec makes the SC7002 an ideal choice for such drives as Fujitsu 2361A or 2333.

SC7003—Our newest high-speed controller supports 80 to 850 MByte drives with transfer rates to 3.0 MBytes/sec, including CDC 9772.

SC758—Massbus controller accommodates up to eight disk drives. Supports capacities from 80 to 675 MBytes and transfer rates up to 1.8 MBytes/sec.

VAX-11/780/785...

V-Master—Houses one or two disk controllers, or a tape controller, or a combination of a disk and tape controller. Each disk controller supports up to four disk drives—up to eight with the SC788 controller.

SC7002—Change a few switches and this "750" controller becomes compatible with the VAX-11/780/785; also supports 2.5 MByte/sec transfer rates and capacities to 825 MBytes.

SC7003—Switch selectable to run 11/780/785, operates transparently with UNIX BSD 4.2, ULTRIX-32, and VMS; also features a large 16K buffer.

VAX 8600/8650

Side Car—Field proven V-Master controller configured in a cabinet that attaches directly to VAX 8600 or 8650.

SC7002—Handles up to four drives entirely transparent to the drive address.

SC7003—Features up to eight drive ports, each transparent to the drive address, which can be set up on any port and changed without controller reconfiguration.

SC788—Supports a transfer rate of 1.8 MBytes/sec and up to eight disk drives.

TC7000—With switch changes, this tape controller is compatible with 11/750 or 11/780/785; mounted in a Side Car runs with 8600 or 8650. Supports up to eight formatted drives. Emulates DEC's TM03/TU77. Works with "old" or "new" GCR 6250 drives and features transfer rates to 1.5 MBytes/sec.

COMMUNICATIONS PRODUCTS FOR THE VAX-11/730 THROUGH THE VAX 8650...

CS21—Single hex board emulates DEC's DH11 and DZ11 communications multiplexers, and asynchronous portion of DMF-32 multi-function controller; also interfaces with three

alternative 16-line distribution panels.

CS23—Still need more lines? On a single hex board the CS23 will give you up to 32 communications lines. Emulating DEC's DHU11, it is transparent to VAX software and diagnostics.

CS32—Add high performance data transfers to all your VAX IIs. It's transparent to DEC's new DMF-32 and supports up to 128 lines per board.

CS41—This new T1 compatible UNIBUS communications multiplexer lets you connect up to 144 asynchronous terminals to your VAX. With a single controller, up to six 24-line remote distribution panels can be connected to a host computer 5000 ft. away. Ring networks exceeding 5000 ft. can also be created with minimal restrictions. CS41, an inexpensive way to connect the most terminals to your VAX for the least money.

The performance is Emulex. The choice is yours. Call Emulex today toll free 1-800-EMULEX3. In California, (714) 662-5600. Or write Emulex Corporation, 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, California 92626.

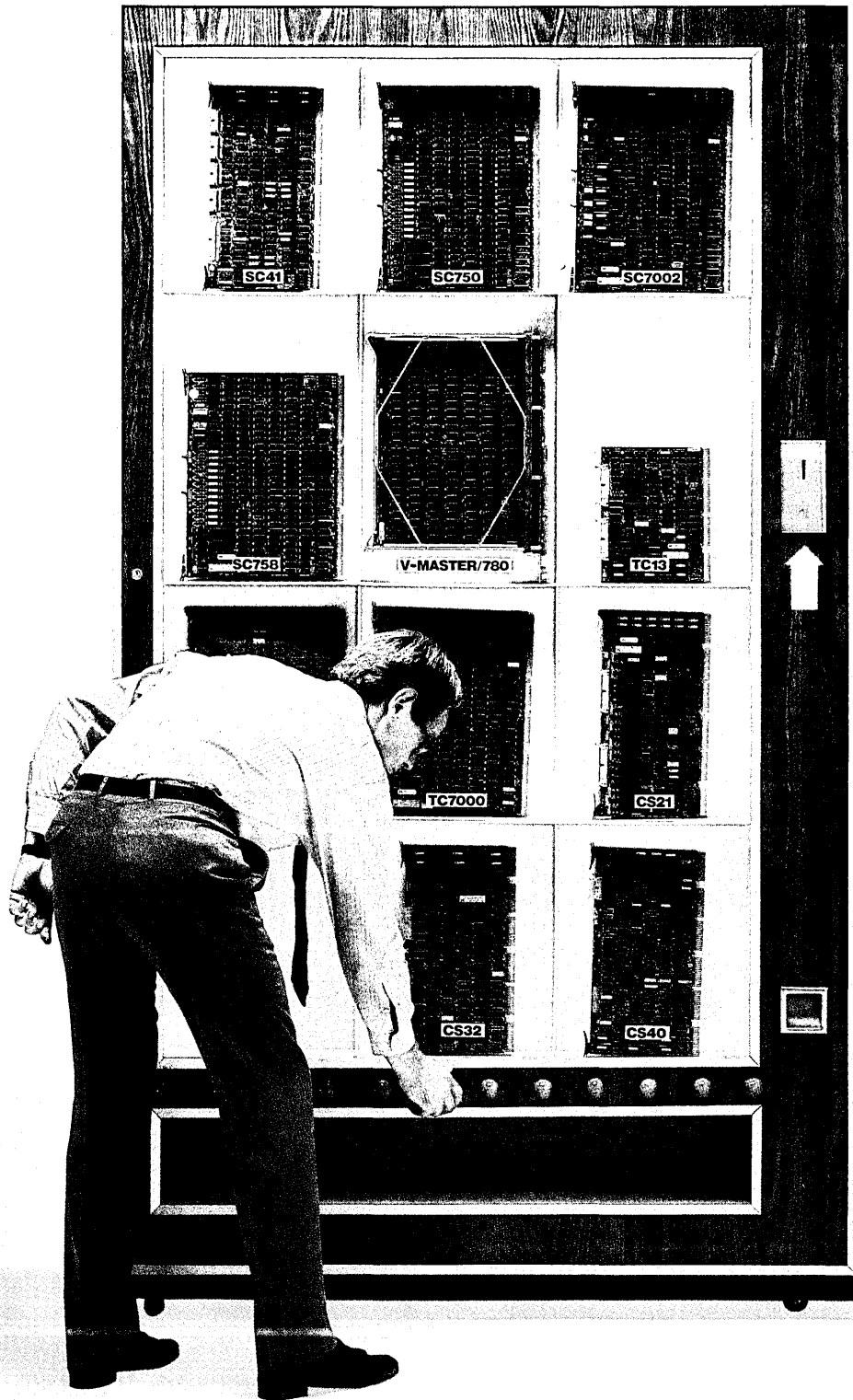


The genuine alternative.

U.S. Regional Offices: Anaheim, CA (714) 385-1685; Schaumburg, IL (312) 490-0050; Roswell, GA (404) 587-3610; Nashua, NH (603) 882-6269. International Offices: Australia, Eastwood, N.S.W. (61) 02-858-4833; Canada, Mississauga, Ontario (416) 673-1211; Montreal, Quebec (514) 332-0763; France, Montrouge (33) 14735-7070; United Kingdom, Bracknell, Berkshire (44) 344-484234; West Germany, Munich (49) 89304051.

CIRCLE 7 ON READER CARD

THE EMULEX VAX ALTERNATIVE



n Retirement Memories Abound



Retire Your PC Coax Connection

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

LANs are dramatically increasing office productivity through efficient information management. And Gateways are exploiting LAN versatility by providing cost-effective host communication for PCs and other network devices. Now for thousands of dollars less, LANs and Gateways provide PC-to-PC and PC-to-host communications all without a cluster controller.

INS Gateway PC Adapters are engineered around proven INS SNA 3274 cluster controller emulation. A single INS Gateway PC Adapter in an IBM NETBIOS compatible LAN, including Token Ring, will support up to 32 logical unit sessions. The LAN allows each PC on the network to share disks, printers and other resources while the Gateway allows performance of any host-supported function and maintains host access.

INS planned on PCs becoming a major component in the development of information systems. We designed our Gateways to be the logical choice in providing the vital link between LANs and

mainframes. We also planned on much more—flexibility, simplicity and reliability. We provide free, responsive user assistance and guarantee every INS Gateway PC Adapter (hardware and software) for five years.

Now the vast resources of mainframes and local area networks are available at your fingertips with INS Gateway PC Adapters.

Call now for more information about putting new life in your MIS/DP efforts with INS Gateway PC Adapters. Our toll free number is (800) SNA-3270, in Alabama (205) 633-3270. Or write Integrated Network Systems, P.O. Box 91395, Mobile, AL 36691. Telex: 701238.

INS
⚡

“THE NETWORK PEOPLE”
An **ICOT** Company

CIRCLE 8 ON READER CARD

LETTERS

TWINS, BUT NOT IDENTICAL

In the June 15 Look Ahead, DATAMATION had it right. It was also right in the July 15 News in Perspective. Now, you've incorrectly placed ETA Systems in Minneapolis (Look Ahead, Oct. 1, p. 10). No, DATAMATION, ETA Systems is still in St. Paul.

PAUL PERRAULT
St. Paul, Minnesota

A LITTLE HONESTY

It was a very small item headlined "Instant Honesty" (On the Job, Sept. 15, p. 150). It discussed how employers are using preemployment opinion surveys to screen prospective employees for honesty.

From the tone of the article, it seems that these surveys are included with other preemployment paperwork without explanation to the applicant. Apparently, the surveys work better if the prospective employees do not know what the surveys are and how they will be used.

How about a little honesty from the employer? How about being candid about these surveys?

DAVID E. ROSS
Agoura, California

CAREER PATH

"MIS for MBAs, or Vice Versa?" by Michael A. Tyler (Sept. 1, p. 46) is interesting, and the main points are well made. One point of disagreement is the comment, "The Minnesota faculty recognizes that its graduates will likely cap their careers at the top of a functional area and not compete with Harvard or Stanford graduates for positions in the very highest tier of corporate management."

We feel just the opposite. Minnesota graduates are ready to compete with MBAs from any school for the top tier of corporate management. The only difference may be that the Minnesota program puts an emphasis on a career path that starts with a functional area.

There is no reason why MBAs who have an interest in MIS should not be able to be chief executive officers. They should be able to do it by first becoming the chief information officers managing the MIS function.

GORDON B. DAVIS
Honeywell Professor of Management
Information Systems
School of Management
University of Minnesota
(On sabbatical leave, 1986-87, as Shaw
Professor of Information Systems and
Computer Science, National University
of Singapore)

BETTER IDEAS

If there are people like Lawrence Seabury (Letters, Oct. 15, p. 19) out there who feel that sending work offshore is less than the best way to handle the data entry problem, perhaps there is a better solution.

We are interested in getting industry to help support a program in which disabled American veterans and other handicapped people work with computers in a sheltered workshop environment. Data entry will be the first area addressed, as it requires less training and equipment than other areas.

We hope that industry will recognize the tremendous resource that the handicapped represent and will actively assist in the creation of curricula that will satisfy the needs of the job market.

JUDITH PHILLIPS
EDWARD JUDGE
Multi-Service Health Inc.
Northampton, Massachusetts

CONSULTANTS BETTER?

"Is Anyone Really Using Computer Consultants?" by David Stamps (Oct. 15, p. 99) clearly identified many of the pros and cons of going outside the company for technical expertise. However, there are some factors working to a contractor's advantage that were not addressed.

My experience at Chrysler, General Motors, and a dozen much smaller firms is that contract jobs are usually well defined. Contractors work to meet real performance and cost criteria. In-house development can mean long coffee breaks, useless meetings, vague goals, and unworkable schedules.

There is a difference in world view between a consultant and a traditional employee. People who contract their services tend to be entrepreneurial, self-motivated, and creative. Employees are generally security oriented, team motivated, and imitative.

The net effect is this: consultants create new systems; employees run them.

MICHAEL E. MAROTTA
Lansing, Michigan

IN OTHER WORDS...

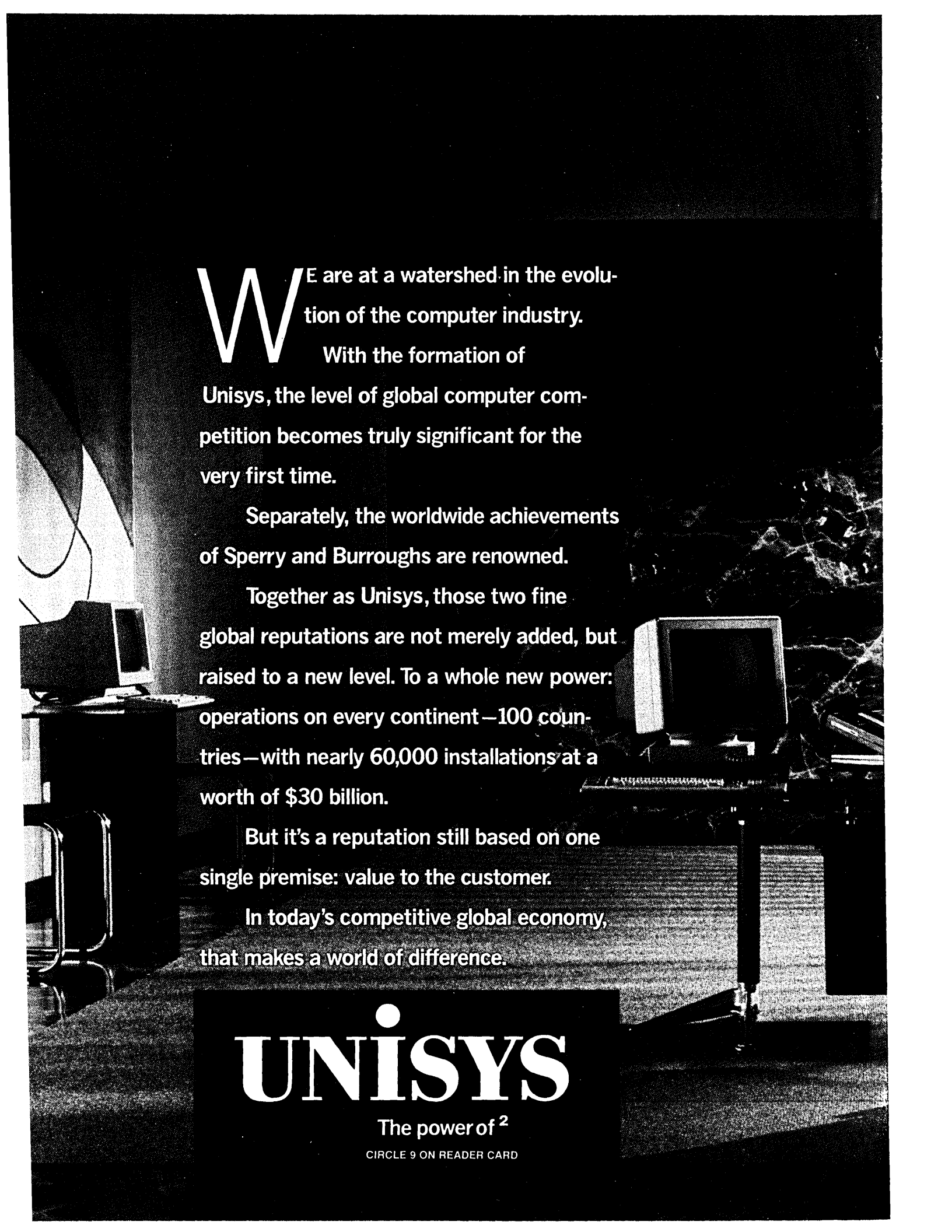
While basically agreeing with the sentiments expressed by Lori Russon in "Understanding Messages" (Readers' Forum, Sept. 1, p. 108), I could not help wondering at the author's examples, some of which undermine her thesis.

"Fine for littering," conveys the opposite of its intent to most readers. "Littering fined" is shorter and more to the point.

In general, words which may serve as more than one part of speech should be avoided. I even prefer to avoid words with similar spellings: "now" and "not" may not be distinguishable on a poorly operating printer.

I strongly disagree with Ms. Russon about words with negative connotations. There are occasions, especially within operating system routines, when the designer has evidence that the user is about to do major harm, and should know better. A weakly worded message might be ignored.

GERHARD POSTPISCHIL
Expert System Programming Inc.
Vienna, Virginia



WE are at a watershed in the evolution of the computer industry.

With the formation of Unisys, the level of global computer competition becomes truly significant for the very first time.

Separately, the worldwide achievements of Sperry and Burroughs are renowned.

Together as Unisys, those two fine global reputations are not merely added, but raised to a new level. To a whole new power: operations on every continent—100 countries—with nearly 60,000 installations at a worth of \$30 billion.

But it's a reputation still based on one single premise: value to the customer.

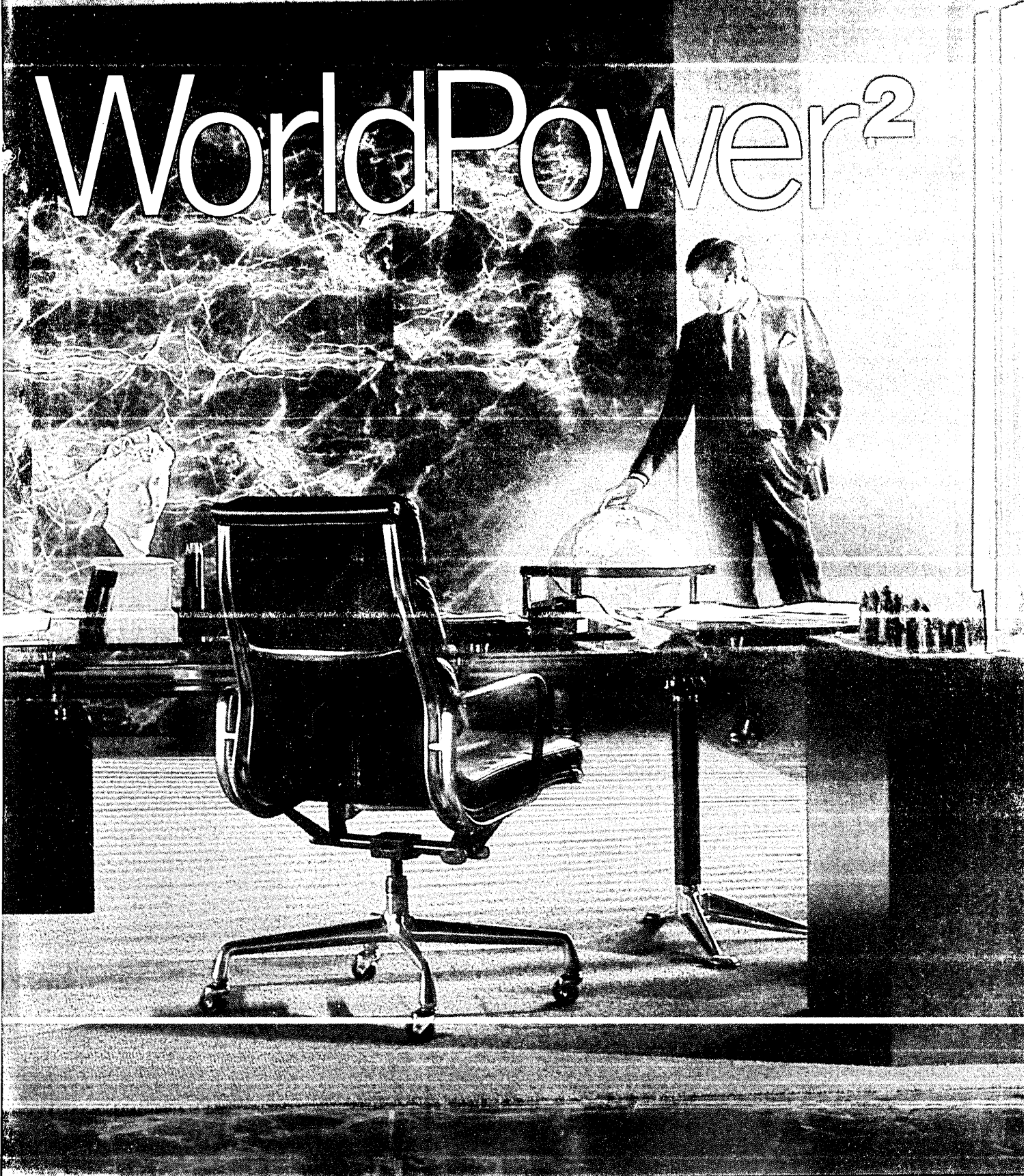
In today's competitive global economy, that makes a world of difference.

UNISYS

The power of ²

CIRCLE 9 ON READER CARD

WorldPower²



NEWS

IN PERSPECTIVE

OPERATING SYSTEMS

TAKING OFF THE CUFFS

AT&T's Unix customers are mad as hell and won't take it anymore.

by Ralph Emmett Carlyle

Efforts to police the use of its new Unix System V.3 technology through stringent licensing provisions have backfired on AT&T. The company is bowing to pressure from major customers for a new licensing agreement—perhaps by Christmas. It is also prepared to hand over control of the System V Interface Definition (or SVID) verification process, which has so angered its customers, to a neutral public body if required, the company revealed in an interview with DATAMATION.

At least eight of the 10 members of X/Open, the international vendor group intent on creating a standards environment for applications portability, are refusing to sign the System V.3 license agreement because, as Geoff Morris, chairman of the group's strategy committee, says, "It's tantamount to letting AT&T set your Unix strategy and product goals for you." The eight members are DEC, Hewlett-Packard, ICL, Siemens, Olivetti, Bull, Philips, and Ericsson.

Under the terms of the System V.3 licensing agreement, available since July, users may be subject to testing at any time by AT&T to see whether their products conform to the SVID. Should they not, in AT&T's view, the company can pull the license within a 60-day period. Put another way, AT&T can force a potential competitor to disclose vital product information well in advance of its marketing phase, and if AT&T is not satisfied, it can stall or severely disrupt that customer's product development. AT&T also reserves the right to change its System V.3 pricing with little notice and no limit.

"Clearly, you can't expect large Unix vendors to commit to wide-ranging System V.3-based product developments under these conditions," says Morris. "AT&T seems to be more interested in policing the market with its license than in enabling it to grow."

AT&T, acknowledging the anger and frustration its System V.3 licensing provisions have engendered in some quarters of its user base, warns that these grievances—"though legitimate"—must not

be allowed to distort the whole picture. "We're shipping System V.3 at three times the rate of our previous release [V.2]," claims Bill Klinger, division manager, Unix Product Management. "Around 60% of the worldwide Unix systems community has taken the software since we began shipping in July. So clearly lots of our customers like the new technology."

Klinger believes that all AT&T customers want to be SVID compatible. "But we recognize that some of our customers—notably those like DEC whose products are based not on System V but on Berkeley 4.2—will have a harder time getting there than others." The AT&T executive revealed that the company is currently drafting a new System V.3 licensing agreement. "One of the changes will allow our customers more time to conform to the SVID," he says, but declines to confirm source reports that the new license would be available by Christmas.

"The message we want to get over is that there shouldn't be any more stumbling blocks. Our licensing people are discussing the problems with customers right now, and whether through licensing changes, side letters, or new schedules—whatever it takes—we'll get over all the hurdles," says Klinger.

The biggest stumbling block, according to X/Open's Morris, is AT&T's testing and verification procedure. "We all recognize that the SVID is the nearest thing to a public domain standard in rela-

"It's tantamount to letting AT&T set your Unix strategy and product goals for you."

tion to Unix," he says. "Shouldn't verification of the standard also be in the public domain, in the hands of a neutral or independent body? This is what we'd like to see."

Adds Robert R. Ackerman Jr., president and ceo of Unisoft Corp., Berkeley, Calif., a market leader in Unix systems software, "It's time to put some distance between the market's Unix standard and any hardware vendor. This is what my customers tell me."

AT&T seems amenable to the idea of relinquishing control of the SVID verification process if a neutral body can be agreed on. "We'll talk any solutions at this time," says Klinger.

One major reason for AT&T's compliance is the rapid emergence of the IEEE trial use standard, Posix (portable operating system for computer environments), as a public domain alternative to AT&T's SVID. Though the two are similar, there are some strategic differences. The Posix interfaces allow users more flexibility than the SVID because of a "host environ-

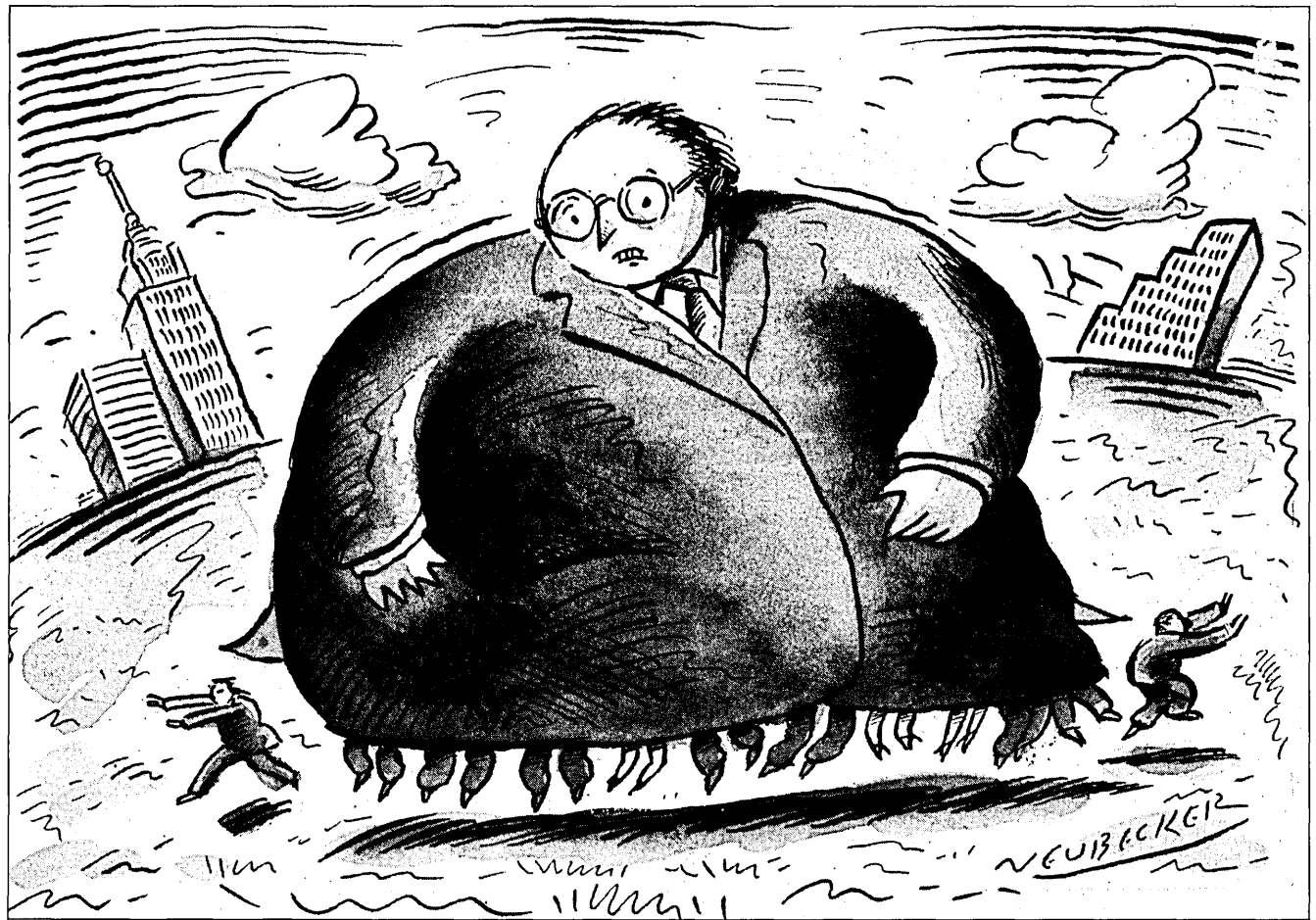


ILLUSTRATION BY ROBERT NEUBECKER

ment" feature. This allows Posix to be used with non-Unix operating systems. Should AT&T persist in stringent policing of its System V.3 technology, angry customers could be driven to Posix, or to the creation of Unix look-alike operating systems working with Posix, and thus could evade the issue of AT&T royalties and control altogether.

Well-placed observers say the System V.3 license was a major blunder—albeit a well-intentioned one. "There was no malicious intent on AT&T's part," says Unisoft's Ackerman. "The company was responding to the call for more leadership [see "Unix Family Feuds," Sept. 15, p. 30] and attempting to speed up the standards-making process. Unfortunately, its new licensing provisions aren't consistent with the needs of today's marketplace."

Ackerman says that two years ago, customers wouldn't have batted an eye at the licensing conditions. "Now that many companies are battling along with AT&T for control of the Unix marketplace, contractual terms are more important. Their lawyers tend to scrutinize these issues and get very nervous."

Thomas F. Cull, president and founder of the Westville Group consultancy in Westlake Village, Calif., adds that AT&T's customers need to be free to

make their own product development decisions. "They're concerned about entering licensing agreements without this flexibility," he says.

Meanwhile, AT&T is feeling the pressure of the Posix bandwagon, which is well on its way into user camps. The federal government and General Motors, two of the biggest Unix customers, have already thrown their weight behind Posix and are eagerly awaiting its emergence as a full-use standard in around one year.

"The problem with the SVID," says Roger Martin, manager of the Software Engineering Group at the National Bureau of Standards (NBS), "is that it is in

"AT&T seems to be more interested in policing the market with its license than in enabling it to grow."

the private sector, and hence can't be tested in the public domain like Posix."

Martin says that if AT&T can bring its SVID and Posix closer together, or ideally, make them one and the same, it would be possible for the NBS to test them both with the verification suite it is currently developing for Posix. "We don't think that NBS is an appropriate vehicle for verifying SVID conformance as things

stand, though we're sympathetic to X/Open and other AT&T customers who would like to see this," he says.

Klinger recognizes that the Unix industry may eventually shift to Posix. "We support the standard and want to bring it as close to the SVID as possible."

Further extensions to Posix are expected in the real-time area (where AT&T has no viable contribution at present) and in the areas of communications, graphics, and databases. AT&T now finds itself in the unusual position of having to stay in close touch with Posix development—in essence, be Posix conforming, if it wants future releases of System V to appeal to its customers.

International Data Corp., the Framingham, Mass.-based research group, anticipates that the total worldwide market for Unix hardware will be nearly \$10 billion in 1990—too big, perhaps, for one firm to continue dictating the evolution of the standard. Rebellion in the ranks of AT&T's customers and the rapid emergence of Posix are just early signs that the telephone giant is beginning to lose touch with the marketplace it created but that now seemingly has a life all its own. ©

International editor Paul Tate assisted in the reporting of this article.

ADAPSO

THE DOMINO THEORY

Charges fly over alleged IBM software bundling and the Hogan deal, but what will ADAPSO do?

by David R. Brousell

The votes confirming his election as the next chairman of ADAPSO had barely been counted when Jay Goldberg found himself in the middle of a political firestorm.

IBM was red hot. The ADAPSO leadership was recoiling. The board was huddling. And the usually soft-spoken Bernard Goldstein, the man who raised the age-old practice of matchmaking to a lofty art form in the software and services world, had a bemused smile on his face.

Had Goldstein, the well-respected ADAPSO pioneer, former executive of Tymshare and National CSS, the man who had married more than 150 companies in the industry, gone mad? If so, there was method to his madness. What was billed as a celebratory 25th anniversary meeting for ADAPSO turned out to be a hotbed of debate over IBM's alleged software bundling and whether the giant manufacturer had somehow erred in striking an exclusive marketing deal with banking software developer Hogan Systems Inc., Dallas.

In a speech immediately following a keynote address by IBM chairman John Akers, Goldstein unexpectedly attacked the Hogan deal. "The press releases have referred to this deal as a distribution agreement; I don't think so," Goldstein said in his speech. "We know that an exclusive license can be a form of acquisition when we see one. . . . Nor is this an isolated incident of IBM filling a small niche. I believe IBM is implementing a strategy and a program to dominate multiple horizontal and vertical software lines. I would like to suggest that this is not good for our industry, and it is equally not good for IBM." Goldstein called for IBM to voluntarily terminate the Hogan deal, and he asked ADAPSO for its support.

That started a large ball rolling. In a subsequent seminar, charges that IBM was again practicing bundling with its new SolutionPacs software and services offerings, of which the Hogan software is one, were thrown at Robert F. Berland, IBM vice president, strategy, Requirements and Quality Assurance, IBM Information Services, Milford, Conn. Berland

forcefully defended IBM's actions.

Chairman-elect Goldberg, who has advocated a more statesmanlike role for ADAPSO (see "Coming of Age," Oct. 15, p. 66), was facing his first test. The ADAPSO board, meeting in closed session, sought to put some distance between itself and Goldstein. Concern over Goldstein's press release, in which a headline referred to him as "ADAPSO Leader," prompted the board to send a letter to Akers saying that Goldstein, a partner in merger and acquisition consultancy Broadview Associates, Fort Lee, N.J., was expressing only a personal viewpoint, and that ADAPSO had taken no position on the Hogan deal. Meanwhile, they formed a committee to look into the issues raised at the conference.

The IBM representatives to the meeting, however, were still fuming. "These guys think they own the industry," says one IBMer who declined to be identified. "Well, I've got news for them; they don't." There was also consternation among ADAPSO leaders. "There was no need to undermine Akers," says Arthur Kramer, former ADAPSO chairman and chairman of Mobix Partners, Cherry Hill, N.J. "I think he [Goldstein] overreacted."

Goldstein, calmly acknowledging that he created a stir, was philosophical. "Well, we only meet twice a year." Goldberg, meanwhile, looked for a middle course, of sorts. "What IBM did from a legal standpoint is not bundling," he says. "But it is approaching bundling. It's a major issue we want to deal with, as is IBM's new strategy. But the Hogan deal is a completely separate issue."

Well, maybe yes; maybe no.

The product in the Hogan deal is a set of banking programs IBM calls Integrated Banking Applications. The software is grouped into a category of



BERNARD GOLDSTEIN: "This is not good for our industry."

offerings called SolutionPacs, which IBM introduced along with its new 9370 mid-range computer. The eight SolutionPacs are described by IBM as a series of "predefined packaged offerings that include software and services," with pricing customized or fixed.

Some feel the combination of software and services under one packaged price amounts to bundling, a phrase traditionally used to describe IBM's combination of hardware and operating systems under one price prior to 1969, the year Big Blue unbundled and began pricing them separately. Others, however, aren't convinced.

Ernest "Lee" Keet, a senior partner in Vanguard Atlantic Ltd., Wilton, Conn., told IBM in Phoenix, "You have rebundled solutions in specific areas to

"These guys think they own the industry. Well, I've got news for them; they don't."

the exclusion of other players." Keet says there's nothing unfair or illegal about the IBM offerings, but it does "raise the ante" for companies that have to compete against IBM's marketing muscle.

Martin A. Goetz, chief technology officer at Applied Data Research Inc., Princeton, N.J., and a well-known maverick who has fought in the past over alleged bundling of the SSX operating system on the Series/1, is not as worried. "It's not unfair, and there is no proof they are dominating these areas," he says.

So what's all the fuss about? Part of it is a domino theory Goldstein and others are advancing that has as its underpinnings the powerful market position of IBM. The theory holds that IBM will make deals like the one with Hogan in a variety of vertical markets, put the marketing squeeze on the remaining, weaker competition with packaging moves such as the SolutionPacs, and end up frustrating the development of software, hurting users by limiting choices, and constricting options for IBM.

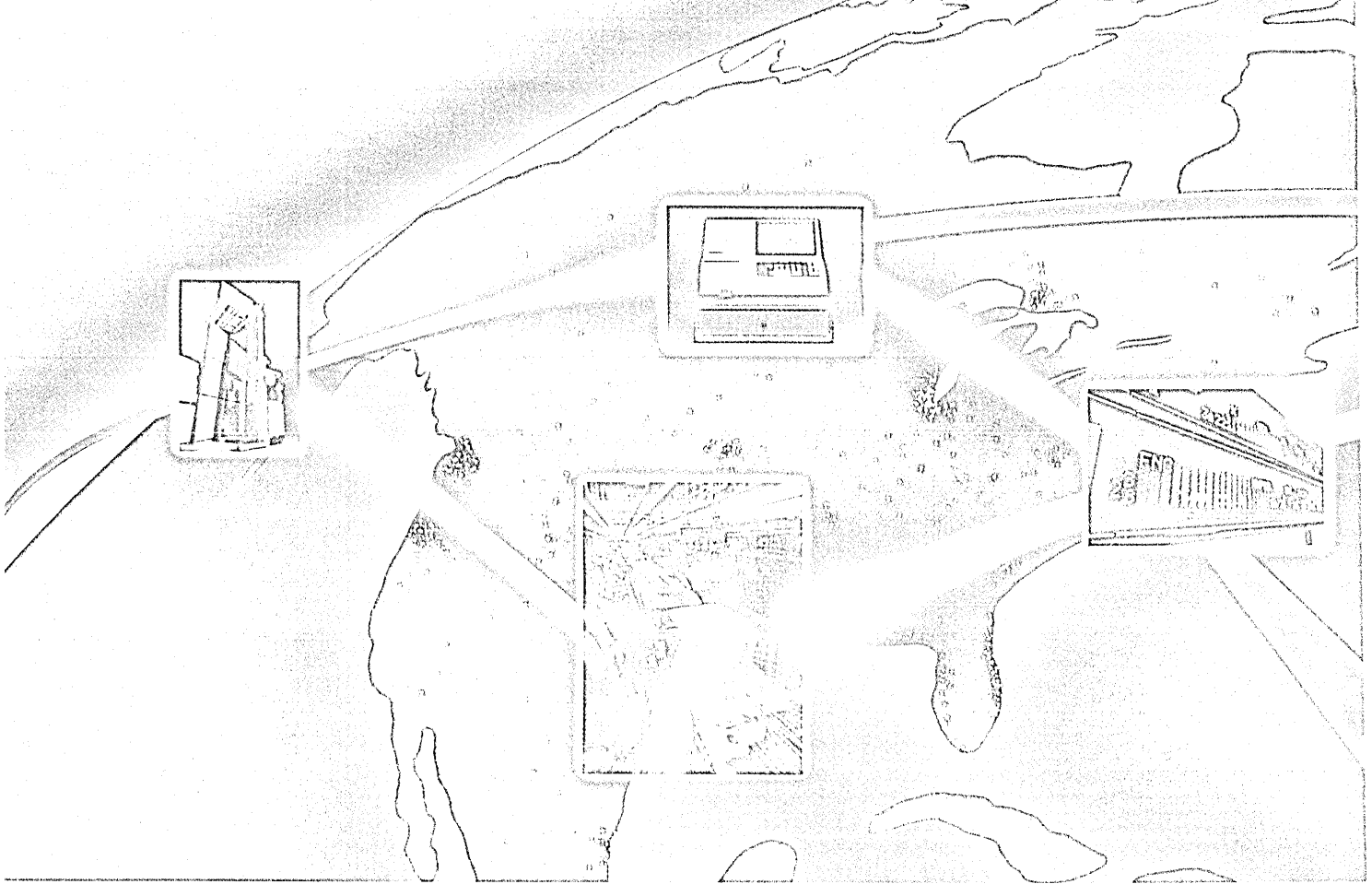
IBM, while acknowledging at least publicly that it needs the independent software producers, says the Hogan deal and the SolutionPacs are good for the industry.

"I understand all this makes some people nervous," Berland told the seminar, "but there are [application] areas that need to be addressed. Some are not growing as fast as we want. When we pick an area, we feel we need to. I think it's healthy to stimulate competition."

He defends the SolutionPacs and denies they are examples of bundling. "It's not bundling. All can be bought separately," he says. "I don't consider it bundling at all. You should look at the

THERE'S
A NEW BIG
4-STAR LINE
TO HELP
STAY
ON LEASED
LINES.

TELENET. SENDING DATA

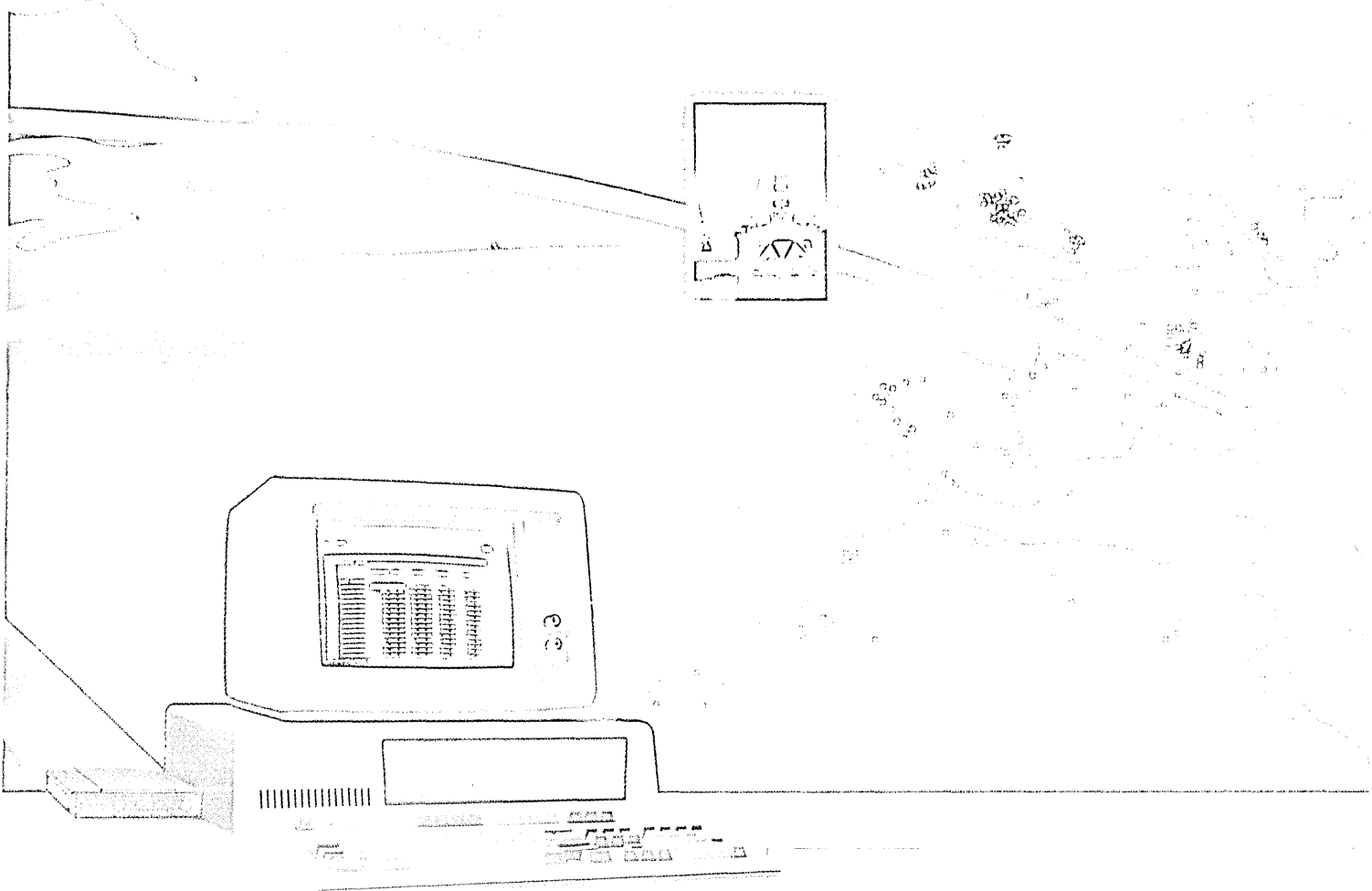


TELENET is the largest, most reliable, and most secure data network in the world. It connects more than 100,000 computers and terminals in over 100 countries. TELENET is a fully dedicated, high-speed, wide-area network that provides secure, reliable, and efficient data transmission. It is the only network that offers you the ability, reliability, and security of a dedicated network. TELENET has developed and installed more than 100 dedicated networks for corporations, government agencies, and countries worldwide. We also operate the world's

HOST TO HOST. FOR IBMs, DEC's, HP's... THE SKY'S THE LIMIT.

largest, most reliable, and most secure data network in the world. TELENET is a fully dedicated, high-speed, wide-area network that provides secure, reliable, and efficient data transmission. It is the only network that offers you the ability, reliability, and security of a dedicated network. TELENET has developed and installed more than 100 dedicated networks for corporations, government agencies, and countries worldwide. We also operate the world's

TA TO WORK FOR YOU.™



YOU HAVE TO BE BIG TO OFFER THE BEST.

Send your files to a remote server, and all your voice and data needs can be handled by one leading communications company.

HAVE YOUR COMPUTER CALL OURS.

Don't be paying 40¢ a month on leased lines. You could be paying 10¢. Telenet can increase your efficiency. And sending you more. Have your computer call ours today.

- With a PC or terminal supporting asynchronous communications, using your modem, dial 1-800-424-9494.
- Wait for connection, then press carriage return (CR) twice.
- At TERMINAL= press CR.
- At a type press CR.
- At USER NAME? type press CR.
- At PASSWORD? type press CR.

Telenet

A US Sprint Company

SENDING DATA TO WORK FOR YOU.™

© 1986 Telenet Communications Corporation. US Sprint Communications Company is a GTE/United Telecommunications Partnership.

NEWS IN PERSPECTIVE

definition of bundling." Berland also notes the exclusivity of the Hogan deal is only a one-way street; IBM can market any other banking company's products if it strikes a deal to do so. But he hints that isn't likely. "I think there is an obligation when you set up a deal to be as equitable as possible," he says.

Another part of the fuss, particularly on the part of ADAPSO and its members, has to do with communication. Sources say that at the most recent quarterly meeting between IBM and ADAPSO, a procedure put in place a couple of years ago enabling the trade organization and

"What IBM did from a legal standpoint is not bundling. But it is approaching bundling."

IBM to discuss areas of interest and concern, the SolutionPac concept was reportedly discussed, but IBM executives at the meeting apparently never mentioned two occurrences that, when ADAPSO members subsequently found out about them, caused concern.

One had to do with the Expert System Assistance SolutionPac, which carries a one-time charge of \$67,500. The total price of all components in this SolutionPac was found to be 10% less than the sum of individually priced components. IBM announced this pricing for the expert system product in its Oct. 7 Programming Announcement document. The second occurrence was for a series of four System/36 Total System Packages, which include cpu, operating system, and utilities, but not applications. Each of these carried a 5.5% reduction when bought as one package. This information was also announced on Oct. 7.

Berland acknowledges that the information was not provided at the meeting, but he defends the two instances of packaged price reductions as specific occurrences. "I presume the two [IBM] executives present [at the meeting with ADAPSO] didn't realize that," he says. "But we make these decisions area by area, on a case-by-case basis. Personally, I think there has been a tremendous over-reaction."

The Hogan deal, meanwhile, has not been lost on users or competitors.

Bill Synnott, director of information systems and services at First National Bank in Boston, says the IBM imprimatur is significant. "It certainly makes a difference," he says. "The resources of IBM give the feeling that it [a company like Hogan] won't collapse."

John J. Cullinane, chairman of Cullinet Software, Westwood, Mass., also believes the Hogan deal "is a legitimate concern. Marketing is something IBM is good at. Some will consider IBM/Hogan

where they would not have before. But Hogan has had its problems, and they're well documented [see "Banking On Big Blue," July 15, p. 34]."

Cullinane notes that IBM made many marketing agreements for software when the PC was introduced, and that a lesson was learned thereafter. "IBM came out with their own software and stiffed all those guys," he recalls.

Whether IBM's approach with Hogan and the SolutionPacs will eventually succeed or whether the issues will fade as did the brouhaha over the SSX operating system, remains to be seen. "The antitrust issue was never resolved," says Thomas J. Lawton, editor of Computer Services Report, Belmont, Mass. "If, as a trade association, they feel it's [the SolutionPacs] a predatory practice, they have to be prepared to pursue it after Reagan leaves office."

That pursuit, if it ever occurs, would be a long way off, but the wariness will continue. Says Keet, "ADAPSO should be at the forefront in educating its members to walk down the red carpet, as long as it's not a dragon's tongue. But I think it's a dragon's tongue." ©

MINICOMPUTERS

CURRENTS GONE AWRY

A RISC machine maker struggles to win back users' confidence in the shadow of mighty DEC.

by Jeff Moad

Five years ago, Pyramid Technology Corp. had all the answers. The Mountain View, Calif., startup was in the process of raising \$31 million to build a 32-bit computer based on a then little-known reduced instruction set architecture called RISC. Pyramid would package its system with the Unix operating system and offer users of Digital Equipment Corp.'s VAX a less expensive, higher-performance alternative able to run nonproprietary software. The so-called VAX Killer was born.

Lately, things have not gone exactly according to plan for Pyramid. After jumping off to a fast start, growing to \$34 million in 1985 sales and going public earlier this year, the erstwhile VAX Killer is struggling to avoid becoming the VAX Victim. In the second half of 1986, Pyramid has reported consecutive quarterly losses totaling nearly \$4 million. Pyramid

is now hoping that an upgraded version of its RISC system and a new solutions-oriented marketing approach can restore its lost luster.

The problem Pyramid has struggled with is one that will face a large group of young companies that followed it in targeting the DEC VAX customer base: how to build new, compatible generations of an initial product and maintain a price-performance edge over DEC.

Pyramid's RISC computer design was supposed to make that task easier. Because a RISC architecture is simpler than conventional designs such as VAX, its proponents argued, it should be easier to implement a RISC cpu in high-speed VLSI logic and take advantage of new, advanced semiconductor technology. Then, package several such RISC VLSI chips packaged together, and you've got power to burn in a small, low-cost package. At least that was the plan.

To date, the company has not succeeded in developing a VLSI version of its architecture, nor has Pyramid been able to bring to market a version of its system using more than two RISC processors. There have been delays in incremental upgrades to Pyramid's original 3MIPS 90X processor. Pyramid's most significant upgrade to date, the 5MIPS 98X dual-processor system, fell about a year behind the company's internal schedule, sources say. A new I/O processor to go along with the 98X was almost two years late, and still doesn't support some of the promised integrated tape drive and Ethernet functions.

Pyramid users interviewed by DATAMATION did not wish to be quoted, but some expressed impatience with Pyramid's product upgrade delays. Their mood was not improved in recent months as they watched DEC make major performance upgrades to its VAX line with the 4.5MIPS 8600, the 6.5MIPS 8650, and the 12MIPS 8800. Suddenly Pyramid found itself being outgunned in its own performance game by DEC. According to analyst Omri Serlin of Los Altos, Calif.-based

"Pyramid can't afford to fall any further behind DEC."

ITOM International, "With the new products, DEC was more powerful than Pyramid. Higher performance was the thing that had gotten Pyramid in the door at a lot of accounts, but with that gone, they were in a much weaker position."

While Pyramid has managed to hang on to its most significant block of customers—several of the Bell operating companies—other Pyramid users have begun to look elsewhere, either to DEC or to younger startups such as Sequent Computer Corp., Portland, Ore. Boeing is

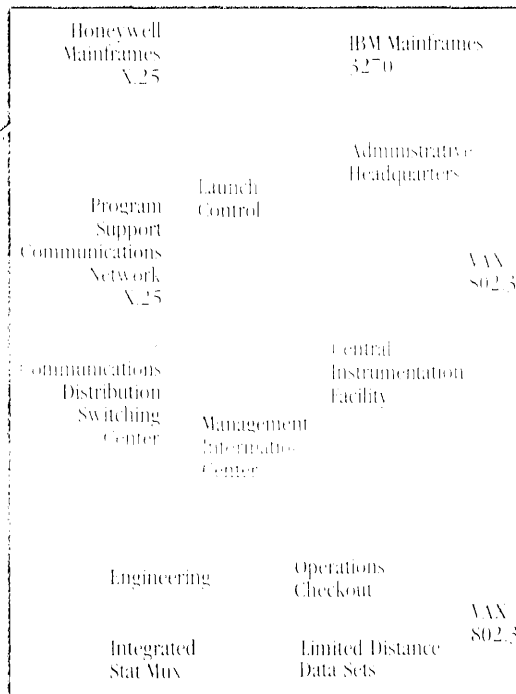
The Common Sense Data Network

The solution to most real-world data communications needs is a hybrid network. One that complements the performance features of LAN and the efficiency of a WAN.

It's simple common sense and it's called DevelNet.

In its most basic form, DevelNet is a data system—but with a significant difference. DevelNet is the most sophisticated data switch available today.

DevelNet features unlimited growth, conventions, data gateways, capabilities, and gateways to complement your existing S02.5, X.25 and T1 networks. DevelNet's performance is proven daily at NASA's Kennedy Space Center.



If you're in the market for a high performance, cost effective data network, you can't afford not to consider DevelNet.

Call us toll free:

In US: 800-423-9210

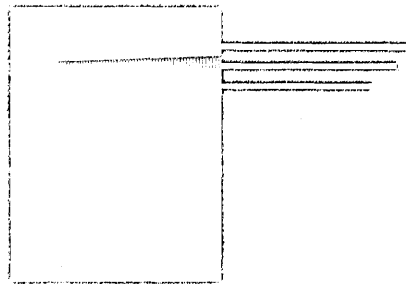
In CA: 800-423-9097

In Canada: 800-268-2349

Or write to receive your DevelNet literature: A Common Sense Approach to Data Networks

6701 Stevens St., Ontario, CA 94568

Real World Data Communications Network



DevelNet
The Common Sense Network

Develcon
The Standard-Begin in Data Communications

Circle 16 on Reader Card

NEWS IN PERSPECTIVE

reportedly close to abandoning Pyramid, as is the University of Illinois. Executives at those locations did not comment.

In order to avoid losing one of its largest end-user customers, Pyramid late last year was forced to ship a preproduction version of the 98X to New York law firm Davis Polk & Wardwell, according to an MIS official at the company who asked not to be identified. Pyramid in recent months also has heavily discounted its systems in order to avoid losing key customers. One such user is Mirror Systems, a Boston-based subsidiary of the Times Mirror Co., which stayed with Pyramid after receiving a large price cut.

In an interview before his recent resignation, Pyramid president E. David Crockett acknowledged that the company had cut prices to hold on to some accounts. "There are some existing customers we don't want to lose right now," he said, and Pyramid has the excess capacity to permit discounting. Earlier this year the company was planning for a 50% increase in sales, but actually saw only a 30% boost, most of that coming from overseas markets such as Australia.

Crockett, who was brought in as Pyramid's president in September 1985, attributed the slower than expected sales growth to the overall industry slump and to the rejuvenation of DEC's VAX line. "The stagnant computer market drives some users to make a more conservative [buying] choice," he said. Additionally, "DEC's had the best product offering they've had in years. Now we have to fight back and say, 'Okay, DEC's announced all its new machines. Now we're in a cycle of announcing our answer.'"

Pyramid's first volley came recently with the introduction of its 7MIPS 9810 single-processor system and its 9820 12MIPS dual-processor system. Selling at \$200,000 and \$300,000 for packaged systems including disk and tape storage, the new systems are designed to allow Pyramid to at least catch up with DEC's current performance levels when it starts shipping in the first quarter of 1987.

Most observers agree the 9810 and 9820 alone do not solve Pyramid's need for a new product generation. The new 9000 products get their improved performance through the addition of floating point accelerator hardware and an extra stage of pipelining that cuts in half the average number of cycles it takes the Pyramid system to execute an instruction, from 3.2 to 1.6. Although the I/O technology on the 9000 systems now integrates the Ethernet and tape support originally promised on the 98X, the hardware is still implemented in the original TTL technology and does not support more than two processors.

Pyramid is still working on that

full next-generation leap. The company is currently pumping lots of cash into the development of both a four-processor RISC system and a VLSI version using fast CMOS technology that will cut power consumption requirements. In fact, Pyramid may introduce the four-processor product as early as February, with initial shipment around midyear. Pyramid is shooting for 20MIPS performance from the four-way system, which will be priced in the \$500,000 range. Pyramid has a working prototype of the system.

The CMOS project, which Pyramid hopes will allow it to package a larger number of processors into one system, represents a change in direction for the company. Until earlier this year, the company was financing development of a VLSI version of the RISC system that used ECL technology. That project, called 300X, has been folded into the CMOS development and is now seen as a performance accelerator add-on to the main product.

Pyramid's tardiness in coming up with a new product generation has frustrated many inside the company who say Pyramid management, until recently, put more time and money into product sales than product development. Several key

Pyramid may introduce the four-processor RISC product as early as February, with initial shipment around midyear.

engineers, including vice president for computer architecture Robert A. Ragan-Kelley, have left Pyramid in the last year. According to one of those former engineers, who asked not to be named, "Pyramid can't afford to fall any further behind DEC. They've got to keep to their current development schedules or they're in deep trouble."

Crockett said Pyramid hasn't missed an internal development deadline since January. The company hopes the CMOS version of its system will be available sometime in 1988. By then, many observers expect Pyramid to face stiff competition from products based on new, more powerful microprocessors from Motorola and Intel and from new entrants like MIPS Computer Systems, Sunnyvale, Calif.

In a bid to speed development of the CMOS product and to boost volumes and cut costs, Pyramid is working on its development with LSI Logic Corp., Milpitas, Calif., and looking for partners interested in licensing the technology for use in their own products. Pyramid is in active licensing negotiations with several Far East companies. The company is looking for licensing deals with firms selling into noncompeting markets or geographic areas, a condition that might

exclude Pyramid's most significant current oem business partner, Nixdorf Computer AG. Nixdorf will resell the new 9000 cpu in Europe, however, under an existing five-year agreement valued by Pyramid in excess of \$35 million. Nixdorf also is evaluating the four-processor product.

While Pyramid pushed ahead with its ambitious new product development plans, the company, under Crockett, was trying to transform itself from being strictly a purveyor of faster commercial hardware to being a provider of hardware and software solutions. Crockett said he started by helping Pyramid identify its user base, something the company had neglected to do in its early days. "Our salesmen used to go to a user and ask, 'Do you know what Unix is? Have you ever heard of a superminicomputer? Okay, I've got a product for you.'"

As it turned out, many of Pyramid's customers, like Johns Hopkins University, use the systems as dedicated database processors, so Pyramid has been working hard at moving the more popular Unix database management software products to the Pyramid hardware.

With Crockett's departure, it is unclear whether his solution strategy will continue at Pyramid.

The company has also become more active in packaging workstations and applications along with Pyramid hardware for customers who want to buy from a single vendor. Pyramid recently sold a system with card readers and workstations to Bennett and Jones Co., a large Canadian printer. Pyramid already supports the Network File System standard, and recently the company announced direct network support for IBM PC, Macintosh, and Sun Microsystems workstations, a capability that should boost the company's solution-selling efforts.

Some observers are optimistic that new products and a stronger solution-selling focus can return Pyramid to the black. Hambrecht & Quist analyst Jeff Canin is predicting Pyramid will be profitable in 1987 on sales of \$60 million, up 37% over 1986. Pyramid still has a long way to come back, especially if it hopes to redeem itself in the eyes of some users and in the opinion of Wall Street traders, who have driven the company's stock price down from \$16.75 to under \$5 a share today, below the company's book value.

According to B.O. Evans, chairman of Ridge Computer, San Jose, another RISC startup that has had problems keeping up with DEC, "When you look at DEC and the long list of applications they support, you can't be just a little better on price/performance and win. You've got to be way better. If you sit on your duff and fall behind in performance, you're going to get killed." ©

PLACE YOUR BETS

Old and new players in the computerized brokerage services game are putting their money on microcomputers.

by Susan Kerr

High stakes and big bucks are common on Wall Street, but lately one of the biggest financial games has been taking place in an unlikely spot: the computer rooms of brokerage firms.

For years, a few companies, most notably Quotron Systems Inc., Los Angeles, and Bunker Ramo Information Systems, Trumbull, Conn., have comfortably handled the business of offering real-time news and quotation services, direct order entry, and other support services to brokers and traders. Unfortunately for them, their niche has begun to attract a lot of attention.

An impressive group of multi-billion-dollar computer and finance companies are now entering the brokerage service ranks. IBM teamed up with Merrill Lynch & Co. to form an on-line service called International MarketNet Inc. (or Imnet). Wang Laboratories recently acquired Walsh Greenwood Information Systems Inc., New York, and now markets the firm's micro-based line of Shark quotation systems. Another big name, AT&T, made an abortive attempt in the market this year, but says it's still interested in what the future may hold.

Quotron and Bunker Ramo hardly have been sitting still, with each recently gaining a new backer. Earlier this year, Automatic Data Processing Inc. acquired Bunker Ramo from Allied Corp. for an estimated \$70 million and Citicorp paid a whopping \$680 million for Quotron, which was then publicly held. Beyond these two are a myriad of competitors, including Reuters Holdings PLC, a big force overseas but not yet in the U.S., as well as Telerate Inc., New York.

The brokerage service industry is one of those niche markets that is lucrative for the few companies that dominate it, but is not particularly fast growing. Analysts estimate that the market, worth between \$500 million and \$1 billion, is growing by 10% annually. Also, the market is saturated—most of the several hundred thousand brokers and account exec-

utives in the U.S. already use one or more computer terminals for up-to-the-minute access to market data services.

So why do IBM and the others want to enter such a market? Simply put, the pc revolution is finally hitting Wall Street. The traditional setup of a computerized brokerage service was a dumb terminal connected to a minicomputer. Now, all the vendors are experimenting with some form of distributed processing, most typically replacing dumb terminals with IBM PCs or compatibles.

Microcomputers would reduce the clutter of terminals on brokers' desks as well as integrate standard office automation tasks into the trading cycle. Furthermore, vendors say, there's the potential for the introduction of expert systems technology, which could allow brokers to act upon the incredible amount of data on hand in more timely and creative ways. And since many brokerage houses typically lease quotation systems under multi-year contracts, replacing terminals with microcomputers is a viable possibility.

Firms not only are trading more, but they are doing so in a greater number of ways. "At the brokers' desks right now there's a margin crunch on," says Wang financial industry group vice president Samuel Gagliano. "A lot of workstation intelligence means applications can be developed to give brokers more choices."

Although the promise of pcs is hardly new, Wall Street firms are just beginning to show their interest in the most persuasive manner: contracts. In October, E.F. Hutton & Co. awarded a \$20 million contract to NCR for IBM AT-compatible workstations, which will replace Bunker Ramo dumb terminals. Merrill Lynch, under the auspices of Imnet, has begun installing 22,000 IBM PC-based workstations in 400 regional locations.

This trend has not escaped Quotron and ADP, although both question the speed with which micros will overtake Wall Street. ADP recently began offering systems based on the IBM PC to augment its line built around San Jose-based Convergent Technologies Inc.'s Ngen computer. Although ADP vice president John Gaven says that many brokerage houses so far have been slow to see the need for pcs, he concedes that intelligent workstations offer great promise. One reason is that "brokers want additional office automation." However, says Gaven, "Although the hardware is there, all the applications haven't been written." So, he adds, "there's still a lot of life left" in the older Bunker Ramo terminals.

Brokerage leader Shearson Lehman Brothers Inc. is definitely interested in the possibilities of distributed processing, but recently found itself in the midst of an uncomfortable situation. The firm

was to have been the first major site for a new product developed and marketed by Quotron and AT&T, incorporating Quotron's 68020- and Unix-based Q1000 minicomputer and AT&T's Unix PC workstations. According to published reports, Shearson had agreed to purchase roughly \$150 million worth of products and services during the next five years, but canceled the deal in the wake of the Citicorp acquisition. Citicorp, Shearson felt, is too close a competitor to be a major supplier.

As a result, AT&T has apparently disbanded its short-lived efforts to enter the brokerage services market. Why is not clear. AT&T is hard put to talk about the situation. Barry Campbell, an AT&T spokesman, tersely comments, "When it became apparent that Citicorp would acquire Quotron, we [realized] we probably would not be able to go through with it. It triggered whether we could continue." But Campbell says AT&T is "still interested in" the financial marketplace.

George Levine, Quotron marketing vp, says something may still come of the aborted relationship. "We have their Unix PC connected to the Q1000 and we're able to upload and download data into the Unix PC," he says. "We've gotten very far. We could sell it now."

Levine adds that Quotron currently is renegotiating a 39-month contract with Shearson and doesn't dismiss the possibility that the contract may still come off. Shearson did not comment on that situation by press time, but word is that the firm is considering continuing the relationship. Although the Citicorp

The personal computer revolution is finally hitting Wall Street.

merger "wasn't our choice," Levine contends that "Citicorp has averred it will keep us as a separate company. We can serve anybody."

But a sampling of Wall Street firms contacted by DATAMATION reveals that buying from a competitor, while not preferable, is not out of the question. That may be good news for Merrill Lynch and Imnet.

Merrill Lynch operates the nation's largest securities firm. Imnet was formed in March 1984 and today employs 250 people. Merrill Lynch and IBM each own 50% of the New York-based company, and reportedly have invested more than \$100 million in the venture. Obviously, Imnet was not founded just to serve Merrill Lynch.

According to Imnet president and Merrill Lynch veteran Joseph Castellano, when Merrill Lynch started Imnet, "we were the first ones to say, 'Go with a pc on your desk.' [Merrill Lynch] was dissatisfied with their vendor. They wanted to



Bell Atlantic Systems Leasing

Formerly Greyhound Capital Co.



OUR NEW COMPUTER LEASING COMPANY WAS FIFTH IN THE INDUSTRY BEFORE THE PAINT WAS DRY.

Yesterday it was Greyhound Capital Corp.

Today it's Bell Atlantic Systems Leasing, part of the Bell Atlantic family of companies. It's one of the largest companies of its kind, with a 22-year history of providing computer operating leases with maximum flexibility.

It still keeps your equipment humming without maintenance or obsolescence worries.

It still supplies IBM and other leading-edge equipment when and where you need it, nationwide and in select overseas markets.

But under its new name, Bell Atlantic Systems Leasing is one piece of a whole that is of greater value to you than the sum of its parts.

BELL ATLANTIC'S FINANCIAL SERVICES FAMILY

Our new computer leasing company joins Bell Atlantic TriCon Leasing, under the Bell Atlantic Capital Corp. umbrella. TriCon specializes in direct lease financing for any kind of business equipment, from telecommunications to transportation, for vendors or end-users.

Separately, each company is a major player in its field. Together, they provide effective finance solutions to the full range of your business' technology and equipment growth needs—from one source.

Yet another member of the family is Bell Atlantic Properties, offering commercial real estate development, investment and consulting.

WE'RE EXPERTS IN FINANCING GROWTH

Leasing financed more than \$93 billion worth of equipment across America last year, making it the preferred source of capital for acquiring equipment.

And Bell Atlantic Capital Corp. is the expert, with a combined 40 years' experience. Operating leases, direct finance leases. Computer equipment, general equipment. Immediate response, immediate availability of new technology. All at competitive rates, that conserve your needed capital.

We're one of the largest in computer leasing, and in the top 10 in overall equipment leasing.

So if you're considering any kind of equipment, consider your options first. For our informative booklet, or to contact someone directly, call us toll-free.

Bell Atlantic Systems Leasing 1-800-528-0358

Bell Atlantic TriCon Leasing 1-800-526-4672

 **Bell Atlantic
Capital Corp.**

Presenting computers that fit them

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

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

Where do these systems fit in?

Here.



Mainframe Territory

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

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

Because of the familiar architecture, personnel trained in IBM mainframe use will be at home with 9370s. With new pre-packaged software, novices will soon feel at home as well. And 9370s will likewise be at

home in many roles: as host systems, departmental systems or remote extensions of existing mainframes.

As your needs grow, 9370s can grow with them—with larger processors and more storage that's affordable and easy

to install. Giving you a five-fold power range in the 9370 line—and a hundred-fold span of computing power within the 370 family from the entry-level 9370 to IBM's biggest mainframe.

Rugged Individualism

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

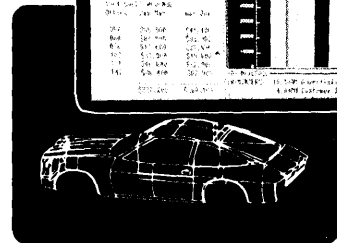
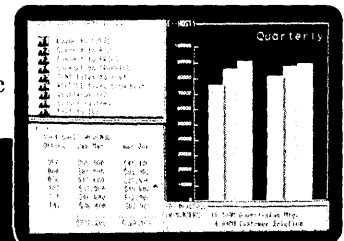
System/36 is IBM's simplest and least expensive entry point into mid-range computing. In addition to being IBM's most user-friendly mid-range system, System/36 also offers

a broad spectrum of application software from specific industry solutions to office applications that suit any business.

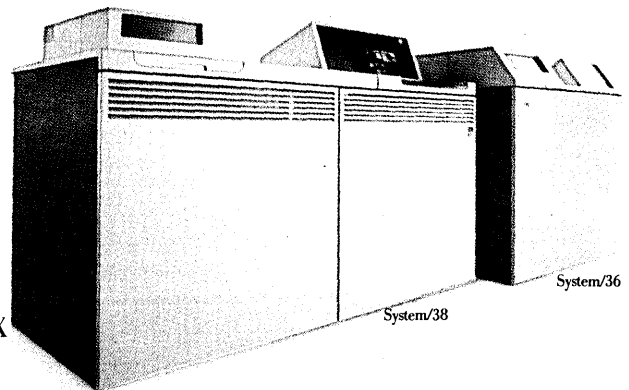
For growth, the System/38 provides a built-in relational data base (allowing you access to data on your own terms) as well as a toolbox of programming aids to help you, in a remarkably short time, custom-design applications that fit the job at hand.

The System/3X family members function equally well

Here.



Here.



System/3X

System/38

System/36

the mid-range in where you need most:

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



Here.

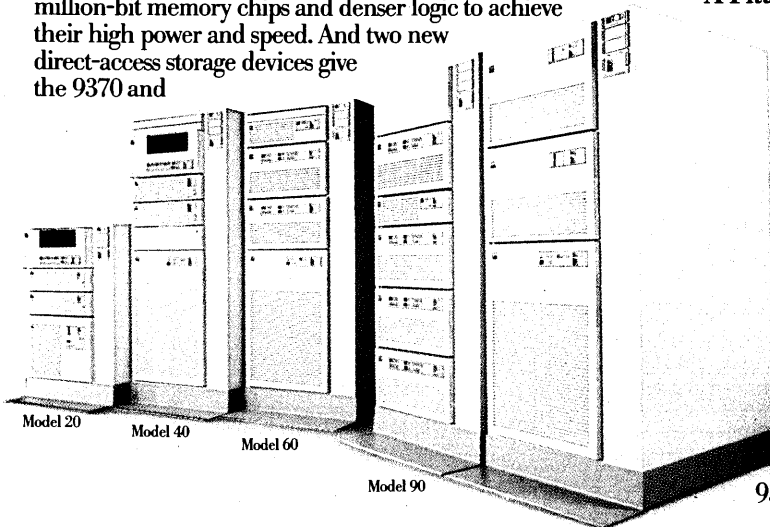
And if you need more power, you can expand the System/36 and System/38 independently, or you can link them in a network where they can share information and resources.

The System of Choice

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

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

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



System/3X increased capacity with unusual economy.

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

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

Here.

Where You Work

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

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

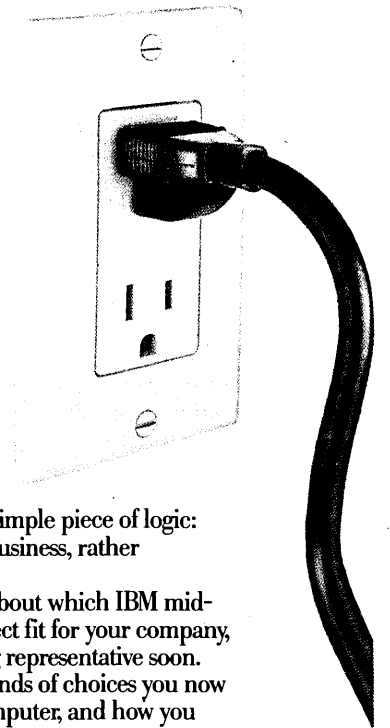
A Fitting Conclusion

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

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

As it's only fitting you should.

IBM, the IBM logo, and the System/3X logo are trademarks of International Business Machines Corporation. © Copyright IBM Corporation 1986

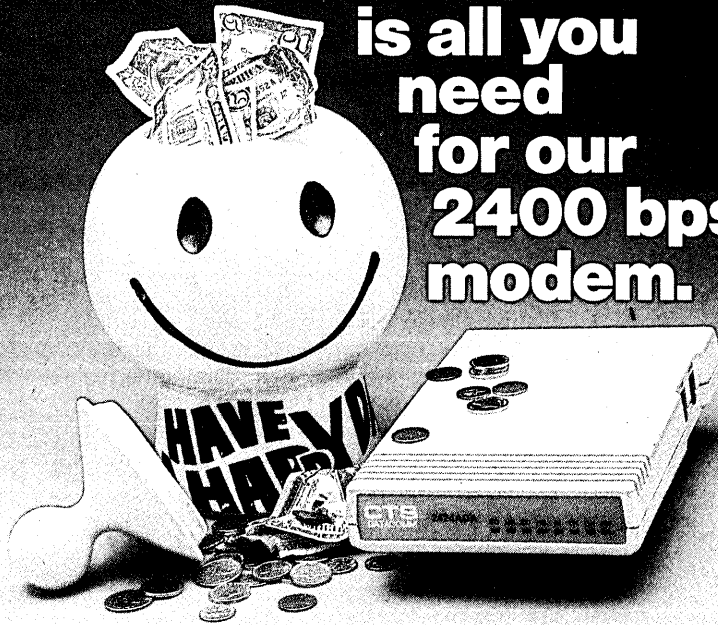


The IBM Mid-Range. The System of Choice.

CIRCLE 14 ON READER CARD

\$395

is all you
need
for our
2400 bps
modem.



\$395 includes the bells and whistles

• Auto dial/auto answer • 2400/1200/600/300/110 bits per second operation • Synchronous/asynchronous • Remote and local diagnostics • Integral adaptive equalization • CCITT V.22 bis, V.22 A/B, Bell 212A, Bell 103/113 and Hayes command set compatibilities • Optional MNP* and X.PC** error correction protocol

\$395 includes our signal processor with surface mount technology

We've designed our own signal processor. We do not rely on a market dominating vendor like our competitors must. We incorporate surface mount and low power technology in our manufacturing. These two reasons are why our 2400 bps modems are less expensive than almost everyone else's.

\$395 includes a two year warranty, stocking distributors who provide immediate service and a company whose history is 90 years of reliable products

Enough said. Call us toll free at 1-800-328-6104 for more information or for your nearest CTS DATACOMM distributor.

CTS
DATACOMM

DATACOMM Products Division CTS Fabri-Tek, Inc.
6900 Shady Oak Road Eden Prairie, MN 55344
612-941-9100

NEW TO THE INDUSTRY SINCE 1896.

*MNP is a trademark of Microcom
**X.PC is a trademark of Tymnet, Inc.

NEWS IN PERSPECTIVE

get the kinds of automation they needed." Imnet began offering its first product, the System 100, in August 1985. Another product, the System 500, is just now entering beta sites at Merrill Lynch, Drexel Burnham Lambert Inc., and a third undisclosed firm.

The vendor Imnet will replace inside Merrill Lynch is Quotron. Merrill Lynch currently accounts for 25% of Quotron's business. "I know they're working very hard, [but I've] not yet seen a proven product," says Quotron's Levine. "Our contract with Merrill Lynch goes through next year with an option for an additional year. We understand what we can do for them and we think we can do it better than they can do themselves."

IBM isn't the only hardware company interested in the brokerage market.

A lot of workstation intelligence means applications can be developed to give brokers more choices.

Wang Laboratories hopes to make a splash with its newly acquired Shark quotation service. Wang's Gagliano says there are today 1,700 installed Sharks.

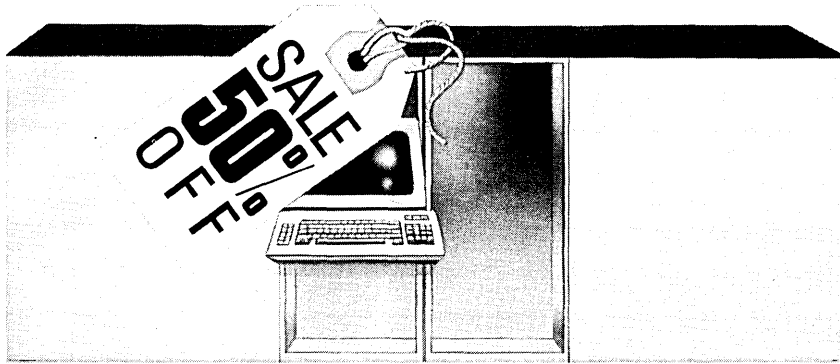
Wang can sympathize with Quotron because it's been there, remarks Gagliano. "When Wang started with word processing in 1972, why did Wang grow as big as it did?" he asks. "Because it had a good product and was the only show in town. Isn't that the same with Quotron? But single-function machines don't make it anymore. History is repeating itself. Pretty soon, brokers will realize that they need databases there [residing in their desktop systems]. With the focus in the financial industry on deregulation, a broker needs the services of a decision support system."

Nevertheless, with all the vendors leaning in a similar direction, the question of differentiation arises. They already for the most part offer the same quotation services, such as broadcasts of the New York Stock Exchange and access to the Dow Jones News Service. And if microcomputers are commodity items, where's the attraction for this crop of suppliers?

Vendors are trying to outshine each other by concentrating on specific features. Imnet, through the help of IBM, has devoted a great deal of time to networking, says Merrill Lynch's Castellano. In addition to a coprocessor card for the PC, it's developed a card that allows the PC to hook up to the Series/1.

"We're using a very special LAN engineered for us by IBM," Castellano says. "It's neither PC Net nor token ring. It's basically a radial LAN providing 1.5 million bits per second to each workstation. We're experimenting with several

GET HALF-A-COMPUTER FREE WITH ORACLE VERSION 5



With ORACLE version 5, you save half the computer you thought you needed in order to "go relational"... some benchmarks indicate you save even more.

WHY IS VERSION 5 OF ORACLE SO FAST ON MAINFRAMES, ON MINIS AND ON MICROS?

□ REASON #1: AI OPTIMIZES QUERY PROCESSING.

V5 applies artificial intelligence to SQL query optimization. For example, few DBMSs can optimize the query "Select accounts 90-days overdue and accounts over \$10,000." But only ORACLE can optimize "Select accounts 90-days overdue or accounts over \$10,000."

□ REASON #2: ARRAY PROCESSING OPTIMIZES ACCESS TO LARGE SETS OF DATA.

Relational DBMSs have always dealt with logical sets of data. But they manipulated only one physical record at a time. V5 eliminates overhead by physically delivering arrays of hundreds, even thousands, of records at a time.

□ REASON #3: PARALLEL-PROCESSING OPTIMIZES COMPUTER RESOURCE USAGE.

V5 is 100% re-entrant shared code, and ORACLE's parallel-processing architecture fully exploits modern dyadic and quadratic processors from IBM, and other multi-processing computers such as those from DEC and Stratus. So ORACLE uses all the MIPS in parallel-processor configurations.

□ REASON #4: MULTI-TABLE CLUSTERING OPTIMIZES JOINS.

ORACLE stores data from different tables on the same physical disk page. This technique—called *multi-table clustering*—permits you to access data from multiple tables in one disk read operation. Clustering improves ORACLE performance on all multi-table operations, such as join queries, update transactions, etc.

□ REASON #5: HIGH-SPEED RELATIONAL SORT FACILITY OPTIMIZES DATA AGGREGATION

Ad hoc relational queries frequently request that data be grouped, ordered or otherwise sorted. V5's internal sort facility performs aggregation and elimination early, faster than previously thought possible.

□ REASON #6: EFFICIENT ROW-LEVEL LOCKING OPTIMIZES TRANSACTION THRUPUT.

Row-level locking and a read-consistency model optimizes ORACLE V5 transaction concurrency. For the first time, high transaction thruput is achieved by a fully relational DBMS.

THE ULTIMATE REASON

Oracle introduced the first relational DBMS and the first implementation of SQL back in 1979. Today ORACLE is installed on thousands of minis and mainframes, and over ten-thousand PCs. ORACLE is the only SQL-compatible relational DBMS that's portable across IBM mainframes, DEC, DG, HP and most other vendors' minis and micros, including the IBM PC. And ORACLE applications and databases are connectable across different hardware and operating system, providing you with a true distributed solution to your information needs.

Spend half a day at an Oracle seminar in your city, and find out how you can have the benefits of a portable, DB2-compatible relational DBMS... and save half a computer. Call our national seminar coordinator at 1-800-345-DBMS. Or write Oracle Corporation, Dept. V5, 20 Davis Drive, Belmont, CA 94002.

U.S. SEMINARS

AK Anchorage Sep 9	Jacksonville Aug 5	Grand Rapids Oct 16	Cincinnati Aug 5, Oct 21	Houston Aug 19, Sep 11,
AL Huntsville Dec 9	Orlando Sep 17, Nov 18	MN Minneapolis Jul 22, Sep 9,	Cleveland Jul 22,	Oct 16, Nov 20, Dec 4
AR Little Rock Sep 30	Tampa Aug 6	Nov 4, Dec 18	Sept 23, Oct 28, Nov 13	Lubbock Oct 2
AZ Phoenix Aug 5, Oct 16, Dec 2	GA Atlanta Sep 23, Nov 6	MO Kansas City Nov 12	Columbus Aug 12,	San Antonio Aug 27, Nov 5
CA Los Angeles Aug 6, Sep 11,	Columbus Oct 27	St. Louis Jul 30, Sep 25, Nov 19	Sept 24, Oct 29, Nov 12	UT Salt Lake City Aug 6, Sep 16,
Oct 14, Nov 13, Dec 16	IA Des Moines Aug 27,	MS Jackson Sep 11	Dayton Sep 9, Nov 5	Oct 7, Dec 4
Newport Beach Sep 25, Nov 11	Oct 29, Nov 11	NC Charlotte Nov 6	OK Oklahoma City Sep 3, Dec 3	VT Burlington Aug 6
Sacramento Jul 22,	ID Boise Jul 31, Sep 11	Raleigh Oct 8	Tulsa Aug 26, Nov 19	VA Richmond Sep 10
Sept 18, Oct 30	IL Chicago Aug 14, Sep 18,	NE Omaha Sep 24	OR Portland Jul 24, Sep 23, Nov 6	WA Seattle Oct 23, Dec 11
San Diego Aug 7,	Oct 9, Nov 5, Dec 18	NJ Cherry Hill Nov 20	PA Allentown Sep 11	WI Milwaukee Sep 9, Nov 13
Oct 7, Nov 6	IN Indianapolis Aug 19,	Convent Station Aug 7, Aug 28	Harrisburg Nov 6	
San Francisco Aug 5, Sep 9,	Oct 15, Dec 9	Iselin Jul 22, Sep 16, Oct 9,	King of Prussia Jul 24	
Oct 14, Nov 6, Dec 9	KS Wichita Sep 4	Oct 30, Nov 13, Nov 20	Philadelphia Oct 9	
San Jose Aug 7, Sep 23,	KY Louisville Aug 7	Princeton Sep 25	Pittsburgh Aug 7,	
Oct 21, Nov 13	LA New Orleans Sep 25, Dec 9	NM Albuquerque Sep 16, Dec 10	Oct 16, Dec 9	
CO Denver Sep 18, Oct 21, Dec 10	MA Boston Sep 16,	NY Albany Jul 23, Sep 11, Nov 20	Scranton Aug 5	
CT Hartford Sep 10, Oct 22,	Oct 15, Nov 12, Dec 10	New York City Jul 24, Aug 12,	SC Charleston Oct 7	
Nov 3	Burlington Aug 12	Aug 26, Sep 3, Sep 17, Oct 2,	TN Memphis Sep 18	
New Haven Aug 20,	Springfield Sep 18	Oct 22, Nov 6, Nov 25, Dec 9	TX Amarillo Oct 9	
Oct 8, Dec 4	MD Bethesda Jul 23, Aug 7,	Rochester Aug 13, Sep 9,	Austin Sep 18, Nov 6	
Ft. Lauderdale Nov 19	Sept 4, Oct 1, Oct 16, Oct 29,	Oct 15, Nov 18, Dec 10	Dallas Jul 22, Sep 9,	
	Nov 13, Dec 10	Syracuse Aug 19,	Oct 14, Nov 18, Dec 11	
	MI Detroit Aug 19, Sep 16,	Oct 21, Dec 16	El Paso Dec 18	
	Oct 14, Nov 18	OH Akron Jul 23	Ft. Worth Sep 23, Nov 13	

CANADIAN SEMINARS

Calgary Sep 25
Halifax Oct 15
Montreal Aug 20, Sep 17,
Oct 15, Nov 24, Dec 17
Ottawa Aug 7, Sep 11, Oct 9, Nov 13
Quebec City Sep 10, Nov 12
Toronto Aug 12, Sep 9,
Oct 7, Nov 4, Dec 2
Vancouver Oct 2
Winnipeg Aug 5, Oct 16, Dec 4

ORACLE®

COMPATIBILITY • PORTABILITY • CONNECTABILITY

Ottawa (613) 238-2381 □ Quebec (514) 337-0755 □ Toronto (416) 362-3275
ORACLE-U.K. (SURREY) 44-1-948-6976 □ ORACLE-EUROPE (NAARDEN, THE NETHERLANDS) 31-2159-49344

Call (800) 345-DBMS today.

©1986 by Oracle Corporation. ORACLE® is a registered trademark of Oracle Corporation. SQL/DS, DB2 and IBM are registered trademarks of IBM. DEC, DG, AT&T, Stratus, HP and Bell Laboratories own numerous registered trademarks. TRBA.

You really don't have to go back to IBM[®] to get your computer serviced.



Too many people feel like they have to go back to IBM to get their computers serviced. But that's just not the case.

Because at Control Data, we service IBM equipment, as well as our own. In fact, we've been in the computer maintenance business for over 25 years. And we maintain everything from PCs to mainframes, even mixed peripherals.

Why do something you don't have to do? Call us now at 1-800-828-8001, ext. 58L. In Minnesota, 612-921-4400, ext. 58L.

 CONTROL DATA

NEWS IN PERSPECTIVE

types of cable and are trying to figure out how to use it with existing wiring in branches. That's a real challenge."

For ADP, the challenge will be capitalizing on its established presence in the back office, where since 1961 it has serviced Wall Street firms' record-keeping activities. "We think back and front offices will be more and more integrated," says ADP chairman Josh Weston. "Management needs workstations that don't just provide stock quotes but are integrated with customer records."

Likewise, Quotron is hoping to build upon its strength in the next generation of systems. Its installed base and well-known name are not easily dismissed. Levine claims Quotron's revenue rate this year will grow 20% over last year's despite the fact that there is "no lack of people who want to be in this business." ©

News editor David R. Brousell assisted in the reporting of this story.

ECONOMY

EUROPE SLOWS DOWN

But its slump is less dramatic than in the U.S.

by Sarah Underwood

Europe's \$50 billion annual dp market will continue to grow next year, say vendors and industry analysts. Opinions vary on the scale of that growth, but one thing almost everyone agrees on is that growth rates will slow. Alberto De Macchi, head of Olivetti's market research and competitive analysis unit in Ivrea, in northern Italy, estimates that the European market grew 16% in 1985. He predicts that "the market will grow at 10% to 12% this year, varying from country to country."

The dramatic slide in U.S. growth rates that has forced U.S. suppliers to look overseas for new opportunities is unlikely to be so steep in Europe. The rapid technological pace set by the U.S. dp industry over the last decade has left a trail of falling earnings as customers pause to assess their needs. In Europe, however, an inherently more conservative attitude is likely to ease the transition from a market hungry for processing power to one seeking systems solutions.

No one in the U.S. is more aware of the need for strong overseas sales to

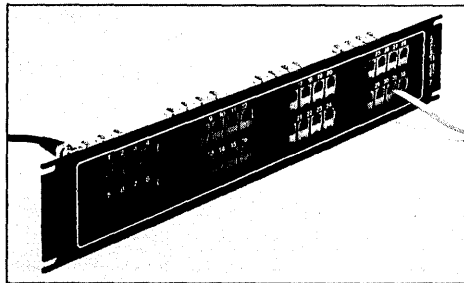
counter a poor domestic performance than IBM chairman John Akers. Last year, the European division showed a 12% gain in profits to \$2.1 billion, while IBM's U.S. earnings plunged 13% to \$3.5 billion. This year the European contribution could be even more important. Akers already has been forced to acknowledge a slowdown in international business. In his nine-month report in October, he conceded, "Growth in our World Trade operations has begun to moderate, and we have yet to see a turn in the weak North Amer-

ican business environment we have experienced over the last year and a half."

Digital, unlike most of its competitors, reported a 153% increase in worldwide earnings in its first quarter ended Sept. 27, with Europe singled out as a particularly strong market for its networking systems.

Wang, on the other hand, suffered a \$30 million loss in its comparable quarter, but again pointed to growth in its European operations. Wang's director of marketing for the European, African, and

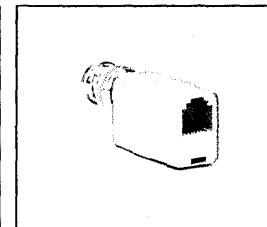
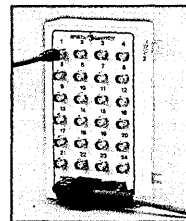
Nevada Western Baluns: For those who would rather switch than fight!



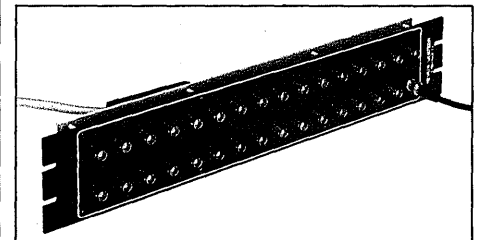
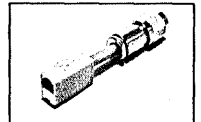
Balun Patch Panel



Balun Breakout Box



Balun
Twinax Balun



Connectorized Balun Patch Panel

Now, you can win the fight over coaxial cable by converting to twisted pair wiring throughout your entire network with the Nevada Western Balun.

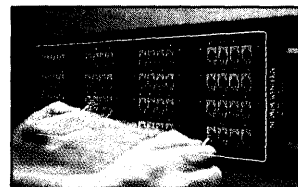
And, you can do it in an organized fashion today with either the Balun, the Balun Panel, the Connectorized Balun Panel, or the Balun Breakout Box, that allows you to use twisted pair wiring in data distribution.

The Nevada Western Balun Family, when used in con-

junction with the Modular Patch Panel, provides you with the extra advantage of patching your coaxial circuits using twisted pair wiring for easier and more economical moves and changes.

And, all are compatible with all other Nevada Western modular interconnection devices.

Make the switch for wire reduction and circuit simplification today — specify the Nevada Western Wire Management System!



Nevada Western Products Are Distributed By:

ANIXTER

ELECTRICAL/ELECTRONIC/COMMUNICATIONS WIRE & CABLE
AND BUSINESS COMMUNICATIONS PRODUCT SPECIALISTS

CORPORATE HEADQUARTERS: ANIXTER BROS., INC.
4711 Golf Road, Skokie, IL 60076, (312) 677-2600 — Telex 289464

WHEN SUCCESS IS
YOUR ONLY ALTERNATIVE...

CHOOSE THE COMPANY THAT
ENGINEERS IT: **SOFTWARE AG**

The success of a corporation is increasingly dependent on its ability to satisfy the growing demands for accurate and timely information.

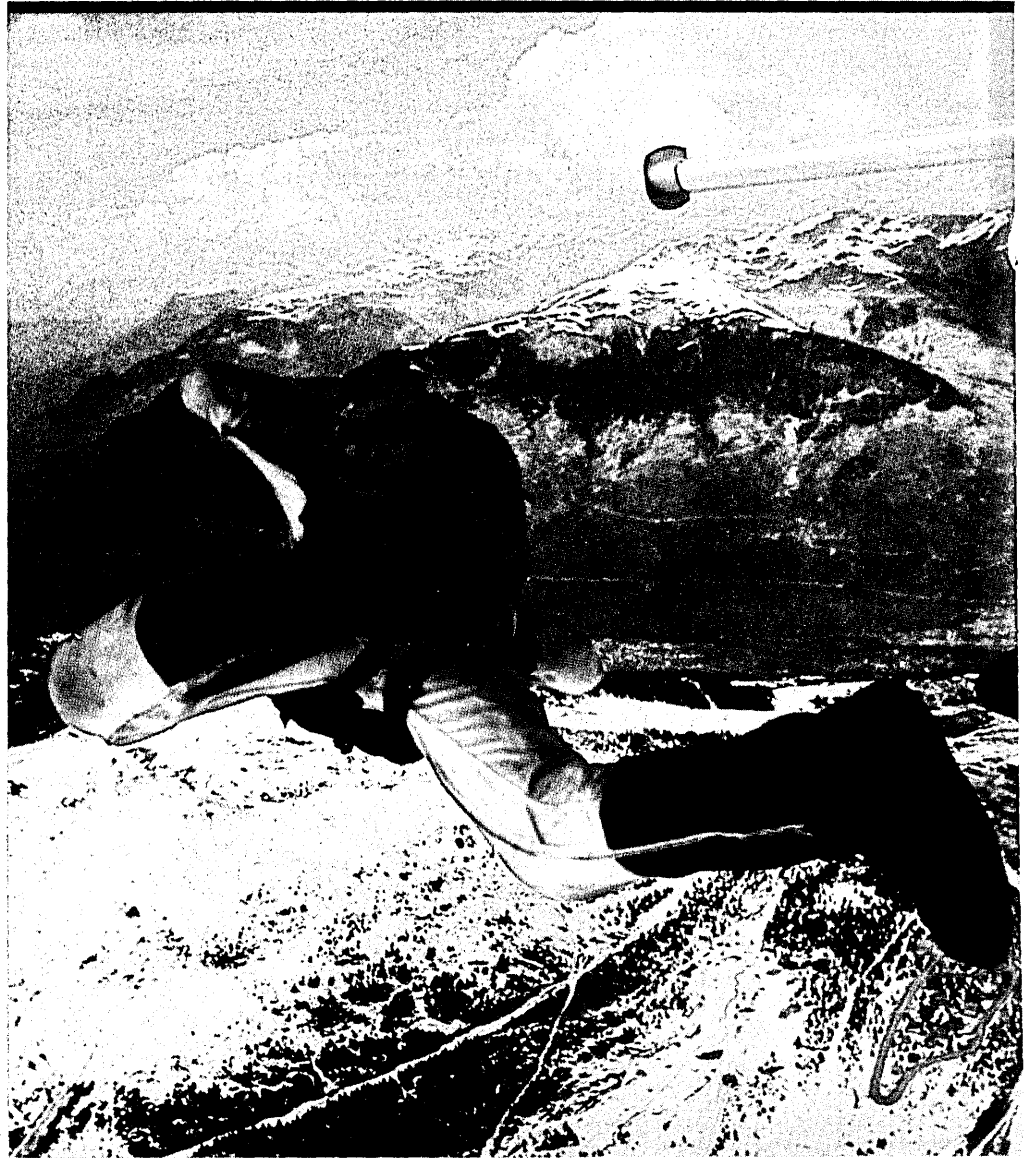
To ensure successful information management, Software AG has engineered a system that is both integrated and comprehensive. A system that integrates the functions of data communications, end user services, applications development, data base management, and the advantages of an automated office environment — without compromising performance.

In addition, Software AG protects your investment by providing environmental independence. Your applications become portable across multiple hardware and operating systems... while giving you the flexibility to grow and change over time.

Forming the foundation of this fourth generation technology are ADABAS, NATURAL, and PREDICT... the basis of successful information management for over 2200 clients — worldwide.

We're Software AG. For nearly two decades, we've been engineering success. Our clients experience it... our customer service teams support it... and our status as an international leader proves it.

Software AG. Because success is your *only* alternative.



ADABAS
EFFECTIVE DATA BASE MANAGEMENT

NATURAL
FOURTH GENERATION APPLICATIONS
DEVELOPMENT

PREDICT
HIGH PRODUCTIVITY ACTIVE
DICTIONARY

...AND MORE

SOFTWARE AG
PROGRAMMING BUSINESS SUCCESS

United States: Atlanta, Boston, Charlotte, Chicago, Cleveland, Dallas, Denver, Detroit, Ft. Lee (New Jersey), Houston, Kansas City, Los Angeles, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, St. Louis, San Francisco, Seattle, Washington, D.C. International: Argentina, Australia, Austria, Belgium, Brazil, Canada, Denmark, Finland, France, Germany, Hong Kong, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Panama, Singapore, Spain, Sweden, Switzerland, United Kingdom, Venezuela.

CIRCLE 18 ON READER CARD

NEWS IN PERSPECTIVE

Middle Eastern division, Ken Olisa, ventures, "The U.S. market is constipated. It has more than enough MIPS to go around, but they are badly distributed. Things are very different in conservative Europe, where users have been far more cautious and slower to accept new technologies. They want to cost-justify investments over longer periods."

The head of Ericsson's Stockholm-based Facit office automation unit, Ulf Bergenudd, is of a similar mind. "People are getting hysterical," he says. "The expansion is slowing but things are not as bad as people suggest." It's a sentiment echoed at Siemens. The West German company is currently experiencing 15% to 20% annual sales growth by meeting the fast-moving networking and end-user computing markets. "Europe had a slow start in the early 1980s compared to the U.S.," maintains a company spokesman. "Our customers are not so excited about new technology and new products. They are fine-tuning their systems, setting up local and wide area networks which, in turn, require more MIPS to support them."

Siemens, with both dp and telecommunications expertise, is hoping to take advantage of the need for integrated systems. So too is the U.K.'s ICL. "We

The dramatic slide in U.S. growth rates is unlikely to be so steep in Europe.

have very consciously shifted our offerings to provide more departmental systems," explains director of external affairs at ICL, Dr. Aodh O'Dochartaigh. "The distributed dp market has been growing at a rate of near 30%, compared to about 12% for mainframes. That's slowing down now, but there will still be new opportunities."

Europe's user community echoes the need for a more flexible approach from equipment and services suppliers, admitting its reluctance to spend money solely for the sake of the latest technology. Geoff Johnson, director of one of two IBM- and ICL-equipped dp shops at U.K. services company Data Networks, West Midlands, comments, "Suppliers are much more realistic than they were and far more flexible. We won't make our next big hardware investment until the next big job comes along."

Statistics in a recent user survey by Price Waterhouse in the U.K. bear out Johnson's attitude. The survey indicates that customers today are not going to spend as much as they thought they would a year ago. Some 61% of users surveyed expect their hardware budgets to rise over the next year, while 13% say they will spend less. By comparison, 64%

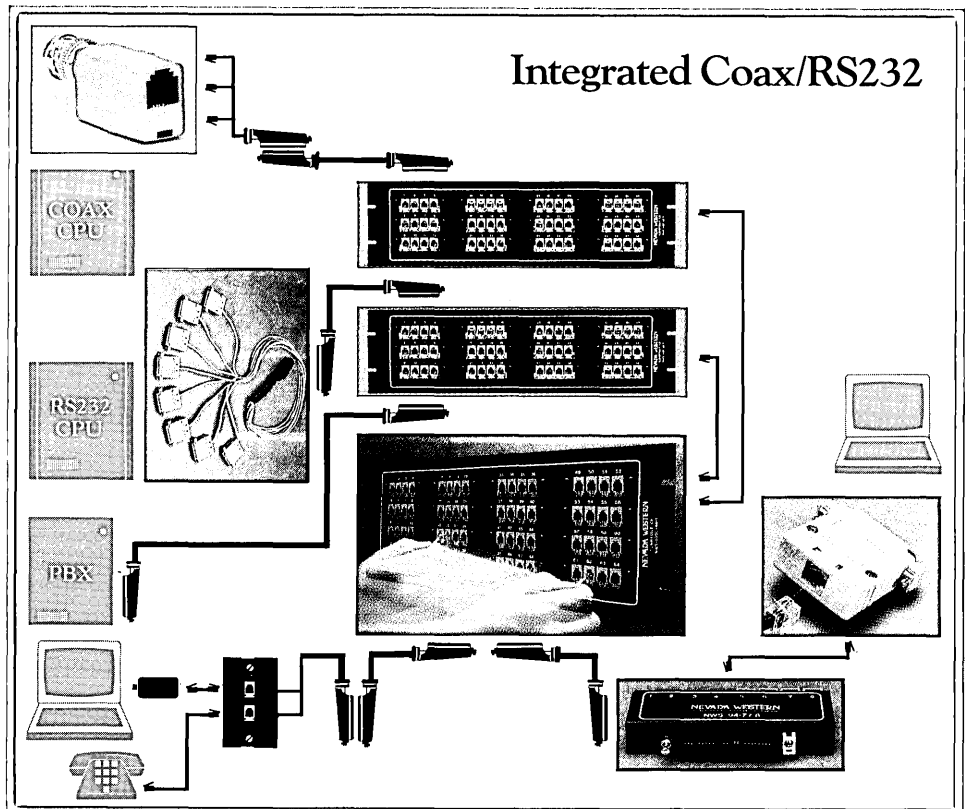
of users surveyed in January expected to spend more on hardware this year, while 10% expected to spend less. Software spending is also forecast to rise, but slowly. Uncertainty in the business climate is reflected by an increase in customers choosing to lease or rent equipment and a decline in those purchasing outright.

Changing national economies clearly affect customer spending patterns. Dave Stone, vice president of international engineering and strategic resources at Digital's European headquarters in Gene-

va, Switzerland, believes that any sharp movement in the economy in any direction is beneficial. Customers spend freely in the good times, he claims, but also invest a lot in the hard times to increase productivity. "The only time sales are not so strong is when the economy is flat—and that only lasts about a week at a time."

West German management consultancy Diebold Deutschland forecasts a healthy 10% growth in the local dp market next year as a result of a buoyant

Nevada Western Wire Management Solutions



Now you can control your Network configuration by patching both Coax and RS232 Data, and Voice, using economical twisted pair wiring.

And best of all, Nevada Western's Modular Interconnection Devices convert virtually all types of data connections to twisted pair

Nevada Western Products Are Distributed By:

ANIXTER

configurations — and each one is compatible with the other elements in our Wire Management System.

Make the switch for wire reduction and circuit simplification today — specify the Nevada Western Wire Management System!

ELECTRICAL/ELECTRONIC/COMMUNICATIONS WIRE & CABLE
AND BUSINESS COMMUNICATIONS PRODUCT SPECIALISTS

CORPORATE HEADQUARTERS: ANIXTER BROS., INC.
4711 Golf Road, Skokie, IL 60076, (312) 677-2600 — Telex 289464



SALES
FINANCE
ADMINISTRATION
PURCHASING
HUMAN RESOURCES
MARKETING
MANUFACTURING
ENGINEERING

So the MIS executive asked,
“How do I get departmental systems
that keep everyone happy?
Including me.”



And we said, “That’s our department.”

With Honeywell’s ONE (Office Network Exchange) PLUS Departmental Systems, computer pros and department heads together can make fully integrated departmental computing a reality. And at the same time protect their present investment in WANG and IBM systems – by tying them together through ONE PLUS’s communications capabilities. ONE PLUS also supports IBM’s SNA. Honeywell’s ISO-based DSA. Ethernet. MAP and TOP protocols. DMI interfaces to AT&T PBX’s.

Much more than communications, ONE PLUS provides business applications like office and data processing. Transaction Processing. Business Graphics. Electronic Mail. Document Translation. Plus access to islands of computing through data base tools such as ORACLE^{®*} and ONEbase.

Through ONE PLUS’s unique document translator, all your systems can share information in their native format: Users can create, revise and transfer files among IBM and compatible PC’s using Multimate, Wordstar and Displaywrite; WANG OIS and VS systems; and Honeywell.

The heart of ONE PLUS is Honeywell’s new DPS 6 PLUS family of 32-bit virtual memory superminis. With shadow processing and tightly coupled multiprocessor architecture, these systems are more than a match for IBM’s System 36, WANG’s VS, Data General’s Eclipse MV, and Digital’s VAX.

For more information, call 1-800-328-5111, ext. 9712 or write Honeywell Information Systems, MS440, 200 Smith Street, Waltham, MA 02154.

Together, we can find the answers.

Honeywell

CIRCLE 20 ON READER CARD

*Oracle is a registered trademark of Oracle Corporation, Menlo Park, CA.

FOR ALMOST TWO DECADES, PAC II® HAS HELPED MORE PROJECT MANAGERS GET THE JOB DONE ON TIME AND ON BUDGET THAN ANY OTHER SYSTEM.

RELY ON AGS PAC II has a proven track record that's the envy of the industry. For years, it's been helping thousands of project managers around the world become heroes for doing almost the impossible: the planning and scheduling of any number of resources and projects, and still save time and money in the process.

But we're not resting on our laurels.

PAC II is constantly updated and enhanced, to increase its power, and to make it easier to use. Today, PAC II remains the state-of-the-art project management system, just as it's always been. And it's fully supported by training, consulting, 24-hour hotline, and experienced client support people. Just as it's always been.

For more information, call or write.

AGS
Management
Systems INC.

The world's leader in project management systems

880 First Avenue • King of Prussia, PA 19406
(215) 265-1550 • Telex: 510-6603320

OUR HERO.



CIRCLE 21 ON READER CARD

NEWS IN PERSPECTIVE

economy. "There are no indications of an imminent disaster," says company spokesman Hans-Joachim Gröbe. "IBM is losing a little ground as local suppliers become stronger, but IBM always has something up its sleeve. Management changes [at IBM Germany] are in the air."

Wang's Olisa contends that the relative health of the European market is a matter of luck rather than judgment. Besides customers' guarded approach to dp, the existence of a PTT in each European country and their restrictions on buying equipment has slowed development—although this could change if the European Commission (EC) uses its legislative powers to end restrictive trade practices.

One solution for U.S. multinationals seeking to raise international sales would be to reduce prices, but this is unlikely to do more than reduce their profit margins. Dave Stone concludes that prices will remain stable in Europe as governments will continue to support indigenous dp suppliers. "If government contracts don't provide local manufacturers with a sufficient profit, the governments will need to put funds into propping them up anyway," he contends.

"Users have been far more cautious and slower to accept new technologies."

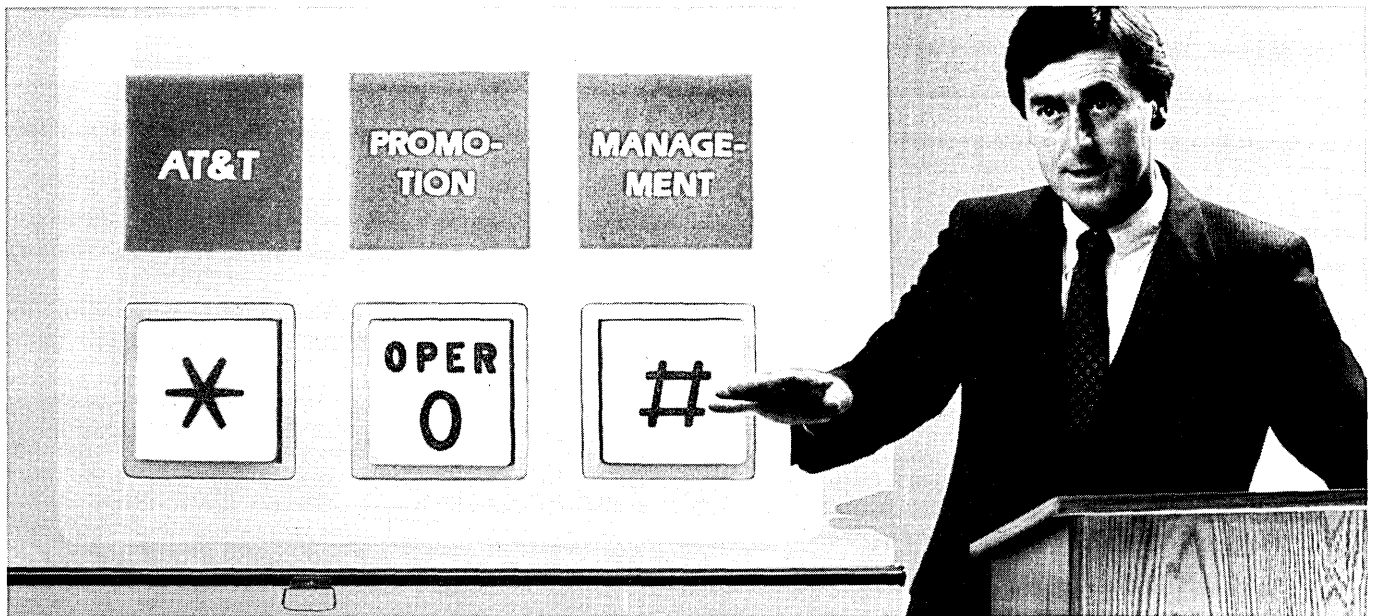
"U.S. companies can therefore keep their margins up in Europe by coming in under that protective umbrella."

The European subsidiaries of U.S. corporations could find themselves under as much pricing pressure as their parents if they fail to respond to the Japanese threat, maintains Maurice English, an economist specializing in information technology at the European Commission in Brussels, Belgium. "The Americans need to be very wary," cautions English. "They could wake up one day and find they have lost their European market share to the Japanese. The European market may not be large, but it's where profit margins are high."

English proposes a policy of both wider cooperation and matching Japanese investment to ensure European suppliers a place in their own market. "Unless European companies start investing the same amount as their Japanese counterparts, they won't get anywhere," he says. "It's a disturbing fact that the European Council spends four times as much subsidizing the cultivation of tobacco every year as it does on technology."

For Europe's dp suppliers that could mean the difference between a \$250 million R&D budget and the \$1 billion budgets of their U.S. and Japanese competitors. ©

AT&T IS IN SMARTER PROPOSALS.



WITH AT&T TELEMARKETING/PROMOTION MANAGEMENT AND THE AT&T CONSULTANT LIAISON PROGRAM.

For telemarketing and promotion management applications, the inclusion of AT&T 800 Service and AT&T DIAL-IT® 900 Service will lead to smarter proposals.

Because we'll help you show your customers how these services can be used for a wide variety of telemarketing and promotional applications.

From order processing and customer service, to full account management and field service support.

All with excellent transmission quality and traditional AT&T reliability.

But just as importantly, through the AT&T Consultant Liaison Program, we can work

© 1986 AT&T

with you to integrate our services and applications into your proposals so that your recommendations will maximize your customer's movement and management of information on a global scale.

In addition, our CLP Network Communications Applications and Services manual (available for a small fee) provides you with a comprehensive fingertip reference for all of AT&T's extensive line of network services.

In short, the people and services of AT&T can help you make more informed, strategic recommendations for your customer's complex business needs.

And that's a smarter proposal for you, as well as your customer.

AT&T Telemarketing and Promotion Management and the AT&T Consultant Liaison Program. More good reasons to partner with AT&T.

To find out more, talk with your account executive at AT&T. Or call 1 800 CLP-INFO.



AT&T

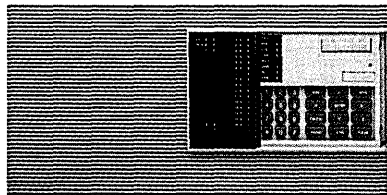
The right choice.

Network Man Dial-Up Only Racal-Vadic

And The System: MDS II.

Somebody has finally brought the money-saving benefits of network management to dial-up networks. That somebody is Racal-Vadic, the company with over 50,000 central-site modem chassis already out there in the real world.

MDS II is the perfect system for managing dial-up access to your network. At its heart is an intelligent, high-density chassis that holds up to 32 autodial synchronous and asynchronous modems. Installed in your network management center, the powerful MDS II system controller lets you change options, monitor performance and usage, and run tests on any portion of a world-wide network.



With MDS II you can busy-out or configure any modem, anywhere, anytime. You can use traffic reports to allocate precisely the number of modems you need, where you need them. In fact, you get information that saves time, effort and money—in maintenance, service calls, installation, reduced down time and more. All with a wide-open system architecture that won't sacrifice performance today or opportunity tomorrow.

So stop flying blind. Call Racal-Vadic at 800-482-3247 today and ask for more information on the MDS II network management system. Then share the vision.



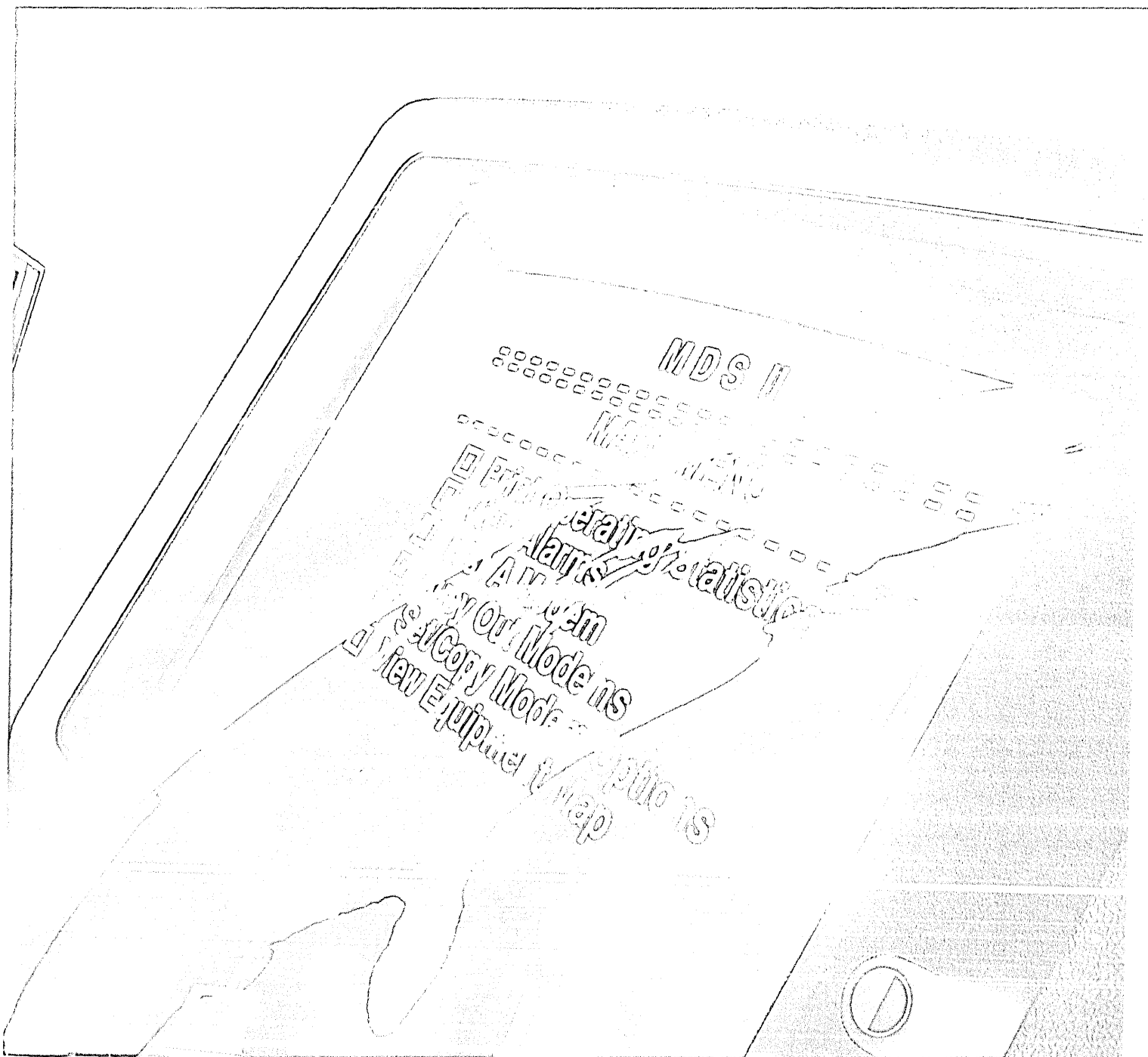
RACAL
The Electronics Group

Racal-Vadic

1525 McCarthy Boulevard, Milpitas, CA 95035
Tel: (408) 946-2227 • TWX: 556-409 RAVA MLP

CIRCLE 22 ON READER CARD

agement For Modems. Has The Vision.



NEWS IN PERSPECTIVE

SOFTWARE

MAKING WAVES

Large IBM users are irked by Big Blue's new software pricing policies.

by Susan Kerr

Someone always has to pay. In this case, it's the big guys.

In the wake of IBM's announcement of new pricing structures for selected VM and VSE operating system products—which Big Blue touts as a boon to small-systems users—come warnings that the move is at the expense of users of high-end System/370 computers.

Under the plan, IBM has divided its S/370 computers into four groups determined by processor size and performance. One-time charges of approximately 120 software programs are now "graduated," so that users of the low-end 4321, for example, pay less for software than top-of-the-line 3090 and 308X customers. Previously, IBM charged one across-the-board price for software.

The move, analysts say, is designed to boost sales where IBM has felt a little vulnerable lately—namely, mid-range, departmental computer accounts. To help drum up some business there, IBM slashed software prices by as much as 75% for computers in its newly created, entry-level processor group, Group 10 (which includes selected versions of the 43XX and 9370 families). On the flip side, software prices for the high-end Group 30 and Group 40 systems were left untouched or in some cases raised.

"This erases the penalty for buying software for smaller cpus," points out Clare Fleig, systems research director, International Technology Group, Los Altos, Calif. "They want to encourage people to buy [at the low end]."

Those other products are primarily manufactured by archival Digital Equipment Corp. DEC already scales software prices according to processor size and configuration, company officials say.

In the IBM way, the company acknowledges that it's following the lead others have set. "It's in keeping with the trends in the industry" is how IBM spokesman Les Szabo explains the pricing move. It's primarily "to respond to customer requirements for more flexible software terms," he says.

Not all customers appreciate the new, "flexible" terms. J.M. Graziani, MIS vice president at San Francisco-based Southern Pacific Transportation Co.,

thinks the new arrangement is unfair. "Why should I have to pay more for the same software products?" asks Graziani, who uses IBM large mainframes but has not yet made the move to departmental systems.

The answer is simple, according to some. While IBM wants and needs to increase hardware sales at the midrange, it's not as pushed at the high end. Indeed, as part of the new pricing scheme, IBM raised the price of 11 software offerings for those systems now placed in Groups 30 and 40.

Conversely, prices of 46 offerings have been dropped for Group 10 and/or Group 20 systems; in almost all these cases, prices were left virtually untouched for the larger systems. One-time charges did not exist previously for the remaining 58 offerings now listed in the graduated pricing list.

Bob Djurdjevic, president of Annex Research, Phoenix, says, "There's no question that this will be a boost to IBM's revenue," says Djurdjevic. He points out that in addition to some of the higher prices, "The general trend is that many of the people who had monthly fees on smaller systems will go for the price break [i.e., elect the lower one-time charge]. . . . It's indicative of how badly IBM is trying to build up its revenues this year. . . . IBM is taking away from its future income and bringing it forward."

While IBM lately has been in a financial slump, it has depended on software for an increasing percentage of its revenues. In 1983, software sales accounted for 6% of its revenues. In 1985, 8%, or roughly \$4.2 billion, of IBM's \$50.6 billion in revenues came from software.

There's every indication that IBM will elect to move to a graduated pricing structure with other product lines.

"This erases the penalty for buying software for smaller cpus."

"We're certainly looking at other software programs" as potential candidates, agrees IBM's Szabo.

Although the changes in the S/370 pricing structure mark the first time IBM has elected a graduated approach to a mainstream product line, there is precedent for the move. In February 1985, IBM priced its IX/370 software according to the number of users on the system.

The graduated pricing structure applies to one-time charges as well as distributed site licensing option prices. Monthly license charges have not been altered, but customers can switch to the one-time charge from their current payment programs, notes Szabo. ©



THIS FREE OFFER CAN BE WORTH A MILLION TO YOU.

Managers of many of the world's most successful organizations rely on ISSCO graphics software.

TELLAGRAF® for business. DISSPLA® for science and engineering. TELLAPLAN® for project planning.

ISSCO software runs on most 32-bit workstations and on departmental and centralized computers. It supports more than 300 output devices. Prices start at \$3,600.

Find out more. Mail this coupon to ISSCO and we'll rush you a report on Million Dollar Applications.

Name _____

Title _____

Company _____

Address _____

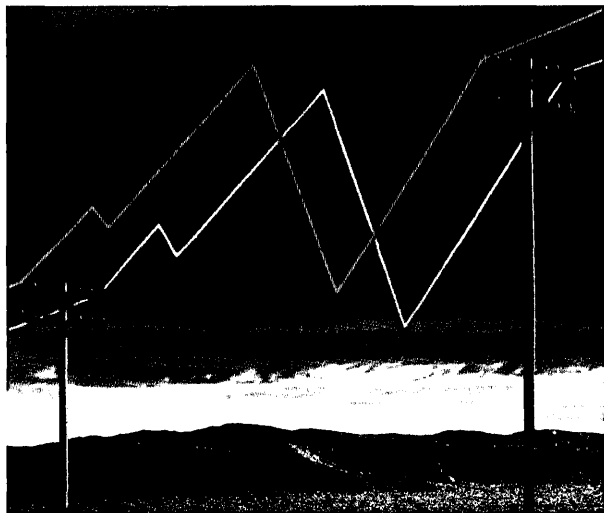
City _____ State ____ Zip _____

Telephone (_____) _____

Computer Type _____

Operating System _____

10505 Sorrento Valley Rd.
San Diego, CA 92121, (619) 452-0170



When managers of a major phone company call up for information, they rely on computers to generate up-to-the-minute status reports in graphic form.

These reports monitor customer service. Monthly phone usage. Installation and repair turnaround.

HOW A MAJOR PHONE COMPANY IMPROVED COMMUNICATION RIGHT DOWN THE LINE.

They help gauge operating costs. And pinpoint areas where profits can be maximized.

The graphic reports are the output of an organization-wide visual information system from ISSCO. A powerful graphics program designed to help managers leverage decision-making skills.

Helping a leading phone company improve communications is just one of the hundreds of success stories associated with ISSCO graphics. At last count, seventy-seven of the top Fortune 100 corporations have chosen ISSCO, the only company with more than 16 years experience developing visual information systems.

ISSCO software runs on 32-bit workstations and on departmental and centralized computers. It supports more than 300 output devices. Prices start as low as \$3,600.

Need to bridge communication gaps?

Write to ISSCO or call toll-free for a free report on Million Dollar Applications. 1-800-556-1234 ext. 530. If you're inside California, call 1-800-441-2345, ext. 530.

10505 Sorrento Valley Road, San Diego, California 92121 (619) 452-0170

BENCHMARKS

CA SEEKS ISSCO: Computer Associates International Inc., Garden City, N.Y., moved to extend its reach into the packaged software market through an agreement to take over Integrated Software Systems Corp. (ISSCO) of San Diego. The proposed deal called for Computer Associates to make a tender offer of \$12.37 a share for ISSCO's 5.6 million shares of common stock. ISSCO specializes in graphics software for use on minicomputers and mainframes.

CENTRONICS BOWS OUT: Centronics Data Computer Corp., Hudson, N.H., agreed to sell its printer operations to Genicom Corp., Waynesboro, Va., for \$75 million in cash. Genicom, which was formed several years ago through a leveraged management buy-out of General Electric's computer printer business, also agreed to acquire Momentum Technologies Inc., Parsippany, N.J., in a stock deal worth \$45 million. Momentum was a remnant of Mohawk Data Sciences Corp. offering data processing services and selling certain hardware equipment; its projected sales for this year were said to be \$165 million. Together, the two acquisitions would give Genicom annual revenues of almost \$500 million a year, making it a leading domestic printer manufacturer. Centronics, which pioneered matrix printers more than a decade ago when it was set up by Las Vegas interests, but which recently lost great market share to Japanese and other suppliers, would exist only as a shell corporation once the Genicom deal went through. Centronics, which expects to show revenues of about \$180 million this year (down from \$217 million last year), is being pressed by the Internal Revenue Service to pay as much as \$13 million in back taxes that it allegedly owes for the fiscal years 1977 through 1982.

MORE DUMPING CHARGES: Just two months after Washington and Tokyo signed agreements designed to stop below-cost selling of Japanese semiconductors in the U.S., the U.S.-based Semiconductor Industry Association charged four Japanese suppliers with dumping certain parts. The SIA declared that Fujitsu, Hitachi, NEC, and Toshiba continued to sell electrically erasable read-only memories, so-called EPROMs, at the same prices as those charged before the recent trade agreement. Those prices are said to be below the fair market value agreed upon in lengthy and politically touchy negotiations held early this year. According to ailing U.S. manufacturers, Japanese chip makers have consistently gained market share in the U.S. and abroad by selling their wares at unprofitable prices; the Japanese companies are

said to subsidize their low prices with profits made on other equipment, namely, computer systems with much added value. Except for IBM, which is the largest chip maker of all but which keeps all its capacity for captive use, U.S. chip makers are narrow-line suppliers with few sources of profits other than chips. They are consequently extremely sensitive to price discrimination by competitors. The Japanese firms charged with dumping had not responded to the U.S. charges by press time.

AT&T-OLIVETTI LINK: Still struggling to make a name for itself in computers, AT&T has given its Italian partner, Ing. C. Olivetti, a more important role in that market. Olivetti is to develop and build all future personal computer products for the two firms and is to take on more marketing responsibilities for AT&T products sold in Europe. Olivetti is also to take on manufacturing of the AT&T System 75 private branch exchange (PBX) in Europe. Meanwhile, AT&T hired Vittorio Cassoni from Olivetti to be senior vice president in charge of a newly formed Data Systems Division, and shifted senior vice president James E. Edwards from his post as head of the Computer Systems Division, now part of Data Systems, to a staff post. AT&T, estimated to have lost as much as \$1 billion on its computer efforts so far, is understood to be concentrating on networking applications that can take advantage of its communications expertise. At least half of its computer sales of about \$2 billion last year were said to come from Bell operating companies. AT&T has a 23.5% stake in Olivetti.

PARALLEL CPU CONTRACT: AT&T's Bell Laboratories, using technology developed at Columbia University, won a \$7.7 million contract to supply the Defense Research Projects Agency (DARPA) with a parallel processing computer designed for speech and image recognition. AT&T has been working closely with New York-based Fifth Generation Computer Corp., which has commercial rights to a computer architecture dubbed Dado, developed at Columbia. DARPA's machine will include 511 node processors running in parallel, which is expected to make it useful in pattern-matching applications. The machine is said to connect to a small host computer, either a personal computer or a minicomputer.

MSA TO EXPAND: Management Science America Inc. (MSA), Atlanta, has agreed to acquire Minneapolis-based Comserv Corp., a developer of manufacturing software for IBM mainframes and Hewlett-Packard minicomputers. The proposed acquisition, which follows

MSA's recent purchase of RTS Limited, a Dublin, Ireland-based supplier of manufacturing software for IBM System/36 and 38 computers, calls for MSA to pay \$2.21 per share, or \$7.1 million, for the common stock of Comserv and assume \$19 million in debt. In addition, MSA has entered into an option to buy Control Data Corp.'s 20% interest in Comserv for \$3.5 million. Comserv has 500 IBM mainframe customers for its manufacturing software and 100 HP customers; MSA has 175 mainframe and 400 S/36 and 38 customers. The proposed acquisition is subject to certain conditions, including settlement of a class action suit brought by Comserv shareholders and bondholders and the disposition of Comserv's lease on its corporate headquarters. MSA says a settlement of the suit has been agreed to by attorneys for both sides and is awaiting judicial approval. MSA says it will combine Comserv's operations with its own manufacturing software activities in an entity as yet unnamed. Named to head what MSA describes as the "new enterprise" is Dennis V. Vohs, executive vice president of MSA, who will have the title of president and retain his MSA corporate title. Tania Amochaev, president and chief executive of Comserv, will become executive vice president. MSA expects the transaction to be completed by the end of the year.

U.S. AIDS ICOT: The Institute for New Generation Computer Technology (ICOT), Japan's fifth generation computer project, is preparing to receive researchers selected by the National Science Foundation (NSF) starting next April. ICOT hopes to have up to three computer scientists or engineers each year from U.S. universities or nonprofit research institutions spend six months to a year working at its Tokyo headquarters. NSF will pay for the travel and living expenses of selected candidates, whose research results are to be published in scientific journals. At present, ICOT receives six to eight foreign researchers per year, but most are able to stay only three weeks to a month because of busy work schedules.

DEC GOES MAP: DEC jumped on the MAP bus just as it was about to leave the station. The company introduced its first product using the manufacturing communications protocol at the recent Autofact show. The VAX DEC/MAP, available Dec. 1, is an interface and software set that will enable the full VAX family to communicate to MAP networks. The DEC implementation of MAP Version 2.1 can coexist on a VAX host system with DECnet, which means both IEEE 802.3 and 802.4 protocols will be available on the same broadband cable. ©

Good News. Travels Fast.



Introducing the New OKIDATA CLX96 Series Modems.

First the good news.

Now you can get a 9600 bps modem that's also an OKIDATA modem. So you know it's dependable, flexible, affordable and fully backed by one of the most-respected names in telecommunications.

Now the Better News: Built-In Full Diagnostics.

Send and receive data with a CLX96 without worrying about interruptions. Automatic adaptive equalization smooths out variable line conditions. A built-in test pattern generator probes for potential trouble. Digital and analog loopbacks look for faulty circuits, both local and remote.

It's all part of the CLX96 series built-in diagnostics. Something few other CLX modems in this price range offer.

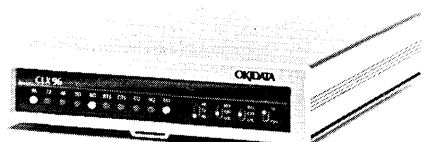
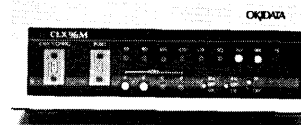
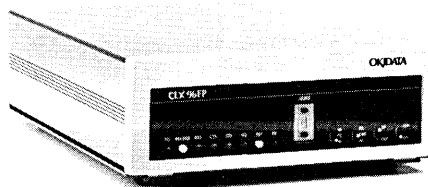
Good News for More People.

No matter what type of network you use there's an OKIDATA 9600 modem to fit it. For point-to-point applications, the CLX96. For multidrop situations, the CLX96FP with a 15-millisecond polling time. And, for multipoint operations, the CLX96M with a 4-port multiplexer.

Turn Ordinary Minutes into OKIDATA Minutes.

When you're using a 9600 bps modem, a minute of downtime is bad news. But an OKIDATA Minute is always good news. You get a full 60 seconds of quality transmission every minute you're on-line.

And the price? That's the best news. But you'll have to call your OKIDATA distributor to get it. Or call 1-800-OKIDATA to get the name of an OKIDATA distributor near you.



CIRCLE 54 ON READER CARD

OKIDATA[®]
an OKI AMERICA company

OKIDATA is a registered trademark of Oki America, Inc. Marque déposée de Oki America, Inc.



In the new world of the IBM Token-Ring network it's nice to see an old familiar face.

The Token-Ring LAN is a reality. It shouldn't surprise you that IBM[®] was the company that developed it. It should be equally unsurprising that the technology that best allows the Token-Ring to communicate with the mainframe comes from DCA, the makers of IRMA.[™]

Introducing IRMALAN.[™]

IRMALAN is a new family of software and hardware products that can exploit the full power of PCs on the Token-Ring and other

NETBIOS-compatible LANs: IRMALAN SNA Workstation[™] is software that provides the PC with the 3270 functionality of IRMA; IRMALAN APA Graphics Workstation[™] is the only software that not only offers that same IRMA functionality and power but can display mainframe graphics on the PC too.

The IRMALAN family includes gateways that connect Token-Ring networks to both DFT controllers and SDLC communication lines.

Best of all, IRMALAN can do all that with the ease and simplicity of IRMA. Which means your users can feel as comfortable working with IRMALAN now as they have been working with IRMA.

To find out more about DCA's IRMALAN, call us today at 1-800-241-IRMA, ext. 507.

The logo for Digital Communications Associates (DCA) features the lowercase letters 'dca' in a bold, stylized, sans-serif font. The 'd' and 'c' are connected, and the 'a' is separate. A registered trademark symbol (®) is located to the upper right of the 'a'.

CIRCLE 23 ON READER CARD

IRMA, IRMALAN, IRMALAN SNA Workstation and IRMALAN APA Graphics Workstation are trademarks of and DCA is a registered trademark of Digital Communications Associates, Inc. IBM is a registered trademark of International Business Machines Corporation. ©1986, Digital Communications Associates, Inc.

BEHIND THE NEWS

GETTING CARRIED AWAY

Laptops are used on space shuttle missions, by scientists in Antarctica, soldiers, and spies ... but what about Harry in accounting?

by Robert J. Crutchfield

Data General introduced its first laptop computer at a lavish gathering in New York City's Avery Fisher Hall. Less than two years later, and without as much fanfare, DG announced its second generation laptop at a restaurant. While changing venues from Lincoln Center to a Manhattan eatery doesn't mean the end to laptops, it does reflect the market, which is sluggish at best.

The laptop market has been an elusive one for vendors; the Holy Grail is always seemingly over the next ridge or past another barrier. First, there was the issue of IBM compatibility. Next, it was better screen graphics and longer battery life. Then, it was a question of incorporating floppy diskettes and hard disks into the machine. Finally, the issues of price and IBM's expected entry into the market became chief concerns.

Today, there have been advances in memory size, battery life, and screen resolution. IBM, along with other vendors, has entered the market this year and even more companies are expected to offer laptops in 1987. The laptop vendors are offering a broader array of features and greater expandability in their products. Nevertheless, "the year of the laptop" has evaded these companies since 1984.

After a slow start, the numbers are improving. According to Future Computing Inc., a research firm headquartered in Dallas, unit sales for battery-powered microcomputers increased only slightly between 1984 and 1985, to 190,000 from 140,000; overall expenditures were \$290 million, up from \$160 million. Sales rose to 350,000 units between 1985 and 1986, while expenditures increased to \$670 million. Future Computing forecasts unit sales will increase to half a million in 1987 and spending will hit \$1.1 billion. By comparison, 8.3 million personal computers were sold in 1986.

Future Computing forecasts that by 1990, unit sales will exceed 13 million, with expenditures of \$2.9 billion. The expansion of the laptop and the downsizing of the luggable microcomputer will ac-

count for much of the growth as those two markets begin to merge.

According to Jocelyn Young, a Future Computing analyst, multimillion-dollar contracts, such as the one Zenith Data Systems, Glenview, Ill., was awarded by the Internal Revenue Service, accounted for the increased unit sales and dollar volume.

According to a number of industry observers, price, perceived need, and specialized software are three criteria that are holding back the market. Despite the problems, there are several serious players. Grid Systems, Data General, Zenith, and IBM have all made headway in securing volume orders from corporations.

The largest laptop order to date has been Zenith's \$27 million order from the Internal Revenue Service for 15,000 to 18,000 Z-171 laptop computers. Grid sold 150 laptops to the Cigna Insurance Co. and is expected to sell more than 14,500 total units this year, according to Dataquest, a research firm in San Jose. Dataquest has also forecast that IBM will sell 105,000 PC Convertibles by the end of this year.

Other vendors include Hewlett-Packard, Tandy, Toshiba, Kaypro, Panasonic, Sharp, and Quadram. Wang Laboratories recently announced its entry into this crowded market and Apple is ru-

Noticeably absent from the market is Compaq Corp., which made its mark with luggable computers.

mored to be readying a laptop offering. There is a trend toward more internal memory and better displays.

Plasma displays are becoming a more common and less expensive option. These displays are more practical for AC-powered systems than for battery-powered systems due to the amount of current required. According to Future Computing, AC-powered laptops that feature plasma displays include Panasonic and Toshiba. Quadram, Sharp, Data General, and Zenith are offering back-lit LCDs as part of the basic configuration of their portables. Backlit LCDs provide the user with better visibility than a regular LCD monitor and cost less than a plasma monitor.

Noticeably absent from the market is Compaq Computer Corp., Houston, which made its mark with luggable computers. Michael Swavely, who is vice president of marketing for Compaq, contends that it is not possible to bring the full functionality of a desktop personal computer to a laptop. Swavely says that no laptop on the market today has the power of Compaq's luggables and that Compaq will introduce a laptop only



when it "can add significant value."

Young of Future Computing says that by the 1990s, the luggables will be smaller and lighter, and will resemble the laptops. "The lines between the different product categories within the personal computer arena are blurring. Both categories are beginning to resemble desktops in functionality and price," she adds.

IBM is beginning to bridge the gap between the desktop pc and the laptop with its PC Convertible. Big Blue sells its laptop with a full-size monitor. Vendors say, however, that the company's most noticeable contribution to the laptop market is its support of the 3½-inch disk drive.

"IBM's entry into the laptop market hasn't hurt us," says Martha Nolan, a product manager at Data General. DG claims it has achieved a double-digit portion of the laptop market with its Data General/One machine. Robert C. Miller, senior vice president of Data General's business group, says, "While market volume fell short of industry expectation due in part to a weak computer demand, the Data General/One has achieved approximately an 18% share of the laptop market."

Indeed, vendors who bet the farm on the 3½-inch technology can breathe a collective sigh of relief.

Clearly, price is a major issue. A

full-blown laptop with a built-in modem, hard disk, and 512KB of memory can be priced upwards of \$3,500. The same desktop pc sells for around \$2,100. Laptops are still too price sensitive, despite the fact that vendors have positioned the product as a second-wave purchase where functionality and productivity would far outweigh cost.

Price in the laptop market, however, is a double-edged sword. Most MIS professionals queried don't see \$3,000

"The lines between the different product categories within the personal computer arena are blurring."

worth of value in a laptop when they have to supply one to every member of a 5,000-person sales force. On the other hand, vendors can't afford to shave their margins too closely.

An examination of the Zenith-IRS deal illustrates this dilemma. The contract is worth \$27 million for a maximum of 18,000 Z-171 laptops equipped with expanded memory and a modem. Retail, this version of the Z-171 would sell for around \$3,000. If the government buys 16,500 machines, it will only pay \$1,636.36 for each machine—a discount of almost 50% off the list price.

In the retail arena, Tandy has

slashed the price tag of its top-of-the-line laptop to \$1,000 from \$1,600. The company has also cut prices on its other laptops. "People originally bought the laptop to use like a portable typewriter," says Ed Juge, director of market planning for Tandy.

Large volume discounts and price slashing at retail show how price sensitive these machines are. Consider Grid Systems, Mountain View, Calif., a company whose sole product has been laptops since its inception. According to Dataquest, while Grid's sales and growth have been modest by personal computer industry standards, the company's revenues have almost doubled since 1985. Grid, a privately held company, reported revenues of \$33 million in 1985 and was not profitable. In 1986, Grid's revenues rose 69% to a modest \$56.6 million and the company is said to have reached the break-even point.

"Many industry observers felt that the high-end true portable market would take off rapidly once these machines equaled desktop computer capabilities," says a Dataquest report. "Hindsight now indicates why this did not happen as expected. Grid, however, was not caught up by these overblown expectations."

Indeed, the market has unfolded more slowly. Despite some benefits, MIS directors say they can't justify the current

ILLUSTRATION BY RICHARD ANDERSON

BEHIND THE NEWS

price. "Our salespeople and auditors don't need [a laptop] to do a more effective job," says Homer Lovoorn, executive vice president of MTEch, a Dallas-based computer service company for the banking industry. "We don't want to be on the leading edge of a new tool."

Yet, other dp managers see the need, and can't understand why more companies don't use laptops. "IBM, HP, Avon, and Mary Kay Cosmetics don't use laptops, but their sales forces could probably use them to fill out forms and in other situations where they can't use a real personal computer," observes Charles Feld, vice president of management services at Frito-Lay Inc., Dallas.

Vendors go out of their way to position the laptop in esoteric applications. A Grid computer has been used on space shuttle flights. Called SPOC (Shuttle Portable On-board Computer), the modified laptop (a fan had to be added) was used to conduct navigational experiments and display the craft's position in orbit. Another ruggedized Grid laptop is used by the U.S. Army for communications and missile guidance under combat conditions. There are Tandy laptops in Antarctica and Data General/Ones in Africa.

Ironically, while a ruggedized laptop can survive in the hostile environment of outer space, it can't survive the rigors of Frito-Lay's route-sales force. Feld says the laptops are too expensive and not rugged enough for the route-sales drivers, whose trucks are exposed to 100°F heat in the Southwest and subzero temperatures in the Midwest. Instead, Frito-Lay uses handheld computers designed by Fujitsu Corp. in Japan.

"Our people in the field don't require laptops that are MS/DOS compatible," says David L. Lee, manager of the information center for M. W. Kellogg, a construction and engineering firm in Houston. Kellogg's engineers use portable dumb terminals like the TI 700. In fact, many companies have chosen a portable dumb terminal when all that is required is a micro-to-mainframe link.

Custom terminals, such as handheld and application-specific devices, and dumb terminals have cut into markets that the laptop vendors are pursuing vigorously. These markets include the federal government, sales, and industrial applications.

As vendors bring applications back down to earth, sales seems to be one of the most viable markets for the laptops. "There are currently 4.5 million people engaged in the field of sales and client management," says Cliff Bream, vice president of Data General's distribution division, adding, "Of that number, only 5% are automated."

Today, 32% of the battery-pow-

ered micros are used by large businesses, 14% by medium-sized businesses, 20% by small businesses, 13% by the government, and 5% by schools.

The government is one area in particular that laptop vendors have targeted. Typical applications in the federal government include financial analysis and auditing. It is also targeted for use by federal investigative agencies. Secure versions that meet the Tempest specification versions are available to the military and intelligence agencies.

According to Future Computing's Young, Zenith has the right idea on how to market to the government, landing large, volume orders instead of focusing on highly specialized and very expensive laptops for secure communications or missile guidance. After all, there are a lot more auditors than there are astronauts or communications officers.

In industrial applications, petroleum and chemical refiners can use the laptop for drill-site data acquisition and

"Our salespeople and auditors don't need [a laptop] to do a more effective job," says Homer Lovoorn, executive vice president of MTEch.

analysis, or as a remote terminal. Laptops could be used on the factory floor to program industrial equipment like robotics controllers, machine tools, and programmable logic controllers.

Personal productivity is another area the laptop vendors are pushing. Certainly you've seen the laptop advertisements where someone is happily manipulating spreadsheets on a commuter train or airplane. Realistically, how many people do you see using laptops on planes, trains, in airline VIP clubs, or other demographically desirable locations where market research says they should be? Not many, according to industry watchers, because personal productivity has been a weak area for laptop sales.

"Unless you are sitting in first class, it is virtually impossible to use a laptop in an airplane," says Juge of Tandy. "I've yet to see anybody using a laptop on an airplane."

"Why spend \$3,000 for a portable to work at home," asks Young, "when for around \$995 you can buy a clone for home use? All you are transporting is a diskette, and which is more portable, a diskette or a laptop?"

"Very few people do work in transit; most work is done at the office or home," says Juge. "For the price of a laptop, I can sell them two personal computers."

A major problem, according to Young, is a lack of industry-specific soft-

ware for the laptops. "Spreadsheets and word processing are not good enough," she says.

"Value-added resellers should work with vendors to develop applications for the laptop," Young adds. She says that because most laptops are sold through the direct sales channel, there is not much opportunity to develop software. Laptops have been virtually untouched by vars. Analysts say that laptops could take off with software geared for company-specific applications.

Another drawback is training. "You have salespeople that won't use a desktop pc—how do you expect them to use a laptop?" asks a Zenith marketing executive.

"We can't even get some of our salesmen to use a desktop computer, let alone a spreadsheet," agrees a data center manager for an office supply company.

While some dp managers don't see the value in laptops and end users don't want to use them, many who work with laptops are very positive about them.

Peter Giampeitro, MIS manager for NYNEX Business Information Systems in White Plains, N.Y., says laptops are used for electronic mail. "I've been in need of a machine that would allow me to access my office wherever I am," he says.

In a sales environment, Mead Data Central Inc., Dayton, Ohio, uses more than 200 laptop computers to demonstrate its legal, news, and medical on-line database services (LEXIS, NEXIS, and MEDIS). "The Grid laptops will give [our] sales force great flexibility to demonstrate our on-line services," says G.M. McGill, vice president of national sales for Mead.

Citicorp's Global Trade Services Division is processing and closing complex financial deals that involve multinational clients and worldwide offices. Laptops played a role in Chevron Corp.'s acquisition of Gulf Oil. Making an offer to buy Gulf meant finding more than \$13 billion in financing. As loan offers came in, iterations were done on the laptops until the amount was reached by the syndicate banks.

Clearly, laptop vendors are starting to find markets for their products. It is slow going, however. While portables are used in unusual situations, the real payoff for these companies is when corporations start using them in broader applications.

"It's not the portability, but the footprint," says Frito-Lay's Feld. Maybe as the portables become more powerful and less expensive, there will be a place for them on a desktop as well as in a suitcase. For now, vendors in this crowded market continue to look for customers who are interested in the laptop and can justify its expense. ©

Use It or Lose It

**Four experts
discuss using
automation to
ensure quality.**



WARD W. "BILL" ARE



FRANK HELMSTETTER



LARRY LINDEN



RICHARD WALLEIGH

□ Everybody wants good value for his money. If manufacturers are unable to produce quality goods at the right price, customers go elsewhere. In some industries, American manufacturers have already lost key battles; in others, domestic producers are under siege. So it is little wonder that companies across the land are renewing their commitment to quality. And the key to higher quality is automation—in engineering departments, testing labs, and on the factory floor in particular.

When automated machines produce or assemble parts, consistency and accuracy generally

improve—as long as the equipment is in proper order. Machines must be watched more carefully than people; they don't know when they're functioning incorrectly. An automated system producing off-spec parts will do so with the same consistency it produces correct output, only, as one panelist puts it, "Not only do you get more scrap, but you get it faster." As a result, automated manufacturing increases the need for automated quality control.

There are many ways for a manufacturer to systematize data collection and analysis of factory floor data. By installing the right kind of computer power at the plant level, companies can not only spot quality problems sooner, they can often cope with them on the spot. When a manufacturer can locate and fix a production problem quickly, defective goods will be trapped on the factory floor, before they are shipped to customers.

Q: What can be done, in general, to improve quality control on the factory floor?

Walleigh: The idea is to do things only one way, and that way is the right way, and to do it that way every time. To do this, a manufacturer needs a good understanding of the production process; he must accurately characterize each process and then control it. The overall goal is to reduce the variability in process, and as you reduce that, you assure that you are going to produce things the same way every time.

Linden: We look at quality as conformance to requirements. And that is really conformance to customer requirements. We have seen situations in our company where we had excellent control of quality on the shop floor, but that did not translate into good quality for the customer, because we didn't begin by adequately identifying the customer's needs. If we fail in the product requirements, we're probably going to carry that flaw into the process requirements.

Helmstetter: As management, we have to communicate to all of our employees what we mean by a commitment to quality. We not only have to communicate the how, but also the why of what we are asking them to do. We have found that if instead of dictating, we put problems in front of groups of workers, and ask them to assist us with a solution, the product and process work much better.

Productivity and quality go

WHERE'S REAL-TIME COMPUTING REALLY HEADING?

SOLUTION:

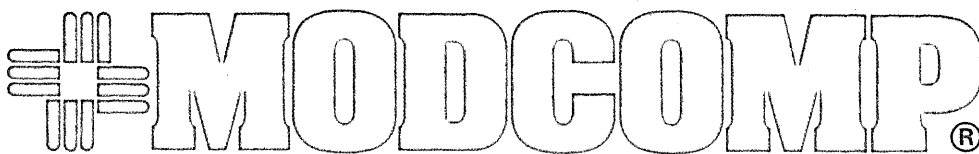
TO A HIGHER LEVEL OF SYSTEMS INTEGRATION THAN EVER BEFORE.

If you have a time-critical application that demands nothing less than real-time response, you might have a problem even if you purchase a real-time computer. Why? Because the computer alone isn't the answer.

At MODCOMP, we know maximizing the potential of real-time computing requires extensive systems integration. That's why we combine the broadest line of compatible products and systems with worldwide support services, including comprehensive maintenance for your entire installation.

We've been solving the problems of industrial automation, scientific, and communications applications for more than 16 years. Our real-time innovations, coupled with third-party strategic alliances, give you a complete system resulting in greater efficiency, dependability, and return on your investment.

So if you've been wondering where real-time computing is heading, and how you'll get there, we just solved your problem. For more information, contact Marketing Communications, Modular Computer Systems, Inc., Dept. C-MT, 1650 West McNab Road, Fort Lauderdale, FL 33310, (305) 974-1380.

 **MODCOMP®**

CIRCLE 261 ON READER CARD

Roundtable Participants

Ward W. "Bill" Are is manager of the Technical and Quality Labs division of the Lockheed-Georgia Co., Marietta, Ga., and is responsible for developing and implementing quality control programs. He has served as manager of the Quality Engineering and Technical Support Department at Lockheed, and has also held positions as manager of production flight inspection in the C-130 and C-141 programs, quality engineer, quality engineering group supervisor, and quality engineering manager.

Frank Helmstetter is an engineering group manager of the process development center for the Buick-Oldsmobile-Cadillac Group of General Motors, Warren, Mich. He is responsible for development and implementation of strategic process automation for that division, which entails overseeing assessment, evaluation, feasibility testing, prototyping, and plant implementation of automated processes and

hand in hand, no matter what industry you are talking about. If you think in terms of productivity, instead of just production, if you do not think about how many things you make, but how many quality parts go out the door, then you will realize what an important part quality plays in that equation.

Linden: The language you use to communicate what you mean by quality is also very important. We make medical products. It is an industry that is highly regulated. We produce something in the order of 10 million products a day that are either life supporting or life sustaining. So we must have a high regard for quality. But it is not so long ago that we were measuring a lot of defects in percent defective. Well, 99.9% good sounds all right, but if we are producing at a high volume, that means 1,000 items that contain some kind of defect even though it might be of a minor type. So we wanted to shift away from the acceptable percentage good, or the acceptable quality level, to defects per million, and ideally, we'll go beyond that to measuring the time between defects, a far more sensitive measure.

Q: Does automated equipment, in general, aid or hinder improvements in quality?

Walleigh: Automation has tremendous potential in being able to reduce

systems. Since joining GM in 1957 he has served in manufacturing engineering, production, and maintenance.

Larry Linden is director of the Manufacturing Data Center and Quality Department for Baxter-Travenol Labs Inc., a manufacturer of medical testing equipment in Deerfield, Ill. He is responsible for all the data processing that relates to Travenol's quality program, and was instrumental in developing and maintaining that program.

Richard Walleigh is a principal in the Management Consulting Group at Arthur Young & Co., San Jose, where he aids clients in developing manufacturing strategies, and implementing total quality control and Just-in-time manufacturing programs. Prior to joining the firm, he spent 10 years with Hewlett-Packard as manufacturing engineering manager, production manager of the Computer Systems Division, and engineering manager.

variability, which is a major cause of defects. But unless you get very, very sophisticated equipment, it will not be able to deal with variability. If you implement automation, that does not necessarily improve quality. If you have a human being doing a process, he will often compensate for problems or variability coming from the previous activity. If you install an automated piece of equipment that can't make those adjustments, then not only are you going to produce more scrap, you'll produce it faster. On the other hand, if you do understand what is going on in the production facility, and you implement automation in order to reduce that variability from the very beginning, then automation can have a tremendous impact.

Helmstetter: Whether automation will help improve quality depends on how

you define a 'good' part. If you design a part to be constructed by humans, and the amount of variability that human labor inevitably puts into a part is acceptable, then it is perfectly possible to have humans make things with zero defects. Automation gives you the ability to define your parts with a much greater precision, since you have eliminated, to the greatest extent possible, human error.

Are: So we are back to definitions again. Defect-free does not mean that something has to be perfect. Perfect is an arbitrary term.

Walleigh: A lot of us are moving towards installing more automated equipment, and see a lot of benefits, but we realize that there are a lot of things that we have been doing that won't work in an automated facility. The guys in the past who were the heroes got things done despite bad documentation and bad product design. Inaccurate specs, defective materials—automation won't take that. Machines are very unforgiving; they force us to do a lot of things right.

Q: If management is going to approve any investment, it has to be able to rationalize it. How do you quantify improvements in quality in order to do cost-justification? Must you invest in more expensive data acquisition equipment to do so?

Walleigh: It has been my experience that improvements in quality are very easy to cost-justify. If you can produce a higher-quality product, and you are successful in projecting that quality to the outside market, you increase your market share. This is the quickest way I know of to improve profits. Still, that is often difficult to put a hard number on up front. There is no way of predicting the rise in market share that will result from improved quality.

On the other hand, you can look inside the factory, where quantifying those things is a little easier. We have had clients who have found the cost of

ARE:
Defect-free does not mean that something has to be perfect. Perfect is an arbitrary term.





HELMSTETTER:
We have to communicate to our employees what we mean by a commitment to quality.

Walleigh: Implementing TQC and JIT together simply forces the issue of a commitment to quality. You may think it's a drastic way to wake people up to the need to a commitment for quality; but then, there are a lot of people in a lot of companies who could use a knock on the side of the head to wake them up to the realities of global competition. JIT is flashier than TQC, people have read more about it, and so that is the thing that they want to go with first. They quickly realize the necessity of TQC with JIT.

Q: Who should have responsibility within a corporate structure for the implementation of a quality program?

Walleigh: It has to be part of everyone's job to improve the processes, and to improve quality. It can't just be the quality department or the process engineers if it is going to work. Somebody at the very top of the company has to make quality a strategic goal. The ceo won't implement the detailed programs on the factory floor, but he has to make a commitment. If that doesn't happen, then inertia will filter down. The people on the factory floor will have no motivation to keep going, and the financial resources won't be committed either. Top management has to define the global performance measures, and then department heads have to define performance measures that support those global performance measures.

Helmstetter: One of the things that is a problem is that top management sometimes sets those performance measures in a vacuum, and doesn't truly appreciate what it takes to get things done.

Are: That can be a problem.

Helmstetter: You've got to have group development of performance measures. You have to involve the people who are actually trying to meet those measurements. We have to eliminate standards that are there because they were there before. The people

poor quality has been 25% of the manufacturing cost. And that just takes into account the inspectors and labor involved in rework that is caused by bad parts. It doesn't even include the cost of the people who make the defective part in the first place.

Helmstetter: All quality really means is eliminating or reducing nonconformity to requirements. If you look at it that way, and you find a way of improving your conformance to standards, 25% is a conservative estimate as far as what you can gain.

Are: In order to defray startup costs, we have found that it is often useful to implement quality control programs on a pilot basis at first. Like so many other projects, the pilot will give us an opportunity to prove to the doubting Thomases that a new idea will work. Then management will begin to see the financial benefits in improved quality. That goes a long way toward getting momentum going and provides the enthusiasm you'll need in order to implement a project on a companywide basis.

Q: What role do computers play in improving quality on the factory floor?

Helmstetter: What the computer is doing for you in this situation is giving you the capability to analyze huge amounts of data in real time. That is what we are using them for. Instead of waiting until tomorrow to find out what we did today, we have immediate feedback that we can use to do something about it today. These systems are measuring tools, and the most important thing is that they be consistent. The danger, of course, is that this will just become another process that we have clouding up production, diverting our attention away from the real goal of improving quality and productivity.

Are: One of the most important uses we have found for computers in quality control is in our testing equipment. We were talking before about the

need for a common way of gauging the conformance to standards. With computerized testing equipment we know precisely how deep that hole ought to be, and can make sure it is that way every time.

Q: Much of the current literature that discusses total quality control (TQC) pairs it with another three-letter acronym, namely JIT, Just-in-time inventory control. What is the relationship between the two?

Walleigh: You can have TQC without JIT, but you can't have JIT without TQC—it just won't work. One of the things JIT will do is to expose a lot of the problems within a manufacturing facility. If you strip away the security blanket of excess inventory, quality becomes critical, because if you have bad quality, you are going to shut your line down. And you need a methodology to get good quality. So I never talk to a company about JIT without telling them that they also have to make a firm commitment to quality control.

Linden: I would never attempt to implement the two simultaneously. The change in mentality that comes with a commitment to quality has to come first, and it will provide the environment in which a company can work toward JIT. Once you are on your way, JIT is a natural progression, but JIT is an awful way to implement quality control.



LINDEN:
In simplifying production processes, you eliminate a lot of potential for a lack of quality.

who know they ought to be changed must be in a position to do something about it.

Are: We are right now embarking on a total quality assurance project. It will be interesting to see under whose control it falls. Because if it comes under the control of the quality assurance division, then it will be just another quality control program and it will not be something that everyone has responsibility for. The way it should work is that every department has the responsibility for quality control in its own functional area. If the project is going to work, management will have to go to engineering and say, 'Okay, you are in charge of quality in your area,' then go do the same thing in maintenance, in accounting, and everywhere else.

Q: So that commitment to quality has to go beyond just the factory floor?

Linden: Without question. We have had a number of independent studies done on customer perception of the quality of our products. What we found was that the customer's perception of the product was influenced to

WALLEIGH:

The idea is to do things only one way, and that way is the right way, and to do it that way every time.



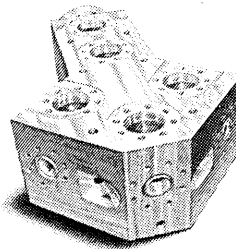
the extent of almost 50% by all of the service-associated aspects. So you can have a perfect product, but if the salesman couldn't provide an answer, if the invoice was not correct, if the delivery was late, the customer doesn't separate that from the product.

Walleigh: The problem is that there are a lot of people working in a production facility who may directly influence production on the factory floor, but they don't think of their jobs in that way. A lot of people go on doing their job and don't think about the fact

that it is part of a process.

In manufacturing we have started to get used to the idea of production as a smooth process flow, and of the importance of maintaining that flow. But the overhead departments of that same company probably don't think that way—and they should. Accounts payable is a process, accounts receivable is a process, and many of the quality control tools used on the factory floor can also be implemented in every one of those 'nonproduction' activities. ©

30 Electrical and Electronic companies, 2 Freight Forwarding agencies, 7 Printers and Publishers, 3 Paper Mills, 6 Transport companies, 3 Packers, 2 Robotic Engineering companies, 16 Precision Engineering groups, 25 Mechanical Engineering works, 8 Computer companies, 26 Business and Secretarial services... and a company that's made all the right connections.*



Glenrothes has over thirty years' experience of establishing an infrastructure that makes sense for business development.

Over thirty years of providing a sound industrial base for the widest range of companies has resulted in a continual pattern of successful growth for the community – the businesses mentioned above are but a small proportion of those enjoying all the

benefits of a continual association with Glenrothes Development Corporation.

*With support from the GDC, Forth Tool and Valve Services set up in Glenrothes and now specialise in the production of energy related components – machining valves, hangers BOP, risers, connectors – and all to customers' specific requirements.



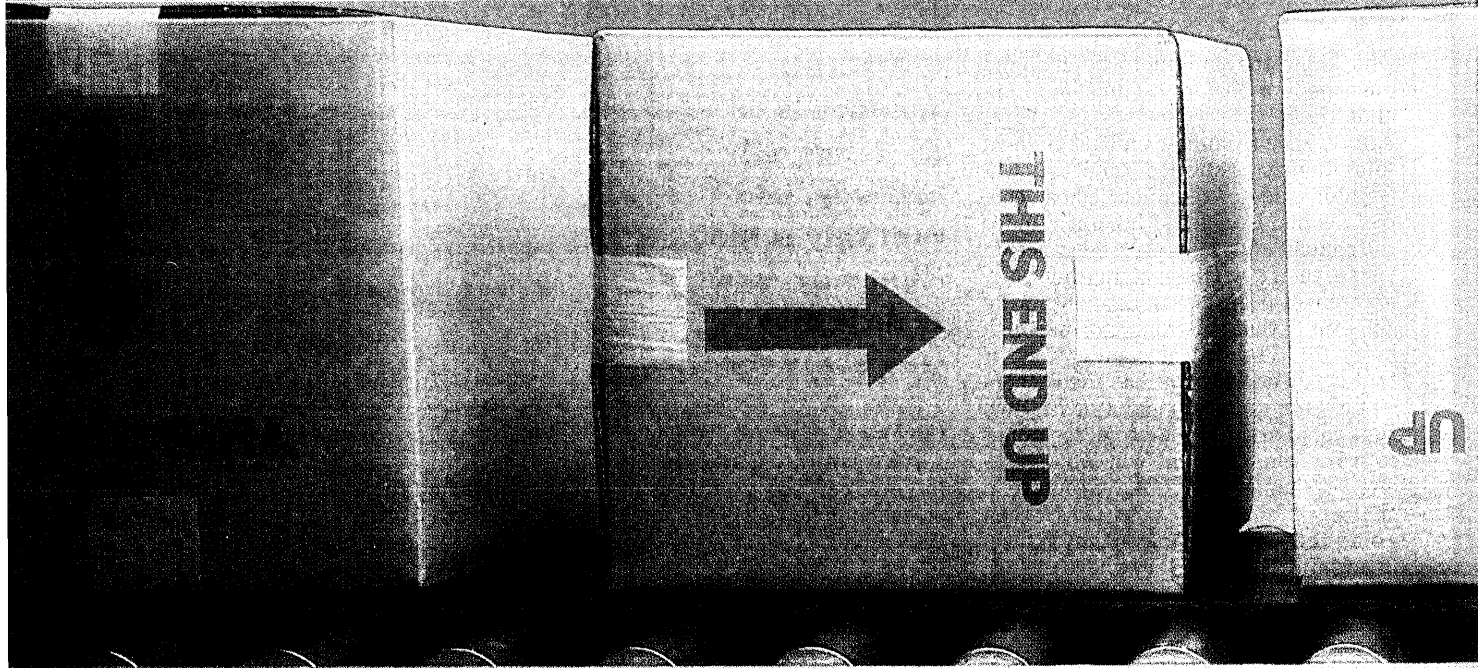
GLENROTHES

DEVELOPMENT CORPORATION

FOR FURTHER INFORMATION PLEASE CONTACT: JOHN McCOMBIE, DIRECTOR OF DEVELOPMENT, GLENROTHES DEVELOPMENT CORPORATION, BALBIRNIE HOUSE, GLENROTHES KY7 6NR, FIFE, SCOTLAND. TELEPHONE: 0592-754343. TELEX: 727125.

CIRCLE 262 ON READER CARD

SPECIAL REPORT E



Let us keep your automation effo

Gathering the right information from machines and getting it into your system is a key to getting automated equipment to do more jobs with greater speed and accuracy.

It can also be one of the most exhausting tasks you face in manufacturing automation.

You can make your automation efforts easier and more productive by calling the Sensor Consultants for all your sensing needs.

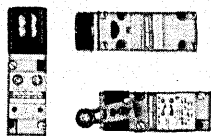
Not only will you find more ways to meet your system's need for better information and more of it. But for most applications, you'll find more than one alternative. And we'll help you

find the best solution for the lowest possible cost.

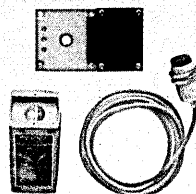
Your choices begin with the industry's most complete line of sensors for manufacturing automation. Including new multi-zone distance, edge-width, object recognition, and all-material proximity sensors.

And we're leaders at meeting special requirements such as miniaturization, EMI/RFI protection, or operation in harsh or hazardous environments.

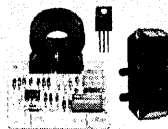
We can also help with in-line inspection to produce statistical process control data. With high-speed sensors that sort parts, detect



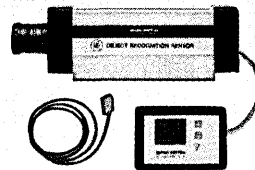
Presence/Absence Sensors



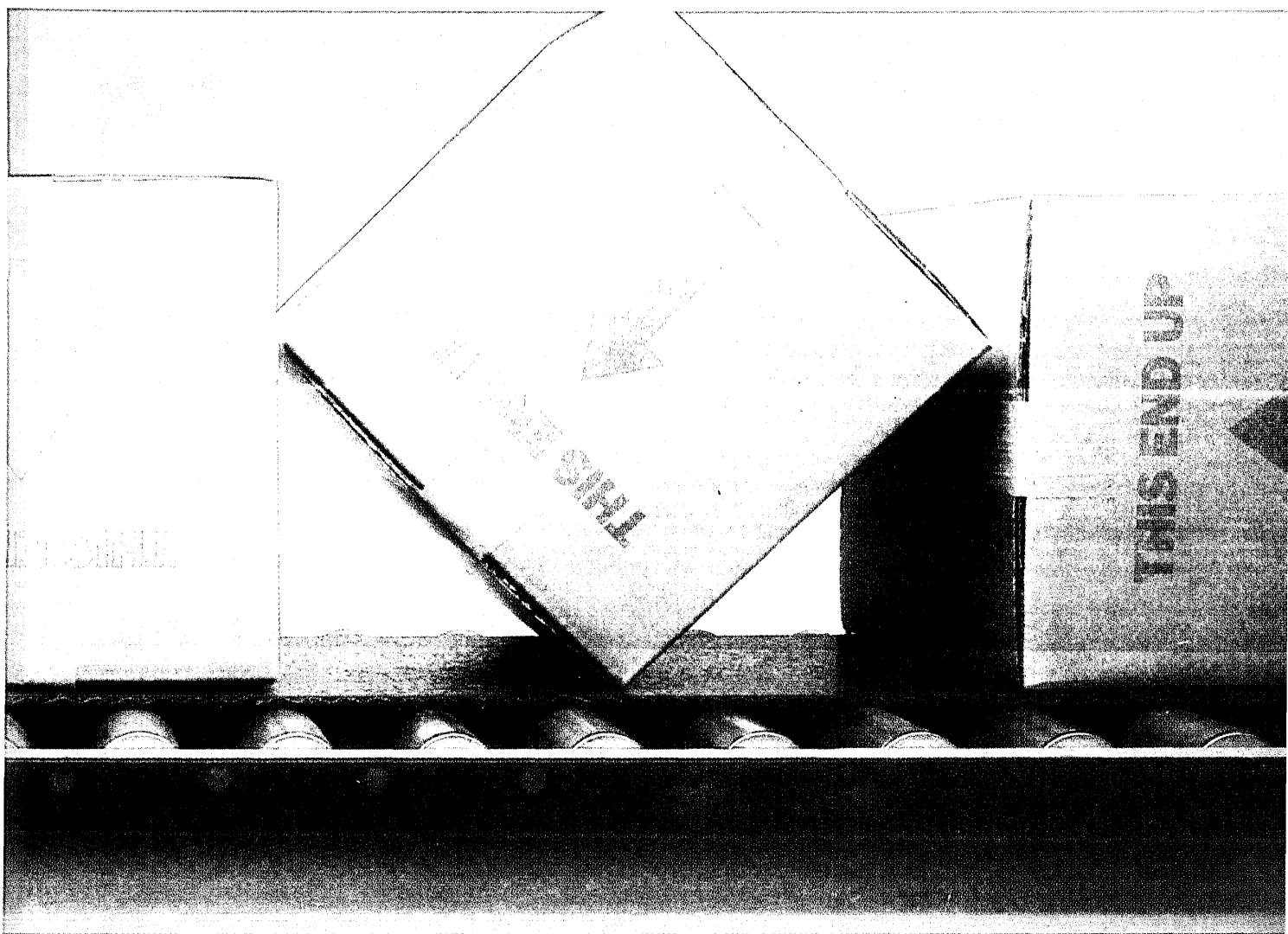
Positioning Sensors



Condition Measurement Sensors



Identification Sensors



Ports pointed in the right direction.

flaws in components, and examine finished assemblies.

We can help reduce downtime by helping your machines look after themselves. With temperature, pressure, current, and airflow sensors that monitor machine conditions to predict problems before they occur.

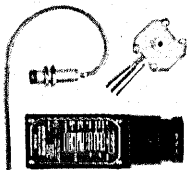
We can even help sensors acquire and communicate data with our SID-2000 Sensor Interface. It can accept direct input from virtually all of the different types of sensors used on your factory floor.

And its modular design can make

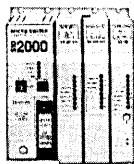
expanding your system easier in the future.

As automation continues to put more demands on the people who operate machines, we've continued to expand our line of innovative touch panels, keyboards, manual switches, and programmable display pushbuttons. So your people and machines can work better together.

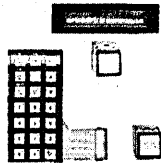
For a free booklet that describes automation sensing and interface needs in more detail, and how we can work with you to keep your automation efforts on the right track, write MICRO SWITCH, Freeport, IL 61032. Or call us toll-free at 1-800-328-5111, ext. 2102.



Inspection Sensors



Sensor Interface



Man-Machine Interface

Together, we can find the answers.

MICRO SWITCH
a Honeywell Division

CIRCLE 263 ON READER CARD

In Alabama, we open the gates for freight.

With a transportation network unrivaled in the Southeast, Alabama opens the gates to industry with efficient, economical shipping services. And the newly completed Tennessee-Tombigbee Waterway now links Alabama with 16,000 miles of navigable rivers.

Air, truck or rail is just as easy in Alabama's central Sunbelt location, with convenient access to shipping across country, or around the world.

Alabama Power has helped industry get moving in Alabama for over 60 years. We're ready to open the gates to get you on the move.

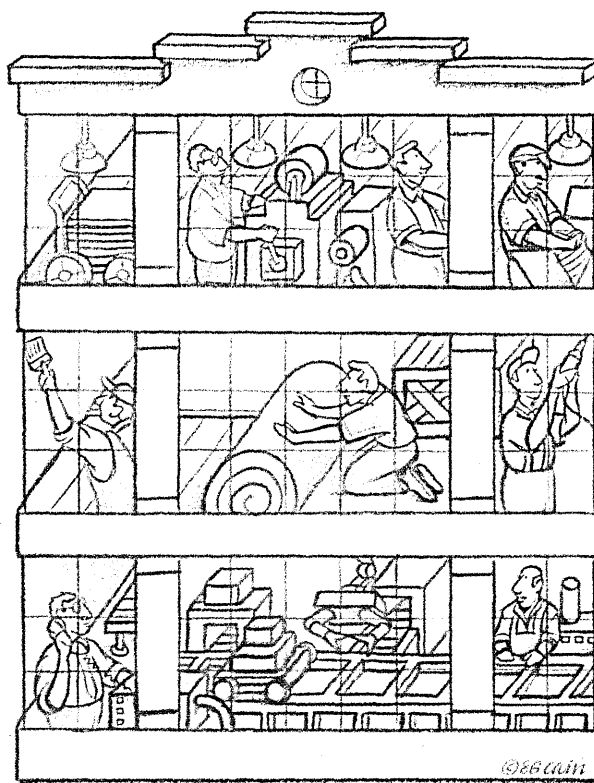
For all the facts, contact: C.B. McArthur, V.P./
Industrial Development, Alabama Power
Company, P.O. Box 2641, Birmingham, Alabama
35291, (205) 250-2534.

Alabama Power



Innovate or Renovate

Companies automating must balance the costs of building vs. rebuilding.



□ So you're going to get into automation in a big way. How are you going to do it? Are you going to start from scratch and build a whole new plant from the ground up, dazzling your directors with a showcase and giving your competitors the willies? Or will you gut old Plant No. 9, which has been in mothballs for years anyway?

The answers can be elusive, for there are no simple rules. Manufacturers faced with a surfeit of options have tried everything at least once. Some take giant steps like creating entirely new divisions, as General Motors did for its Saturn manu-

facturing facility project. Others go into automation one tiny step at a time, replacing machine lines with work cells, adding new wiring, and adjusting production plans only when absolutely necessary.

Setting up a new facility—or installing new automated lines in an existing plant—means juggling dozens of variables and making a lot of choices that boil down to, well, gut decisions. Yet somebody's got to call the shots, whether it's an individual or a committee. And, in big business, that means checking out every angle.

To begin with, a company must calculate whether it costs more to build or rebuild. But even if all the contractors' quotations can be pumped into a spreadsheet, the answer may not present itself. Numerous intangibles have to be figured into the equation as well. Costs will also continue after a plant is built. Savings achieved in haste at the start of construction could lead to big penalties over the years. Further, companies that try to avoid big bills by renovating piecemeal will often pay more over the long run than those that revamp factories in one organized push.

Not all the hard numbers will be found in bricks and mortar. The real cost of a facility is after tax, not pretax. The changing federal tax rules and revised accountants' opinions have made construction a whole new ball game. Nevertheless, the Commerce Department estimates that private industry players have spent \$16 billion building factories during 1985, and will invest more this year.

The IRS is only one of several tax authorities a manufacturer will have to appease. State and local governments may also significantly affect the cost of setting up and running an automated plant. Some communities will give a manufacturer a tax holiday for building plants on their turf. Others, afraid of losing their tax base altogether if old factories shut down and move away, provide comparable incentives for renovation. "Not only does every state follow different rules, but the tax rules change with greater frequency and are more flexible at the state level," says Mark Johnson, a tax manager at Coopers & Lybrand's Richmond, Va., office. "There are so many factors that determine how to get the greatest tax break, it really pays to have some outside help on it."

Recent revisions in the federal Tax Code have put many builders at

sea. The useful life, for tax purposes at least, has been extended for both real estate and machinery. Machines that were written off over five years now "survive" between five and 10 years, although programmable equipment is generally considered to have a useful life of no more than five years. Real estate that was depreciated over 19 years now must be written off over 31½ years.

In part to compensate for the loss of the Investment Tax Credit, depreciation schedules for machinery have been made more favorable. Depreciation schedules for real estate remains straight-line; users will deduct equal amounts each year. Machinery, however, will follow an accelerated schedule that allows users to deduct 200% of the declining balance each year. According to the experts, this means companies will try harder to blur the distinction between real estate and machines to get the more favorable depreciation schedule.

"When you start trying to decide for tax purposes what is part of the building and what is machinery, it gets very sticky," says Johnson. "For example, if I want to install a local area network within a plant, that is counted as an equipment purchase. If I want to build a clean room within a factory, that also can be counted as separate tangible personal property—equipment, in other words. But if I have to make changes to the building itself, if I have to add extra ventilation or raise the roof of the factory, then I am entering a gray area in the code, and everything has to be considered on a case-by-case basis."

Erecting a new plant can cost a fortune; so can shutting down an old factory that the new one will replace. For industries that want to move into a new geographic area, or for those building up in a locale that offers no suitable existing structures, there's really no choice but to build. And even

an otherwise acceptable facility may not be able to accommodate necessary new installations.

Even with several options available, the construction of a new plant provides a company with an opportunity to institute changes in fundamental aspects of production. A new facility may enable a manufacturer to substantially improve the handling of freight, or to better segregate hazardous materials, or produce products with greatly increased size, weight, or delicacy.

But setting up a new plant is a costly choice if a manufacturer already owns some real estate, and has an adequate shell building containing electrical fixtures, heat, and water. The company should not have to make those investments again, assuming the existing shell can support new technology. There is a need for caution here, however, since many companies don't know what may be lurking inside an old plant.

"A manufacturer will go into a renovation, having done as much financial planning as possible, and when he begins work, he runs into all sorts of surprises," says Tom Frey, a consultant with the Austin Company, a Chicago-based management consultancy. "It isn't until he rips up the floor that he discovers there are a lot of things down there that he didn't expect to find. And at that point he has committed himself to that plan, and he's stuck with it."

The decision of whether to build or to renovate may well hinge on the physical characteristics required of the plant. Building from the ground up will allow the company to do things right in the first place; renovation may well involve compromises that create problems later. The builder can take advantage of the latest energy efficient designs and materials. The new plant can have adequate loading docks, enclose clear floors to accel-

ate the flow of goods through the facility, include a computer networking scheme that will allow greater flexibility in the future, provide good ventilation, and include features that add to that very important intangible, company pride.

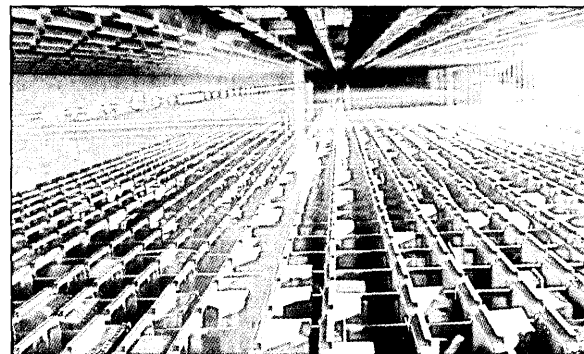
A manufacturer that cannot afford all this luxury may still get the results it needs—if it can meet the challenges associated with a renovation. "There are a number of things that can present problems for a renovator," says Glen Allmendinger, president of Harbor Research Inc., a Cambridge, Mass., consulting firm. "Most older buildings have only 12-foot ceilings. They are not adequate for a lot of machinery. They are also not high enough for proper ventilation for either a paint application or a clean room application. Many older buildings have columns spaced every few yards for support; they are a nightmare for materials handling systems and assembly lines."

Even if the physical layout of an old building is adequate, its physical stability may not be. "When engineers designed buildings 40 years ago, it was fine for the floor to shake a little," says consultant Frey. "But today, you are going to be in trouble if you try to make a highly sensitive positioning robot or a delicate vision system work on a bouncing floor."

Another problem common among facilities that date from the World War II era is electric wiring that was installed to what are outdated specifications. "When a manufacturer goes to get a construction permit," Frey says, "he may find that fire codes and electrical codes have all been changed, and he is going to have to pay a lot more to get his building brought up to snuff."

The difficulties of carrying off a renovation are compounded if the company wants to maintain production while work is going on. When contractors must come in on weekends and during odd shifts, costs go up.

And these days, safety regulations are not limited to the building and its contents. A plant has to pass muster with environmental authorities, too, whether it is a new facility or a significant renovation of an existing one. While this is a necessary step to control pollution, it may adversely affect a company's profits and a community's prosperity. Carmine DiLullo, a consultant with Lockwood Greene Inc., a Spartanburg, S.C., facility plan-



Xerox cut overhead costs between 10% and 30% by building a "green fields" facility in Fremont, Calif.

Digitalizing Springfield

In 1777, General George Washington authorized in Springfield, Mass., the first federal arsenal, which functioned as an arms facility manufacturing muskets and gunpowder throughout the Revolutionary War. The Springfield Armory, as it was called, was productive for nearly two centuries, expanding and modernizing in both appearance and product. In 1968, the federal commission was withdrawn and the Armory was closed.

But this sprawling complex of red brick buildings had not witnessed its last metamorphosis. By 1987, Digital Equipment Corp. will have completed a \$25 million renovation project that will have transformed the hoary abandoned munitions plant into a high-tech facility, manufacturing some of the company's most sophisticated equipment. Where there were forges there are now robots, the firing range is now office space, and where the Springfield rifle was developed and assembled is now a class 1000 clean room.

DEC could have moved and built a spanking new facility, but according to Harry Drab, manufacturing programs manager at the plant, employees were a large determinant in the decision not to move. Management believed that moving out of the center of town would disrupt otherwise good employee relations.

There were also solid financial reasons for staying put. Beyond the federal investment tax credit, DEC also received, through the jurisdiction of the Massachusetts Historical Society, a tax subsidy equal to 25% of funds spent to update the building—a mixed blessing according to DEC engineers. Locating the factory in a designated historical area placed certain restrictions on what could be built in the space and what those buildings could look like, even though it reduced the ultimate price tag.

According to facilities manager Charles Crocini, almost nothing from the old plant was salvageable. "If you had seen the place when we started, you would not believe it now," he says. "We left the shell of the buildings and cleaned everything else out. Besides the pounds of brass shell casings we took out of the the rifle range and sold for scrap, we removed about a ton and a half of lead out of the bunker it was fired into." Where that bunker was is

now a small courtyard with a gazebo and outdoor tables.

But what remained—solid brick walls, and wood and concrete floors—had already proven strong enough to withstand the test of time. "The basic structure was sound," says Crocini, "They really don't make buildings like



this anymore. It is surprisingly energy efficient. Once we got the new windows put in, the buildings were pretty snug."

Unlike a plant dropped down in the middle of a rural area, which has room to expand, the facility is in the center of downtown Springfield, and bounded on all sides. The Massachusetts Historical Society restrictions exacerbated the limitations. Digital was not allowed to add new buildings, and the number and location of entrances were also restricted. Clearly, the company needed to make very efficient use of what it had.

When DEC first moved in, the space wasn't being used well. There was little warehouse space, and, since the company had no good inventory management plan, inventory was left on the production floor. "We knew from the start that our biggest problem was going to be getting materials through the plant—from inventory, through production, and back out again," says Crocini. "So the plan we devised was to automate inventory, and work with suppliers toward a Just-in-time zero inventory system. We knew that if we could reduce inventory we would free up the space we needed on the floor to add more production lines and increase capacity."

According to Walt Tucker, distribution systems manager, WACS was a group project developed by the inventory and MIS departments over a two-and-a-half-year period. He says that when the planning team first got

together, it quickly became clear that even the most brilliant scheduling program in the world would leave them with problems. "The facility was planned from the start to support high-volume production. We figured out that without an automated inventory retrieval and distribution system,

Preserving the exterior was one of many challenges DEC engineers faced in renovating the Springfield, Mass., facility.

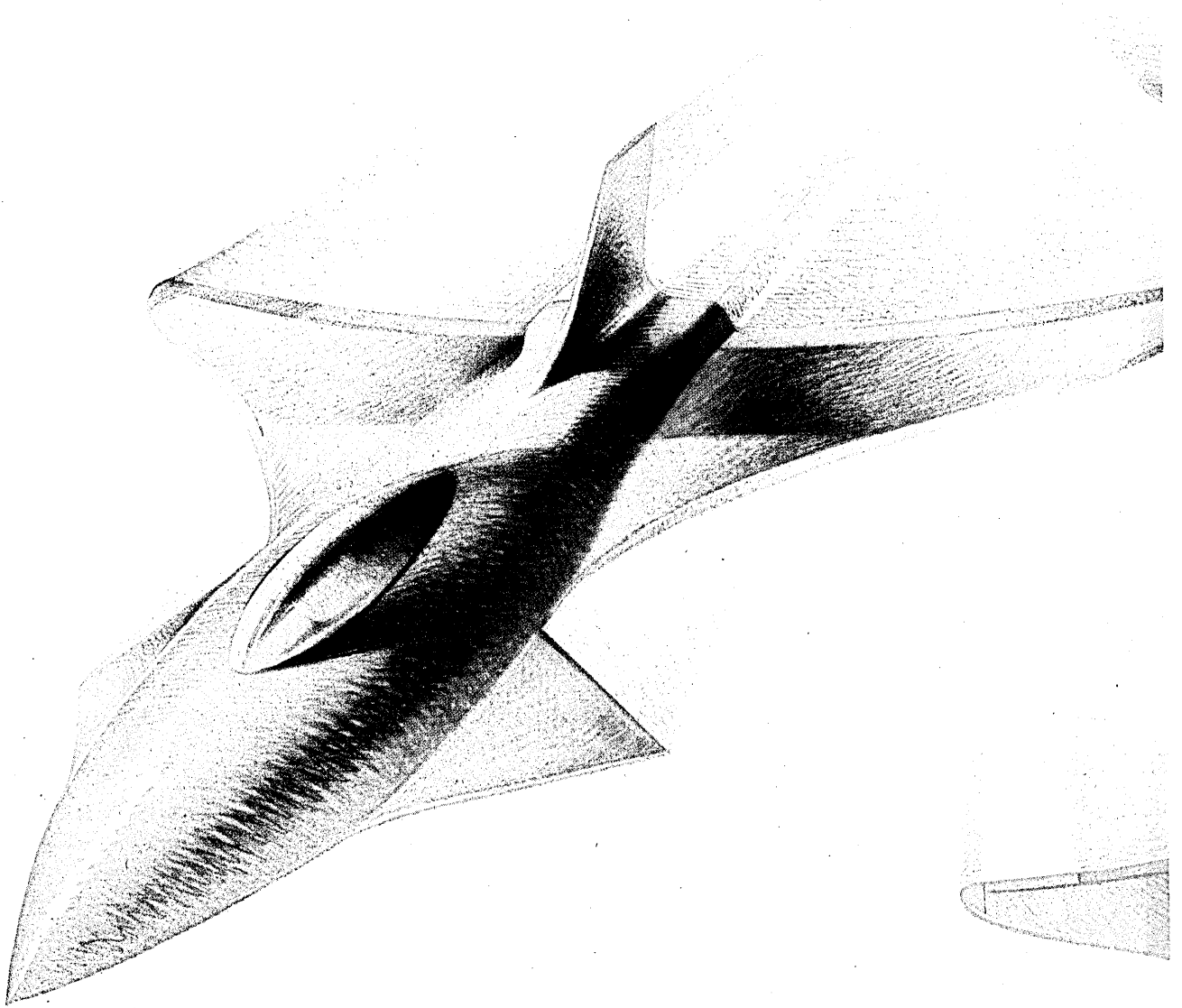
we would have people literally waiting in line to get goods."

The inventory distribution system the planners needed had to be able to store large amounts of goods and retrieve them rapidly—and take up as little room as possible. The solution that engineers devised was a pair of 150- by 14- by 8-foot rotary racks that house totes of goods. Both racks have four bidirectional levels, which move independently of one another; each set of racks is controlled by a dedicated Falcon computer (an early version of DEC's PDP-11).

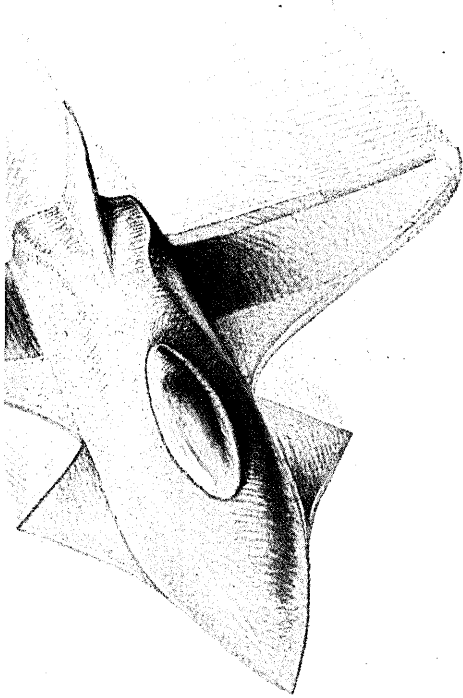
The complex inventory/distribution system is orchestrated by WACS in tandem with DOLPHIN—Delivery Organizer Linking Parts Handling and Internal Navigation, essentially the execution part of WACS. WACS runs on a VAX 8600 with 32MB of main memory and 200MB cartridge memory; it is linked via Ethernet to a VAX 11/780 with 16MB of main memory running DOLPHIN, which controls the four Intel ART-automated guided vehicles currently in use at the plant (the system will eventually support 14), as well as the plantwide conveyor system.

The conveyors are complemented by a series of Allen-Bradley PLC-controlled lifts to transport materials from level to level in the plant. Even though there are only four floors in the facility, material must be moved automatically between nine levels, as all five buildings were constructed at different levels. To compensate, engineers installed multilevel lifts.

CONTROL: Manufacturing.™ It's Turning Manufacturing



Into A Competitive Weapon.



Get The Proven System That Lets You Implement Aggressive New Manufacturing Management Techniques.

From aerospace to electronics to pharmaceuticals, CONTROL: Manufacturing, from Cincom,[®] is at work turning manufacturing into a competitive weapon.

CONTROL: Manufacturing can help your company implement today's essential management techniques—techniques which arm you with the most powerful weapon available in the manufacturing arena: **information**.

Through business planning, production scheduling, shop floor management and integrated financial tracking, CONTROL: Manufacturing gives you the power to increase productivity, reduce costs and improve product quality.

CONTROL: Manufacturing lets you start today with a powerful MRPII foundation, incorporate JIT and move on to fulfillment of your overall CIM strategy. Built on Cincom's comprehensive information systems architecture, TIS/XA,[™] it gives you a framework for continuous improvement. It's your solution for immediate and long-term results.

And it's a **proven** solution that's currently at work in both the IBM[®] mainframe and DEC[™] VAX[™] environments.

Arm yourself with CONTROL: Manufacturing. It gives you the power to take manufacturing to greater heights than ever before. Call or write for more information today.

CONTROL: Manufacturing.
To make it **your** competitive weapon, call, toll-free:

1-800-543-3010.

Or simply complete and return this coupon.

NAME _____

TITLE _____

ORGANIZATION _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

BUSINESS PHONE _____ (AREA CODE)

MT1286

 **CINCOM**

World Headquarters
2300 Montana Avenue, Cincinnati, Ohio 45211

CIRCLE 265 ON READER CARD

DEC and VAX are trademarks of Digital Equipment Corporation.
IBM is a registered trademark of the International Business Machines Corporation.

ning firm, recalls such an event. He did a study for a Pabst Blue Ribbon brewery located in the heart of Newark, N.J. The company wanted to double production, and that meant that effluent discharges into the Newark River and the atmosphere would also be doubled. There was no practical way to handle that much waste. So DiLullo advised Pabst to close the plant, which it did.

Some of the most important issues cannot be easily quantified, even if they can be translated into dollars and cents. Community relations, labor contracts, logistics of moving goods, and a company's competitive situation must all be reckoned with.

Every locality wants to hold onto existing industries, and to attract more. There's hardly a town anywhere that wants its corporate ranks to move away or even diminish.

"Community feeling about a company is more powerful than you might think," says Tom Frey. "In particular, if a company only has a single plant, or it has been in a particular place for a long time, then it is a big deal to the community for it to move. There are very few companies that want to get the reputation for destroying the economy of a small town."

On the other hand, there are a lot of state and local bureaus that are hungry for new industrial residents. Cities and states will do all they can to woo new employers, including, of course, tax incentives, but also promises of transportation links, low-interest loans, and funding of joint training programs with local universities.

Another major consideration is labor relations, not only because automation changes the relationship of the worker to the production process, but, for multiplant companies, employee problems that start at one facility can easily spread to the others. If a company has good labor relations, it may not want to rock the boat by moving production or shutting down a plant for renovation. Yet management may well be tempted to move production to a region with a large and enthusiastic labor pool, even at the cost of angering its present employees.

Different problems surround a company's plans for management. Restructuring may mean eradication of many middle management positions. "Very often, when a company wants to streamline a production facility, it will involve eliminating a lot of middle management positions," says Allmen-

ding. "And those guys are not going to be in a hurry to make themselves obsolete."

Top management and key technical people may have to be relocated if a new plant is far from existing facilities, and this can be expensive. Even when a company provides substantial relocation benefits, some employees will not leave communities where they have deep roots, particularly if they can find other jobs.

Regardless of the ultimate choice—building or renovating—there is significant pressure to get the job done. There's no reward for stalling. Companies that waver for months before deciding on a strategy may just be increasing their costs. "Business today changes so fast," DiLullo says. "A manufacturer naturally wants to put off committing itself until the very last minute. Planners want to make sure that their market projections are as on target as possible, and that the technology they will be investing in has progressed as far as possible, before they commit to a particular strategy and particular machines. So by the time planners decide, management will already be asking where the product is."

There are some things companies can do to save time and therefore construction costs. A manufacturer will know relatively far in advance whether or not many of the physical properties of the present facility—the hanging loads, the rooftop air conditioning units, and everything else required for the new production lines—are adequate for the new operation. According to DiLullo, fast tracking, or

Revamping facilities allows companies to implement new technologies and improve production practices.

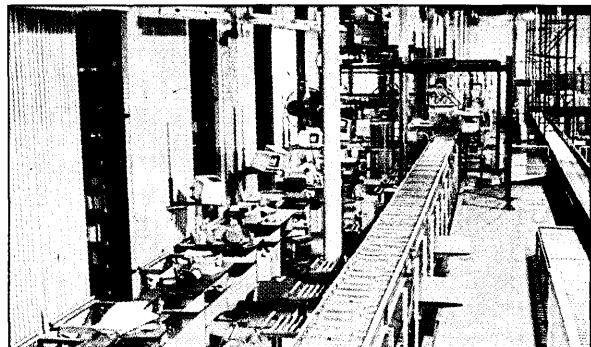
doing advance planning for those types of things, can save from two to six months on each project. "Time is money to management, and they'd like to knock off a couple of weeks if they could do it," he says. "Maybe they can save two to six months by fast tracking a multimillion-dollar project, which

will be 10%, 20%, up to 50% of the construction time." In any event, building a new plant is less disruptive to production than rebuilding an existing facility.

In addition to tactical planning, a manufacturer on its way into the automation age should do some strategic thinking. "Typically, for a new plant, you want to do all of the financial analysis for 10 years out," says Harry Mathews, a consultant with Arthur D. Little Inc., the Cambridge, Mass., consultancy. "But that is really difficult. Some engineering and marketing people get very uneasy if you ask them to look even two or three years out. And you really have to force their hands to get their best judgment on five years. That means at some point management has to bite the bullet and make an educated guess."

Long-term planning may cast a new light on the build-or-rebuild decision. It may be easier to install flexible manufacturing systems in a new facility. Even if the smart tooling goes into a revamped factory, the renovation must be extensive enough to give the manufacturer some room to change.

These days, manufacturers realize that both the products they make and the technologies that make them are changing faster than ever. The pace is so fast that the amount of time it will take to amortize the equipment on the line may be longer than the projected life span of the product. So it may pay to spend a little more money at the front end in order to construct a layout that will work for future as well as current products.



"Larger industries," says Harbor Research's Allmendinger, "were basing their cost-justification of investments in production gear on a false assumption: that they would build a line, and it would take 10 years to write it off. That's okay—if they knew that they were going to machine

the same size engine block for that amount of time, as they did in the '50s.

"Those manufacturers," he continues, "are just catching on to the fact that true flexible plants follow assumptions like, 'I don't know what I am going to be building here in a few years except for its approximate size and the general class of metalworking that it will entail. Beyond that, it could be anything.' Then they set up for processes that make that feasible."

Allmendinger adds that there is no real incentive within manufacturers' financial departments to alter the way they look at investments. The old way of thinking will most likely remain until the engineering groups educate management.

Done correctly, a gradual retrofit can be a way of diffusing some of the costs, but it, too, has pitfalls. If the incremental changes are not part of an overall plan, then a manufacturer may encounter the much talked about problem of islands of automation. "A user may decide he can boost productivity by implementing CAD systems, so he buys a few, and speeds up the design process," Allmendinger explains. "This improves productivity in a way that makes the accountants happy. But it only improves one of the steps of the process. What those systems ultimately produce is paper, and unless the manufacturer can eliminate that paper, and fully integrate the design system, then it has just foisted the productivity problem off onto another department."

The same problems crop up when a plant is modernized in a piecemeal fashion. It is much more difficult and expensive to expand a cooling system than to build it properly in the first place. The same is true of a conveyor system, or an automated guided vehicle setup, although these components of a plant can be built up to some extent.

"When I design the structure of a facility," says DiLullo, "I have to think, 'Do I ever want this facility to have a mezzanine? Will I ever have to add extra pipe loads? Will I ever want to add something that will require supports that the building doesn't have?' These things have to be planned for now, because they will be very expensive to do in the future.

"The big companies have learned this the hard way," he continues. "They now realize that the most important thing is to not lose manufacturing time. If the choice is between

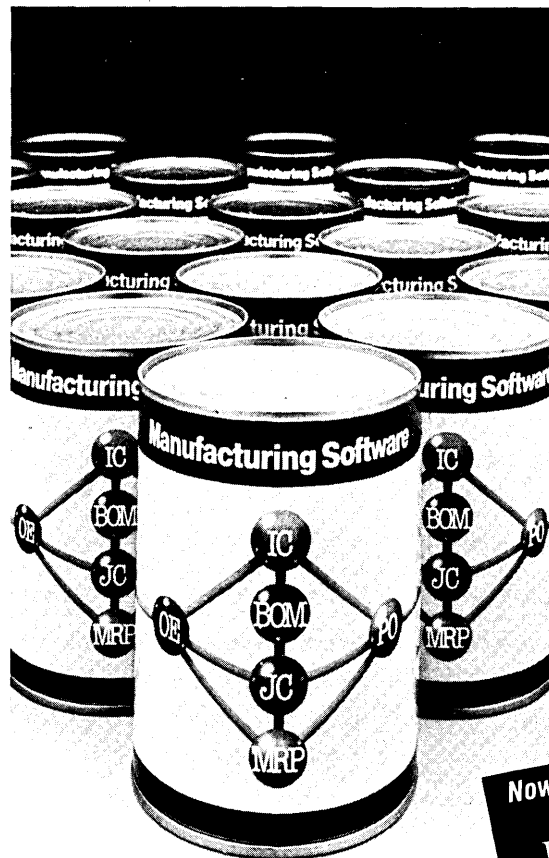
spending an extra million dollars up front on a \$20 million project, or to hurt production, they are going to spend the 5% to make it flexible."

The maturity of the product and the technology employed to make it are also important considerations. Manufacturers don't want to invest millions building a facility for a prod-

uct that won't be around in a few years. "It's pretty straightforward: don't spend more on a production facility than you expect to get back over a certain amount of time," says Allmendinger. "You would be crazy to invest millions in producing a product that is going away in a year, or in a technology that will shortly be obsolete." ©

INMASS[®]

the leader in Manufacturing Software for Micros.



More than 1500 companies now use MC's Software. This broad acceptance has been achieved because the software has proven itself to be effective in controlling costs and cutting inventories. It is also adaptable to a wide range of companies.

Available on most popular single and multi-user microcomputers, INMASS includes: Inventory, Bill of Materials, MRP, Job Cost/WIP, Purchased Order, Sales Order Entry, Payables, Receivables, General Ledger, and Payroll.

Trust the future of your company to the leader in micro manufacturing software: INMASS. For more information, or the name of a dealer nearest you, call (800) 824-5952, or (916) 756-8104 (inside California).

MC Software
A FLAGSHIP COMPANY

Now an affiliate of
THE FLAGSHIP GROUP
INC.

INMASS and INCOME are registered trademarks of MC Software, Inc.

CIRCLE 266 ON READER CARD

AMS '87:

*We're not just talking about CIM, we're
applying CIM technology...again!*

IMPACT™

On site! 18,800 square feet of McCormick Place become the IMPACT™ factory (Integrated Material handling, Production and Control Technology) for three days. CIM Planning. CIM Application. CIM Integration. CIM Justification. In action! Don't miss IMPACT™.

The Executive Track

An industry innovation. An invitation-only seminar for CEO's and top corporate marketing executives. An exclusive program to guide key management in preparation for the acquisition of their own CIM systems.

The Conference Program

The industry's largest and most comprehensive. 60 sessions of Strategic Planning for CIM, Integration of CIM Subsystems, and CIM Functions (Design, Information Management, Material Handling, Production).

Find out more about AMS® '87 by calling Cahners Exposition Group AMS Show Management at 312-299-9311.



AMS '87

*Advanced Manufacturing Systems Exposition and Conference®
June 23-25, 1987*

McCormick Place, Chicago, Illinois

*The most powerful manufacturing buyers and sellers in the market.
Together for three unforgettable days. Be there!*

CIRCLE 267 ON READER CARD

Real Time or Bad Time

On-line systems help manufacturers conduct their business.



□ Managers of discrete manufacturing plants used to be happy with 24-hour turnaround on finished goods inventory. Today, they get uptight if it takes 24 minutes. On the factory floor, where people can't dodge spilling cups of coffee, users want computers that jump in microseconds. Every desk, from the ceo's to the maintenance engineer's, seems to have a terminal on it. And every person at every terminal demands an instantaneous response. Entire plants are going real time.

Manufacturers, accustomed to measuring plant output by the week, the month, or the quar-

ter, may find moving to on-line information is a big and difficult step. But there are substantial rewards for those who take it.

When the information from the factory floor is made available to departments outside manufacturing—purchasing, for instance, or sales—it can be put to productive use. Constant awareness of inventory levels is an absolute necessity if a plant wants to move toward Just-in-time. Similarly, good control over output is important for companies that want to build to order, or minimize warehousing of finished goods.

Before these benefits can be realized, changes must occur throughout the factory. Electronic systems in the plant must be enhanced in order to yield the three Rs of real-time systems: response, resiliency, and reliability. Controllers and minicomputers in the factory must be tied together and then linked to computers in data processing departments. The closer the ties, the faster the movement of information, and the more efficient the factory can become.

As they solve their technical problems, manufacturers going on-line will also encounter some new managerial headaches. For instance, going to a real-time system will change the relationship of floor engineers to the dp department.

"It isn't that common today to have the middle-level plant computers linked to the bigger, corporate computers," says Omri Serlin, president of ITOM International, a Los Altos, Calif., consulting house. "The barrier is primarily organizational. In the past, plant people bought their computers, and the larger ones were taken care of by the data processing guys. And these departments rarely spoke. Now that companies are beginning to realize that there is some value in top management being able to get immediate information on the status of the plant, you see these people beginning to talk to one another more."

While there is no easy way to iron out all the potential disputes, let alone the technical problems that accompany them, most companies will improve their chances of getting on-line if they try to meet key technical goals first. By defining the performance characteristics of the system they want, personnel from the corporate level on down will foster a set of common interests. Having set the goals, management should then let the

personnel closest to the actual problems develop specific solutions.

A good way to begin is by defining an on-line system in terms of response time. At every level in a plant hierarchy, having a responsive system means installing hardware, software, and communications links with real-time capabilities. At each level within a factory, the real-time needs of the system will be different.

At the controller level, real time means a control device that thinks faster than any of the machines it watches. In some manufacturing systems, response times of 500msec are considered real time, but a fast robot running a cutting tool will need much better reflexes. Similarly, a minicomputer that checks on controllers every second may be good enough for slow-moving lines, but it won't support a group of fast cutting tools or robots.

"What real time means depends on the needs of the system," says Mel Olson, product manager at Anatec, a Dublin, Ohio-based subsidiary of Anaconda Controls. Anatec makes control equipment for both process and discrete manufacturers. "For example, suppose you have a canning operation, and you just want to scan each piece as it comes down a line. If the cans are moving at 100 per second, you have to be able to count that fast. Something like a shut-down mechanism on an operation is very different. Not only do you have to get the information that something is wrong to the proper place. You then have to get instructions back out to the system fast enough so it shuts down before a mishap can occur."

At the plant level, real time means something else. It is defined by the rate of flow of goods through the plant, not by the speed of individual operations on the factory floor. "Real time above the control level is just a different degree," says Serlin. "Materials flow into a plant, and you process and assemble them into finished goods. If your computer operations cannot keep up with that rate of flow, then you have an inadequate system."

So, at the plant level, a system's response requirement is determined by the rate at which the information can be used—not by the speed of a computer or a smart tool. If a company can react quickly to changes in a process, whether they are variations in throughput, quality or consistency, it will get its money's worth from a faster, more powerful computer. By

the same token, a company that spends days adjusting to changing conditions probably does not need reports updated every few minutes; it can use a less powerful computer at the plant or enterprise level and still satisfy its managers' requirements.

Because real-time needs are different at every level of a plant, users have developed different ways of addressing those needs. When it comes to performance, for example, control systems differ from computing systems. The speed of a computer depends on the rate at which the central processor can execute instructions, and the amount of work each instruction performs. Sometimes a computer is characterized in terms of the millions of instructions per second, or MIPS, that it can execute.

With most equipment controllers, this is not the case. The ability of a control system to monitor a machine depends only to a small extent on the calculating power of the chips in its small processor. For the most part, there just isn't that much information to process at the machine level, as long as its function is limited to basic control. The information is often simple data, like the state of a switch on a sensor, expressible as one number.

"At the factory floor controller level in the computer hierarchy, it is the I/O structure that is most important," says Serlin. "Above all, you would like to have a machine that has sufficient input and output channels to allow you to handle as many external devices as you want.

"The second thing that you want," he continues, "is for the ma-

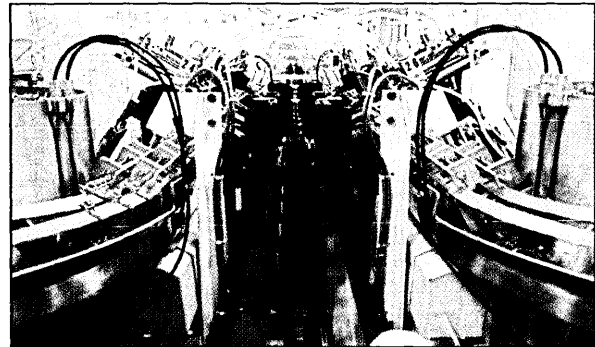
interrupt response time than to worry about MIPS."

Consequently, a programmable controller may have much more circuitry dedicated to the handling of signals from switches and sensors than to the interpretation of the data on its input lines. It will also have more electronics, compared with a general purpose microcomputer, that are needed to get the electronic signals it emits back to the machines that must be regulated. It is still too expensive to pack everything into one box, so users have traded off computation in favor of fast, accurate process control.

The result is that affordable factory floor control technology is mainly in the form of programmable controllers built with specific jobs in mind. Increasingly, however, the line between controllers and computers is being blurred. Controller manufacturers are including capabilities to make their products act like personal computers, while personal computer makers have begun to offer add-in circuits that boost the response time of their machines.

Fast response and greater capability at the lower levels will require added power higher up to interpret and use the new influx of data. Thus, directly above the controller level, the amount of power in the central processor grows in importance. "A manufacturer," says Serlin, "may have a line producing several thousand parts per day, and enough control computers to handle that speed of material flow at the level closest to the process. But once the processes are controlled, all the resultant data must be shipped up

Allen-Bradley has fully integrated all levels of control in its World Contactor facility in Milwaukee.



chine to quickly respond to a situation where a particular external device calls for attention. You want the computer to be able to very quickly identify the fact that such an event has occurred, and then act upon it. Here, it is more important to have a rich enough I/O structure with an adequate

a level. Which may mean much more data to handle at a time than before. Therefore, that processing requires a higher MIPS rate at the higher level."

The capabilities of small machines are constantly increasing. As more compact and inexpensive processors reach the market, manufacturers

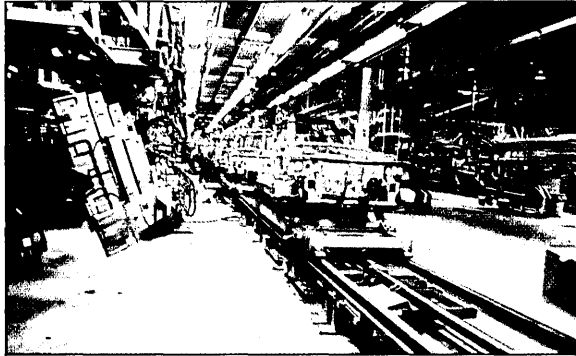
will shift greater computational work loads to the factory floor. This trend is already apparent in the growing popularity of vision systems, which require a great deal of processing power. Similarly, calculations that regulate processes will be moved closer to the machines that do the work.

"Today, I can get a 2MIPS machine right down on the basic control level," Olson says. "This will let me do many vital operations on the plant floor that are so compute-intensive they used to be off-loaded to the corporate mainframe. I can do them more frequently, in my own domain. I can do things like production optimizations every couple of hours and have up-to-the-minute information about how production is running. It's like being able to fine-tune your Ferrari every day, instead of taking it to a mechanic once a month."

With increasingly complex factory automation comes greater vulnerability. A production process can be optimized with the aid of technology, but if the automation isn't dependable, the net result may be a loss instead of a gain. It is theoretically possible to install automation that is as reliable as you please, but the cost of that technology may not be practical. Good maintenance is vital, particularly preventive maintenance. But some failures are inevitable. When they occur, good systems design can minimize the consequences.

At the basic control level, a user must be able to count on his equipment all of the time. Most experts advise building redundancy into controllers wherever possible. Fortunately, the technology closest to the production line is the least expensive. "The costs of a control system going down just begin with the costs of the material," says Olson. "If you have an interdependent process, like aluminum casting, you can't afford to have that process shut itself down because one of the sensors dropped out. If the process just stops in the middle, you are going to have to go in and trash all of the work you have done up to that point. That can get very expensive."

Above the controller level in an on-line system, the high cost of the equipment forces users to perform careful cost analysis. "You have to make some decisions pretty early on in designing an on-line system," says Mike Galane, a manager of research and development at Hewlett-Packard's Manufacturing Productivity Di-



vision in San Jose. "You have to know how you are going to back it up, and how much downtime you are going to be able to afford. Your choices will have broad implications for how you design the total system."

There are computers specifically built to be fault tolerant. They feature redundant processors, automatic recovery capabilities, and other such specially designed components. These computers can cost substantially more than non-fault tolerant machines that can do all the work, but may also crash. The simplest fault tolerant system is a duplex unit; there are some systems on the market, however, that include several interconnected processors.

A much more frequently used scheme to insure resiliency of the equipment is the distribution of process control intelligence over a number of processors. No single processor works on the whole job at any time.

In a highly automated environment, resilient equipment is not the only requirement of real-time systems. The reliability of the data must be maintained as carefully as that of the equipment. The definition of data integrity, and the standards to which it must be held, vary from situation to situation.

Most sensors and actuators at the control level are optimized for speed. The amount of information they provide and its complexity are kept to a minimum, which lessens the possibility of getting bad information. "Because it is gathering a small enough amount of information, a sensor that is 1% in error is tolerable," says Anatec's Olson. "If the device is off spec, but still within the parameters set by the quality department, then you shouldn't be too concerned. All you need to worry about is that it is consistent, and resistant to failure. Of course, at some point there is no difference between a lack of correct

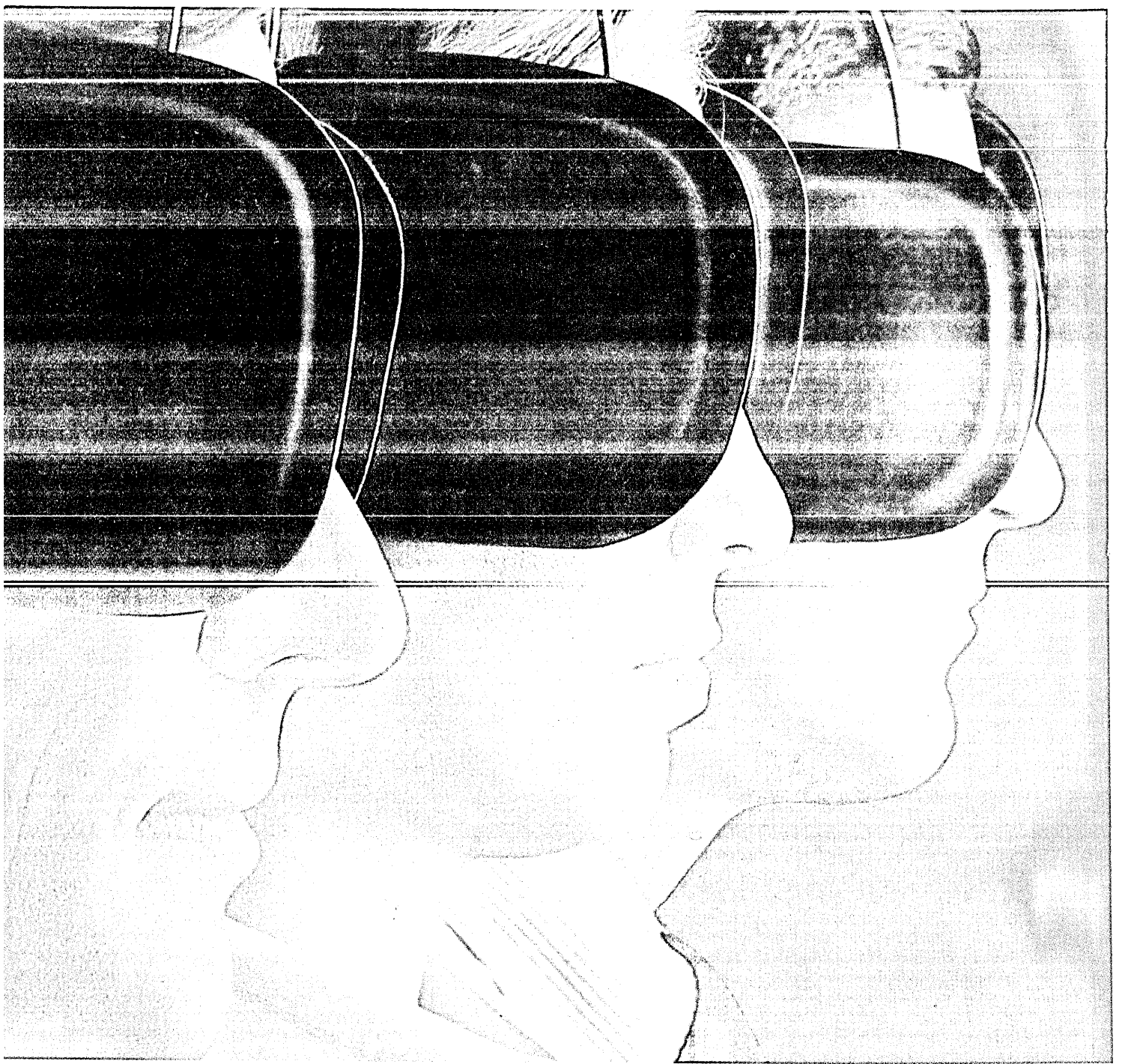
Manufacturers are realizing the benefits of making real-time production information available to management.

data and an equipment failure. If a sensor is consistently 50% off, it is useless and you'd better replace it."

Reliability of data very quickly becomes important in an on-line system. Errors at one point in a process will produce errors throughout the system. Users need to be able to trust the veracity of the information they are receiving. They must have a comprehensive scheme of preventive maintenance in order to preserve the integrity of the manufacturing process. In addition, measuring devices should be placed at key points to permit production systems to catch errors that occur despite the best efforts of maintenance personnel.

The need for data integrity may bring manufacturers into the world of artificial intelligence. Common methods of checking on the reliability of data involve mathematical checks to see that the numeric values being interchanged follow a certain pattern. The process is a bit like casting out nines in arithmetic, although the math used to test blocks of data is quite a bit more sophisticated. This kind of data checking is based on an assumption that the sending unit—a controller, sensor, minicomputer, or other electronic device—is operating correctly. But if the raw data themselves are wrong, the sending unit may still send the error accurately. The error will not be detected.

Artificial intelligence techniques and other advanced computer-based checks can isolate faults that result from bad data. Computers can flag a sudden change in information from a process so that personnel can react. The cause for alarm may not be an event that signals a potential safety hazard. With sophisticated programming, a minicomputer can detect machines drifting out of spec, batches of parts that differ from the usual run, or an unexpected change in reaction time at the controller level. ©



DATA GENERAL ASKS: OPERATING AT

GIVE THEM TOTAL RESOURCE-SHARING WITH TEO!TM THE FIRST COMPLETE INTEGRATED ENGINEERING ENVIRONMENT.

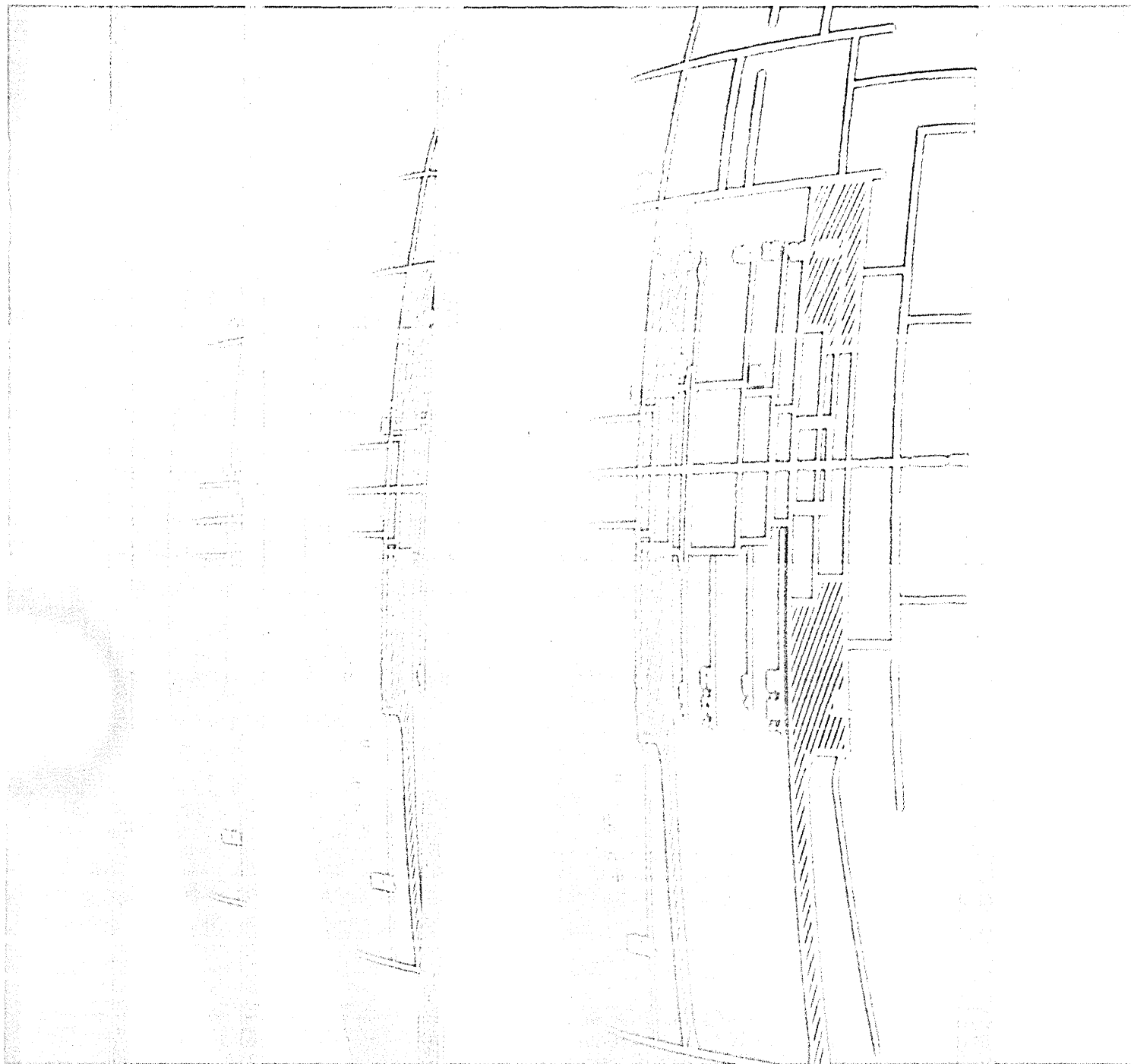
Take the blinders off your engineering and development operations. With a systems solution that affordably integrates hardware, applications, advanced office automation and personal productivity tools in a shared environment.

Data General's Technical Electronic Office (TEO) combines your existing applications software

and over 500 state-of-the-art packaged applications with CEO,[®] our industry-leading office automation. It integrates engineering functions with full office automation. And our unique AOS/DVSTM distributed operating system lets your engineers tap all the power and responsiveness of your company's entire computing resources from each workstation.

It's just one of Data General's total solutions for industrial and business automation. A solution that lets engineering workstations, superminis and servers work together as a single resource.

AOS/DVS is the only distributed operating system offered on a full range of compatible processors, from our new DS/7000TM family of workstations to the new standard for supermini's, the Data General MV/20000.TM Or MV/UXTM and DG/UXTM can provide



ARE YOUR ENGINEERS A HANDICAP?

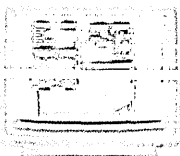
enhanced UNIX™ operating environments throughout your organization.

Either way, Data General's commitment to industry standards and compatibility lets you integrate your current mainframes. Easily expand your network. And protect your investment.

From the most affordable single-board workstation to an entire 10 MIPS supermini system, Data General delivers superior performance and availability.

To learn more about TEO and our other integrated solutions, write Data General, 6300 South Syracuse

Way, Englewood, Colorado 80111. Or call 1-800-DATAGEN (in Canada, call 1-800-268-5454).



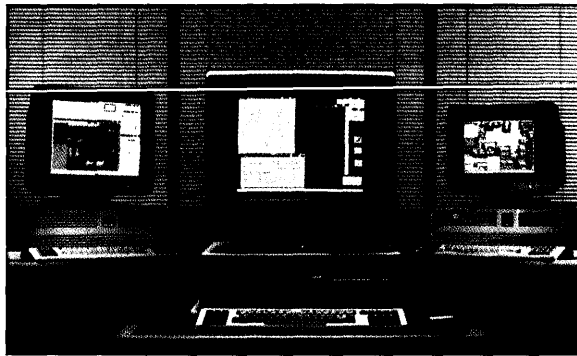
Data General
a Generation ahead.

© 1986 Data General Corporation, Westboro, MA. CEO is a registered trademark and TEO, MOS IWS, DG UX, MV UX, DS 7000 and MV 20000 are trademarks of Data General. UNIX is a trademark of Bell Laboratories.

CIRCLE 268 ON READER CARD

Product Spotlight

Enhanced versions of the Domain 3000 personal workstation are now available from Apollo Computer.



□ ADAC Corp., Woburn, Mass., is now offering a standalone or intelligent satellite data acquisition and control system for harsh industrial environments. The PX11/BASYS provides 16-bit LSI-11/23- or 11/73-based distributed control while interfacing to the IBM PC, XT, AT, Digital Equipment Corp. VAX and other DEC mini hosts. It will support more than 1,000 analog, 2,000 discrete, and up to eight serial I/O points. It comes with up to 4MB of nonvolatile battery packed CMOS RAM. All types of I/O are supported including high-voltage AC/DC, pulse trains, and sensing applications. The PX11/BASYS shares ADAC's proprietary PROM resident I/O-BASIC programming language, and it will support FORTRAN and Pascal. Prices begin at \$5,500. RS # 270

Apollo Computer Inc., Chelmsford, Mass., has expanded its DOMAIN Series 3000 personal workstations with additional memory, better graphics, and enhanced network capabilities. Besides boosting resident memory from 4MB to 8MB, Apollo now offers 155MB and 348MB 5¼-inch Winchester disk drives and an enhanced 19-inch 60Hz noninterlaced 1,024 by 800 bit-mapped display with 16 simultaneous colors out of a possible palette of 4,096. The company also announced a serial/parallel expansion board and

EtherController-AT, which allows users to link workstations to Ethernet LANS. The DOMAIN Series 3000 personal workstation with the new display, 8MB of memory, 348MB Winchester, and a 60MB quarter-inch tape drive costs \$38,200. It is available 60 days after receipt of order. RS # 271

Cad Design Systems Inc., Chicago, is offering a computer aided design system for personal computers for under \$6,000. CADengine includes an IBM XT compatible computer with a graphics card, 640KB of RAM, 20MB hard disk, 360MB diskette drive, 8087 math coprocessor, two RS232 serial ports, one parallel port, a digitizer, plotter, MS/DOS 2.1, and Version 2.5 of AutoCAD enhanced by CDSi's AcadPLUS tablet menu; the package costs \$5,995. Training and a help hot line are included and AT turnkey systems are also available. RS # 272

Hewlett-Packard, Palo Alto, has announced an addition to its HP 9000 line of graphics workstations. The Model 320SRX uses custom VLSI and a new architecture to provide three-dimensional solids modeling at high speeds. It gives users doing solids modeling a response time similar to that of 3-D wire-frame applications, and also allows designers to work interactively. It will be primarily mar-

keted for molecular modeling, mapping, and high-end architectural and engineering construction markets. The Model 320SRX bundle costs \$45,000 and includes a 60Hz noninterlaced monitor, with 1,024 by 1,024 pixel resolution, I/O expander, 4MB RAM, HP-UX operating system, eight planes of frame buffer memory, and four overlay planes. An upgrade from the Model 320 costs \$12,440. RS # 273

IBM's Information Systems Group has announced a new real-time coprocessor for the industrial environment. Called A Realtime Interface Co-Processor (ARTIC), it can be used as a dedicated high-performance subsystem for IBM industrial computers and Personal Computers to increase real-time capabilities. When used along with new software, it will also provide support for programmable controllers. Based on the Intel 80186 16-bit microprocessor, it comes with two independent serial ports that can be programmed for asynchronous, bit synchronous, and character synchronous protocols that either access memory directly or use interrupt mode. It has both 8-bit mode and 16-bit mode data bus support, with eight selectable interrupt levels. ARTIC comes in two configurations, one with 128KB of memory, which costs \$1,295, and one with 512KB of standard memory, which costs \$1,695. Prices include either a 5¼-inch or 3½-inch microcode diskette. RS # 274

A ruggedized IBM PC/XT/AT-compatible computer is now available from **Comark Corp.**, Medfield, Mass. The Expert is being marketed for use in process control, factory automation applications, and distributed numeric control. It comes with eight expansion slots, 640KB RAM, a 19-inch NEMA 12 RGB monitor with 16 colors, low- or medium-resolution display, and a full keyboard with 10 function keys. Expert-XT costs \$4,995; the Expert-AT costs \$5,995. RS # 275

WinSystems Inc., Arlington, Texas, is now shipping an all-CMOS STD bus single-board computer based on the 80C88 cpu. The LPM-SBC8 combines the cpu, two 28-pin memory sockets, an 8087 coprocessor socket, three 16-bit counter/timers, serial RS232/422 I/O, an interrupt controller, precision power fail detect circuit, and watchdog timer on a single card. It operates at either 5MHz or 8MHz, and is available from stock for \$495. RS # 276

Control Data Corp., Minneapolis, has expanded its line of pro-

processors for integrated computer aided manufacturing and engineering. The ICEM 793G processor is a low-end, entry-level system for design, drafting, and analysis. The 32-bit machine includes an integral floating point accelerator, 2MB on-board memory, and 320MB of disk storage. It runs at approximately one million instructions per second. Additional cards will provide either a two-channel or a 12-channel asynchronous controller, an Ethernet controller, or memory expansion. The 793G runs under IWOS, a proprietary operating system, and supports terminals from CDC and Tektronix Corp. Prices range from \$22,585 to \$47,500. RS # 277

The Test Instruments Division of Honeywell has published a brochure describing its H.TMS 3000/22 Test Management System for die casting. It explains how the Die Casting Test Management System can generate Statistical Process Control quality reports and how it can also be used for a variety of machine monitoring applications. To receive a copy, write to Honeywell TID Inquiry Services, 5105 East 41st Ave., Denver, CO 80261. RS # 278

A new software tool for evaluating and justifying investments in robotics is available from the Society of Manufacturing Engineers. Robot Calc II is a computerized database for IBM PCs, ATs, and XTs. It includes names, addresses, and corresponding data sheets on products from over 100 major robot manufacturers and associated suppliers. The system can be used interactively to allow users to do financial justification of potential purchases. List price for the package is \$895 (\$850 for SME members). To get more information, or a copy of the program, write to Marketing Services of SME, One SME Dr., P.O. Box 930, Dearborn, MI 48121, or call (303) 271-1500. RS # 279

Two new collections of articles,

**The HP 9000
model 320SRX
will allow users
to do three-
dimensional
solids modeling
at high speeds.**



one on the Just-in-time method of inventory control and the other on robotics, are now available through the Institute of Industrial Engineers. *Robotics and Industrial Engineering: Selected Readings*, edited by Edward Fisher and Oded Maimon, is a collection of IIE papers and proceedings covering major topics in the field of robotics, including selection and justification of equipment, robotic cell design, and implementation issues. *Applying Just In Time: The American/Japanese Experience* is a collection of articles edited by Yasuhiro Monden, himself the author of various works on the subject. It includes articles on the *kanban* system, synchro MRP, total productive maintenance, and FMS at Toyota. Each book costs \$39.95 (\$26.95 for IIE members). They are available through IIE Publication Sales, 25 Technology Park, Norcross, GA 30092. RS # 280

A new brochure on Artificial Intelligence is now available free from Digital Equipment Corp. "Artificial Intelligence: Training and Consulting" describes in detail the company's Software Services and Education Services offerings in the AI environment. It discusses how the technologies work, and summarizes how DEC evaluates individual customers needs, as well as how the company aids users in developing AI applications and integrating them into their businesses. Those interested in obtaining a copy of the brochure may write to George Starr, 129 Parker St., Maynard, MA 01754, or call (617) 493-4596. RS # 281

A 96-tape library of videotapes outlining the implementation of Manufacturing Resource Planning (MRP II) programs is now available from Oliver Wight Video Productions Inc. The library comes in three versions. The complete library is intended for companies just beginning with MRP II, or those hoping to improve an existing system. Users planning to integrate

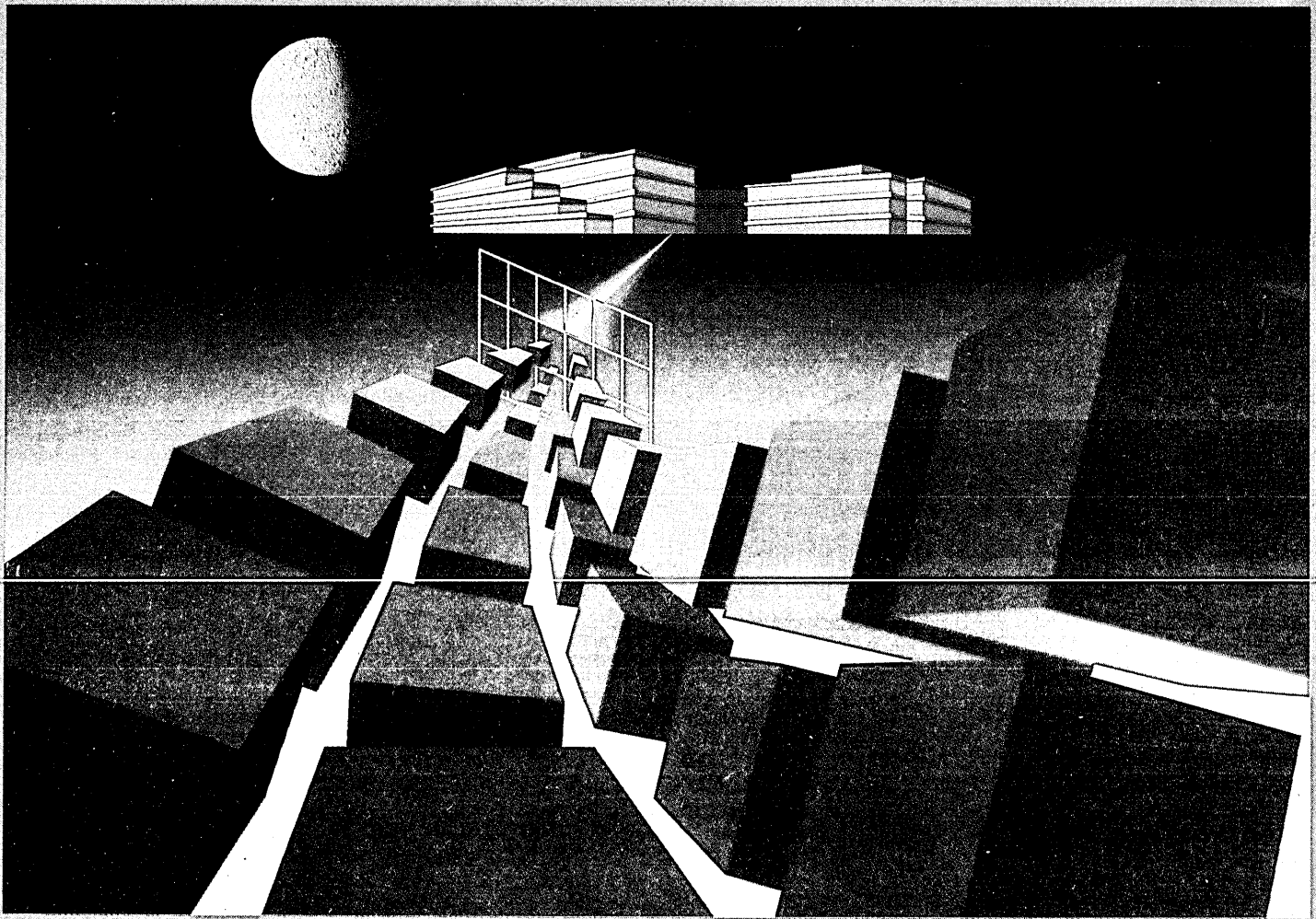
distribution with manufacturing can purchase the Distribution Resource Planning Library, and those companies looking for a general discussion of the fundamentals of MRP II can buy the Overview Library. Prices for the library, and the educational services that come with them, range from \$20,000 to \$50,000, depending on the size and needs of the company. All three versions are available now on VHS from Oliver Wight Video Productions, 5 Oliver Wight Dr., Essex Junction, VT 05452, or call (800) 343-0625 or (802) 878-8161. RS # 282

A new brochure containing the product specifications of the Bailey Loop Controller is now available from Bailey Controls Co., a division of Babcock & Wilcox. The brochure contains tables and photos describing the standard product and available options, basic and advanced functions, and specifications including inputs, outputs, dimensions, and communication loop capabilities. To receive a complimentary copy, write to Bailey Controls Co., Marketing and Communications 3T6, 29801 Euclid Ave., Wickliffe, OH 44092. RS # 283

Users of personal computers can get help selecting the best color monitor for their needs from a new brochure from Princeton Graphics Systems, Princeton, N.J., a marketer of high-resolution monitors and accessories for personal computers. "Gaining the Color Advantage: How to Select a Color Monitor For Your Pc," describes the different types of color monitors, as well as the different considerations that should go into a buyer's decision such as system compatibility, color brilliancy, and ergonomics. It also lists suggestions on how to assess price/performance, and includes an example comparison chart. For a copy of the brochure, write to PGS Brochure, P.O. Box 853, Valley Forge, PA 19842. RS # 284 ©

In September's MRP II vendor survey, the manufacturer of MACPAC software products was inadvertently omitted. It is Arthur Andersen & Co., 33 West Monroe St. Chicago, IL 60603, (312) 580-0033.

This special report, which appears in *Datamation*, Dun's Business Month, Control Engineering, and Plant Engineering, was prepared by Sharon Brady of Technology News of America Co. Inc., a New York City-based research and publishing company.



The facility of tomorrow.

In today's highly competitive and unpredictable economic climate, the facility of tomorrow may well be the key to both short-term profits and long-term growth.

Properly designed, it helps accomplish strategic objectives that affect the bottom line—reduced inventories, optimum materials flow, product quality and productivity.

Creating the facility of tomorrow poses problems so complex that solutions can be achieved only through total integration of systems and structure.

Austin today is creating the facility of tomorrow for industrial, commercial and governmental clients. We should be developing one for you.

The Austin Company, Cleveland, Ohio
44121. (216) 382-6600.



**THE AUSTIN
COMPANY**

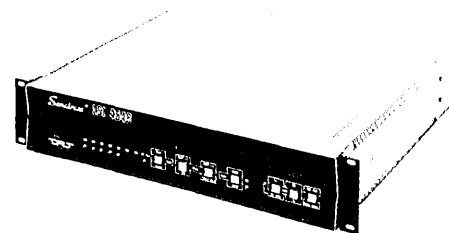
DESIGNERS
ENGINEERS
BUILDERS

ATLANTA CHICAGO CLEVELAND HOUSTON KANSAS CITY LOS ANGELES NEW YORK SEATTLE • AMSTERDAM BUENOS AIRES LONDON MADRID SAO PAULO SYDNEY TORONTO

CIRCLE 269 ON READER CARD

PICK THE BEST!

V.32 MODEM



ENJOY OUR FASTEST-EVER 2-WIRE FULL DUPLEXABILITY

Now you can move your data at 4800 bps simultaneously over two wires with the first V.32 modem available off the shelf: TRT's Sematrans 4848.

This outstanding unit incorporates leading-edge technology in echo cancellation by signal processing and filtering, providing high-quality data transmission on both dial-up and dedicated lines. It also features: automatic calling, automatic answering, asynchronous/synchronous conversion, error detection and correction (ARQ).

The Sematrans 4848 is the outgrowth of research conducted in France by TRT as part of its commitment to finding better ways of anticipating and meeting corporate datacommunications requirements and truly represents a long-awaited and unique breakthrough in full duplex modem design.

For more information:
TRT/Operations

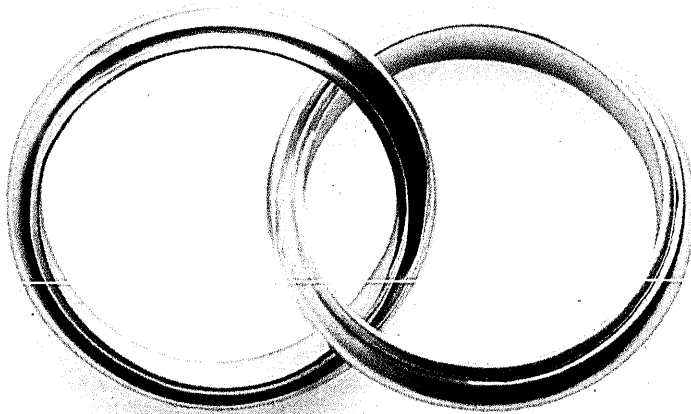
180 Franklin Turnpike - Mahwah N.J. 07430
Tel. 201 - 529 38 00

Distributor: Comlink Inc.
4229 Northgate BLVD - Sacramento CA. 95834
Tel. 916 - 922 54 16

Headquarters: TRT
88, rue Brillat-Savarin - 75640 Paris Cedex 13,
France - Tel. 33-1- 45 81 11 12 - Telex 250838 F

CIRCLE 24 ON READER CARD





THE MARRIAGE THAT CHANGED THE SOFTWARE INDUSTRY.

In an industry that's had its share of volatility, we present an ideal partnership.

On one side of the aisle, McCormack & Dodge. A fast-growing software company known for its leading edge technology.

On the other, Dun & Bradstreet. Employer of four U.S. presidents, a symbol of financial stability for nearly a century and a half.

They exchange vows, and you've got the kind of company the business software market has been waiting for.

A software company that's not only rich in talent. But rich in resources.

Resources to train, support and service. Resources to fix a problem no matter where in the world it occurs.

Resources to fund serious long-term

R&D in every field of business software. Financial, manufacturing, human resources, application development tools.

Backed by Dun & Bradstreet, today's McCormack & Dodge combines stability and innovation. Something no other software company has managed to do. If you're planning on a new family of software, isn't this the kind of company you want to marry?

McCormack & Dodge

DB a company of
the Dun & Bradstreet Corporation

McCormack & Dodge Corporation, 1225 Worcester Road, Natick, MA 01760, 1-800-343-0325

CIRCLE 26 ON READER CARD

Choosing the right output machine is often a matter of character.

THE ABCS OF PRINTING

by Hesh Wiener

On May 3, 1983, IBM introduced its 2,000 lpm model 4245 line printer. The product suffered from some engineering problems — problems that came as a surprise since IBM's line printers have almost always been the best in the industry. For two years, IBM tried to mollify unhappy users who complained about the device's print quality and stability, but the reputation of the \$54,500 box was tarnished beyond repair.

Finally, on May 1, 1985, IBM unveiled a new 4245 that offered the old performance specifications at a new low price of \$35,000. A slower version selling for \$28,000 was also announced. The new 4245, which came with a one-year warranty, carried maintenance charges of \$400 a month — more favorable terms than its predecessor, which had a three-month warranty and monthly maintenance fees of \$650. Even though the sales pitch for the revitalized 4245 touted the unit's improved price/performance, the main advantage of the new machine over the old one was its superior quality. Redesigned and repriced, the 4245 won over users in droves. Before a year

was out, it had become one of IBM's most successful line printers.

This success, however, did not spell relief for disgruntled owners of the original 4245s. In fact, it exacerbated their woes. Customers who purchased the first version of the printer are married to the machine. The printer simply cannot be resold. Nobody will buy it at any price. Even leasing companies that invested in the machines have philosophically, if not financially, written them off. Investors in lease-based tax shelters are in the same position as lessors, but because they buy into large and diverse pools of equipment, they are unlikely to feel the pinch.

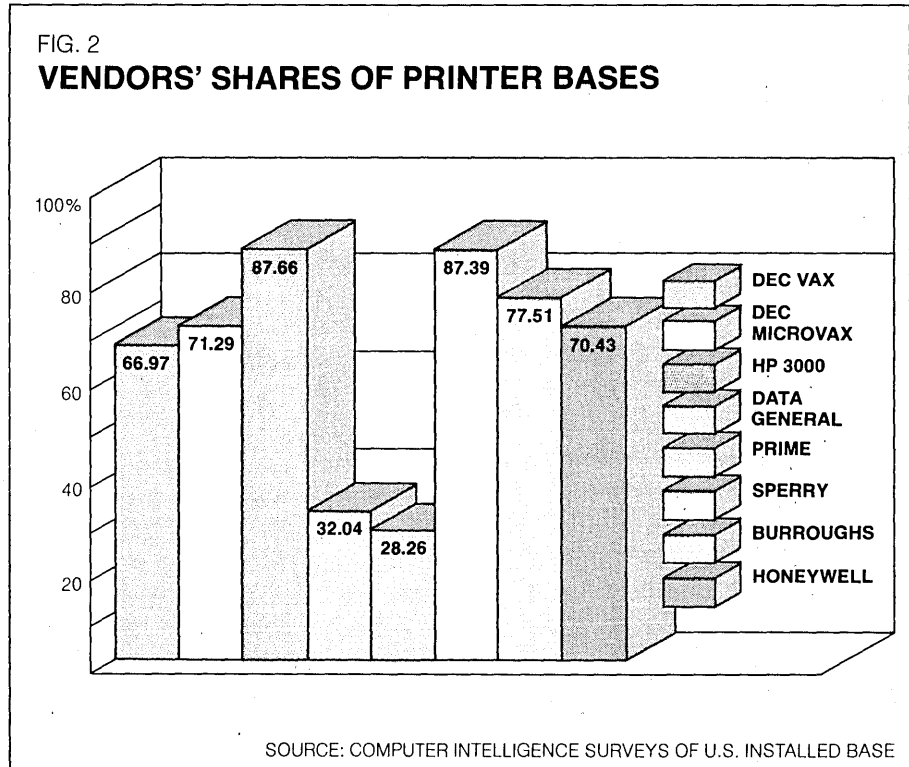
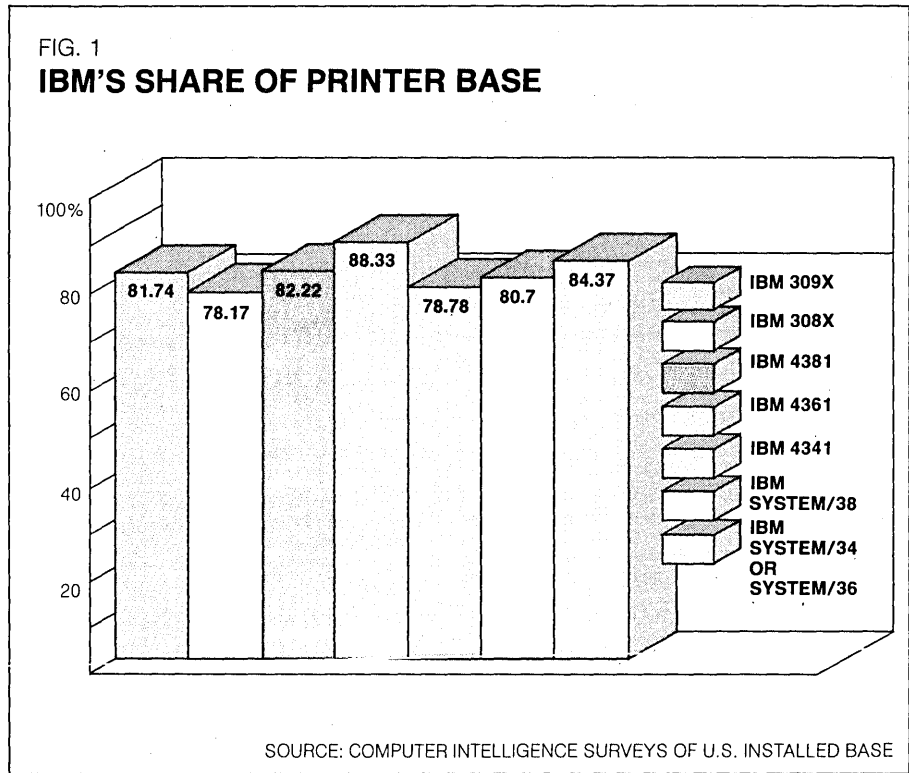
IBM never offered buyers of the older 4245s a chance to trade in their machines for newer and better units. The company's position seems to be that the original machines, even with their faults, performed as promised and, with IBM maintenance, will continue to work for years to come. Indeed, many buyers of the old 4245 appear to be happy.

So are third-party firms that sell used IBM gear as an alternative to the manufacturer's new products. IBM's flub produced a windfall for its third-party competitors. From the time the first 4245 was introduced until the revised version was shipped in volume, the third parties that had portfolios of used IBM printers cleaned up. Such stalwarts as the 1,200 lpm 3203-5 and the 2,000 lpm 3211/3811 printers gained value as buyers bid up the prices. Even the venerable 1403-N1, which dealers had pretty much consigned to the scrap heap, garnered a few orders.

IBM also did well with another new printer, the model 4248 that runs at up to 3,600 lpm. This heavy-duty machine became more attractive to midrange users who might not have been willing to plunk down \$99,000 for a line printer under less pressing circumstances. (When the revised 4245 was introduced, the price of the 4248 was cut to \$75,000 to maintain sales momentum.) In addition, non-IBM printers from various makers became a bit easier to sell to formerly true blue shops.

A HIGHLY UNUSUAL IBM CASE

The case of the 4245 was highly unusual for IBM and for the computer industry as a whole. Processor vendors normally enjoy extraordinary success in selling their printers to users, and so, indirectly, do several independent manufacturers that provide printers on an oem basis to the full-line computer vendors. But the story of the original 4245 and what happened when users realized it was not up to snuff demon-



strates that even IBM, the strongest vendor of them all, must yield to the will of the market.

The will of the market in the printer sector seems to be operating in favor of the processor vendors. Surveys of the U.S. installed base conducted by Computer Intelligence Corp. of La Jolla, Calif., show that mainframe and minicomputer companies provide the overwhelming majority of the printers installed by their customers. IBM

printers are attached to IBM mainframes, Digital Equipment Corp. printers to DEC machines, and so on (see Figs. 1 and 2). The notable exceptions are mini makers Prime Computer and Data General, which have simply not pushed their own printer products the way other computer makers have.

Roughly 10% to 20% of the market veers away from the processor path and goes its own way. That more random route

Can your on-line transaction processor do anything else?

A lot of on-line transaction processors just can't cut it if you need them to do other kinds of processing.

Oh, they can do some of your general purpose processing work when push comes to shove.

But not easily, and not efficiently. That's where we come in.

The NCR 9800 was built to be an excellent on-line transaction processor, as well as an excellent general purpose processor.

How?

Using what we call job-specific modules.

The 9800's architecture lets you configure the right processors to do the job: either application processors or data storage processors.

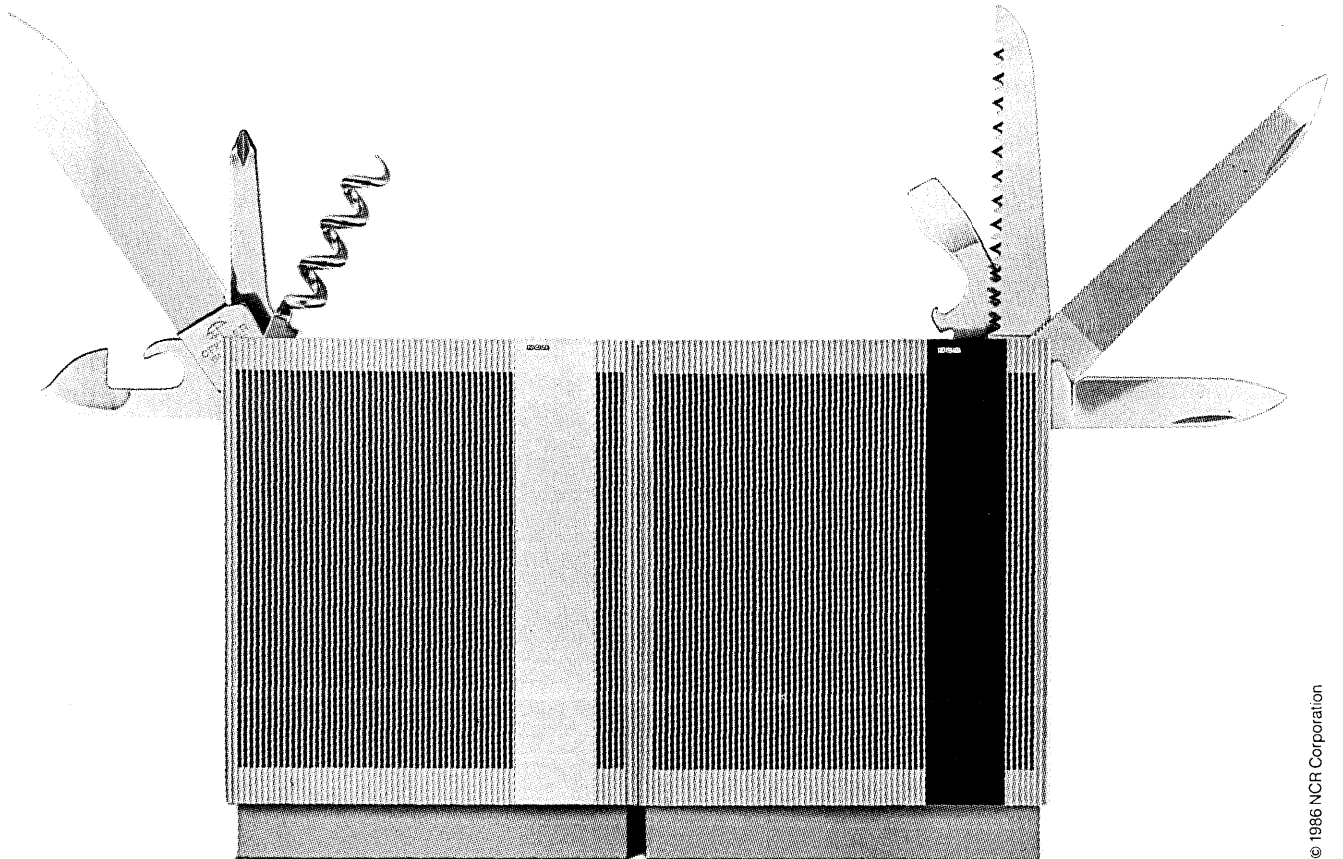
So it can do both, transaction and general purpose processing, more efficiently.

And that leaves just one job for you:

Calling us. We're at 1-800-CALL-NCR.

**NCR 9800. The evolution
of the mainframe.**

NCR



CIRCLE 27 ON READER CARD

represents a substantial opportunity for independent printer makers. It's good for maverick users, too. They don't have to feel they're the only ones out there shopping for their own output devices.

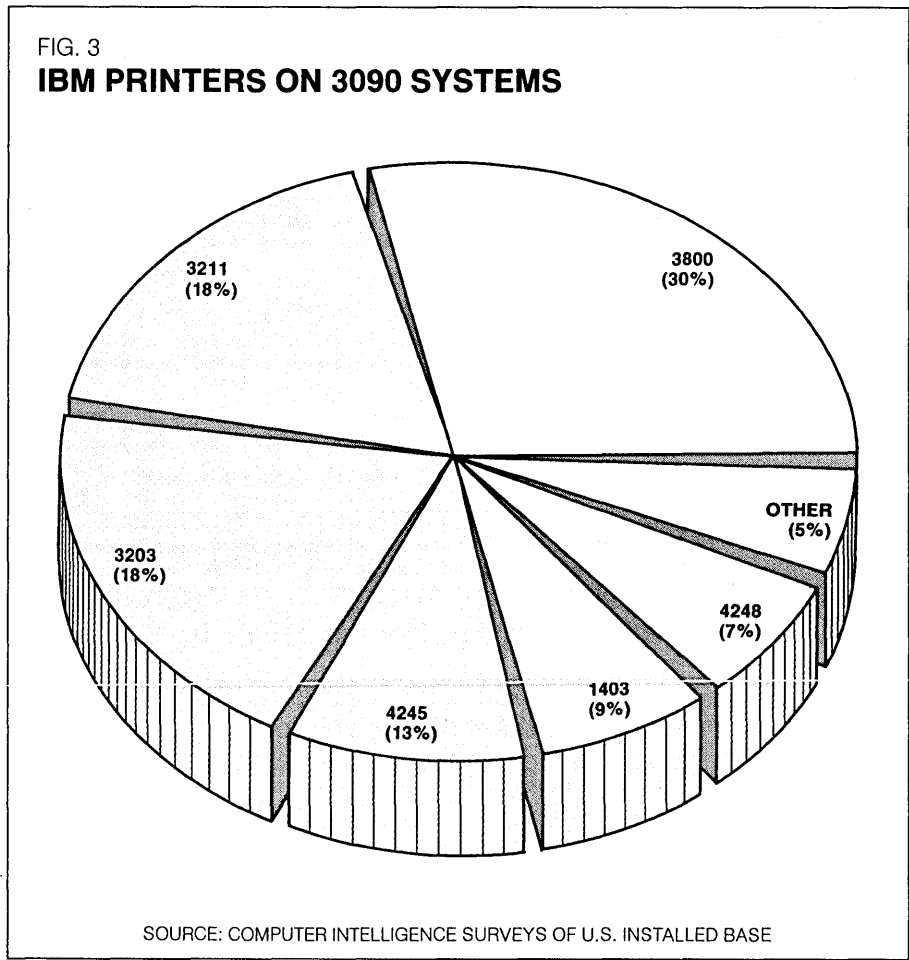
In the personal computer world, things are a little different. Machines built to the IBM standard can drive dozens and dozens of printers. All the successful software packages for the IBM PC family and its vast horde of imitators are designed to drive a variety of output devices. The diversity in this market stems from IBM's decision to go with a standard plug on the back of its original PC, leaving the rest of the interface job up to printer makers and software houses.

Also, IBM did not offer its own printers to PC users at first. Instead, it put its logo on dot matrix machines made by Epson and let users know it. As a result, corporate America grew to trust Epson's printers, and, by inference, those of other Japanese companies. So even though IBM now has two strong contenders of its own in the Proprinter and Proprinter XL, there is little evidence that users can easily be wooed back into the IBM fold in the short run. In the long term, of course, the printer game may go to a persistent IBM.

In the other personal computer ballpark, where Apple goes to bat, the Macintosh requires a printer that can replicate bit-mapped screen images. This has greatly limited most of the company's users to Apple-supplied printers. The Mac, however, does use an independently developed page description language that permits intrepid users to attach various laser printers and typesetters to the machine.

A mainframe's age seems to be a factor in the user's choice of printer. This is evident in Computer Intelligence's extensive studies of the IBM base. While nearly 82% of the printers on 3090s come from IBM, only 78% of the printers on 3080s are supplied by the computer giant. And, while more than 88% of the printers on 4381s are from IBM, only 79% of the printers on 4341s bear Big Blue's logo. The 3090, of course, is the successor to the 3080, just as the 4381 is the follow-on to the 4341. Figs. 3 and 4 show how Big Blue's printer pie is divided up on the 3090 and the 4381.

Many of the older mainframes are no longer in their original homes. When a user organization decides to install a second-hand computer—and buck the pressure to buy new gear directly from the manufacturer—it apparently is also more open-minded when it comes to buying printers. Used computers almost invariably pass through the hands of dealers. These dealers generally prefer to install all-IBM



systems, so the statistics showing that non-IBM printers are more abundant on older machines reflect user preferences, not characteristics of the used equipment market.

STRONG SUPPLIER A FACTOR

Another factor that influenced the preferences of users of old IBM systems was the presence of a strong pcm supplier, Storage Technology Corp. While STC was growing into a billion-dollar business by supplying plug-compatible tape and disk systems, its printer subsidiary, Documentation, was achieving substantial penetration into the IBM market. Things have changed dramatically since then, however.

Users, worried over STC's Chapter 11 bankruptcy filing, have been justifiably skittish, though the company's service and support received a great deal of attention from ceo Ryal Poppa. Should a new Storage Technology emerge from court protection with vigor—and the right products—the base of non-IBM printers on new IBM systems will almost certainly increase in size.

Outside the IBM arena, conditions are similar. The other mainframe makers have done roughly as well as IBM, selling most printers to their own user base. Ironically, Honeywell, the only mainframer that's succeeded in selling very high speed, nonimpact printers to IBM mainframe

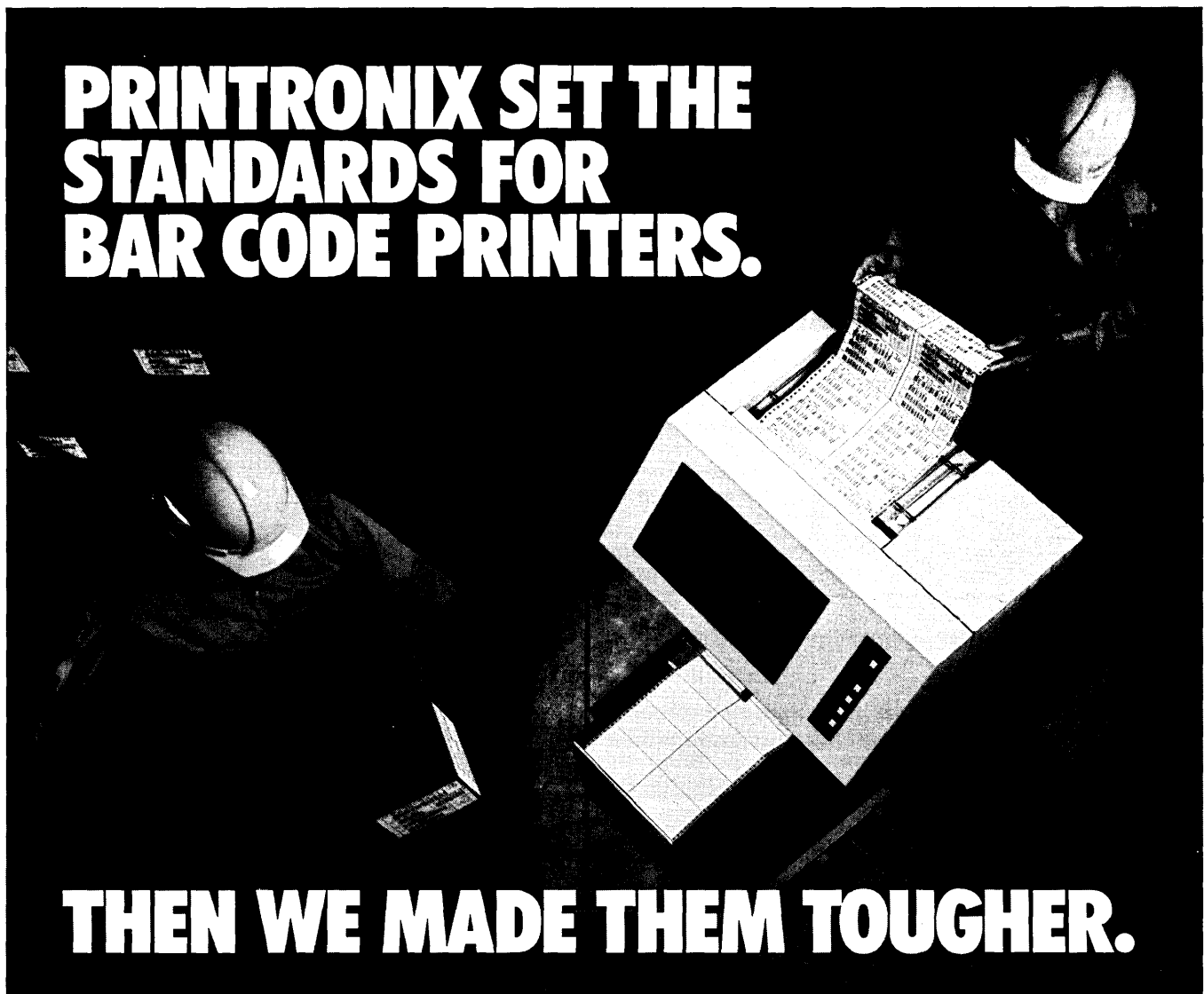
shops, seems to do worse than others in peddling printers of all types to its own customers. But the Honeywell survey data may be influenced by the company's minicomputer base. In the minicomputer business, users tend to be more independent of processor vendors than in the mainframe realm.

Users of DEC VAX machines are a good example of this independent streak among mini customers. Even though DEC printers enjoy good reputations, VAX users still buy a third of their machines from other suppliers. This can be partly attributed to the important role value-added resellers (vars) play in the DEC VAX market. Vars that provide independently made printers can often give users more value for their money. The vars, meanwhile, increase their profit margins through such sales.

The VAX market is also a much better target for independent printer makers than any other. Digital's VAX base includes more machines than that of the comparably powered IBM 4300 series. That base is also growing more rapidly than the 4300 base. Add to all this the availability of printer interface cards at modest prices, and you get a marketplace that simply boils with competition.

While all this may put the heat on marketing executives charged with selling DEC printers, the peripherals race helps the company sell processors and other system

PRINTRONIX SET THE STANDARDS FOR BAR CODE PRINTERS.



THEN WE MADE THEM TOUGHER.

Printronix L-Series bar code printers are not afraid of work. Or overtime. They produce spec-quality AIAG, LOGMARS, UPC and EAN labels hour after hour. Day after day. Week after week. With no special treatment. Because these workhorses were made for the factory floor.

Introducing the Printronix L300. The new L300 is ideal for virtually all bar code applications, with speeds up to 33.3 inches per minute for graphics output. And up to 300 lines per minute for data processing.

Like all L-Series matrix line printers, the L300 prints labels from 3.5" to as wide as 16". Plus handles everything from shop reports and work orders to multi-part forms. The L-Series prints on virtually

anything from card stock to bond. And offers a broad range of printing modes and speeds.

L-SERIES FAMILY

Model	L150	L300	L600
AIAG Shipping Labels per hour	250	600	1,200

No wonder Printronix has put more bar code printers to work than anybody else. With the most service and support facilities nationwide.

Want a hard working helper that prints superior quality bar codes right on the shop floor? That's tough. That's Printronix.

CALL 1-800-826-3874. In California, **1-800-826-7559.**

CIRCLE 28 ON READER CARD

____ Please send more information on the L-Series Bar Code Printers
 ____ Please call to schedule a demonstration of the L-Series Printers

NAME/TITLE _____
 COMPANY _____
 ADDRESS _____
 CITY/STATE/ZIP _____
 PHONE NUMBER () _____

DA

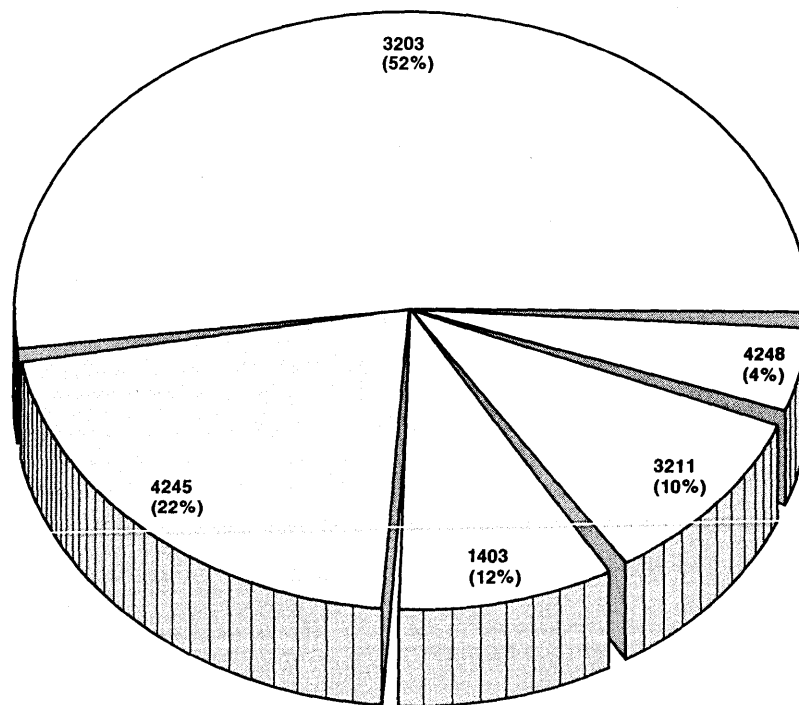
PRINTRONIX®

SEND TO: Printronix, Inc., P.O. Box 19559, 17500 Cartwright Rd., Irvine, CA 92713.

European Headquarters: Printronix Europe S.A., Boulevard du Souverain 100, 1170 Brussels, Belgium, Telephone: (32) 2-660-2904. Euro Telex: 26043 PRINTR B.

Printronix is a registered trademark of Printronix, Inc.

FIG. 4
IBM LINE PRINTERS ON 4381 SYSTEMS



SOURCE: COMPUTER INTELLIGENCE SURVEYS OF U.S. INSTALLED BASE

components to budget conscious users. These days, that means just about everyone, as DEC's financial results so clearly show. Also, there are indications that the mini manufacturer's increasingly competitive home-brewed printers are winning market share among users who are putting in new VAX machines. The statistics on the MicroVAX base, which includes a larger proportion of recent installations, show that Digital has done a better job of selling printers during the last year or two.

Other minicomputer makers have had mixed success in the printer business. One firm that comes out on the successful side is Hewlett-Packard. The California company, which has put tremendous emphasis on its peripheral wares, has earned strong user loyalty. HP has been providing excellent nonimpact printers for years, and its reputation for good service on all peripherals makes it a force in the field to be reckoned with. The result is apparent in the statistics and in the way the company has succeeded in selling printers to users of rival minicomputers.

It is not only the desktop laser printer market that Hewlett-Packard has taken by storm. The company's midrange laser printers are also in demand. These printers are the basis of the hardcopy output on MCI Mail's VAX network and they show up in many shops that have processors made by HP and its competitors.

Hewlett-Packard isn't the only player in the nonimpact printer business. At the high end, IBM's 3800s are the most widely used machines. Xerox also has a strong entry in the nonimpact niche, as does Honeywell. Kodak too is about to make the plunge into the midrange market, which has become a battleground for makers of high-end machines seeking to expand their business and producers of low-end printers that are looking for growth opportunities. The technologies used by various vendors include laser, LED array, and electrostatic transfer. It looks as if several techniques for inking paper will remain around for some time. So, of course, will paper, a persistent printer problem.

A nonimpact printer suffers from the same trouble copiers do. Paper is a dusty and generally annoying material to move through a complex machine. It also can be stubborn when it comes to taking toner. End users who want a choice in the type of paper they use for billing, management reports, and other kinds of computer-generated hardcopy are unsympathetic to the engineer's dilemma. Every improvement in image quality that an engineer makes is met by a paper mill's development of some new, cheap, attractive, and inhospitable

batch of squashed wood pulp.

Nonimpact printers reduce the cost of preprinted forms. As color capability is added to the machines—something likely to happen in the midrange before it does at the high end—even more forms will disappear. Nor has the large dp shop overlooked the way laser printers and their kin have changed desktop computing. By permitting users to control typography, graphics, and other aspects of document production, laser printers have greatly increased the effectiveness of computer printed materials.

Midrange laser printers, which have benefited from progress in page description languages, provide good graphics quality. For users of nonimpact printers, the job of moving images from a workstation screen to paper has been greatly simplified.

What's coming in that era may not be coming from number one. Oddly enough, IBM has thus far been a laggard in the nonimpact printer domain. Most nonimpact printers generate images at 300 dots per inch, but IBM's entries have a significantly lower resolution, 240 dots per inch. While several vendors have been able to link workstations to hosts and printers in a way that permits images to remain intact as they travel down the cables, IBM, with its diverse installed base and incomplete networking strategy, is unable to deliver end-to-end compatibility. While it's true that IBM's problem is far larger than that of

other vendors, so is IBM's capacity for coming up with solutions.

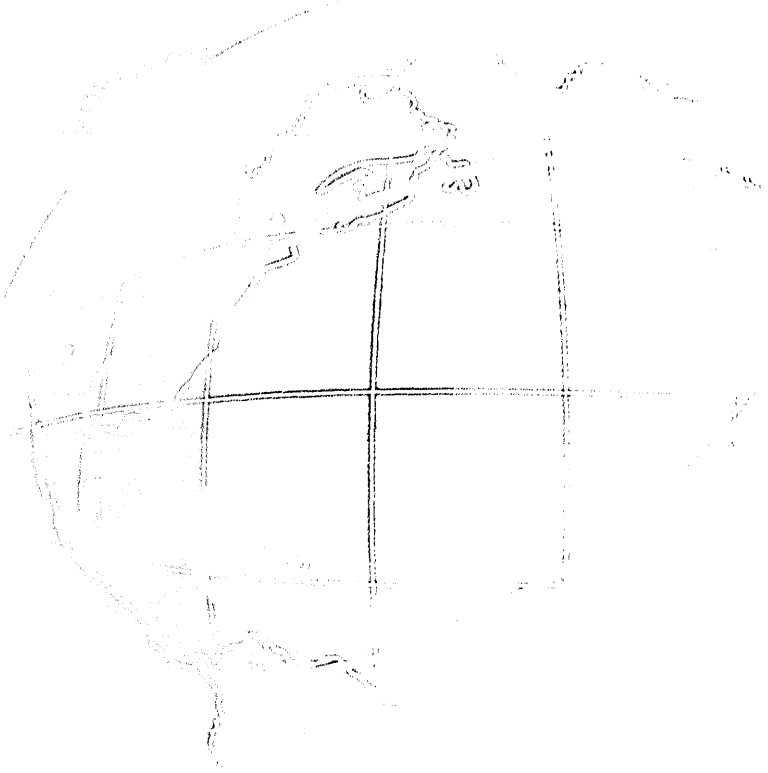
During the past couple of years, IBM has outlined much of its document interchange scheme, but so far the company has not committed itself to a page description language that can serve as a way to connect its diverse terminals, systems, and printers. To be sure, IBM has not entirely ignored these issues. Some of its products do support page composition software developed by outsiders and other IBM products can capture, move, and reproduce detailed images. But Big Blue's products still don't all work together in harmony. This same problem afflicts users of other vendors' systems.

USERS AHEAD OF VENDORS

Hundreds of users are already well ahead of the vendors, pushing output systems to their limits. Banks, for example, have greatly improved the ease with which their statements can be read, as have credit card companies. Direct mail solicitations, group travel itineraries, stock analysts' reports, and countless other computer-generated documents attest to the capabilities of nonimpact printers. By contrast, documents with the same content produced on impact printers are starting to look old-fashioned.

Yet image quality is only one appeal of nonimpact printer technology. In high-volume applications, laser printers are the

WHY DID



AT&T

General Dynamics

Rockwell International

Northwestern Bell

Procter & Gamble

Canadian Pacific

Fireman's Fund

American Family
Insurance

Bankers Life

Irving Trust

PSIS

Texas American Services

Wisconsin Department
of Transportation

CHOOSE EMCOM

NO. 70 SERIES NETWORK CONTROL SYSTEMS

for monitoring their telecommunications networks, and measuring and reporting critical performance information vital to effective network control and planning?

CALL 1-800-22-EMCOM

to schedule the delivery of a FREE evaluation system or
to find out about our NEW RENTAL PROGRAM,
and SEE FOR YOURSELF.

EMCOM (Corporation)

1101 East Park Blvd., Suite 9101, Plano, Texas 75074 USA (214) 423-7183

CIRCLE 28 ON READER CARD

SEE US AT CMG '86
LAS VEGAS - DEC. 9-12

The printers of Texas

The printers you need when

Model 810: The 810 easily handles nine-part forms in high-duty-cycle applications, where its proven reliability and long life have helped make it the market leader in forms printers.

Model 855: The 855 is the perfect printer for LQ word processing. Its removable font modules are available in over 30 type styles and special character sets.

OmniLaser: Available in three models, the 2015 and 2115 for shared-resource applications and the 2108 for workstations. The OmniLaser is designed to print more, print longer, and for less.

Model 860: The Model 860XL offers draft and correspondence printing and is ideal for spreadsheets and forms up to 16 inches wide.



Instruments. your needs are demanding.

Model 880: The 880 is the ideal choice for high-speed, high-duty-cycle data processing report applications that require unattended printing along with correspondence output.



Premium performance and industrial quality. That's what TI printers are known for. Their reliability has always been standard-setting. Their throughput, consistently high. And their quality surpasses the needs of their applications. Which means few, if any, failures and a minimum of downtime. In fact, about all the service a TI printer needs is a paper or ribbon change.

The reason is simple — every TI printer is made to do its job very well, for a very long time.

The Model 810. The workhorse.

For almost a decade, the Model 810 heavy-duty 150 cps system printer has been printing forms and data reports in virtually unattended operation. Its performance has been so reliable that it's the choice of most of the world's major airlines for ticket counter service for one reason. If they aren't printing tickets, they aren't making money. We even took the 810's field-proven architecture and put it to work in our Model 880 system printers. You can't argue with success.

The Model 880 Series. The 300 cps heavy-duty system printers.

Our 880s are the perfect upward migration and high-speed complement to the Model 810. They're twice as fast, fully compatible with the 810, offer correspondence-quality printing, raster graphics, and come in three models — the standard 880, the 880DP and the 880AT. The DP model offers the higher throughput necessary for high-speed data processing forms and report printing applications. And the AT model is ideal for multi-user environments because it is both hardware- and software-compatible with AT- and XT-class personal computers.

TI's micro-printers. They make more out of any PC.

Dual-mode, letter-quality, color printing and graphics, too. However you use your PC, there's a TI micro-printer to match. Our micro-printers feature front plug-in fonts, easy-to-use control panels and a long service life. They're

also compatible with virtually all PC hardware and third-party software. Available in both 80- and 132-column carriage models.

Now, our OmniLaser™ Printers. TI's answer to the shared-resource laser environment.

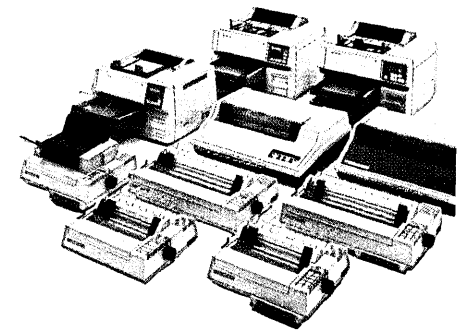
The TI OmniLaser family of printers is the very first of the second generation of laser printers. Why did we wait? Laser printers of the first generation couldn't live up to our standards for function, quality and reliability. In fact, our OmniLaser printers are documented to last up to 15 times as long as their first-generation counterparts, with the lowest cost per page in the industry.*

To be TI printers, the OmniLaser had to print unerringly at incredible speed with unrivaled quality. And they had to be simple to use. The OmniLaser Model 2015 will last in shared-resource work environments where lesser printers fail. They had to be the "810" of laser printers.

So if you're equipping a computer system with printers, or replacing those you already have, demand the printers that fit your demanding needs. Call 1-800-527-3500. For the printers of Texas Instruments.



TEXAS INSTRUMENTS



The power and flexibility of the laser printer necessitate clever software.

most economical and fastest means to generate documents. Large utilities, financial institutions, and government offices have all installed high-end print engines in order to meet production goals. While a fast electromechanical line printer may run at 3,600 lpm, nonimpact printers can spew out upwards of 20,000 lpm in small type.

In terms of document output, several nonimpact printers exceed 100 pages per minute, and the fastest popular unit, IBM's 3800, runs at more than 200 pages per minute. Nevertheless, no laser printer can do the things an impact printer does.

Many jobs require the production of multiple copies, the handling of multipart forms, or the imprinting of self-stick labels. Other jobs are best run on wide paper, card stock, or other materials that accept oil-based inks better than toners. Whether or not laser printers can handle midrange tasks, impact printers are often the least expensive source of hardcopy output.

A mechanical printer capable of running, say, 1,000 lpm and surviving a high-duty cycle may cost \$15,000; a non-impact printer with output of 20 pages per

minute can cost twice that much. As speed requirements fall to 300 lpm, prices of heavy-duty impact printers are dropping to the \$3,500 range. While desktop laser printers can equal this throughput for a comparable price, they're not made to take the beating a line printer is built to handle.

At the micro level, where dot matrix printers still reign supreme, the laser printer is often a luxury. Nonimpact technology is replacing other means of printing with full-formed characters, but the machines are still too expensive, too large, and too sophisticated for small business applications. Accounting packages and spreadsheets don't demand anything more complicated than a dot matrix printer, and getting these popular software applications to drive a nonimpact printer can be a chore.

The power and flexibility of the laser printer necessitates clever software; such ingenuity is rarely included in business programs. When pretty output is part of the job, the contest between printer technologies is a closer one. Dot matrix printers can draw graphs and charts, but the resulting printout falls short of what can be pro-

duced by a laser printer.

On the other hand, the most popular laser printer, Hewlett-Packard's LaserJet, even in its enhanced version, can't do full-page, high-resolution graphics—it will run out of memory before the program driving it runs out of points to draw. The lowly dot matrix printer, which has to remember only one band of dots at a time, can actually produce a more detailed though less crisp printout.

A user who must have graphs as well as character output can also buy an inexpensive plotter, a dot matrix printer, and a PC clone for less than the price of a LaserJet. But for the user who is more concerned with textual output, choosing the right printer for the right job is often a matter of character.

A selection of vendors and the types of printers each makes begins on p. 70. ©

Hesh Wiener is the president of Technology News of America Co. Inc., a New York-based research and publishing company. He is a contributing editor of DATAMATION.

ADVERTISING OFFICES

Francie Bolger,
Eastern Regional Sales Manager
Eastern District Managers:
John M. Gleason, Kathleen A. Murray
New York, NY 10022
875 Third Ave.
(212) 605-9400
Plymouth Meeting, PA 19462
Plymouth Plaza, Suite 201
(215) 825-4410

New England District Managers:
Ed Rappaport, Michael W. Andrea
Newton, MA 02159
199 Wells Ave.
(617) 964-3730

Southern District Manager:
Scott Schumacker
Atlanta, GA 30329
4 Executive Park Drive N.E., Suite 1205
(404) 633-5112

Midwest District Manager:
Joseph P. Gleason
Flossmoor, IL 60422
PO Box 279
(312) 381-1840

James E. Filiatrault,
Western Regional Sales Manager
Western District Managers:
Janet Engelbrecht
Mountain View, CA 94043
2680 Bayshore Frontage Rd., Suite 401
(415) 965-8222

Robert J. Rielly
Los Angeles, CA 90035
1801 S. LaCienega Blvd.
(213) 559-5111

William M. Wilshire
Irvine, CA 92715
2061 Business Center Dr., Suite 111
(714) 476-2511

Southwest District Manager
Thomas C. Rousseau
Dallas, Texas 75243
9330 LBJ Freeway, Suite 1060
(214) 644-3683

Postcard Inquiry Service/Recruitment/
Marketplace:
Shirley Stirling
(212) 605-9733
Toll Free (Outside N.Y.) (800) 223-0743



William M. Platt, President
Terrence M. McDermott, Executive Vice
President
Edwin V. Burkholder, Group Vice President
J.J. Walsh, Financial Vice President/
Magazine Division

Jerry D. Neth, Vice President/
Publishing Operations
International Headquarters
Technical Publishing Co.
27 Paul St., London, EC2A 4JU England
Tel: 01-628-7030, Telex: 914911-TECPUB G,
Fax: 01-628-5984
Sal Massimino, Managing Director,
International Operations
U.K., Scandinavia, Netherlands:
Martin Sutcliffe
France:
Michael Sales
W. Germany, Austria, Switzerland, E. Europe:
Uwe Kretzschmar

Japan:
Hiroshi Sato
IRM, Inc.
Rosei Building, 4-2,
Higashi Azabu 1-Chome,
Minato-Ku, Tokyo 106, Japan
Tel: (03) 584-1241, Telex: 242-2588 IRMTOK J

Israel:
Roseline Lewin-Wainberg
Technical Publishing Co.
68 Sokolov St.
Ramat Hasharon 47 235, Israel
Tel: 03-49 12 69



Now You Can Communicate Anywhere With Anything.

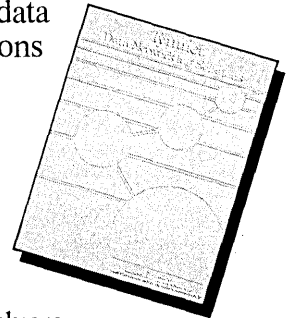
TYMNET's public data network provides communications to anywhere with a local phone call from virtually any city, connecting different types of computers, terminals and PCs.

No one does it better.



NEW

For business data communications users: Call or write for your **FREE** copy of TYMNET's Public Data Network Brochure



Tymnet
2710 Orchard Parkway
San Jose, CA 95134
(408)942-5254 ext. 73

One Company, Many Solutions.

CIRCLE 30 ON READER CARD

TYMNET

**MCDONNELL DOUGLAS
NETWORK SYSTEMS COMPANY**

A SELECTION OF PRINTER VENDORS

The following list has been coded to show the types of printers each vendor makes. The codes are

- 1) Dot matrix (black)
- 2) Dot matrix (color)
- 3) Fully formed characters (daisy wheel, minidrum, etc.)
- 4) Electromechanical line (band, train, chain, dot bar)
- 5) Ink-jet (black)
- 6) Ink-jet (color)
- 7) Low-speed page printers (under 20 pages per minute)
- 8) Midrange page printers (20 to 75 pages per minute)
- 9) Production page printers (more than 75 pages per minute)

Advanced Color Technology
21 Alpha Rd.
Cneimsford, MA 01824
6 (CIRCLE NO. 100)

Advanced Matrix Technology Inc.
1157 Tourmaline Dr.
Newbury Park, CA 91320
2 (CIRCLE NO. 101)

Alphacom Inc.
2323 South Bascom Ave.
Campbell, CA 95008
1,3 (CIRCLE NO. 102)

Amdek Corp.
2201 Lively Blvd.
Elk Grove, IL 60007
3 (CIRCLE NO. 103)

American Computer Hardware Corp.
2205 South Wright St.
Santa Ana, CA 92705
1,8,9 (CIRCLE NO. 104)

Anadex Inc.
1001 Flynn Rd.
Camarillo, CA 93010
1,2 (CIRCLE NO. 105)

Anderson Jacobson
521 Charcot Ave.
San Jose, CA 95131
1,3 (CIRCLE NO. 106)

Anser Technology
5535 Airport Freeway
Fort Worth, TX 76117
9 (CIRCLE NO. 107)

Apple Computer Inc.
20525 Mariani Ave.
Cupertino, CA 95014
1,3,7 (CIRCLE NO. 108)

AT&T
5555 Touhy Ave.
Skokie, IL 60077
1,2 (CIRCLE NO. 109)

BDS Computer Corp.
800 Maude Ave.
Mountain View, CA 94943
1,4 (CIRCLE NO. 110)

Brother International Corp.
8 Corporate Pl.
Piscataway, NJ 08854
1,3 (CIRCLE NO. 111)

Bull Peripherals
766 San Aleso Ave.
Sunnyvale, CA 94086
9 (CIRCLE NO. 112)

Burroughs Corp.
Burroughs Pl.
Detroit, MI 48232
1,4,8,9 (CIRCLE NO. 113)

CAL-ABCO
6041 Bariel Ave.
Woodland Hills, CA 91367
1 (CIRCLE NO. 114)

Canon USA Inc.
One Canon Plaza
Lake Success, NY 11042
1,5,7 (CIRCLE NO. 115)

Centronics Data Computer Corp.
1 Wall St.
Hudson, NH 03051
1,2,4 (CIRCLE NO. 116)

CIE Terminals Inc.
16842 Von Karman
Irvine, CA 92714
1,4 (CIRCLE NO. 117)

Citizen America Corp.
2425 Colorado Ave., Ste. 300
Santa Monica, CA 90404
1,3 (CIRCLE NO. 118)

Complete Electronics
23501 Ridge Route Dr., Building E
Laguna Hills, CA 92653
3 (CIRCLE NO. 119)

Computer Transceiver Systems
Inc.
East 66 Midland Ave.
Paramus, NJ 07652
1 (CIRCLE NO. 120)

Comrex International Inc.
3415 Kashiwa
Torrance, CA 90505
1,3 (CIRCLE NO. 121)

Concept Technologies Inc.
P.O. Box 5277
Portland, OR 97208
7 (CIRCLE NO. 122)

Contitronix Inc.
3848 Marquis Dr.
Garland, TX 75042
1 (CIRCLE NO. 123)

Cordata Inc.
275 East Hillcrest Dr.
Thousand Oaks, CA 91360
7 (CIRCLE NO. 124)

CPT Corp.
8100 Mitchell Rd.
P.O. Box 295
Minneapolis, MN 55440
1,3,7,8 (CIRCLE NO. 125)

Craden Peripherals Corp.
204 Cooper Center
North Park Dr.
Pennsauken, NJ 08109
1 (CIRCLE NO. 126)

Daisy Systems Holland BV
3731 Northcrest Rd., Ste. 28
Atlanta, GA 30340
3 (CIRCLE NO. 127)

Data Card Corp.
Troy Div.
2331 South Pullman St.
Santa Ana, CA 92705
4 (CIRCLE NO. 128)

Data Engineering Inc.
2515 North State Rd. 7, Ste. 207
Margate, FL 33063
4 (CIRCLE NO. 129)

Data General Corp.
4400 Computer Dr.
Westboro, MA 01580
7 (CIRCLE NO. 130)

Datagraphix
P.O. Box 82449
San Diego, CA 92138
9 (CIRCLE NO. 131)

Datapoint Corp.
9725 Datapoint Dr., MS H13
San Antonio, TX 78284
1,3,7 (CIRCLE NO. 132)

Data Printer Corp.
99 Middlesex St.
Malden, MA 02148
4 (CIRCLE NO. 133)

Dataproducts Corp.
6200 Canoga Ave., MS 2032
Woodland Hills, CA 91365
1,2,3,4,7,8 (CIRCLE NO. 134)

Datasouth Computer Corp.
4216 Stuart Andrew Blvd.
Charlotte, NC 28210
1,2 (CIRCLE NO. 135)

Data Terminals and Communications
590 Division St.
Campbell, CA 95008
3,4 (CIRCLE NO. 136)

Decision Data Computer Corp.
400 Horsham Rd.
Horsham, PA 19044
1,3 (CIRCLE NO. 137)

Delphax Systems
315 University Ave.
Westwood, MA 02090
8 (CIRCLE NO. 138)

Di/An Controls Inc.
944 Dorchester Ave.
Boston, MA 02125
3 (CIRCLE NO. 139)

Digital Associates Corp.
260 West Ave.
Stamford, CT 06902
1,3,4 (CIRCLE NO. 140)

Digital Equipment Corp.
146 Main St.
Maynard, MA 01754
1,3,4,7 (CIRCLE NO. 141)

Digital Matrix Corp.
105 Filley St.
Bloomfield, CT 06002
1 (CIRCLE NO. 142)

Docutel/Olivetti Corp.
106 Decker Court, Ste. 300
Irving, TX 75062
5 (CIRCLE NO. 143)

Dynax Inc.
6070 Rickenbacker Rd.
Commerce, CA 90040
1,2,3 (CIRCLE NO. 144)

Epson America Inc.
Computer Products Div.
2780 Iomita Blvd.
Torrance, CA 90505
1,2 (CIRCLE NO. 145)

Ergo Systems Inc.
303-3 Convention Way
Redwood City, CA 94063
1,2,3 (CIRCLE NO. 146)

Facit Inc.
9 Executive Park Dr.
Merrimack, NH 03054
1,2,3 (CIRCLE NO. 147)

Florida Data Corp.
600 D John Rodes Blvd.
Melbourne, FL 32935
1 (CIRCLE NO. 148)

Fujitsu America Inc.
3055 Orchard Dr.
San Jose, CA 95134
2,3,4 (CIRCLE NO. 149)

General Business Technology Inc.
1891 McGaw Ave.
Irvine, CA 92714
1,3,4,8 (CIRCLE NO. 150)

General Optronics Corp.
Two Olsen Ave.
Edison, NJ 08820
8 (CIRCLE NO. 151)

Genicom Corp.
1 General Electric Dr.
Waynesboro, VA 22980
1,2,4,7 (CIRCLE NO. 152)

GTC Technologies Inc.
216 West Florence Ave.
Inglewood, CA 90301
7 (CIRCLE NO. 153)

Hermes Products Inc.
Printer Div.
1900 Lower Rd.
Linden, NJ 07036
1,2 (CIRCLE NO. 154)

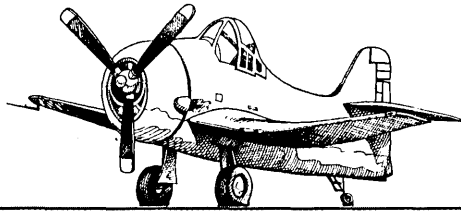
Hetra Computer and Communica-
tions Industries Inc.
P.O. Box 970
Melbourne, FL 32901
4 (CIRCLE NO. 155)

Hewlett-Packard Co.
19447 Pruneridge Ave.
Cupertino, CA 94014
1,4,5,7,8 (CIRCLE NO. 156)

Honeywell Information Systems Inc.
65 Walnut St.
Wellesley Hills, MA 02181
1,4,9 (CIRCLE NO. 157)

Imagen Corp.
2650 San Tomas Exwy.
Santa Clara, CA 95056
7,8 (CIRCLE NO. 158)

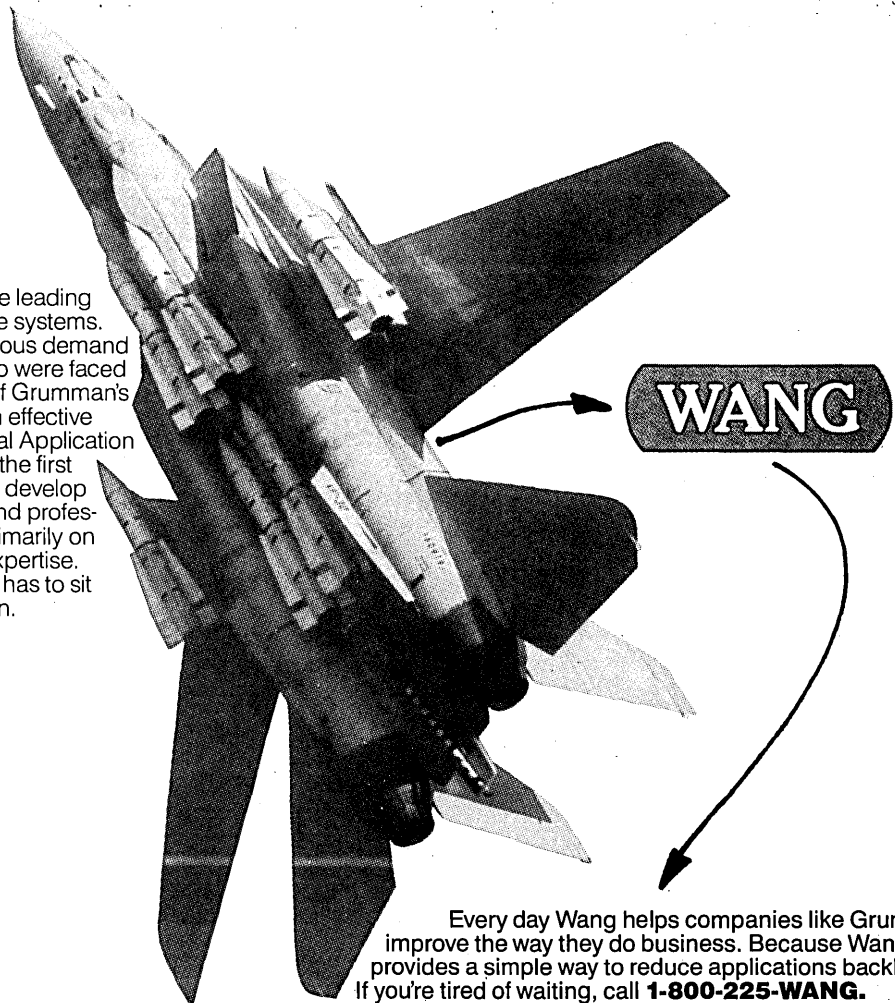
Imtec Inc.
13 Columbia Dr., Unit 7
Amherst, NH 03031
1 (CIRCLE NO. 159)



At Grumman the people who need computer programs write the programs. And computer backlogs are as rare as a vintage Hellcat.

WANG MAKES IT WORK.

Grumman Corporation is one of the leading manufacturers of aircraft and aerospace systems. Their size and scope placed a tremendous demand on their professional programmers, who were faced with developing applications for each of Grumman's different departments. Wang offered an effective solution—the Wang VS and Professional Application Creation Environment (PACE). Now for the first time Grumman's employees are able to develop their own sophisticated applications. And professional programmers are free to work primarily on applications that require their special expertise. Which means that no one at Grumman has to sit around waiting for something to happen.



Every day Wang helps companies like Grumman improve the way they do business. Because Wang provides a simple way to reduce applications backlog. If you're tired of waiting, call **1-800-225-WANG**.

A SELECTION OF PRINTER VENDORS

Infoscrite Inc.
1808 Michael Faraday Ct.
Reston, VA 22090
1,2 (CIRCLE NO. 160)

Intecolor Corp.
225 Technology Pk.
Norcross, GA 30092
6 (CIRCLE NO. 161)

Interface Systems Inc.
5855 Interface Dr.
Ann Arbor, MI 48103
1,2,4 (CIRCLE NO. 162)

IBM Corp.
Old Orchard Road
Armonk, NY 10504
1,2,3,4,5,6,7,8,9 (CIRCLE NO. 163)

C. Itoh Electronics Inc.
5301 Beethoven St.
Los Angeles, CA 90066
1,2,3 (CIRCLE NO. 164)

ITT Qume Corp.
2350 Qume Dr.
San Jose, CA 95131
3,7 (CIRCLE NO. 165)

JDL Inc.
2801 Townsgate Rd., Ste. 104
Westlake Village, CA 91361
1,2 (CIRCLE NO. 166)

Juki Office Machines Corp.
20437 South Western Ave.
Torrance, CA 90501
2,3 (CIRCLE NO. 167)

Kentek Information Systems Inc.
6 Pearl Ct.
Allendale, NJ 07401
7 (CIRCLE NO. 168)

LaserMaster, Ltd.
P.O. Box 1439
Minnetonka, MN 55345
7 (CIRCLE NO. 169)

Leading Edge Products Inc.
225 Turnpike St.
Canton, MA 02021
1,3 (CIRCLE NO. 170)

Lear Siegler Inc.
Data Products Div.
714 North Brook-Hurst St.
Anaheim, CA 92803
1,2 (CIRCLE NO. 171)

Magnetec Corp.
105 Filley St.
Bloomfield, CT 06002
1 (CIRCLE NO. 172)

Mannesmann Tally Corp.
8301 South 180th St.
Kent, WA 98032
1,2,4 (CIRCLE NO. 173)

MDS Trivex Inc.
Red Hill Ave.
Costa Mesa, CA 92626
1,3 (CIRCLE NO. 174)

Memodyne Corp.
220 Reservoir St.
Needham Heights, MA 02194
1 (CIRCLE NO. 175)

Micro Peripherals Inc.
4415 South 500 West
Salt Lake City, UT 84123
1 (CIRCLE NO. 176)

Miltope Corp.
1770 Walt Whitman Rd.
Melville, NY 11747
4 (CIRCLE NO. 177)

Mitsubishi Electronics America Inc.
991 Knox St.
Torrance, CA 90502
1 (CIRCLE NO. 178)

NCR Corp.
1700 South Patterson Ave.
Dayton, OH 45479
1,3,7 (CIRCLE NO. 179)

NEC Information Systems Inc.
1414 Massachusetts Ave.
Boxborough, MA 01719
1,3 (CIRCLE NO. 180)

Nissei Sangyo America Ltd.
40 Washington St.
Wellesley Hills, MA 02181
4 (CIRCLE NO. 181)

Nissho Information Systems
3838 Carson St., Ste. 105
Torrance, CA 90503
1 (CIRCLE NO. 182)

North Atlantic Industries
60 Plant Ave.
Hauppauge, NY 11788
1,2 (CIRCLE NO. 183)

Okidata Corp.
532 Fellowship Rd.
Mount Laurel, NJ 08054
1,2 (CIRCLE NO. 184)

Olivetti Peripherals Inc.
505 White Plains Rd.
Tarrytown, NY 10591
1,3 (CIRCLE NO. 185)

Olympia USA Inc.
Box 22
Somerville, NJ 08876
1,3 (CIRCLE NO. 186)

Panasonic Industrial Co.
One Panasonic Way
Secaucus, NJ 07094
1,3 (CIRCLE NO. 187)

Personal Computer Products Inc.
11590 West Bernardo Ct.
San Diego, CA 92127
7 (CIRCLE NO. 188)

Personal Micro Computers Inc.
275 Santa Ana Ct.
Sunnyvale, CA 94086
1 (CIRCLE NO. 189)

Philips Peripherals Inc.
385 Oyster Point Blvd., Unit # 12
South San Francisco, CA 94080
1,2,8 (CIRCLE NO. 190)

Plessey Peripheral Systems
17466 Daimler Ave.
Irvine, CA 92714
3,4 (CIRCLE NO. 191)

Practical Automation Inc.
P.O. Box 313
Shelton, CT 06484
1 (CIRCLE NO. 192)

Primages Inc.
151 Trade Zone Dr.
Ronkonkoma, NY 11779
3 (CIRCLE NO. 193)

Printek Inc.
1517 Townline Rd.
Benton Harbor, MI 49022
1 (CIRCLE NO. 194)

Printer Products
25 Denby Rd.
Boston, MA 02134
1 (CIRCLE NO. 195)

Printer Systems Corp.
9055 Comprint Court, Ste. 200
Gathersburg, MD 20877
1,4 (CIRCLE NO. 196)

Printronic Inc.
17500 Cartwright Rd.
Irvine CA 92713
1,2,4,8 (CIRCLE NO. 197)

Quadram Corp.
4350 International Blvd.
Norcross, GA 30093
7 (CIRCLE NO. 198)

Quality Micro Systems
P.O. Box 81250
Mobile, AL 36689
7,8 (CIRCLE NO. 199)

Ricoh Corp.
5 Dedrick Pl.
West Caldwell, NJ 07006
7 (CIRCLE NO. 200)

Royal Business Machines
500 Day Hill Rd.
Windsor, CT 06095
8 (CIRCLE NO. 201)

Sand Technology Systems (Canada) Inc.
10 Edison Pl. Bonaventure
Montreal, Quebec H5A 1G5
Canada
4 (CIRCLE NO. 202)

Sanyo Business Systems Corp.
51 Joseph St.
Moonachie, NJ 070674
3 (CIRCLE NO. 203)

SCI Systems Inc.
5000 Technology Dr.
P.O. Box 1000
Huntsville, AL 35807
1 (CIRCLE NO. 204)

Sharp Electronics Corp. of America
10 Sharp Plaza
Paramus, NJ 07652
7 (CIRCLE NO. 205)

Siemens Communications Systems Inc.
240 East Palais Rd.
Anaheim, CA 92805
9 (CIRCLE NO. 206)

Silver Reed America Inc.
1960 South Vermont Ave.
Torrance, CA 90502
3 (CIRCLE NO. 207)

Smith Corona
65 Locust Ave.
New Canaan, CT 06840
3 (CIRCLE NO. 208)

Southern Systems Inc.
100 North Belcher Rd.
Clearwater, FL 33575
4,8 (CIRCLE NO. 209)

Star Micronics Inc.
#3 Oldfield Rd.
Irvine, CA 92714
1,3 (CIRCLE NO. 210)

Storage Technology Corp.
2270 South 88th St.
Louisville, CO 80028
9 (CIRCLE NO. 211)

Talaris Systems Inc.
5160 Carroll Canyon Rd.
San Diego, CA 02121
7,8 (CIRCLE NO. 212)

Televideo Systems Inc.
1170 Morse Ave.
P.O. Box 3568
Sunnyvale, CA 95088
3 (CIRCLE NO. 213)

Telex Computer Products Inc.
6422 East 41st St.
Tulsa, OK 74135
1,2,3 (CIRCLE NO. 214)

Texprint Inc.
8 Blanchard Rd.
Burlington, MA 01803
1,2 (CIRCLE NO. 215)

Toshiba America Inc.
2441 Michelle Dr.
Tustin, CA 92680
1,2 (CIRCLE NO. 216)

Trendcom/3M
311 Turquoise St.
Milpitas, CA 95035
1 (CIRCLE NO. 217)

Versatec Inc.
2710 Walsh Ave.
Santa Clara, CA 95051
8 (CIRCLE NO. 218)

Vivitar Computer Products Inc.
P. O. Box C-96975
Bellevue, WA 98009
2,3 (CIRCLE NO. 219)

Wang Laboratories Inc.
1 Industrial Ave.
Lowell, MA 01851
1,2,3,7,8 (CIRCLE NO. 220)

Xerox Corp.
Xerox Square 5A
Rochester, NY 14644
3,5,7,8,9 (CIRCLE NO. 221)

Technical and vendor information
courtesy of Datapro Research
Corp., Delran, N.J.



NEC'S PINWRITER P5XL HAS MADE BLACK A PRIMARY COLOR.

Our Pinwriter® P5XL printer has changed forever the way people look at dot matrix printing.

It's the first 24-pin dot matrix printer to use a letter-quality multistrike film ribbon—the same ribbon used in typewriters and letter-quality printers, such as our Spinwriter®. So for the first time in computer history there is a printer that honestly does everything. A printer that produces

important letters and documents with crisp, black, true letter-quality printing. But with all the speed and graphics capability dot matrix printers are known for.

Fast, black letter-quality printing will be the primary reason many people will buy a P5XL printer. But there are plenty of other good reasons. In fact, it's the most versatile printer ever created for personal computers.

It can use an optional ribbon to print seven other colors plus black. And it has the best graphics resolution of any impact printer you can buy, due in part to our advanced 24-pin printhead. Plus it can print more type faces automatically than any other dot matrix printer. And it's quiet and fast.

You can also expect a P5XL printer to turn out millions of characters before it will need service because it has the highest reliability rating in the industry. And there's a nationwide network of NEC Customer Service Centers to take care of maintenance.

Now, while the Pinwriter P5XL performs a little black magic, you won't have to go in the red to buy it.

The Pinwriter P5XL is the latest addition to the most advanced and extensive family of 24-pin printers available.

See it at your dealer or for an information package that includes actual print samples, 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.**

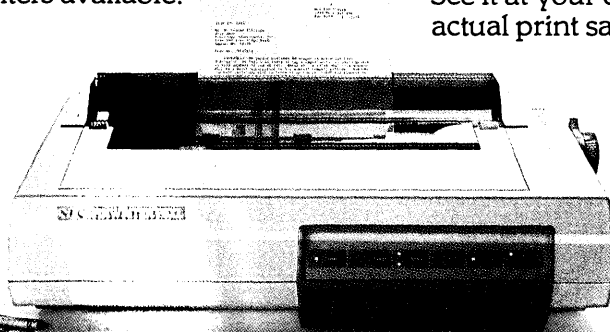
NEC

NEC Information Systems, Inc.

CIRCLE 32 ON READER CARD

Dear Mr. Black:

Actual line printed
with a Pinwriter P5XL printer.



C&C Computers and Communications

The chevrons and serpentine designs are registered trademarks of Binney and Smith Inc., used with permission.

Would your PC software

1. Does your software include programs for easy access to mainframe information?

5. Can you link a series of commands that will automatically update and assemble comprehensive reports month after month?

2. Can your spreadsheet consolidate additional spreadsheets then retrace your steps so auditors can find what they're looking for?

6. Can you personalize your document by redesigning the layout, or the look of the type, and adding color?

3. Can you draw 12 different kinds of graphs, size and position them, put them side by side (4 to a page if you need to) and preview before printing?

7. Can you access a mainframe, store and organize information with a database manager...

4. If you have a mainframe connection, can you share information with those who should see it, and protect it from those who shouldn't?

...analyze it with an audit-able financial model or spreadsheet...
 ...present your numbers in lots of different kinds of charts and graphs...
 ...customize your document, write whatever text you need...
 ...then take all the work you've done and put it on the same page...
 ...without scissors, tape or a manual on computer programming?

Griffith, Halladay, Inc.

To: Mr. N. Ives
Internal Zip 13A11
30AB052_5K4
New York (212)555-8687

December 2

From: N. Delaney

Just a reminder, the budget meeting is this Thursday. We have to tell the Board how much funding we need to see us through the fourth quarter. I did some projections which consolidate all five departments in our division. The graphs will give you a clearer picture. (You were right, travel expenses are getting out of hand.)

1985 BUDGET -- 4TH QUARTER PROJECTION (000's)					
	1st	2nd	3rd	4th	Total
Salaries	\$250.0	\$260.0	\$270.0	\$270.0	\$1,050.0
Travel	150.0	170.0	207.0	249.0	776.0
Rent, Util	65.0	65.0	68.0	68.0	266.0
Supplies	27.6	28.1	27.7	27.9	111.3
Equipment	39.0	40.5	39.9	40.2	159.6
Other	33.5	34.4	35.0	36.5	139.4
TOTAL	\$665.1	\$698.0	\$647.6	\$691.6	\$2,502.3

BUDGET EXPENSES

TREND ANALYSIS

I've given our department heads the authorization to view my projections. All of us should meet before Thursday to discuss these projections in detail.

A room has been booked for Wednesday morning at 9:00. Call if you have a conflict.

Norah

The IBM Personal

©Copyright IBM Corporation 1985



flunk this simple test?

Try to build a document like this with most popular software programs and you'll be stuck cutting, pasting or studying computer languages. The IBM Personal Decision Series (PDS) makes no such demands.

PDS not only does a lot of jobs well, it combines all of them easily. It's a team of six powerful programs (or Editions), which unlike all-in-one packages, don't have to be bought all at once. You can get some of the programs or all of them, depending on your needs.

DATA Edition is where you begin. It's a flexible database manager that organizes a lot of information, and takes it from a variety of sources. When you use the HOST ATTACHMENT Edition you can get valuable information from an inside source—the central computer—without having to rekey it all.

Add PLANS+ and you can answer "what...if" questions with a financial model or spreadsheet, which let you remember how you arrived at your answers.

You can transform your numbers into different shapes, sizes and colors by using GRAPHS. Or customize your document by making layout and type style decisions with REPORTS+.

WORDS helps you get your point across with an easy-to-learn word processing program. (PDS even works with IBM Display Write.) Then you can combine all the work you've done into one document with a few keystrokes.

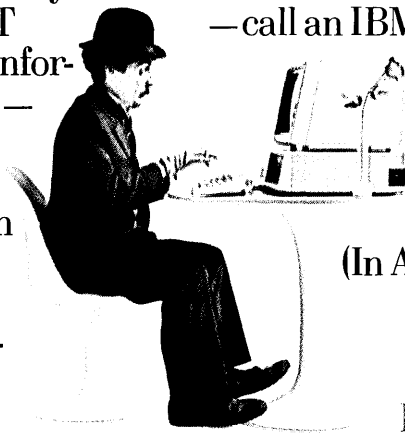
It's that simple.

If you can't do it that simply, you're doing a lot of work by hand your software should know how to do by heart.

For more information on PDS—the software solution that puts it all together—call an IBM marketing representative,

or visit an Authorized IBM PC Dealer. For the store nearest you, and a free brochure, call 800-447-4700.

(In Alaska, 800-447-0890.)



IBM[®]

Personal Computer Software

For more information about IBM Personal Decision Series, circle 33.

Decision Series.

Little Tramp character licensed by Bubbles Inc., s.a.

Words



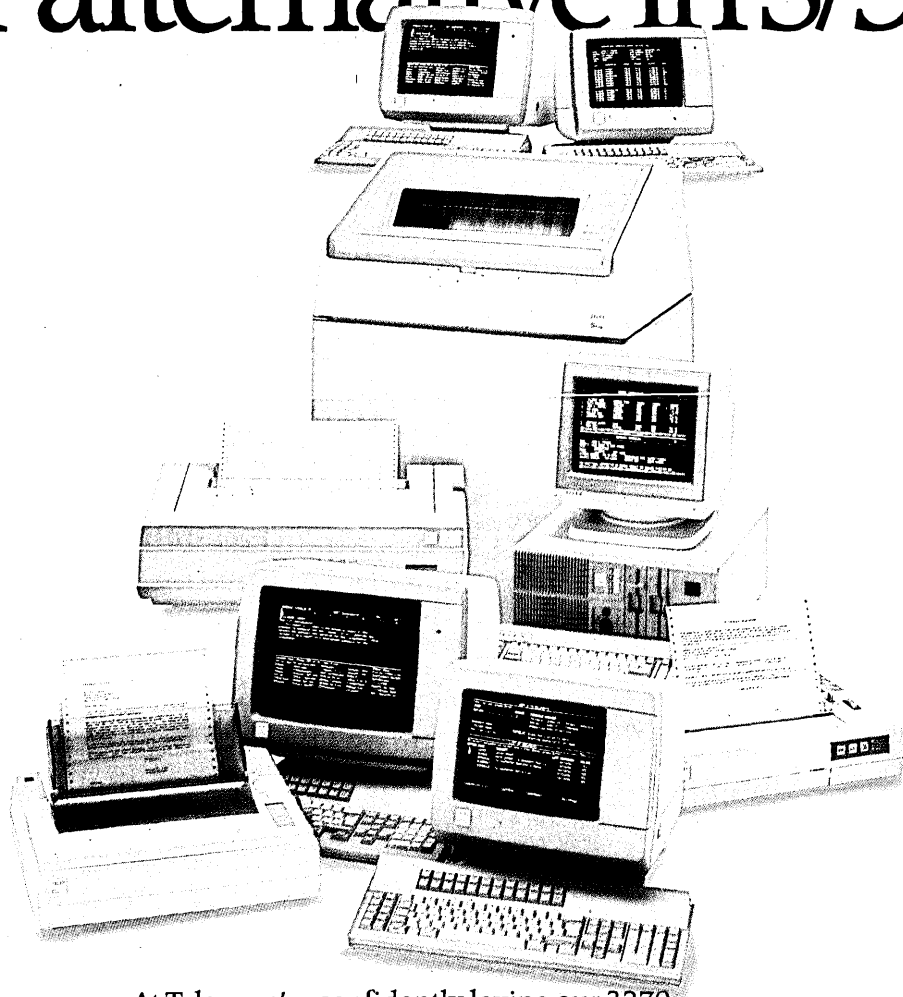
Reports+



Host Attachment



The #1 3270 alternative is also becoming the #1 alternative in S/3X.



At Telex, we're confidently laying our 3270 reputation on a new line. This time with a full line of System 36/38 products. Selections range from low-cost, plug-compatible displays and printers to high performance Intelligent Workstations with 5250 emulation.

The Telex tradition for compatibility and reliability, backed by exceptional worldwide service and support, is making us the #1 alternative in S/3X.

For more information, call Telex. USA: 1-800-331-2623, Ext. 3284 (Oklahoma, 1-918-628-3284). INTERNATIONAL: 1-617-769-8000. CANADA: 1-800-268-3233. EUROPE: 41-38-22-6101.

Now You Have
A Reliable Choice

TELEX

TELEX COMPUTER PRODUCTS, INC.

In the search for storage, IBM and the independents are looking for ways of . . .

TAMING THE DASD MONSTER

by John W. Verity

As hardware prices steadily drop and mainframe applications reach further and further into the corporation—automating functions in virtually every department and serving remote processors in networks of increasing complexity—the demand for on-line disk storage capacity continues to explode. That capacity is currently growing at close to 40% compounded annually.

The typical large 370 installation now comprises upwards of 30GB of direct access disk storage (DASD). By the mid-1990s, some observers say, on-line capacities of a terabyte (1,000GB) or so will not be uncommon in many large sites. Although database management systems will be there to handle much of those data, an unwieldy collection of hundreds, if not thousands, of discrete datasets for testing, production, and backup will remain. How to manage those datasets as they migrate between disk, tape, and future mass storage devices is fast becoming a problem of epic proportions.

“Historically, we’ve seen it take one person to manage each 10 to 15 gigabytes of on-line storage,” says Victor Swan, marketing manager at Cambridge Systems in Santa Clara. “But with a terabyte on-line, there’s no way people will be able to do it. They will most certainly need help from the system itself.”

And that help is on the way. It’s embodied in the evolving concept of automated storage management. IBM and independent software competitors are hard at work preparing products that in the future will transparently and automatically arrange data files in hierarchical schemes, putting the most active ones on disk for instant access and keeping less-used files close at hand on cheaper storage devices. In fact, much of this storage management

function is already available today. IBM and rival vendors are vying for a market of approximately \$60 million a year, a market that is expected to grow significantly as the demand for DASD capacity continues to rise.

While no one is committing himself to describing products that will be available in the next decade, some general technical trends are already visible. One of the most prominent is the push toward integrating presently discrete products. Also discernible is the increasing role played by the mainframe system itself in the movement of datasets.

IBM has already taken steps in the integration direction. The company has adopted the Data Facility moniker for a mutually compatible family of program products that “form the strategic base from which IBM is evolving to a system-managed storage environment.” These include the Data Facility Product (DFP), the Hierarchical Storage Manager (DFHSM), a record sorting package called DFSort, and the Data Set Services (DFDSS) program.

The DF family can work closely with other IBM products: the Resource Access Control Facility (RACF), which is the company’s primary data security offering; the TSO timesharing system; and the DB2 relational database management system. As IBM has stated, the DF family is a “foundation for response to the expanding storage management requirements in the MVS/XA environment.”

COMMON DF FAMILY INTERFACE

Early this year, IBM unveiled to users a “consistent, common interactive interface” for the DF family in the form of the Interactive Storage Management Facility (ISMF). Based on the facilities of IBM’s Interactive System Productivity Facility (ISPF), the ISMF provides

storage administrators and users with a series of interactive screens to choose from. They can also select datasets for certain operations. One of ISMF’s prime advantages is that it eliminates the bother of creating and debugging JCL code—chores needed when operating “manually.”

ISMF users can also browse through datasets, copy them, and delete them. IBM described the product as providing a simplified command syntax, input prompts, defaults, last-use priming, on-line help, and full use of crt screens—all of which can improve shop productivity.

ISMF provides a “syntax umbrella” that controls the individual DF programs that actually manipulate datasets, explains Michael Braude, who tracks mainframe software developments for the Gartner Group in Stamford, Conn. It is meant, he says, to shield users from much of the complexity of those programs and to “exploit the synergy between them.”

Braude notes that IBM seems to be incorporating nearly “half of MVS” under that umbrella, including data access methods and the operating system’s entire I/O subsystem structure. Most of the work on such subsystems takes place in Santa Theresa, Calif., and in Poughkeepsie, N.Y., home to two large IBM development centers. Braude speculates that related work is also going on in Tucson, Ariz., where much of the company’s mass storage hardware is designed and manufactured.

The Gartner Group analyst believes IBM’s interactive umbrella has gone a long way toward answering users’ calls for a common interface to what were once seen as a motley collection of “primitive mechanisms.” Nevertheless, competitors can still stay in the game with products that replace individual components of the DF family—products they claim offer better functionality and performance than IBM’s packages.

"IBM would like to go to a single-level storage scheme."

In the sorting package market, the industry leader has been playing catch-up for a long time with the independent software houses. More recently, the independent software vendors have targeted IBM's hierarchical storage manager (HSM) with relatively good success. This is the package that keeps track of datasets as they move among disk, tape and, once upon a time, IBM's ill-fated 3850 mass storage device.

The two most successful companies competing for HSM business are Cambridge Systems and Sterling Software, Rancho Cordova, Calif. Cambridge marketing manager Swan says his company introduced its ASM product in 1974 to help users manage a proliferation of datasets in the batch-only computing environment that was common in those days. "ASM was designed for archiving of seldom used datasets," Swan explains. "It moved stuff to tape when it wasn't needed."

Then, as interactive computing came into fashion, ASM/2 evolved functionally to take advantage of new 370 computing facilities and the ongoing series of storage devices introduced by IBM and its competitors. The most dramatic of these wares was certainly the 3850, which stored data on broad pieces of videotape contained in cartridges that were stored in and plucked from a honeycomb-like rack. IBM, which sold less than a thousand 3850s, finally stopped marketing the device altogether.

In the meantime, HSM, which staged datasets on disk after they were called out of the 3850 by an application program, had caught on sufficiently to be used without the Rube Goldberg hardware.

A GRAND LEAP FORWARD

Cambridge's Swan says that ASM/2 also took a grand functional leap forward several years ago when it was enhanced with new facilities that enable it to better track the usage of individual datasets, storing them on the appropriate mechanical devices. With ASM/2, users can define classes of datasets that are to be treated in different ways; production data, for instance, are most likely to remain on disk, while test data, if not used for a few days, might be automatically transferred to tape. The goal is to free disk space for high-priority data and to improve overall system and worker productivity.

Swan feels that storage management has long been "person driven," because users themselves or dp staff had to intervene with the system to move data between storage devices. The latest version of ASM/2 is automatically invoked in a way that he claims is "totally transparent to the end

user. He has no need to know where his data is—the software keeps track of where each dataset is and can move it as needed." Cambridge calls the new function IXR, for intelligent, transparent restore.

Swan stops short of calling the IXR capability artificial intelligence. "What does AI mean?" he asks, displaying more true intelligence than many a buzzword-happy marketer these days. But he adds that Cambridge "is going to build more 'intelligence' into the ASM/2 product and enable it to make better decisions. We're trying to remove the decision-making process from the end user." Swan reports that the installed base of ASM/2 is "in the neighborhood of 900 copies."

At Sterling's systems software marketing division, the answer to IBM's HSM goes by the name of DMS/OS. Introduced in 1976, it too has evolved over the years to handle automatically tasks that once required tedious attention from system users and administrators. "We try to deal with the total range of managing storage," says Kelton Kinnick, the product's development manager. "This includes backups, archives, device conversions, compressions, DASD billing, and reporting.

"Most of the developments in hardware technology," declares Kinnick, "are complicating the storage management issue, because they've increased the recording density disks. All that does is give managers and budget people a way to put more data on-line. There are more bytes and more datasets. The problems of today and tomorrow are identical to those in the past, but the sheer magnitude has increased the level of severity of those problems. Storage management has been a labor-intensive task, but it's getting so you can't get your hands around it."

Both software companies claim their products outstrip IBM's HSM, primarily in the areas of functionality and performance. "We address a broader spectrum of needs," maintains Kinnick. "Our customers are used to the idea that we give them systems that can be tailored and can manage storage the way they want to do it."

Cambridge's Swan says that HSM is "very global in nature" and users archiving datasets cannot be as selective as they can be with ASM/2. He also contends that the Cambridge product has better reporting and flexibility than HSM.

Both Cambridge and Sterling vow they are not afraid of IBM locking them out of the evolving systems software arena, either through the intricate functional binding with specific pieces of storage hardware or through the changing of software interfaces. "We make a big attempt to sit on the

outside [of IBM's operating system]," says Sterling's Kinnick. "We try to stay out of the internals. There are only three places where we go inside and there we try to use IBM-documented interfaces. One of those interfaces does not work as documented, but we've still figured out how to use it. We've made changes so we can coexist with IBM, even with HSM itself."

Cambridge's Swan reports that "IBM has stated to us and in marketing presentations to customers that its Data Facility products will evolve independently of MVS." Swan doesn't expect IBM to bundle the DF products into a single package with a single price tag, for two reasons. First of all, by marketing separate DF products, IBM can generate additional revenue. Second, and even more important, the company must keep the DF family composed of discrete "chunks" simply to make their development manageable.

"IBM could never evolve these products to the next generation all at the same pace," Swan points out. The only possible problem he sees is if IBM decides to integrate the RACF security package more tightly with DF components. "That would cause us a problem," Swan admits, "but it would hurt [IBM's] own customers as well."

How will future hardware developments affect storage management software? To forecast the future, you must take a look at what's going on now. Today, peripheral controllers seem to be getting more intelligent with each new operating system version, and new storage and memory technologies are adding more levels to the overall storage hierarchy.

SHOULD CONSIDER CACHE

The storage management function, predicts Swan, "could go into the controller, but that is over the horizon for now. But we must consider [disk] cache as something we might want to get involved with in the future. . . . If we could identify datasets that are to be randomly and sequentially accessed, and store them in cache when appropriate, we could maximize system throughput."

The view from the Sterling camp is that IBM could use hardware "hooks." But as Kinnick notes, the company has "stated publicly [at GUIDE meetings] that they won't do that."

Kinnick also feels confident there won't be a block by Big Blue. "IBM has not done anything in recent times that makes us think they have any intentions of locking us out," he says. Well aware of the subtleties involved here, Kinnick is quick to point out that IBM's DF programs are delivered in object code form only, which makes them

A

26K per MIP

K

Up to 33 MIPs

Q

Real Time Operating System

J

Growth

10

Low Life-Cycle Cost

9

64MB/sec Bandwidth

8

High Availability



For superminicomputer value—

THERE'S NO BETTER DEAL

Deal yourself the winning hand with Parallel Processing Technology from Concurrent Computer Corporation. It's in the cards.

The Deal—Awesome real-time performance. Unequaled value. The benefits of parallel processing come together in our flagship 3280 MPS: extraordinary system performance, event-driven real-time operating system, leadership system capacity and throughput.

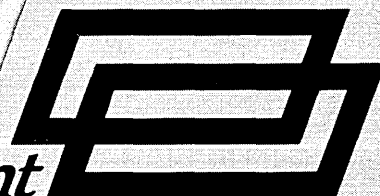
The 3280 MPS gives you an almost unlimited growth path with total hardware and software investment protection. And you get the ultimate in plug-in processing - all in a remarkably small footprint.

You'll find it's the best deal in town. The facts prove it.

The Facts—The 3280 has: • As low as \$26K per MIP • Up to 33 MIPs • Growth without replacement • High availability • Low life-cycle costs • 64MB/sec bandwidth

The Winning Hand—Concurrent Computer Corporation has been delivering the benefits of parallel processing for more than a decade. We've met the real-time challenges of real world application needs like image and signal processing, simulation, command and control and on-line transaction processing.

For more information call **1-800-631-2154** or write:
Concurrent Computer Corporation
2 Crescent Place
Oceanport, NJ 07757



Concurrent Computer Corporation

CIRCLE 35 ON READER CARD

Vendors expect IBM will eventually come out with a "jukebox" version of its 3480 tape drive.

relatively difficult to decipher.

Despite talk to the contrary, both vendors expect IBM will eventually come out with a "jukebox" version of its 3480 cartridge-based tape drive. The drive would be able to store hundreds or even thousands of cartridges for automatic loading under control of the operating system, or perhaps

under the control of DF and competitive software. Storage Technology, the financially troubled maker of IBM-compatible peripherals, has already made it quite clear that even if IBM does not come out with such a device, STC will. In fact, the company, which has pinned its hopes for future revenue growth on the product, is believed

to be gearing up for a formal introduction of the drive.

The STC announcement could come any day now. IBM's moves, on the other hand, remain a mystery. Deciphering IBM's intentions, which has never been easy, is particularly hard in the crucial area of mass storage, which has long been a big contributor to company coffers. "IBM would like to go to a single-level storage scheme in which the user perceives all his datasets as residing on the same device," speculates the Gartner Group's Braude. "The goal would be to manage storage at the logical, not physical, level."

Braude goes on to talk about a hush-hush IBM development program known as Project Jupiter, which supposedly involves as many as 300 people in Santa Theresa and Tucson. What those people are reportedly working on is applying AI-related techniques to storage management problems. "Every once in a while these guys come out of the lab and try out one of their prototypes," says Braude. "They have a lot of fancy design goals."

Meanwhile, the independents have some projects of their own. They say they are exploring advanced scheduling techniques that could monitor system activity and initiate storage management tasks as time and space permit. This would take some work off the shoulders of the administrators who are currently overloaded with such chores.

The independents and users are also keeping a watchful eye on DB2 developments. Of particular concern is the relationship between the database manager and IBM's DF scheme. The software houses claim their products work as well as IBM's with DB2. Nevertheless, it is conceivable that DB2, which already manages its own datasets, might become more tightly tied into DF's various facilities.

Cambridge's Swan insists that he is not worried about this possible tie-in. "Not all data is in the database management system," he declares. "There will always be individual datasets for us to manage."

But how should your data be stored and managed? The question is posed by the Gartner Group's Braude. "That depends on what the data is used for," he answers. "I see lots of levels of physical storage in the future—multiple members of the 3380 disk, optical devices, tape drives. There will be more granularity in the storage hierarchy." ©

The Marketplace...

JOB MARKETPLACE, SOFTWARE SERVICES, BUY, SELL, LEASE



The Food and Agriculture Organization of the United Nations (F.A.O.) requires a:

PROCUREMENT SYSTEMS OFFICER

• **Position:** Will be responsible for the monitoring and improvement of the computer based systems of the Purchasing and Control Branch at FAO's Headquarters in Rome - Italy.

• **Qualifications:** University degree in computer science, business administration, mathematics or related field of specialization or acceptable technical qualification in computer technology. Five years' professional experience on large computer systems, applying modern computer techniques, including computer programming, system analysis and office management. Extensive experience in basic software environments used in DEC systems, such as VAX VMS, DBMS, TDMS, RSX and related products. Full working knowledge of English. Good knowledge of traditional development tools such as third generation programming languages and basic access methods. Experience on microcomputers and related basic software tools such as DBase III, Spreadsheets, etc. Knowledge of TP environments techniques and tools and of Italian, French or Spanish desirable.

• **Benefits:** relocation, tax free salary, cost of living adjustment, education grant and other benefits of International Civil Service.

Please send detailed curriculum vitae not later than 29 December 1986 quoting VA 301-AFS to:
CENTRAL RECRUITMENT FAO, Via delle Terme di Caracalla, 00100 Rome Italy

SOFTWARE CONVERSION SOLUTIONS

Dataware provides the software translation system for your complex conversion problems. Over 18 years of conversion experience has resulted in thousands of satisfied customers, worldwide.

- **COBOL to COBOL**
Circle No. 500
- **AUTOCODER/SPS to COBOL**
Circle No. 501
- **EASYCODER/TRAN to COBOL**
Circle No. 502
- **BAL/ALC to COBOL**
Circle No. 503
- **DOS/ALC to OS/ALC**
Circle No. 504
- **PL/1 to COBOL**
Circle No. 505
- **RPG/RPG II to COBOL**
Circle No. 506
- **RPG/RPG II to PL/1**
Circle No. 507
- **DOS to MVS**
Circle No. 508

Dataware offers services & software to meet your needs. For more information, call or write today.

Dataware, Inc.

A Computer Task Group Company **CTG**

3095 Union Road
Orchard Park, NY 14127-1214
Phone: (800) 367-2687
TELEX: 510-100-2155



Reprints of all DATAMATION articles, including those printed in 1985, may be obtained by calling (212) 605-9730.

The total number of programmers required to implement your text management applications with BASIS is...

BASIS enables users to define applications with menus, screens and a help facility. Most applications—no matter how demanding—can be written by novices. No code. And no programmers to write it.

Not only is the DP staff freed for other tasks, but BASIS applications are productive quicker.

And BASIS gives you the power and flexibility to alter your applications as your needs change. Unforeseen requirements can be accommodated at the user level.

With all that, you still don't have to give up a thing. Not power. Not the ability to tailor the applications to your particular needs. BASIS' end-user orientation is just a very important plus.

BASIS—the information system that gives you what you want. As you want it.

Call 1-800-DATA MGT for product literature and seminar information.



**Information
Dimensions, Inc.**

655 Metro Place South
Dublin, Ohio 43017-1396
In Ohio (614) 761-7300 collect
1-800-DATA MGT

A Subsidiary of Battelle

BASIS runs on DEC VAX®, IBM, Prime and Wang VS mini and super minicomputers; on IBM, CDC and DEC® mainframes. UNIX version also available. DEC and VAX are trademarks of Digital Equipment Corporation.

Offices in Columbus, Cleveland, Chicago, New York, Washington, DC, Boston, San Diego, London, Paris, Frankfurt, Geneva, and Milan.

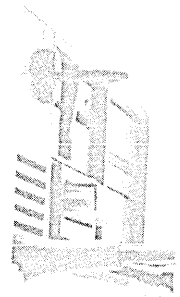
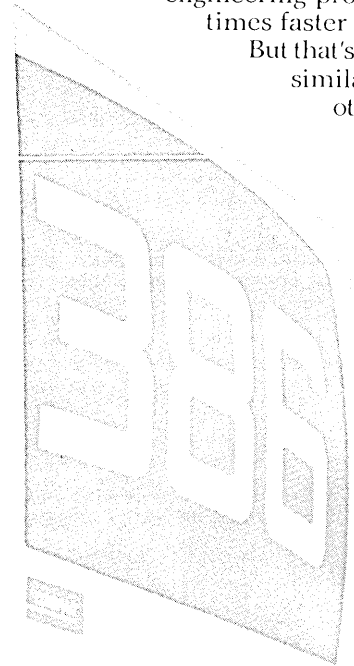
CIRCLE 43 ON READER CARD

Why the COMPAQ continue to be the world's most long after others

The 32-bit, 16-MHz Intel® 80386 microprocessor is at the heart of the new COMPAQ DESKPRO 386™.

As such, it lets you run thousands of industry-standard business *and* engineering programs 2-3 times faster than ever.

But that's where the similarity with other 80386-based PCs



The most advanced personal

DESKPRO 386 will advanced personal computer copy its engine

ends. Along with advanced 32-bit architecture, every component has been optimized to achieve a true minicomputer level of performance in a personal computer. That's why no other personal computer is this advanced.

Greater stores of knowledge

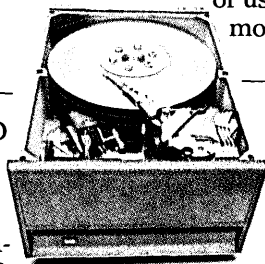
The COMPAQ DESKPRO 386 provides you the most storage capacity and performance available in any personal computer. High-performance 40-, 70- and 130-Megabyte fixed disk storage drives access information as much as 50 to 150 percent faster than those used in other advanced-technology PCs. And they store 5,000 to 50,000 more pages of data.

We also developed a fast, economical way to protect all that data. Back up and verify 40 Megabytes of data on a single formatted cartridge at the timesaving rate of one Megabyte per minute.

The most memorable personal computer

Break the 640-Kbyte memory barrier and use up to 8 Megabytes of high-speed 32-bit RAM with the COMPAQ Expanded Memory Manager. This software comes standard and

works with programs that follow the Lotus®/Intel/Microsoft® (LIM) Expanded Memory Specification, allowing you to build even bigger spreadsheets, sort larger databases and run more programs without having to buy additional software or use expansion slots, leaving more room for you.



Storage drives access data faster, enhancing performance.

Expanding horizons

Exceptional expandability lets you add as many as four internal storage devices. Place up to 10 Megabytes of high-speed 32-bit RAM on the system memory

board without using an expansion slot; 14 Megabytes of RAM using only two.

Or configure it using the COMPAQ Enhanced Color Graphics Board with built-in lightpen interface taking up a single slot. This leaves four expansion slots that are compatible with industry-standard expansion boards. So you can communicate with mainframes, in a network, or in a multi-user environment.

Built to higher standards, with "more" standards

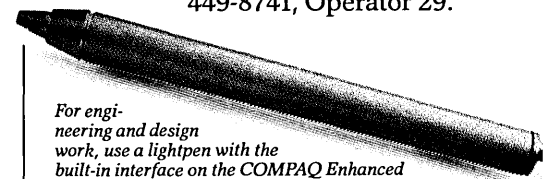
We build more into the COMPAQ DESKPRO 386, with more care. We have included interfaces for printers and modems. We improved the

keyboard to help touch typists avoid mistakes and simplify common chores. We offer a color monitor with enhanced color graphics. And we offer a one-year limited warranty. These are just a few reasons why the COMPAQ DESKPRO 386 is the unparalleled value for demanding users.

History in the making

COMPAQ® reached the Fortune 500 faster than any other company in history by making computers that work better. And even though some companies may copy one or two of our latest computer's features, it will be years before they copy them all. Such attention to engineering detail is the reason why COMPAQ Computers are recognized as best in their classes by industry experts and users alike.

For the Authorized Dealer nearest you, or to obtain a brochure, call 1-800-231-0900 and ask for Operator 29. In Canada, call 416-449-8741, Operator 29.



For engineering and design work, use a lightpen with the built-in interface on the COMPAQ Enhanced Color Graphics Board.

It simply works better.



The most advanced personal computer because it incorporates the most advances.

computer in the world

COMPAQ
DESKPRO 386™

C.Itoh gives a lesson
on printing technology.

By today's standards, early computer printers were slow-moving dinosaurs. But then, so were computers.

And you could easily tell a computer printout from typewriter output.

As computers became smaller, faster, less expensive and more versatile, so did printers.

With the advent of the PC, C.Itoh and other manufacturers developed new technologies for low-cost dot matrix and solid-character daisy wheel printers.

More recently, additional advances in speed and flexibility have been made with the introduction of low-cost laser technology for non-impact page printers.

And now, in 1986, C.Itoh introduces the CIE 3000 Ion Deposition Printer based on a whole new technology.

This new non-impact page printer combines high volume and high throughput with new lows in purchase price, maintenance and per-copy costs.

For comparison purposes with the printer you're using now, a CIE 3000's recommended volume per month is as high as 150,000 pages. The

preventive maintenance cycle is approximately every 400,000 pages. The printing drum life exceeds 1,000,000 pages. And it has a machine life in excess of 5,000,000 pages.

It's all because this new printing technology requires very few moving parts and incorporates unusually rugged components, requiring a minimum of service.

Available in two models, the CIE 3000s print at 30 or 45 pages per minute. The print resolution of 300 x 300 dots per inch gives clear, crisp characters in either portrait or landscape orientation.

Using ordinary, non-treated, pre-printed or plain letter-size or legal-size paper, the CIE 3000 very reliably and quietly fulfills all of your printing needs.



Its overlay forms (including text) and multiple copy capabilities reduce the load on your host computer and further improve throughput for even greater cost effectiveness.

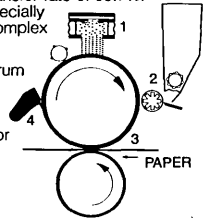
The new C.Itoh 3000 Ion Deposition Printers. A lesson in high volume, high speed, high print resolution and low costs.

To learn more, just write or call C.Itoh Electronics Group, Image Systems Division, 19300 South Hamilton Ave., Torrance, CA 90248, (213) 327-9100.

Phone toll free 1-800-843-6143.
In California, call 1-800-323-2024.
Telex: 652-451. TWX: 910-343-7446.

Ion Deposition Printing is a revolutionary concept using a simple, inexpensive four-step process.

1. An electronic image is generated from the ion cartridge toward a rotating drum.
2. Mono-component toner is attracted to the latent electrostatic image on the drum.
3. Toned image is transferred to paper through cold, high-pressure fusing for a transfer rate of 99.7%. This high transfer rate is especially important as high volume, complex images are generated.
4. Toner traces remaining on drum after transfixing are aggressively scraped off. Charge is neutralized and ready to instantly accept the image for printing the next page.



C.ITOH
Ion Deposition Printers

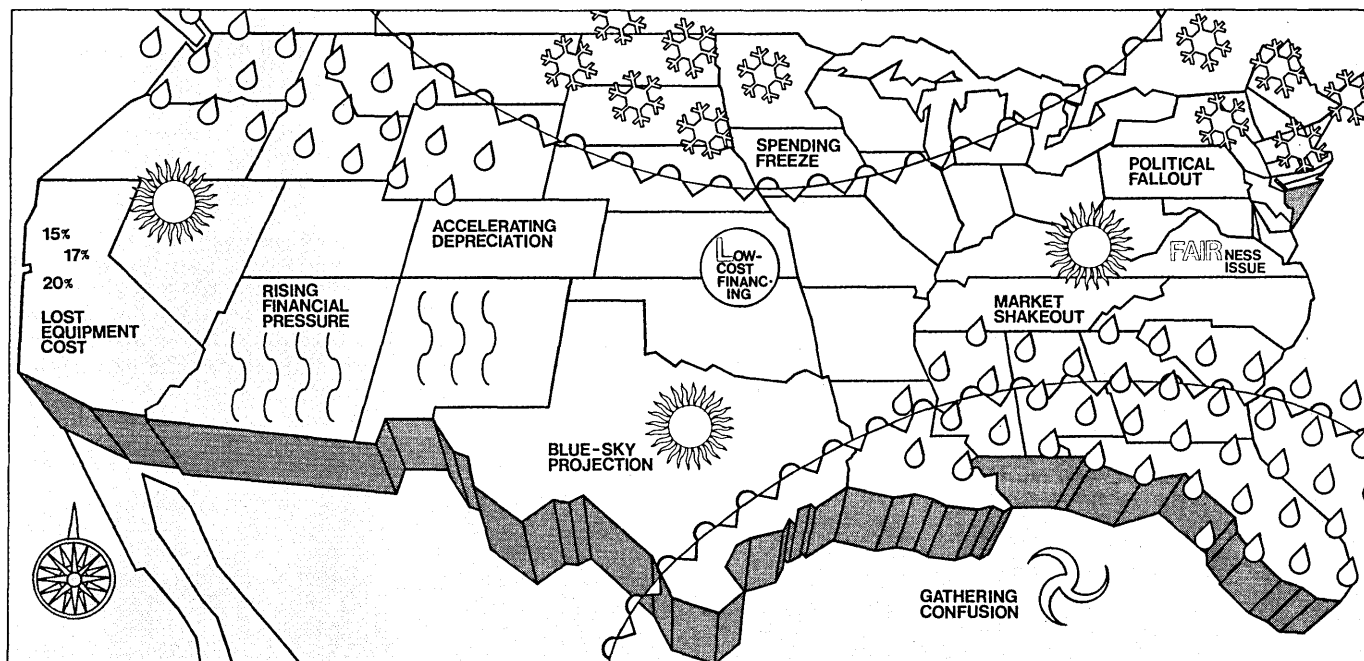
© 1986 C.ITOH Electronics, Inc.

**INTRODUCING THE
CIE 3000 ION DEPOSITION
PRINTER**

CIRCLE 37 ON READER CARD

Tax reform stirs up stormy weather for dp leasing companies and their clients.

A NEW CLIMATE FOR LEASING



by David Stamps

It was the third-party leasing company that called the dp manager's attention to the fine print in the contract he'd signed last March—a contract for a couple of IBM 3380 disk drives. The manager had entered into what's called an ITC-lessor deal, meaning that the 10% Investment Tax Credit allowed for new equipment such as computers was handed back to the leasing company.

The practice has been commonplace in computer leasing in recent years. Since the decision to lease equipment is usually made as a hedge against technological obsolescence—not for tax advantages—dp managers have normally handed ITCs back

to the lessor in return for lower monthly rental rates on the equipment.

But 1986 was not normal. For much of the year, Congress was making noise about a new tax bill, one provision of which was the repeal of the ITC. In June, when the tax bill's chances of passage began to look good, the lessor directed the dp manager's attention to the fine print, and a thing called the ITC indemnification clause. It stated that if the ITC were repealed retroactively to Jan. 1, 1986, the lessee would have to "make the lessor whole," on the basis of after-tax yield.

What does that mean? The answer is not always clear and may in some cases be a matter for company lawyers. But at the very minimum, the lessee must fork

over 10% of the equipment costs to the lessor.

The loss of the ITC benefit is just one of several changes that the new tax code brings to the computer leasing marketplace. Among the longer-term effects is the strong probability that lease rates will increase (see "What Price Leasing?"). There's an equally strong likelihood that the number of leasing companies will decrease and that lease/purchase decisions will have to be analyzed much differently from the way they have been in the past. Already, some users have found themselves studying the fine print on their current lease contracts.

"Fortunately, we didn't acquire that much equipment this year," says the dp

ILLUSTRATION BY CYNTHIA STODDARD

WHAT PRICE LEASING?

A question soon to tax the minds of dp managers everywhere is how high will lease rates rise, once the full effects of tax reform are felt. The obvious answer is 10%, the amount of the Investment Tax Credit (ITC) that will be immediately lost to new equipment deals—at least until such time as the economy goes into a tail-spin and Congress feels political pressure to reinstate the ITC. (The latest repeal of the ITC is the third in the past 20 years. Since previous repeals have been followed by immediate slowdowns in nondefense capital spending, many observers believe the ITC will be reinstated, possibly before the 1988 elections.)

But the new tax law changes more than the ITC, of course, and some of these changes will affect lease rates. For example, the tax bill contains provisions for a change in the corporate tax rate to 34% from 46%, sets a new alternative minimum tax of 20%, and allows quicker depreciation of computer equipment under the accelerated cost recovery system.

Other indirect changes resulting from tax reform could influence lease rates as well. Many smaller leasing firms could lose their primary sources of capital, i.e., investors who in the past sought tax shelters. That drying up of capital could increase the rates they quote. Many believe the small leasing companies will be shaken out of the market entirely. Assuming the small players have been a factor in keeping lease rates down, their disappearance could be a factor in driving rates up.

Whether or not the predicted disappearance of small lessors will drive up rates is a subject of debate. James Benton, president of the Computer Dealers and Lessors Association (CDLA) in Washington, D.C., believes the leasing business will remain competitive. "With 300 members in the CDLA and another 800 members in the American Association of Equipment Lessors [Arlington, Va.], it hardly makes sense to say the computer leasing business isn't going to be competitive." He adds, "You only need two firms to get competitive bids."

Customers don't necessarily see it that way. "It's true that the big leasing companies like Comdisco [Rosemont, Ill.] and CMI [Brookfield Hills, Mich.] bid

against each other," notes one dp manager who claims to be an experienced lessee. "But if you don't have those little guys making bubbles in the leasing business, you'll see prices start to slide up."

While most lessors say they expect lease rates to rise, few are willing to cite a specific figure. One person willing to do so is Tom Martin, president of Computer Financial Inc. in Hackensack, N.J. Martin, who did computer runs in September to find out how the tax bill would affect his business, claims that lease rates will increase about 20%. Citing four provisions of the tax bill, Martin offers this breakdown: loss of the ITC will cause rates to rise to 12% from 8%; the change in the corporate tax rate will increase lease rates by 8%; and the alternative minimum tax provision will increase rates anywhere from 1% to 4%.

The accelerated cost recovery system will have the effect of lowering rates by about 2%, estimates Martin. But that 2% will be more than offset by the disappearance of private investors from the leasing market, which he estimates will boost rates anywhere from 1% to 5%.

"The deep shelter syndicators will be removed from the leasing market and that will have a big impact on rates," says Bruce Smith, vp at BancNewEngland Leasing Group, a subsidiary of the Boston-based Bank of New England that operates as a diversified equipment lessor. "A number of leases relied on those investors, and computer leases have been especially popular for tax-oriented leasing deals," he explains. "High-tech gear, particularly mainframes, tends to command higher rental rates; that has allowed computer deals to raise more tax leverage."

The assumption that lease rates will go up is not universal. Bob Djurdjevic, a Phoenix forecaster of computer equipment residual values, believes that increased competition in the leasing industry could hold rates at their present levels. "Most lessors would have us believe that rates will go up. That's assuming that as the cost of production goes up, prices go up. That's not true," he argues.

"Competition is what dictates prices and I foresee a sharpening of competition," Djurdjevic continues. "With tax considerations going away, lessors

will have to risk more of their own money. Changes in the tax law are going to bring this industry closer to reality."

Closer to reality means more closely tied to equipment residual values, not tax benefits. Others in the industry acknowledge that such a change could indeed mean more competition among lessors. Still, says BancNewEngland's Smith, "it would take a lot more competition than you're going to see to compensate for the loss of the ITC."

He adds firmly, "Lease rates will go up."

Many in the industry are also predicting that the alternative minimum tax provision of the new tax law could have a dramatic effect on the leasing business. For lessors, the impact will be largely beneficial. One strategy companies may use to avoid paying the 20% alternative minimum tax will be to lease equipment rather than purchase it; for some capital-intensive companies, the cost of leasing may be lower than the 20% tax triggered if the equipment is purchased and then depreciated. Some observers expect the minimum tax will boost the demand for leasing in general.

For computer users, the effects will be less advantageous: they could be picking up the buck passed on by leasing firms. Leasing companies haven't been taking the ITC off the hands of their customers for years just to be nice guys; they have used tax benefits to cut their own tax liabilities to near zero. As a result, virtually every leasing company in the business will be hit with the 20% minimum tax, and they will try to pass that cost on to their customers.

"What doesn't bode well for the industry, at least in the near term, is that there is going to be a lot of upheaval," says Bob Gulko, president of Unicorn Leasing Corp in Sausalito, Calif. What with the income funds entering into the business, and attempts to take advantage of tax benefits before the new tax law takes effect, Gulko says he has seen in the past 12 months some of the lowest rates in years. He believes that the reverberations from the tax bill will be felt for a while. Until things settle down, Gulko predicts, "rates are going to be all over the place."

—D.S.

manager with two leased 3380s. "We did a rough check and calculated that we'll have to come up with a one-time payment of \$18,000 to \$20,000, and our rates will increase about \$2,400 per month. I can live with that. But companies that acquired a lot of equipment might find themselves in trouble."

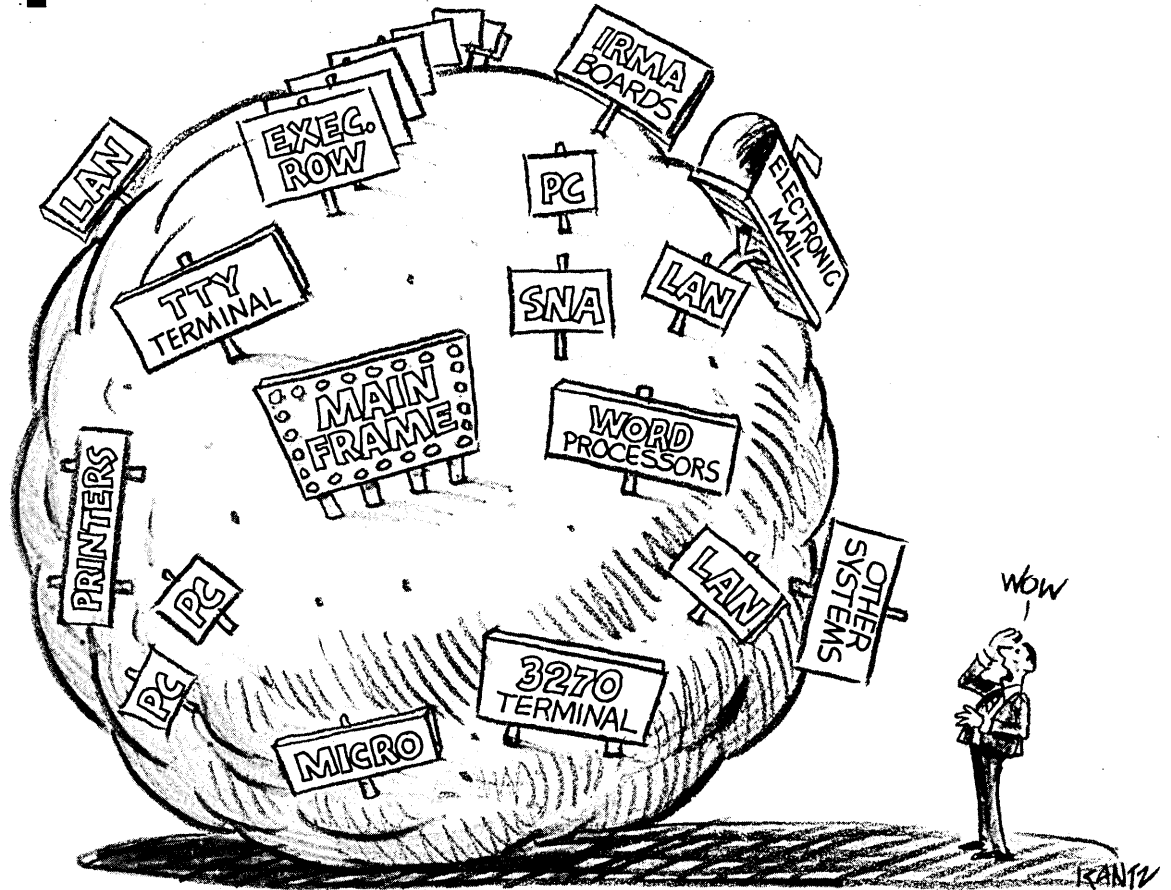
Indeed, the 10% ITC on a \$5 million IBM 3090 mainframe is a cool \$500,000—a painful bit of cash to fork over, especially if you did not budget the money to cover this

indemnity. The key question may turn out to be not whether you signed a contract with an ITC indemnification, but whether or not you budgeted for it.

The loss of the ITC and the resultant confusion over ITC indemnification clauses have the potential, at least, to create some unpleasantness between computer lessors and their customers. Just how big a stink might erupt is currently difficult to gauge. Most dp users interviewed by DATAMATION claimed to be unconcerned, but that

may have been because all but a few customers had yet to be notified by lessors as to exactly how the ITC indemnification would hit them. In fact, most leasing companies waited until after President Reagan signed the bill into law in October before notifying customers that ITC indemnifications would kick into effect. As the bill drew closer to final approval, a number of lessors admitted to some anxiety over the potential for misunderstanding and conflict.

Who ties the whole kit and caboodle into one very productive ball of wax?



Computer Corporation of America.

Computer Corporation of America introduces ProdNet. The Productivity Network.™ The most comprehensive networking system on the market. One that literally uses your mainframe as the hub of the system.

Not as just another peripheral system.

Why is CCA, known primarily for advanced DBMS products, moving into data communications?

Because as the developer of Model 204, the industry's most productive database management system, we have a very vested interest in making sure your company's data gets used to its utmost advantage. That means creating the most productive internal communication network possible.

We've taken PORT,™ the industry's most dynamic LAN, and built a complete system around it.

ProdNet is designed as a system that can grow with your needs, without having to reinvent the wheel every time you add another workstation, more peripherals, or an entire LAN.

With ProdNet, everyone can share everything you want them to. From word processors, electronic mail, PCs, LANs, and IRMA boards, to terminals. Everything.

And your mainframe is the hub of the network. Directing the traffic and keeping the network operating in a very

productive fashion.

And, when it comes to product support, ProdNet is backed by CCA's full-time support organization. Support that consistently wins high marks from CCA customers.

Find out more about tying your whole kit and caboodle into one very, very productive ball of wax. Just send the coupon. Or, call John Donnelly at 1-800-258-4100, ext. 707.

*PORT is a trademark of Waterloo Microsystems Inc.

Please send me the complete story on ProdNet.
Mail to: Four Cambridge Center, Cambridge, MA 02142.

Name _____

Company _____

Title _____ Telephone _____

Address _____

City _____ State _____ Zip _____

Computer Corporation of America

 A Crowntek Company

DM

Small, tax-oriented lessors could be driven out of the business.

"The bookkeeping on this alone is a world-class pain," declares Rick Forsythe, a partner in Forsythe & McArthur, a Skokie, Ill., leasing firm. "It has the potential to be a real national problem. Looking at IBM equipment alone, and assuming that \$5 billion worth of IBM equipment transactions were done as ITC lessor deals, that is half a billion dollars that lessors are going to have to recover. They're going to have to do it by going back to lessees and asking them to ante up."

That's assuming that lessees who inked ITC-lessor pacts will be asked to cough up just 10% of the equipment cost. Some lessees will be shown computer printouts purporting to prove that they owe the lessor anywhere from 15% to 20% of the equipment cost. The reason for the higher figure has to do with the indemnification clauses that state that if the ITC is repealed, the lessor must be made whole on the basis of after-tax yield. Covering the accumulated total of lost tax benefits to the lessor, or the lessor's investors, could actually mean paying more than a straight 10% of equipment costs.

REAL GOUGING POTENTIAL

"Our leasing vendor tells us that he will not push for more than 10% of the cost of equipment," reports Dick Reidy, vp of information management at Union Labor Life Insurance in Washington, D.C. "It appears to me that unless you've dealt with a reputable vendor, there is a real potential for some gouging on this one."

James Benton, president of the Computer Dealers and Lessors Association (CDLA) in Washington, D.C., is reluctant to predict how much gouging will be going on. "I don't think it's going to be real widespread, but the whole issue is going to be fraught with confusion. It's not the sort of thing that's going to foster harmonious relations between lessors and lessees."

Just how big a problem retroactive ITC payments become will be known only when lessors begin billing customers. Even then, the true scope may never be widely known.

"There are lots of firms—banks and other leasing organizations—in the business of originating leases at the lowest rates," explains Bob Gulko, president of Unicom Leasing Corp. in Sausalito, Calif. "A lot of customers only look at the lowest rates, and I'm sure there are some who will have been caught, but I doubt if you'll find many people willing to stand up and admit it." Gulko is also chairman-elect of the CDLA.

Not all dp managers were caught

in the rain over the ITC revision. Some were attuned to the tax climate enough to shun ITC-lessor transactions.

"Normally, we give the ITC back to the lessor, but this year, given the tax climate, we just ignored it and paid a higher monthly lease rate," reports Mark Stonecipher, facilities manager for Arthur Andersen's Advanced Systems Center in Chicago. "I'm sure there are people in the industry who didn't put two and two together, though. It may not be as many as one in 10—maybe only one in 25—but some of those people are going to find themselves in hock up to their noses."

Some leasing companies claim they tried to prepare customers as far in advance as possible. Frank Chartier, executive vp for financial services with CMI Corp., Brookfield Hills, Mich., says his firm "tried to make sure lessees went into a deal aware of the financial hits. Wherever possible, leases quoted specific rates, and we have tried to keep customers notified as developments with the tax bill transpired."

Nevertheless, indemnification clauses with an imprecise "make the lessor whole" statement are fertile grounds for disputes. "It's possible some lessors could end up suing lessees in order to get their money," Chartier admits.

"Frankly, I don't know what the response will be when we start to contact customers," declares Marc Keepman, senior vp of financial services for Dataserv, a computer leasing firm in Minneapolis. "For the most part, lessees are pretty savvy about indemnifications, especially for a big-ticket item like a mainframe. Some will say, 'I was waiting for your call.' Others may not have been thinking about it at all. I'm a little anxious."

SAVVY ENOUGH TO HOLD OUT

Many dp managers were apparently savvy enough about indemnification to hold out for lessors willing to write leases without an ITC clause. A number of leasing companies claim their volume for 1986 is down because they had to walk away from dp managers who insisted on such deals. Few lessors would admit to writing ITC-lessor contracts without an indemnification, though many say they knew of competitors who had done so.

"We did a few deals where the equipment cost was only \$150,000 or so," reports one lessor. "On a small deal, we can make up the ITC; it's hardly worth the paperwork. But to write a deal on a large processor with no indemnification—after June you'd have had to be crazy to do that."

Such deals were reportedly done, however—evidence, perhaps, that the

third-party leasing business retains a wheeler-dealer aspect that savvy dp managers can profit by. Dataserv's Keepman estimates that his company lost out on half a dozen contracts because competitors were willing to write nonindemnified leases.

Nonetheless, according to many lessors, the effect of the new tax code will be to drive small, tax-oriented firms who traditionally offer cut-rate leases out of the business. The leasing business will be consolidated, in this view, among a smaller number of well-financed companies—so-called larger lessors—that provide services in addition to low-cost leasing.

Some observers predict that leasing companies will try to differentiate themselves from one another with extra services, and that the leasing market will become highly segmented. As the task of setting rates based on forecasted residual values—the anticipated value of the leased equipment at the end of the lease—requires ever sharper pencils, the smaller leasing companies will have to focus on niches in order to play the game.

Centron DPL, a Minneapolis leasing firm, has already taken the niche market approach, specializing in communications front-end processors. Moreover, it offers installation and equipment refurbishing through a separate division. This year, it's adding a new division to provide network services.

One must excuse dp managers, however, if they seem mostly unaware of niches and diversification in the leasing business at large. Ask any dper why he turns to third-party lessors for his equipment, and the answer is not likely to be network service, disaster recovery, or maintenance.

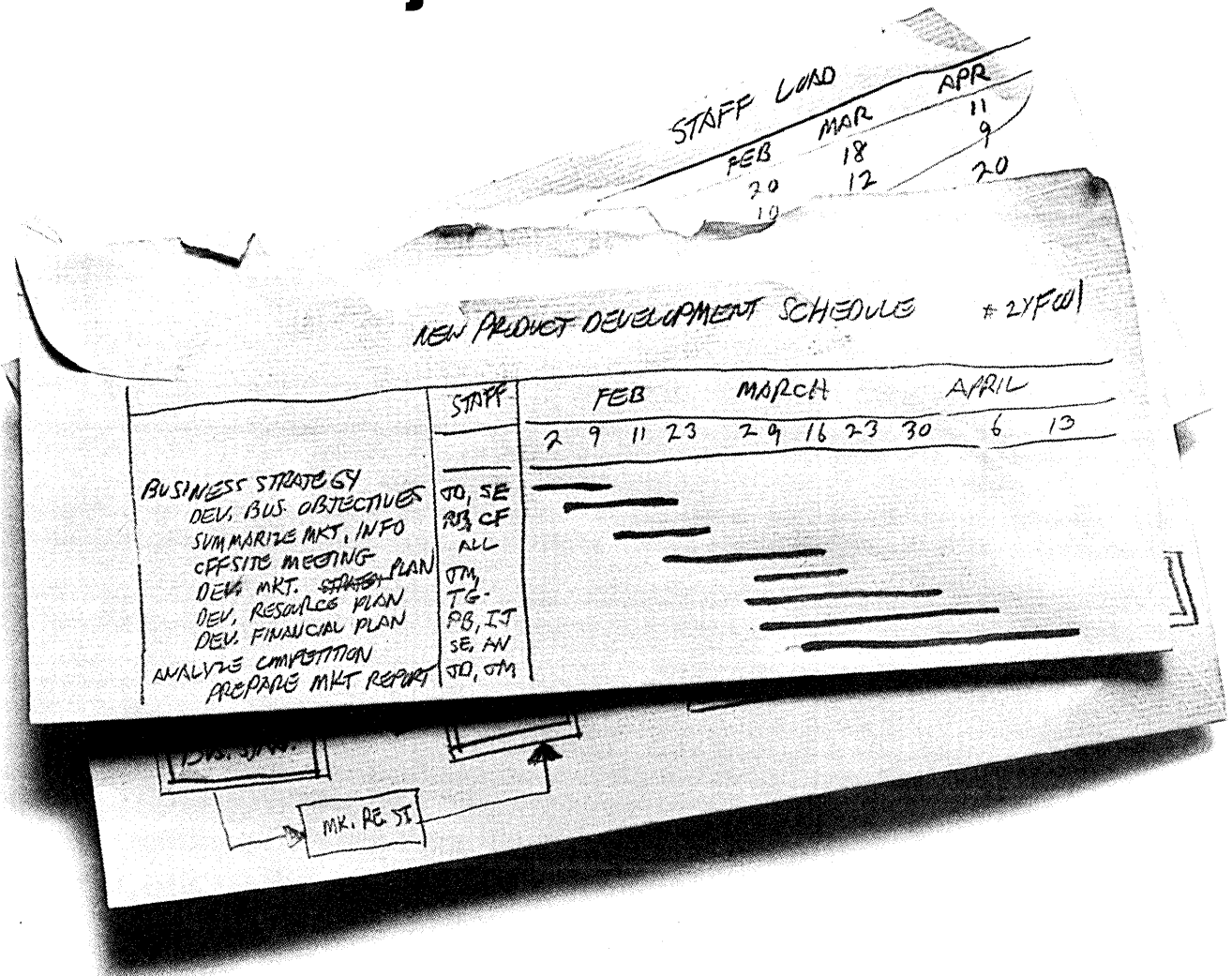
"I'm looking for the lowest rate," says David Johnson, corporate vice president for MIS at National Car Rental Systems in Minneapolis. "Smaller companies may need those services. A big company can usually get IBM to provide service if it pushes them."

"Low rates" are also what Chemical Bank vp Louis Riehl seeks. "Price is absolutely the main concern," he insists.

Echoing these bottom-line sentiments is Arthur Andersen's Mark Stonecipher. "I don't need technical support services, I don't need physical planning, and I don't need a monthly rehash of the Gartner newsletter," he says. "I'm only interested in leasing because it offers lower rates. But now, thanks to the new tax law, those rates will not be as low as before." ©

David Stamps is a Minneapolis-based freelance writer.

The only project management system as easy to use as Project Workbench.



The back of an envelope. That's where project planning traditionally got done. It was simple and flexible. You could keep making new plans as long as your supply of envelopes lasted. But the power wasn't there. **Project Workbench turns on the power** but keeps the "back-of-an-envelope" spirit intact. Workbench is easy to use. Comfortable to work with. And flexible enough to do things your way, with:

- * Great graphics—Gantt Charts, resource spreadsheets, critical path and dependency networks
- * Full text editing for presentation-quality reports
- * LAN support, communications, and more!

For a free demo diskette, call us or contact your local dealer today. **With Project Workbench, you'll never run out of envelopes again.**

- * Automatic staff overload alert
- * Resource loading across multiple projects

Call or write for a free demo diskette! [212] 219 8945

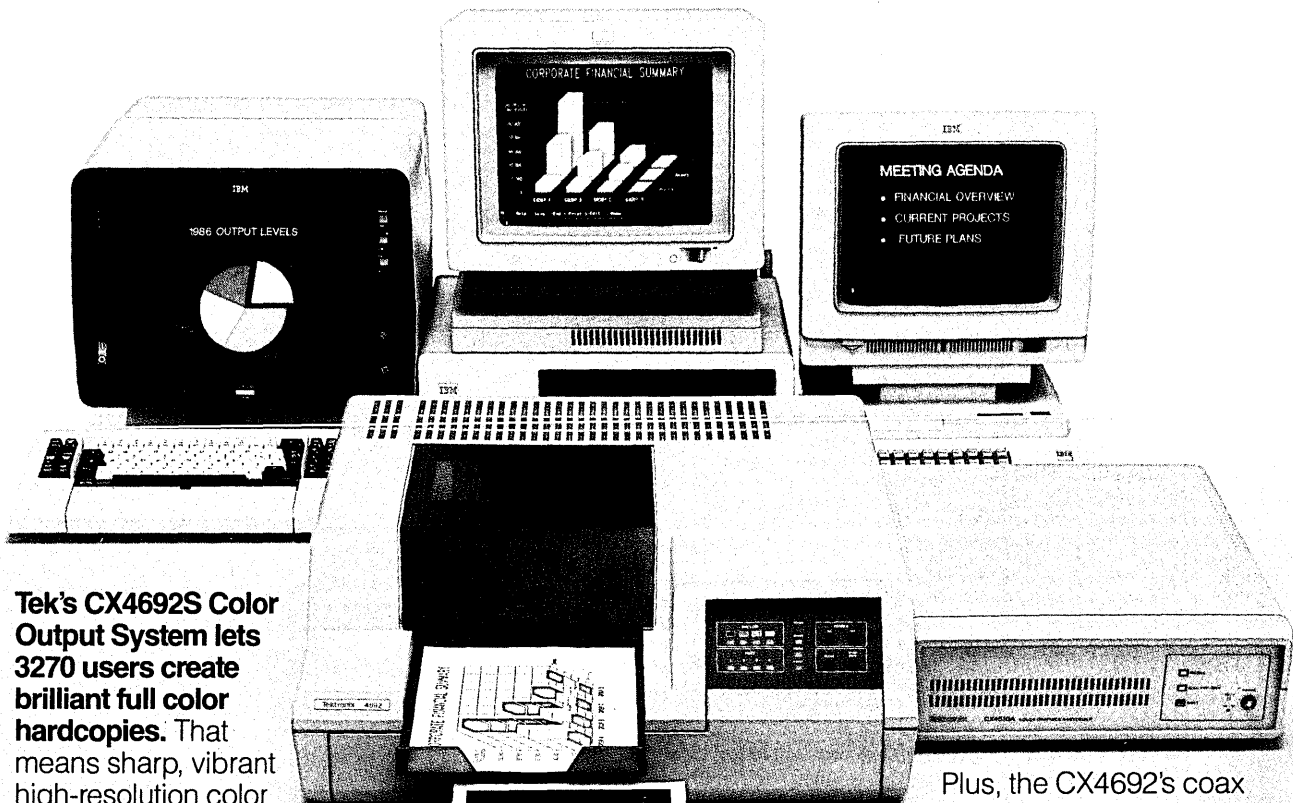
ABT PROJECT WORKBENCH

Applied Business Technology Corporation ■ 365 Broadway ■ New York, NY 10013

In Europe, Asia & Africa: Hoskyns Group Ltd., 130 Shaftesbury Ave., London W1V 7DN. Telex 893529
 Workbench was designed for the IBM PC, XT, AT, 3270PC and compatibles, the DEC Rainbow, and the Wang PC. Registered trademarks
 IBM—International Business Machines Corporation. DEC Rainbow—Digital Equipment Corporation. Wang PC—Wang Laboratories, Inc.

CIRCLE 66 ON READER CARD

HOW TO END IBM OUTPUT BLUES.



Tek's CX4692S Color Output System lets 3270 users create brilliant full color hardcopies. That means sharp, vibrant high-resolution color output for users of SAS/GRAPH®, TELL-A-GRAF®, DISSPLA® and GDDM™-based applications.

Tek's Color Graphics Output System provides excellent color hardcopy, not limited by the resolution or colors of your display. What's more, output is fast and economical on both paper and transparencies.

Plus, the CX4692's coax interface means 3270 users can continue work during graphics printing. You can even connect it to non-IBM hosts simultaneously, thanks to its auxiliary RS-232 interface.

Put your IBM output blues into perfect harmony. Get free samples of CX4692S output by contacting your local Tek representative. Or circle the reader reply number below.

IBM and GDDM are trademarks of International Business Machines Corporation. SAS/Graph is a registered trademark of SAS Institute, Inc. TELL-A-GRAF and DISSPLA are registered trademarks of ISSCO. VKT-101

Copyright ©1986 Tektronix, Inc. All rights reserved.

Tektronix®
COMMITTED TO EXCELLENCE

CIRCLE 40 ON READER CARD

Campbell Soup, Smith Barney, The Commonwealth of Virginia and USAir have all benefited from Peat Marwick's unequalled information systems development experience.

Maybe you can, too.

In an area where experience really counts, you can count on Peat Marwick. Our experienced systems consultants bring you the highest level of expertise, whether your project involves systems planning, custom design and development, packaged software implementation or software re-engineering services.

Peat Marwick's systems consultants average more than ten years' experience. What this means to you is an unequalled opportunity to get more out of the system you are planning, developing, implementing or maintaining. Our consultants provide high quality, and reliable consulting services that will help take the risk out of your critical systems projects. And they will follow through to insure that your systems continue to perform at peak effectiveness.

You can benefit from the information systems skills that have helped some of the world's finest corporations and governments. For more information and a free copy of our systems brochure, "Meeting the Technology Challenge," send in the coupon below or call **1-800-344-3600**. (In Illinois, call 800-328-4200.)

D-UM-12/1

Mail to: Peat, Marwick, Mitchell & Co.,
345 Park Ave., Box ISS, New York, N.Y. 10154

Name _____

Title _____

Company _____

Address _____

City _____

State _____

Zip _____

 **PEAT
MARWICK**

Accounting and Auditing/
Tax Services/Management Consulting/
Information Systems Services

CIRCLE 41 ON READER CARD

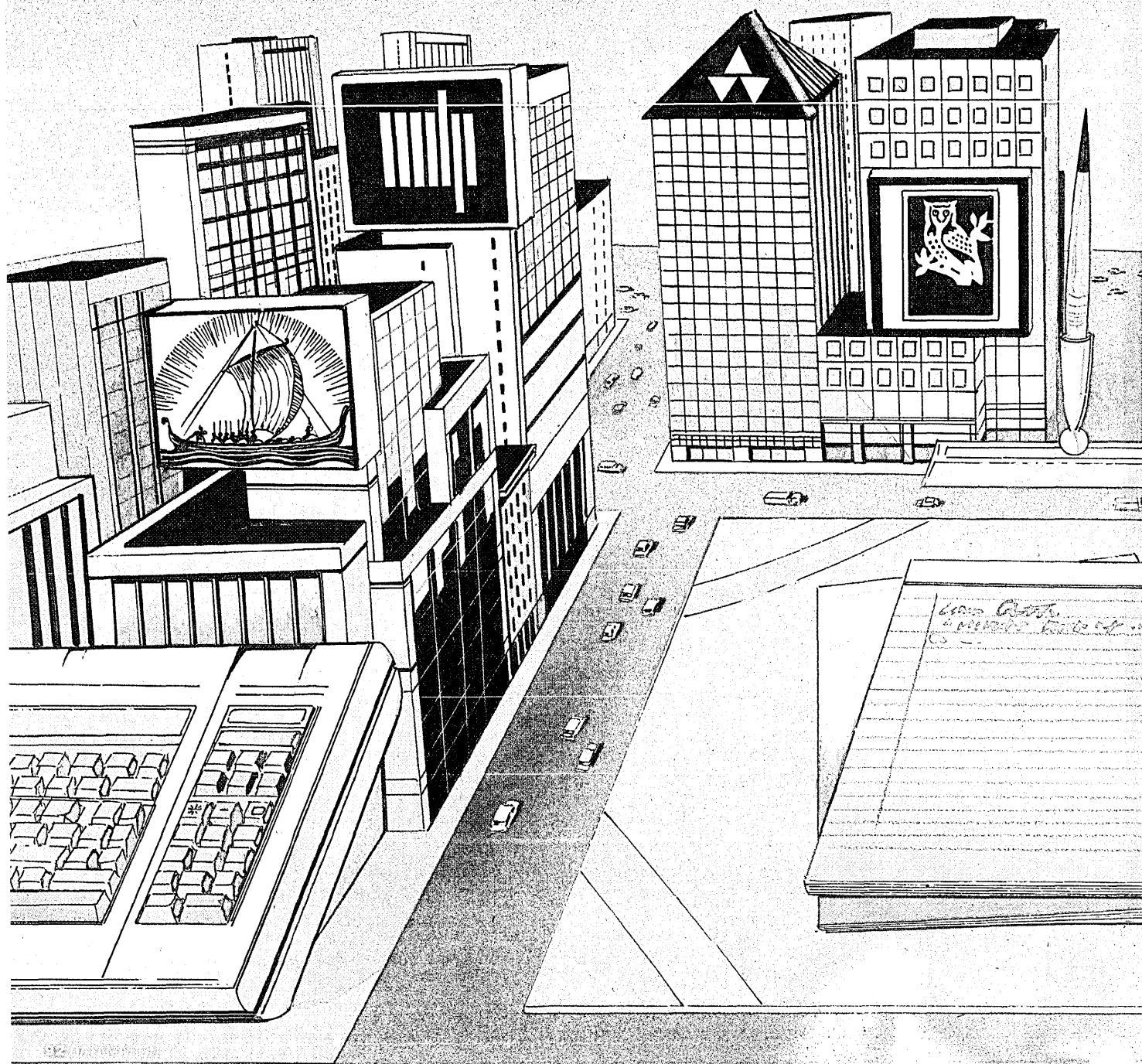
Electronics can help companies build their own publishing empires.

DESKTOP PUBLISHING

by Connie Winkler

WYSIWYG—What you see is what you get—is the competitive cry of those vendors on the desktop edge of electronic publishing technology. In the WYSIWYG world, what appears on the CRT screen is exactly what's reproduced on paper, with no embedded codes. WYSIWYG, however, is an ironic sales slogan, because what users are actually getting is a mixed bag of hardware and software offerings accompanied by a gush of hyperbole about the benefits of electronic publishing.

Electronic publishing is the automated integration of text and graphics for



paper output—operations that are usually done by the traditional commercial typesetting and printing trade. Electronic publishing using a microcomputer and laser printer to attractively display text on a printed page is referred to as desktop publishing. In the overall field of electronic publishing, some of the most satisfied users are those who have large mainframe-based systems that combine huge databases with electronic composition systems and heavy-duty printers. Two leading-edge users in the mainframe mold are Ace Hardware Corp., Oak Brook, Ill., and the U.S. Postal Service.

Despite the big differences in capabil-

ities between low-end systems and high-end systems, electronic publishing is one of today's liveliest applications, especially at the desktop level. Printing centers that provide fast turnaround are beginning to appear in storefronts, much the same as copying shops—and in many cases the two operations are actually one and the same.

Desktop publishing proponents envision a \$6.5 billion market by 1990. That multibillion-dollar business does not even include revenues that could flow from in-house corporate publishing. Only 3% of the 85,000 corporate printing operations use any form of electronic system, according to Art Ryzoun, director of electronic

publishing market analysis at Dataquest, the San Jose market research firm.

The new battle for the desktop is once again between Apple and IBM. Dataquest predicts that by late next year, IBM, with an estimated \$840 million in revenues from desktop systems, will pull ahead of Apple, which is expected to make \$705 million from its desktop wares.

Apple's graphics-oriented Macintosh and LaserWriter printer introduced in January 1985 helped the company establish an early lead in the desktop domain. Users of any or all compatible products have had faster page makeup times, so what many have done is to buy the world



processing packages to Hewlett-Packard LaserJet printers to produce newsletters or proposals. Those publishing options should increase within the next few months as companies such as Software Publishing Co., Mountain View, Calif., Aldus Corp., Seattle, and Xerox's recently acquired Ventura Software fulfill their promises to deliver desktop packages for the IBM PC.

DESKTOP SYSTEM SATISFIES

One user unaffected by such PC market moves is WGBH Education Foundation, which is happy with its Mac-based desktop publishing system. "One of the surprises," comments WGBH senior designer Paul Souza, "has been how many other things we could do with the system."

The Macintoshes were originally brought into WGBH to design routine internal documents such as proposals, letterheads, and newsletters, which had formerly been done with typewriters. "We wanted to improve the quality of low-end projects," explains Souza. Now the design group is doing 300-page new project proposals with the help of the Mac system.

The award-winning public television producer has three Macintosh desktop systems running such art and composition software as MacDraw and MacPaint from Apple and PageMaker from Aldus. PageMaker enables WGBH staffers to preview multiruled forms so they can easily make changes or updates as required.

One Macintosh enthusiast not satisfied with the 300 dots per inch output of the LaserWriter is Karen Johnson, a designer at the Seattle office of Hill & Knowlton Inc., a public relations firm. Johnson designs charts and presentations on a Macintosh using PageMaker. After her design chores are finished, she sends the disk to a typesetter for the final output.

Seattle is just one of three Hill & Knowlton offices that use the Mac-PageMaker combo. Johnson, who favors the micro method of design, says she would like to see more Seattle clients and other Hill & Knowlton offices delivering materials on diskettes. That would make it a lot easier, she says, to exchange data and projects.

One company that demands high-quality composition as well as typesetting is Harcourt Brace Jovanovich (HBJ), which recently installed a midrange pc-based system that costs between \$5,000 and \$10,000. HBJ went with Typesat from Bestinfo of Springfield, Pa. The system, which runs on pcs in HBJ's editorial offices in New York, Chicago, and Cleveland, does hyphenation and justification (H&J), and shows a WYSIWYG electronic galley preview.

MICRO, MAINFRAME, AND MINI SOLUTIONS

Although the dividing lines are blurry, electronic publishing systems generally fall into three categories. First, there are desktop publishing systems based on a personal computer and a laser printer. Moving up a notch, you'll find midrange systems that traditionally have been based on minicomputers. More recently, however, those midrange systems are being supported by IBM ATs. Finally, at the high end, there are mainframe-based systems that are in sore need of standards.

Desktop publishing was born when Apple Computer introduced its \$10,000 Macintosh personal computer and LaserWriter duo back in January 1985. The micro maker quickly followed up with page makeup and composition software that lets users design page layouts for simple printing jobs like employee newsletters, brochures, and flyers.

IBM PC developers followed suit with their PC and Hewlett-Packard LaserJet combination. These systems, which save users a trip to the typesetter, can also save them time and money. Typically, the output to a \$2,000 to \$5,000 laser printer is three unjustified columns on an 8½ by 11 inch piece of paper, which can then be duplicated on a copying machine. These page makeup systems, like PageMaker from Aldus Corp., Seattle, and Ready-SetGo from Manhattan Graphics, New York, sell for between \$250 and \$700. Hoping to build on the popularity of these systems is a new group of vendors that has come out with more powerful personal computer packages. On that vendor list are Xerox's new acquisition, Ventura Software, Morgan Hill, Calif., which has the Ventura Publisher package, and Software Publishing Co., Mountain View, Calif., which has yet to deliver its Harvard Professional Publisher.

Computers have long been connected to typesetters. Until the advent of desktop publishing, those computers have mostly been minis that were used primarily in high-quality commercial typesetting

and composition systems. Those systems are provided by such traditional manufacturers as Compugraphic Corp., Wilmington, Mass., and Linotype Co., Hauppauge, N.Y. To keep pace with developments in the desktop publishing market, these manufacturers are also offering Mac or PC-based systems that for the most part connect to their larger machines. These companies, however, should get a run for their money from vendors that sell professional-quality software composition and typesetting software solely for the PC.

A good example of these mini replacement systems is the \$7,000 SuperPage page composition system from Bestinfo, Springfield, Pa. The second attack on the midrange front has been launched by manufacturers and software developers in the 32-bit workstation market. Such sophisticated typesetting and composition software, which sells in the \$30,000 range, is also available on the RT and from Digital Equipment Corp.

The growth of such desktop or other "publishing island" systems is not without glitches, however. "While it's one thing to publish your own newsletter, the true productivity is in being able to share information in a work group—to pull information from a departmental computer . . . and the corporate mainframe," points out Jacqueline Kahle, marketing manager for departmental systems at Digital Equipment in Merrimack, N.H. Also, users quickly tire of having to do the repetitive formatting, style, and type font selection. All this could move large organizations that want to do electronic publishing into the mainframe mode. It's in that mode where electronic publishing runs up against the same old bugaboo that haunts data processing: standards. In this case, the standards needed are for document architectures and graphics images transmissions in multivendor environments.

—C.W.

In the past, operators had to dial up a minicomputer-based typesetting system at the company's Duluth, Minn., operations site to do the H&J. This process, according to HBJ information services director Al Campenhout, became even more expensive and slow when there were changes and the H&J had to be repeated. The new micro composition system, which will avoid all the H&J hassles, is being tried out on HBJ's *Instructor* magazine, distributed to some 250,000 teachers.

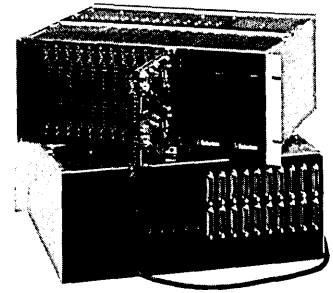
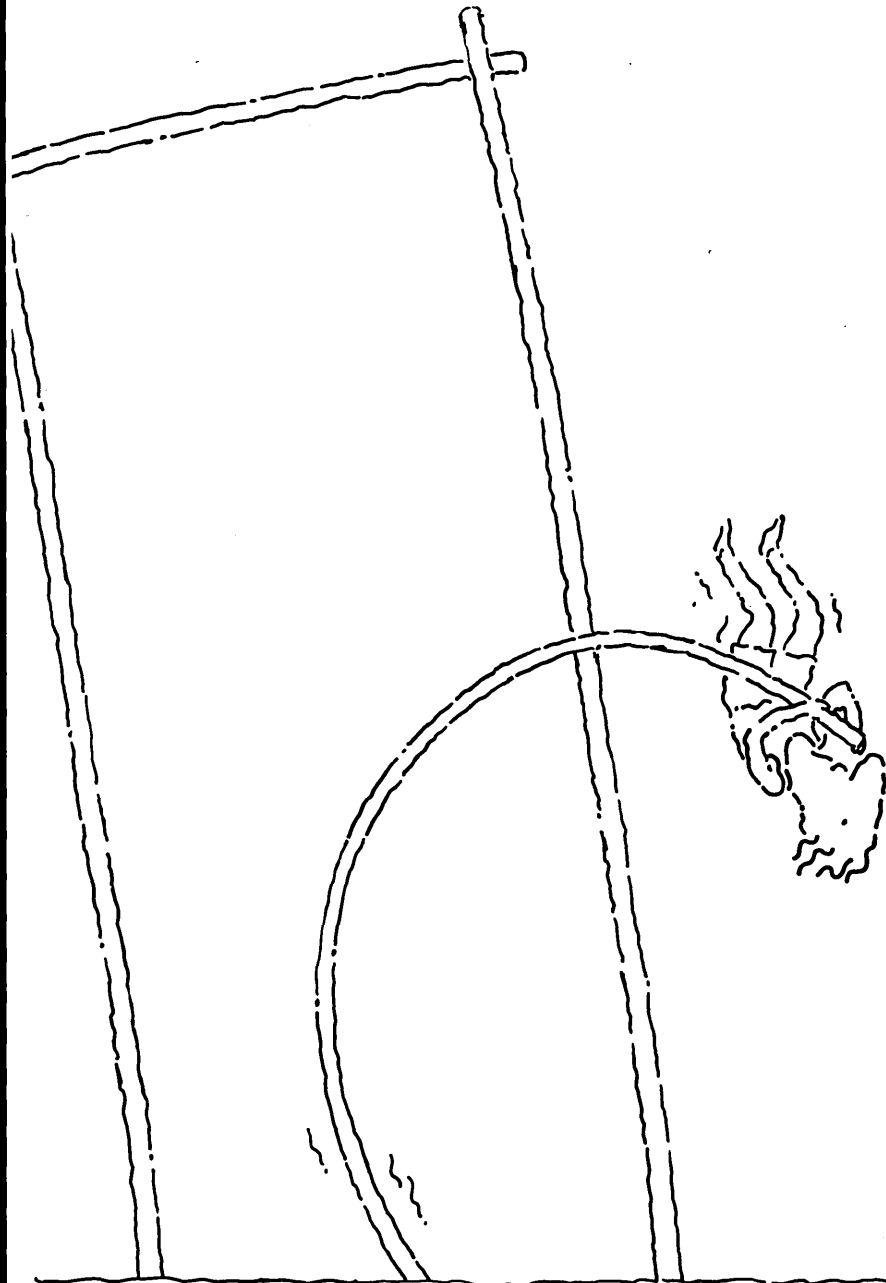
"We're in the shakedown period, still getting a solid driver for the APS Micro 5 typesetter," explains Campenhout. "While it certainly gives us a lot more capability, it's going to be a while before we have it in the whole company—it gets expensive. We already have a lot [of hard-

ware] in place that's still good enough."

At Paul Revere Life Insurance Group, publications manager Alfred J. Lemire, who is also interested in a personal computer composition system, has decided to wait for the next round of products. In the meantime, he keeps in touch with the dp department at the Worcester, Mass., insurance company to make sure that the systems compatibility issue is covered.

Lemire is concerned about potential life insurance customers being put off by promotion pieces generated by personal computers. "With a slogan such as 'Our policy is quality,' it's difficult to imagine us drifting downward from typesetter resolution for many document applications." Likewise, staffers want more capability from page composition systems. "If one has

The new Rackmount 30.TM Sometimes a little more flexibility will put you over the top.



USRobotics modular system gives you more modems and more automatic features. For more applications.

Start with full-featured modems: 15 dual modem boards, each with 2 auto-dial, auto-answer, 2400/1200/300-bps asynchronous modems, for a maximum of 30 modems per rack chassis. LED indicators on each modem give you continuous diagnostics. Use the Rackmount 30 as an auto-answer system for the asynch ports of your mainframe or mini. Use Rackmount 30 as an auto-dial modem pool for a cluster of PCs or data terminals. Or use auto-dialing to automate central site polling of remote PCs.

Add a modular chassis design: At the back of the 19-inch-wide chassis, each modem board couples to a matching dual interface board containing cabling interfaces for telephone and computer. You can remove or install modem boards through the front of the rack without ever disturbing any cable connections or interrupting power to other modems. Choose your RS-232 cabling interface—either DB-25 or modular 8-pin style. Redundant power supplies assure you uninterrupted operation.

DuPont, Digital Equipment, Boeing, the U. of California—all have chosen USRobotics Rackmount 30. For flexibility now and expandability tomorrow. Learn how the Rackmount 30 can push your business over the top.

**Call 1-800-DIAL-USR
In Illinois (312) 982-5001**

Yes, please send me your free 6-page brochure on the new Rackmount 30, and how rack modems can benefit my operation.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Business Phone () _____

12/1/86-DA-30

USRoboticsTM

The Intelligent Choice in Data Communications.
8100 McCormick Blvd., Skokie, Illinois 60076.

The ultimate system connects the various publishing islands inside an organization.

used fractional point size, you don't want to have to go back to full point sizes," he explains. "You want everything you could do [on the large systems] and more—and you want it easier."

Such desktop systems are only on the first level of the multitiered electronic publishing hierarchy, according to consultant Michael Szczygiel, president of Inforizon in Princeton, N.J. Next come office publishing systems. This is where networked users, perhaps an editorial department, have desktop systems and share a small database. At the third level, where documents are tightly controlled, are database publishing systems based on large mainframes. Many organizations already have such databases.

CONNECTED ISLANDS SYSTEM

The ultimate desktop system connects the various publishing islands in the organization—office automation, publishing systems, database systems, and records management or document storage systems. Many standards need to be hammered out, however, before these computer-integrated publishing systems become a reality. Nevertheless, Dataquest's Kapoor believes that the market for these connected-island electronic publishing systems "will really, really explode."

The total publishing industry today is worth about \$106 billion. "Electronic publishing is by no means at that stage. There's a long way to go," Kapoor points out. Inforizon's Szczygiel believes the development distance could shorten if designers and dpcers would talk to each other. "The printing people are not particularly oriented toward issues of information management and the information people are not oriented towards considerations such as formatting, but they're starting to come together," says Szczygiel.

Things have really come together from a publishing point of view at Ace Hardware outside Chicago. In 1981 there was real doubt whether Ace would be able to continue producing its 45,000-item, 4,000-page catalog for its 13 regional warehouses. "Producing this book was becoming almost cost prohibitive. Despite the word processing systems, it was very laborious," remembers Chris DeBoo, the company's office systems manager. "Until the new system, there were days when I wondered if we were a publishing company or a hardware company."

The catalogs that Ace sends out to its 48,000 dealers must be tailored to specific regions because some products are only suitable for certain areas—snowblowers in New England, for example. Thirteen word

processing operators and thirteen graphic artists manually prepared each region's catalogs. Also working feverishly to pull the books together were seven paste-up people, line illustrators, and two clerks who assisted the wp operators. The \$1 billion hardware company updates the important catalog checklists, rotating the various departments such as housewares or hand tools throughout the year.

"Each time we added a warehouse," says DeBoo, "we had to add five people. At the time, we were adding a warehouse a year, so the preparation was very cumbersome, the books were enormous," recalls DeBoo, who supervised much of the conversion work.

Ace started looking for automated alternatives and found the Xerox XPS 700 publishing system, a mainframe-based setup built around the Xerox 9700 high-speed laser printer. Now all the catalog checklist information is stored on the corporate IBM 3081 mainframe that runs Xerox's XICS software. Pages are composed on the XPS 700 system, with output to the 9700.

During the demanding two-and-a-half-year conversion period, Ace's dp shop wrote 50 to 60 custom programs. It was also necessary to keep producing the catalog by the old manual methods, so temporary staffing was high. The new system has cut down on those personnel costs. "One operator in half a day of keyboarding does what dozens of operators and clerks used to do full time," explains DeBoo. "We've saved \$600,000 and every year that grows by leaps and bounds."

The publishing system has helped Ace do more than produce its mammoth catalogs. It has created several new marketing tools the company has used to good advantage, such as a catalog without prices that local dealers can give to their commercial and industrial accounts.

A WAY TO MASS PRODUCE

Another company making marketing use of electronic publishing is May & Speh, a service bureau in the Chicago suburb of Oakbrook Terrace that caters to large direct mailers. "We were looking for some way to mass produce time-sensitive documents, such as price lists and technical publications," explains Gene Kent, director of R&D at May & Speh. "Before, we had to go to the typesetter."

To accomplish their automation, the service bureau added seven Xerox printers (attached to an NAS AS/XL-80) and the XPS 700 composition system. All the necessary custom programming was provided by May & Speh. The new publishing scheme "makes it a lot easier to meld old

and new data," says M&S's Kent. It also makes it a lot easier on customers, who can sit at the screen and design their mailing pieces. This capability, Kent adds, has "brought in a few new customers."

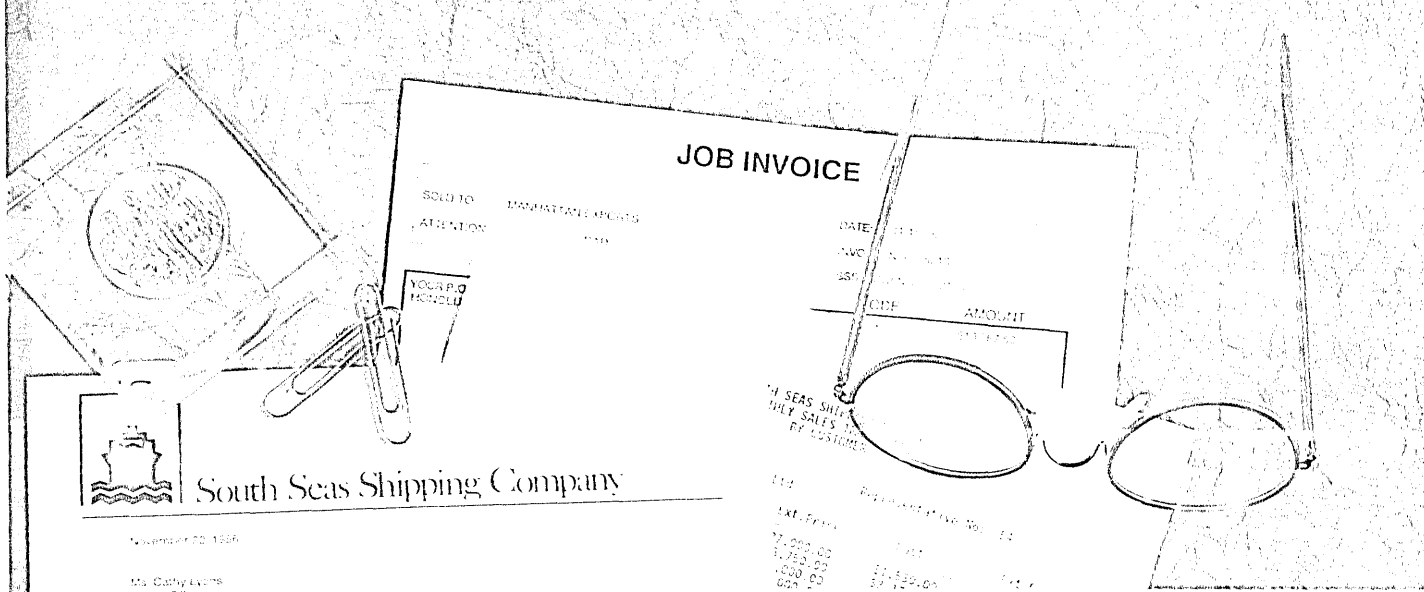
May & Speh's document production requirements were nothing compared to the publishing problems faced by the U.S. Postal Service. "Things were so bad we had to do something," admits Marguerite Boudreau, general manager of the document control division at the USPS in Washington, D.C. The USPS is the first of what will probably be a long list of agencies to digitally distribute employee and customer publications. The Department of Defense, for example, recently asked, through the Government Printing Office, for proposals to develop an automated publishing system for the army. The subsequent award to Electronic Data Systems Corp., Dallas, is being challenged by other competitors.

USPS employee and customer publications such as postal bulletins, policy manuals, management instructions, and handbooks—totaling about 53,000 pages—are now electronically produced under a project called Spectrum. The documents, references, and chapters from all the sundry publications are stored on IBM mainframes in Raleigh, N.C., so that they can be accessed and then printed locally on laser printers. The problem of finding the most recent version or the exact citation in the USPS literature is then eliminated.

USPS editors and document preparers working on Wang word processors are part of this "connected islands" publishing system. This setup eliminates much rekeying by ensuring that everyone works on the same version of the documents. The need for expensive outside typesetting is also dramatically reduced.

The Spectrum system in service at USPS uses a combination of database management software (IDMS from Cullinet, Westwood, Mass.) and publishing software (XICS from Xerox). Considerable custom programming is also required. Consultant Szczygiel predicts that such custom techniques will move into the mainstream as the separate worlds of printing and information management come closer together. The next critical task—that of linking documents entered into the database with the right format and document structure coding for output—is no easy matter. It's exactly in this crucial area of electronic publishing that much more work needs to be done on setting industry standards. ©

Connie Winkler, the former executive editor of *PC Magazine*, is a freelance technology writer based in New York.



South Seas Shipping Company

November 20, 1988

Ms. Cathy Lyons
Import Office
Botanical Research Inc.
55 Warwick Road
Mirest, Papua New Guinea

Re: Palm Fruit Research

Dear Ms. Lyons:

This letter confirms the agreement we reached at our meeting last week in San Francisco. Botanical Research Inc. will provide the optimal conditions for shipping palm fruit and we will provide constant assistance for cultivation and temperature during shipping and improvement of fruit quality.

Yours faithfully,
Trevor Cardinal

South Seas Shipping Company
Corporate Organizational Chart

PRESIDENT
Trevor Cardinal

INVESTOR'S UPDATE

SHIPPING GOES WILD

South Seas is causing the shipping world to tremble. South Seas has managed to maintain its growth despite the soaring dollar and lower-than-ever freight rates. For the first quarter ending in March 31, South Seas turned in a record \$26 million profit on a sale of \$111.1 million. President Trevor Cardinal cited several reasons for this record-breaking quarter. First of all, by breaking operations into specialized, price-insensitive commodities like palm oil and rum, South Seas has been relatively unaffected by the strong dollar and unfavorable exchange rates. Second, South Seas is now reaping the benefits of long-term relationships it has developed with major authorities throughout the South Pacific. These relationships have let South Seas keep its rates competitive, yet profitable, during recent freight rate wars. Finally, Mr. Cardinal said South Seas had money left over from funds it set aside last year for costs associated with the building and launching of new container ships.

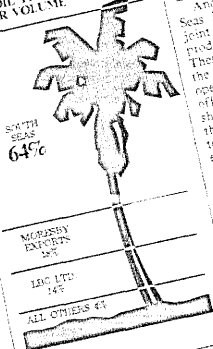
Outlook for Sales

Spectacular sales for the first quarter suggest the pace will be a record for South Seas. "South Seas is the industry leader by a wide margin," says Mr. Lyons, vice president at De Witt, Knapp & Co. "Their sales growth is due to their ability to respond to demand and their financial management. They grow over 100% a year."

Competitive Factors

One of the primary factors in South Seas' success has been the company's ability to identify new market opportunities and then to establish the dominant position in that market. The palm oil trade is a prime example of this successful strategy. Since entering the market in 1977, South Seas has become a key player in the specialty shipping market.

SHARE OF PALM OIL TRADE (1985) DOLLAR VOLUME



Joint Ventures Considered

Another growth strategy South Seas is exploring is to establish joint ventures with several of the producers of these commodities. These ventures would be similar to the Transpac-South Seas venture. The Transpac-South Seas venture is a shipping equalizer offer of the venture. At this time the company is holding talks with many major export firms. Another possibility would be to join with a major oil company. This company expects to enter the joint venture market in the near future. South Seas is Mountain View has been growing for its products in the Japanese market. This demand, Mountain View has begun to strengthen.

What if...

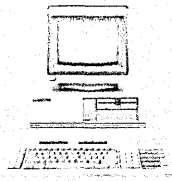
THERE WAS A DESKTOP PUBLISHING SYSTEM THE WHOLE COMPANY COULD USE?

People are screaming for high-quality, professional-looking printing. Accounting needs to print spreadsheets. Secretaries need memos, letters and reports. And the folks in public relations need to print newsletters. But there's *only* one printer of its kind that can give your company what it needs, right now: the Hewlett-Packard LaserJet Desktop Printer.

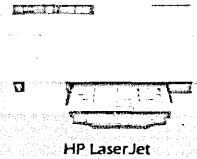
Consider this: it connects easily to most PC's, (including the HP Vectra PC and IBM PC's) and it runs over 300 software programs that are available now. Since there's a whole family of HP LaserJets, (with starting prices around \$3,000) you won't be limited by hardware choices, either. The HP LaserJet 500 Plus works nicely for high-volume printing needs. And the original LaserJet is ideal for individuals and small work groups.

Combined with our very fast, very versatile HP Vectra PC (it's IBM PC/AT compatible) and the software of your choice, the HP LaserJet makes a complete desktop publishing solution.

For a detailed brochure, call us at 1 800 367-4772, Dept. 275J.



HP Vectra PC



HP LaserJet

HEWLETT PACKARD
Business Computing Systems

CIRCLE 36 ON READER CARD PG602DMY

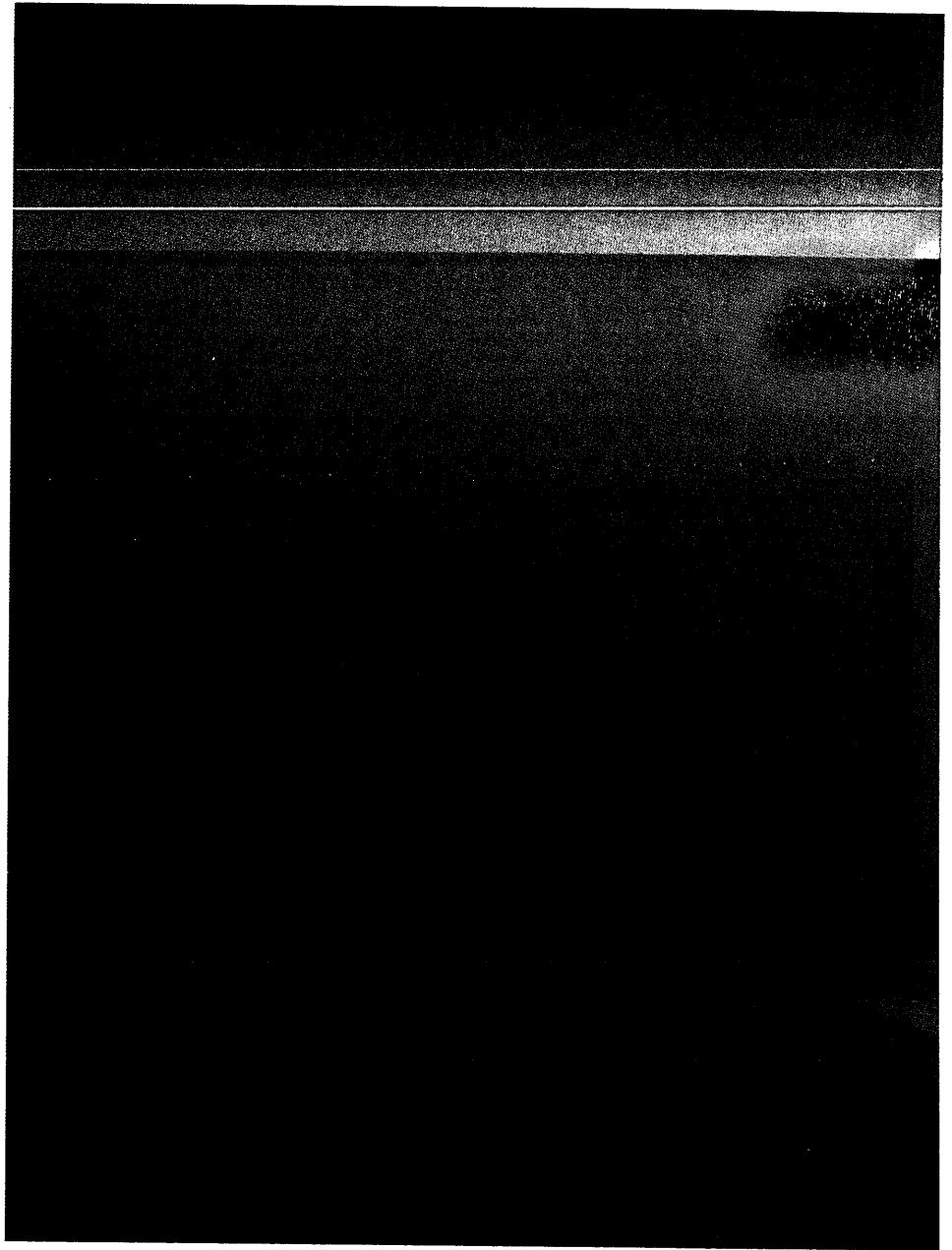
ACCESS RAND MC



"We were looking for an information technology that would show us the short cuts. We found it with Culinet's relational database - IDMS/R. I'm pleased to report that the system has made *all* of our various businesses much more cost-effective operations!"

Andrew McNally IV

Andrew V. McNally IV
President
Rand McNally & Company



IDMS/R. NALLY DID.



Mapmaker. Book publisher. Printer. Manufacturer. Market Researcher. Rand McNally is all of them. And to succeed as a major diversified corporation, they had to map out an information management strategy that would work both today and down the road.

That's why Rand McNally turned to Cullinet's IDMS/R. Its state-of-the-art, relational architecture allows them to maintain enormous databases. IDMS/R provides an integrated base supporting Cullinet's broad application software - including inventory control, bill of materials, credit and order entry. They have already developed their own custom applications through ADS/OnLine, Cullinet's unique fourth generation programming language.

Cullinet's solution is based on an integrated technology that performs. So companies like Rand McNally can simultaneously check inventory levels, confirm pricing and verify credit history - instantly. It's an information management system that'll keep users on strategy, keep them headed in the right direction.

For more information on how your company can access Cullinet through IDMS/R, call toll-free 1-800-551-4555. In Massachusetts, call 617-329-7700. 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.

CIRCLE 44 ON READER CARD

Cellular telephones may take a back seat to a proposed satellite system when it comes to making long-distance calls. The mobile satellite network, consisting of two Hughes Aircraft Company HS 393 spacecraft, would relay two-way voice and data communications services directly from airplanes, cars, trains, or remote locations. While cellular telephone systems are limited to areas equipped with fixed antenna networks, mobile satellites would cover the continental U.S. and Canada, and possibly Mexico. Users would have their own mobile ground terminals. Hughes Communications Mobile Satellite Services, Inc. is seeking authorization from the Federal Communications Commission to operate the system.

Computers will be troubleshooting hybrid microcircuits used in new sophisticated missiles at Hughes. Computer-aided troubleshooting (CATS) will cut troubleshooting time, improve effectiveness by automatically locating faults, eliminate mistakes and wasted time, and simplify the technician's decision-making. CATS also will be able to use past repair records as a key to speed up troubleshooting. A typical case: An automatic bar code reader identifies a failed part, and data about the failed test is retrieved from a main computer. A probe then automatically takes measurements at key internal circuit nodes so the fault can be isolated. Next, the computer displays a schematic of the failed circuit area and compares the actual and ideal signal values. The technician then determines which component has most likely failed and selects rework instructions accordingly.

Infrared sensor transplants would enhance Air National Guard F-4 Phantoms for approximately one-tenth the cost of developing a new infrared system. Hughes has developed a concept to transfer Infrared Search and Track (IRST) systems to F-4 aircraft from deactivated U.S. Air Force interceptors. IRST detects targets passively and supplements radar detection. It would allow a pilot to establish and maintain target tracks when the F-4 radar couldn't pick out targets because of clutter, countermeasures, or malfunctions. Hughes built IRST in the 1960s to provide low-altitude detection and countermeasure capabilities for the F-101, F-102, and F-106. The systems have been upgraded, most recently in 1980 with a new detector that improved performance and cut operating costs.

Enhancements to NATO's air command and control system will include provisions for interoperability among all member nations, as well as a variety of systems that will prevent gaps in the network. These enhancements to NATO's C³I (Command, Control, Communications, and Intelligence) system will also include the expanded use and reliance on advanced high-speed digital computers to sort vital information from sensors and immediately relay it to commanders in the most useful form. Hughes is part of an international team that is studying NATO's needs and defining just how the command and control network should be upgraded.

Hughes needs college graduates with degrees in EE, ME, physics, computer science, and electronics technology. To find out how to become involved in any one of the 1,500 high-technology projects, ranging from submicron microelectronics to advanced large-scale electronics systems, contact Corporate College Relations Office, Hughes Aircraft Company, Dept. S3, C1/C128, P.O. Box 45066, Los Angeles, CA 90045-0066. Equal opportunity employer. U.S. citizenship required.

For more information write to: P.O. Box 45068, Los Angeles, CA 90045-0068

PEOPLE

KING OF THE JUNGLE

When he walks into the room, six feet four inches tall, impeccably dressed, with a commanding baritone voice and silver-gray hair, you know one thing for sure: Gordon Smith is a marketing guy.

In fact, with 46 years of experience under his belt, Smith might be considered the dean of computer industry marketing executives. For a time, in the 1950s, he was mentioned among those in line to become president of IBM. He has worked for Sperry-Univac, Control Data, and Honeywell. He has been called upon to sell computers in the Soviet Union and to polish the tarnished images of companies such as Information Sciences Corp. and Memorex. Along the way he has built up a network of personal, governmental, and business contacts that often startles his associates. He has built a reputation for mixing a flamboyant style with a keen marketing instinct. According to his associate and longtime friend Donald Dowd, "Gordon is the marketing lion of the information industry."

A graduate of Swarthmore College, 21-year-old Smith joined IBM as a salesman in 1940—before IBM entered the computer business. In his 18 years there, Smith worked alongside Thomas Watson Jr. and Sr. He started IBM's well-known corporate image program, and he was named to head IBM's corporate advertising and public relations operation—at the time one of IBM's seven corporate staff functions.

Smith was there in the mid-1950s when Sperry's Univac division, with its newly invented computer, "was starting to eat our lunch," says Smith. "One day, Mr. Watson Sr. sat in on a morning meeting to discuss the Univac situation. As usual, there were mountains of reports and memos, and at the end of the morn-



GORDON SMITH: "There are a lot of ways to get people to work for you."

ing, Mr. Watson asked if he could address the group after lunch. When we came back, Mr. Watson told us he had been listening all morning to us worry about what our competition was doing, 'But they should be worried about you,' he said. Then he showed us a large print of a group of horses in the snow being attacked by coyotes. The horses had formed a circle with their heads in the center and were kicking the coyotes to keep them back. 'That's what you can do if you act as a team,' Mr. Watson said. He was very straightforward."

Smith carried a simple, straightforward approach to marketing with him when he left IBM for personal reasons in 1958. Today, as a marketing consultant to startup companies and large corporations, Smith still keeps it simple. He urges executives to keep defining the markets they think they are addressing, and he helps them hire and motivate the best sales and support employees.

"Today, a lot of companies just throw money at people," says Smith, "but there are a lot of other and better ways to

get people to work for you."

Just because Smith's marketing philosophy is basic, it doesn't mean he's unacquainted with high-profile marketing bombast. In fact, if the computer industry ever emerges from its current economic doldrums, it should consider getting Smith to stage the press conference announcing the return. Smith was perfecting "events marketing" before Apple's John Sculley knew what an event was. Once, while corporate marketing vice president at Memorex, he had a Pullman positioned in the company's parking lot for a press briefing. He has held similar meetings in Swiss chalets and European palaces. Once, as the executive vice president of Sperry Rand International, Smith rented an Italian submarine within which he held a press event in the depths of Lake Geneva.

"Gordon, more than any other person I know, thinks big," says Dowd, who worked with Smith at Sperry and more recently was a partner with Smith on a European marketing venture. "Gordon literally thinks he can do anything he sets his mind to. It's not easy being seen as a poor second in any market, but Gordon has the persistence to take a sales team into a big account and say, 'This is going to be my account.'"

That's just what Smith and Dowd did in the early to mid-1960s, when Smith was running Sperry's Univac marketing and sales operation in Europe, Africa, Eastern Europe, and the Middle East. Sperry had already fallen far behind IBM and was losing about \$2 million a year on \$13 million in sales on its overseas operations. Smith moved in and targeted a few large accounts, including the big European airlines to which he aggressively marketed Sperry's new real-time computer. Smith's team captured many of those airline accounts, including Air France, Lufthansa, SAS, and Iberia. The effort helped establish Sperry as a key supplier to the airline industry, a position Sperry has managed to retain. By 1967, Smith built Sperry's overseas operation to \$65 million in sales.

If Smith thinks big, he also expects big things from his associates. According

PEOPLE

to Kenneth J. Rowe, who worked with Smith at Memorex and is now director of communications at Rolm Corp., "Gordon's staffers always found themselves getting stretched almost to the breaking point. You'd propose a modest project to Gordon, and before you knew it, it had grown into an impossible project." Dowd remembers his first week working in Europe for Smith. "I showed up and was told I had to put together a six-page advertising supplement to go into the *Herald Tribune*. It had to be in four different languages, and it had to be ready in time for the Hannover Fair. Somehow it got done."

Smith put such demands on his staff in part because he was often running a marketing operation on not much more than a shoestring, and with not a lot of corporate support. For example, when Smith moved to California and joined Memorex in 1979 as its corporate marketing vice president, reporting to then president Robert Wilson, he was the company's first high-level marketing official in two years. "Mr. Wilson thought of marketing as a necessary evil," Smith says.

Smith had to contend not only with Wilson's lack of enthusiasm for marketing but also with the mostly accurate public perception of Memorex as a com-

pany in a struggle with IBM for its very survival. Smith used that challenge to motivate his associates. Remembers Rowe: "When I was considering going to work at Memorex, I also had an offer from AT&T. But when I talked to Gordon about it, he said, 'You'll learn more here in three years than you would in a career at AT&T. We're at the edge of the tar pit, boy.'" Rowe chose Memorex.

Smith left Memorex in 1982 when the company was acquired by Burroughs. After a brief stint at Palo Alto-based Varian Associates, he founded World Trade in Computers, an international marketing operation designed to utilize Smith's vast network of contacts both inside and outside the computer industry. In the industry, associates say, Smith seems to know everyone. According to Rowe, Smith once invited an unsuspecting reporter to an informal lunch with some friends. It wasn't until halfway through the meal that the reporter realized he was dining with Presper Eckert, designer of the first computer, and Grace Hopper, its programmer. "Gordon does stuff like that all the time," says Rowe.

Through the 1970s, Smith's stops included Diebold Corp., where he was director of research; the Association for Computing Machinery, where he was ex-

ecutive director from 1970 through 1972; Singer Business Machines International, where he was vice president and general manager; and Information Sciences Corp., Montvale, N.J., where he was senior marketing vice president. Although World Trade in Computers failed due to poor timing and the stronger U.S. dollar in 1985, Smith, at 67, remains active as a marketing consultant, based in Menlo Park, Calif.

Many of the young companies Smith advises today have a lot to learn about marketing, he says. "Many of them are run by engineers who like to talk about the wonderful features of their products. They don't realize what they need to talk about is the benefit those products can bring to the user. Why should he buy it?"

As a marketing consultant in Silicon Valley, Smith is in demand, and his friends are pleased to report that he has lost little of his flamboyant marketing flourish. Recently, says Rowe, Smith brought a group of Danish officials over to Rolm for a tour of the company. They arrived in a Rolls-Royce, of course. On his way into the building, Rowe says, Smith whispered to him, "Well, times are tough. It's only a Bentley."

—Jeff Moad

ADVERTISING INDEX

Circle		Page
6	ADR	11
21	AGS Management Systems	40
267	**AMS '87	56P
—	AST Research Inc.	2
—	AT&T Communications	41
—	AT&T Information Systems	6-7
264	**Alabama Power Co.	56H
66	Applied Business Technology	89
269	**Austin Co.	56X
63	*BASF AG	56-20/21
13	Bell Atlantic Enterprises	29
47	Businessland	108-109
56,57	*Bull	56-5, -7
37	C. Itoh Electronics-IPD	84
15	CTS Datacomm	32
50	Cincom Systems	114-115
265	**Cincom Systems	56-L/M
—	Compaq Computer Corp.	82-83
67	Computer Corp. of America	87
35	Concurrent Computer Corp.	79
16	Control Data Corp.	34
44	Cullinet Software	98-99
4	Datasouth	1
500-508	**Dataware, Inc.	80
268	**Data General Corp.	56-T/U
11	Develcon	25
23	Digital Communications Assoc.	48-49
52	Digital Communications Assoc.	118-119
60	*Deutsche Messe (Hannover Fair)	56-12/13
46	EMC Corp.	107
29	Emcom Corp.	65
7	Emulex Corp.	12-13
61	*Ericsson Info Systems	56-14/15
—	***Food & Agriculture Org. of U.N. (F.A.O.)	80

Circle		Page
262	**Glenrothes Development Corp.	56-E
5	Hayes Microcomputer	8
36	Hewlett-Packard	97
20	Honeywell Info Systems	38-39
—	Hughes Aircraft Co.	100
14	IBM Corp.	30-31
33	IBM Corp.	74-75
43	IDI	97
62	*I-Data A/S	56-16
8	INS Corp.	14
45	ITT-CSG	103
53	ISSCO	44-45
49	Index Technology Corp.	113
59	Interprogram	56-10
1	Kennedy Co.	CV2
266	**MC Software	56-O
3	MSA	CV4
26	McCormack & Dodge	58
263	*Micro Switch, div Honeywell	56-F/G
261	**Modcomp	56-B
58	*Mimer Information Systems	56-8/9
27	N.C.R.	61
32	N.E.C.-Peripherals	73
17, 19	Nevada Western/Anixter	35, 37
54	Okidata Corp.	47
—	Oracle Corp.	33

Circle		Page
41	Peat, Marwick, Mitchel	91
28	Printronic	63
22	Racal-Vadic	42-43
—	SAS Institute Inc.	5
18	Software AG	36
51	Sorbus	116
—	***Southwestern Bell Telephone	88A-D
24, 25	TRT	57
40	Tektronix Inc.	90
10	Telenet/U.S. Sprint	21-23
21, 65	Telex Computer Products	76
—	Texas Instruments	66-67
55	*Toshiba Europe	56-1
30	Tymnet McDonnell	69
42	U.S. Robotics	95
9	Unisys	16-17
68	VM Software Inc.	53-56
48	VM Software Inc.	110
31	Wang Laboratories	71
39	Westinghouse Computer Services	104
38	Xerox-Lasography	27
*International Edition		
**Manufacturing Technology Supplement		
***Marketplace		
****Regional Insert		

★ **EXTRA** ★

FIND CARGO LOST AT SEA!

ITT rushes aid to fleet

A California shipping agent, who used to worry about keeping in touch with a worldwide fleet of container ships by telex, called his operation "shipshape" today.

Bill Lowe, a manager for Los Angeles-based Merit Steamship Agency, Inc., added that ITT Worldcom experts had made it "much, much easier" to transmit cargo schedules.

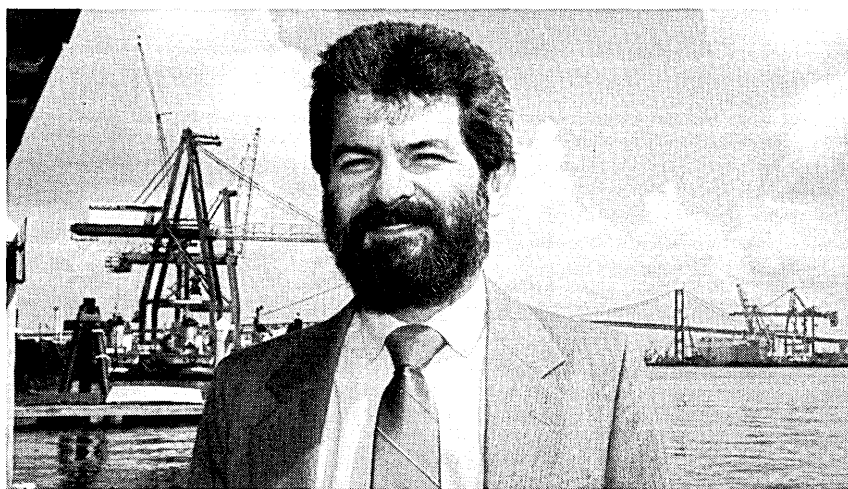
Merit, a nationwide shipping agency, is one of the few agencies to represent a number of steamship companies in worldwide cargo transport, Mr. Lowe explained.

"We dispatch over 40,000 telex messages a month," he said. "So we really needed a first-rate communications network to keep our customers on top of their imports and exports."

ITT Worldcom solved all the sticky problems that Merit faced with its last international carrier, Mr. Lowe pointed out. "And they even cut some of our costs—by 50%!"

Service...and Savings.

Among Merit's major clients is Japan Line, which each year moves thousands of containerized shipments, inland and overseas.



BACK IN TOUCH—Shipping agent Bill Lowe after rescue.

ITT Worldcom created a super-efficient network between Merit's 14 U.S. locations and Japan Line's Tokyo headquarters.

This network includes customized communications software, plus ITT's sophisticated WorldbridgeSM family of networking, office automation and electronic mes-

saging services.

Let the ITT Lifesavers go to work for you. Call 1-800-922-0184. Or mail our coupon.

ITT WORLDCOM. WE COULD BE YOUR LIFESAVER.SM

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

ITT World Communications
Dept. CR/A, 100 Plaza Drive
Secaucus, N.J. 07096

COMMUNICATIONS
SERVICES VIA

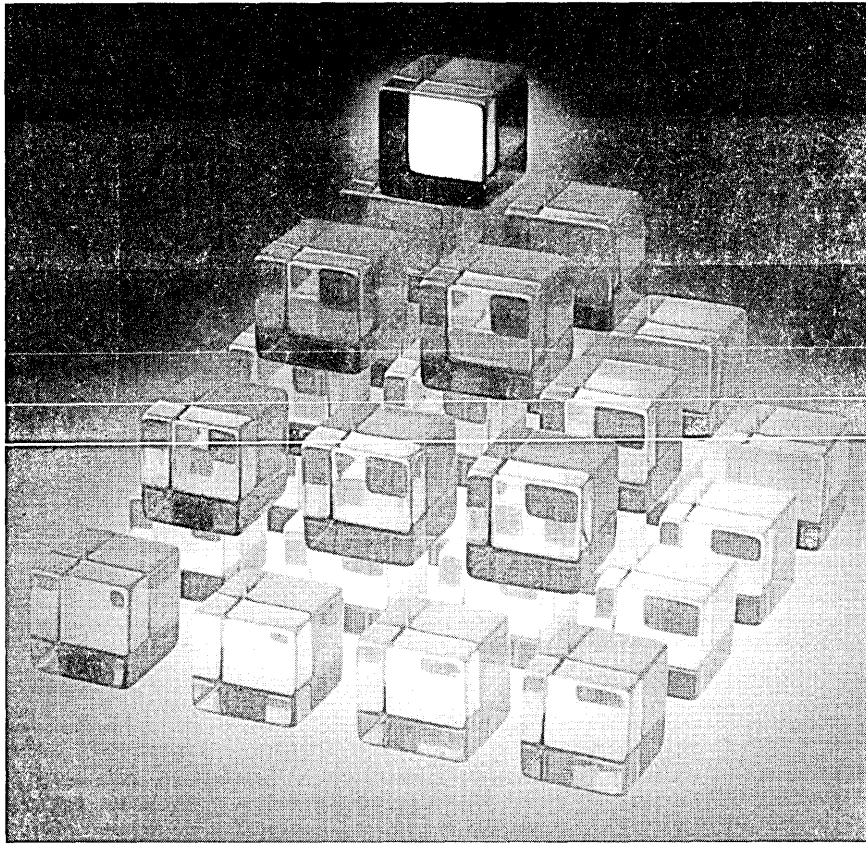
ITT

© 1986 ITT World Communications Inc.

CIRCLE 45 ON READER CARD

Westinghouse

SOFTWARE SOLUTIONS



Building a better network . . .

Increasing the productivity of VTAM networks means getting users on line and lined up — with the data, with the application programs, with the jobs that must be done.

Westinghouse Software Solutions is a portfolio of program products that can be used, either separately or concurrently, to increase your systems productivity and effectiveness.

NCI/XF (Network Control Interface/Extended Features) is a network-wide single point entry system. NCI/XF helps VTAM users access applications quickly and easily, while reducing user support requirements and simplifying network administration. NCI/XF also provides message and broadcast capabilities.

NCI/XF adapts to your installation needs.

- Customized network entry procedure
- Accommodation for network configuration changes
- Basic or total network security

MULTSESS, the most efficient multiple session manager available today, orchestrates the complex connections between users and applications for improved productivity and data availability.

MULTSESS switches a user from one application to another in the time it takes to press a predefined function key, as easily as changing television stations.

With the optional Automated Transaction Processor (ATP), MULTSESS users can get to the working levels of their applications automatically.

MULTSESS provides fast transaction processing with minimal storage requirements. MULTSESS is also a security controller. Access to programs is secured by user or terminal ID. For protection during brief absences, MULTSESS has easy disconnect/reconnect capabilities.

Getting the job done . . .

NCI/XF and MULTSESS are tools to align your network users and their functions for peak effectiveness. The Westinghouse Software Solutions portfolio makes your network an organized, efficient, easily managed data processing resource. Westinghouse Software Solutions makes it easy to get the job done.



You can be sure... if it's Westinghouse

Westinghouse Electric Corporation
P.O. Box 2728
Pittsburgh, PA 15230-2728

**Call (412) 256-2900 or
1-800-348-3523**

CIRCLE 39 ON READER CARD

HARDWARE

OFF-LINE

In the low-end printer market, dot matrix is dominant. It's capable of handling the tasks of most businesses and is relatively inexpensive--under \$1,000. Typical business-printer users, industry observers say, simply do not have a need for the "pretty" output that laser printers produce.

Some printer manufacturers are betting that this will change. The desktop publishing boom will create opportunities for these manufacturers as users look for near typeset quality output. The advent and acceptance of color in the graphics environment and aggressive pricing by laser printer vendors should have the same effect.

John Boldt, who follows the printer market for research firm Dataquest, San Jose, says the laser printer market opened up to the populace back in 1984 when Canon introduced a low-end printer built around its copier engine. This heralded the age of the under-\$100,000 laser printer--well under. By 1985, low-end laser printers (zero to eight pages per minute range) were selling for around \$3,800. Companies like Hewlett-Packard and Apple entered the market with printers built around the Canon engine.

Boldt says in '85 there were a total of 136,500 laser printers shipped, and of this total, 110,400 were low end. Canon's engine is the heart of 80% to 85% of these printers, including those from HP, Apple, and QMS, he adds, with HP's LaserJet printers holding the lion's share. Ricoh of Japan uses its own engine, as does Digital Equipment Corp. A third

engine from Mita, a Japanese copier company, was introduced this year in printers from Printronix.

While dot matrix will continue to reign supreme until the end of the decade, says Boldt, we'll see 15% to 20% price drops. By '87, he adds, even though there will be higher volume sales in dot matrix, expenditures on lasers will outpace those of dot matrix. Software development will also grow, Boldt believes.

Three more printer companies recently entered this market. Okidata announced its Personal Laser Printer with a base price of \$2,195, which features a print speed of 6ppm; one-port HP LaserJet compatibility with options to expand to three-port LaserJet Plus compatibility; 272K of memory expandable to 656K; quarter-page 300 by 300dpi resolution expandable to half a page at 656K; and a second-generation Ricoh engine. The company also announced it will be including \$150 worth of software with the printer through March '87. Okidata is shipping it now.

Citizen America's Over-ture 110 is a 10ppm laser printer priced at \$2,395 that features a Mita engine; 512K of memory; parallel and serial interfaces; and Epson, Diablo, and IBM emulations. The product will be shipped in February '87.

The GQ-3500 from Epson boasts a second-generation Ricoh engine; 470K of memory expandable to 640K; half page 300 by 300dpi expandable to full page at 640K; Hewlett-Packard and Diablo emulation; and a price tag of \$2,495. It will be shipped in January '87.

DOCUMENT SCANNER

The Stand-Alone Entry Station (SES), recently introduced by FileNet Corp., is designed for high-volume document scanning. It records digitized images of documents onto optical disks without interrupting processing or utilizing resources of FileNet's document-image processing system, the company claims.

The SES consists of a document entry file server, scanner, image display and quality control checking features, an optical disk drive for writing images, and a 300MB magnetic disk for storing operating system software and for temporarily storing document images. It's claimed the SES can scan from 10,000 to 15,000 pages per day. FileNet's document interchange architecture for writing images onto optical disk is utilized by the SES, allowing images recorded off-line on it to be used by a FileNet document-image processor.

The SES is priced at \$175,000 for a basic configuration. It can be expanded to include up to three more scanners, six more workstations for indexing document images, and two more magnetic and optical disk drives. FileNet's document-image processing systems begin at \$328,000. FILENET, Los Angeles.

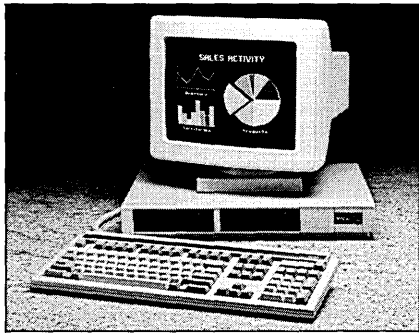
FOR DATA CIRCLE 301 ON READER CARD

PERSONAL COMPUTER

Wyse Technology recently unveiled its newest pc, the Wysepc+. Standard features include a dual-processing speed offering a 9.54MHz mode and a standard 4.77MHz mode; a built-in monochrome/color graphics adapter compatible with IBM, Hercules, and other adapters, which provides 16 shades of gray; a 256KB cpu board expandable to 640KB of RAM; one parallel and two serial ports; a real-time clock with battery backup; and either IBM AT-compatible or enhanced keyboards.

The Wysepc+ can be configured with a single floppy disk drive, a dual floppy disk drive, or a 20MB hard disk. Two slots remain free for further expansion. International keycaps are available, and the pc meets European regulatory

HARDWARE



and safety approvals. Available now in three configurations, the single floppy model WY-1400-01 is \$1,265, the dual-floppy model WY1400-02 is \$1,444, and the 20MB model WY-1400-20 is \$1,995. WYSE TECHNOLOGY, San Jose.

FOR DATA CIRCLE 302 ON READER CARD

TERMINAL AND SOFTWARE

Talaris Systems Inc. has introduced the Talaris 7800, a terminal combining alphanumeric, graphics, bit map capabilities, and a set of resident fonts. To accompany it, Talaris has written a page previewing program, PreText, for users of TEX, the computerized typesetting language.

The 7800 features Tektronix 4014 emulation for graphics, DEC VT220 keyboard, VT220 emulation for alphanumeric text input, and a bit-mapped display with a resolution of 1,024 by 780 pixels in a 14-inch monitor. It has 30 proportionally spaced resident fonts and can be configured to store up to 300KB of font bit maps downloaded from the host. The PreText page previewing software transforms a TEX device-independent file into complete

page images for viewing on the 7800. The terminal also serves graphics applications throughout the Tektronix emulations.

The Talaris 7800 and the PreText screen previewer are available now for users of DEC VAX/VMS and many systems using the Unix operating system, and are priced at \$2,890 and \$750, respectively. Optional DEC REGIS compatibility and a mouse pointing device for graphics and directory manipulation are priced at \$195 each. TALARIS SYSTEMS INC., San Diego.

FOR DATA CIRCLE 310 ON READER CARD

TWO PRINTERS

Printronix recently introduced two printers. The P1013 Personal Line Printer is designed for the IBM PC, XT, AT, and compatibles, offering, the vendor claims, line printer technology in a desktop format. It features an "ultra-small" print tip that produces letter-quality text and graphics. Text printing can be done in draft mode at 134 lpm, and in letter-quality mode at 47 lpm. IBM Block Graphics can be printed in either mode. The IBM Proprinter, Epson LQ1500, or Diablo 630 can be emulated with the included plug-in cartridges. Price is \$795. The second printer, the L1012 Personal Laser Printer, also targeted for desktop micro-based applications, offers 12-page-per-minute printing with 300-by-300dpi resolution. It features 250-sheet automatic paper feeder cassette and a second 50-sheet tray. The L1012 is compatible with the Diablo 630, the HP Laserjet and Laserjet Plus, and Epsoms with IBM Graphics. It is priced at \$2,295. PRINTRONIX, Irvine, Calif.

FOR DATA CIRCLE 311 ON READER CARD

MODEM AND PRINTER

LaserLine 6 is the first in a new family of laser printers from Okidata. The six-page per minute printer features three plug-in personality modules that enable up to three users to share a printer. Included are 15 resident, typeset-quality fonts and face-down and correct-order stacking of letter and legal paper. The input tray can handle up to 150 sheets. The basic personality module is a one-port HP LaserJet-compatible version, the advanced module is a one-port HP LaserJet Plus-compatible module, and the multi-user module is a three-port HP LaserJet-compatible module. Laserline 6 is compatible with such software packages as Microsoft Word, MicroPro Wordstar 2000, and Lotus 1-2-3. The printer is priced at \$1,995 and is available now. The advanced and multi-user modules will be available in February for \$400 and \$600, and the basic module, available now, is priced at \$200.

The Okitel 1200 is Okidata's first entry into the PC modem area. Features include auto dial and auto answer, automatic disconnection of phone line when call is complete, and automatic determination of transmission speeds of incoming calls. It works with Touch-Tone or rotary dial phones and stores the last number dialed for automatic redialing. It contains two standard modular telephone plugs. It's compatible with Hayes modems and supports AT commands, and it meets Bell Standards 212A and 103 for asynchronous data transmission at either 1,200 or 300bps. The Okitel 1200 is available now for \$449. OKIDATA, Mount Laurel, N.J.

FOR DATA CIRCLE 314 ON READER CARD

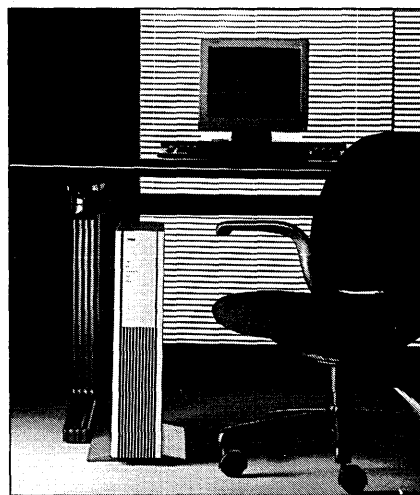
HARDWARE SPOTLIGHT

NEW TOWER

NCR has added a fourth member to its Tower supermicrocomputer family with the Tower 32/400. This is the second 32-bit entry into NCR's Tower family to utilize the 16.7MHz Motorola MC68020 microprocessor. The first offering to use it, the Tower 32/600, formerly called the Tower 32, offers 48-user connectivity, while the 32/400 supports up to 16 users. Other features of the 32/400 are Unix System V operating system (which is used throughout the entire Tower family), 1MB to 8MB of memory, and 46MB to 140MB disk capacity.

Based on Aim Suite II benchmark testing (see "Updates," Oct. 15, p. 151) for Unix-based systems, the 32/400, NCR claims, provides more than twice the performance of the 16-bit Tower XP and more than triple the performance of the MiniTower.

Built in NCR's South Carolina plant using surface mount technology and integrated circuitry, the 32/400 uses the



same skin as the MiniTower; the 32/600 uses the same skin as the Tower/XP. The price for the Tower 32/400 ranges from \$14,995 to \$54,810, depending on configuration. NCR CORP., Dayton, Ohio.

FOR DATA CIRCLE 300 ON READER CARD

GENERATES FORMS

Computer Language Research has introduced a series of products that enable companies to create and generate their own forms. The vendor says the ability to electronically reproduce forms virtually eliminates their oversupply and obsolescence. The Formwriter products consist of an IBM AT, laser printer, and software. The Formcoder workstation includes a graphics tablet to create business forms. The Formwriter workstations support laser printers that print from six ppm to 20 ppm. The workstations allow users to merge electronic forms with application data created by software packages including Lotus 1-2-3, and also allow for the alignment and placement of data anywhere on the form. The products store up to 5,000 electronic forms and 150 fonts. Prices range from \$5,000 for the Formwriter 2 to \$25,000 for the Formwriter 10XD. ELECTRONIC FORM SYSTEMS, a division of Computer Language Research Inc., Carrollton, Texas.

FOR DATA CIRCLE 313 ON READER CARD

—Theresa Barry

The Secret To Maximizing Your 4381 Performance

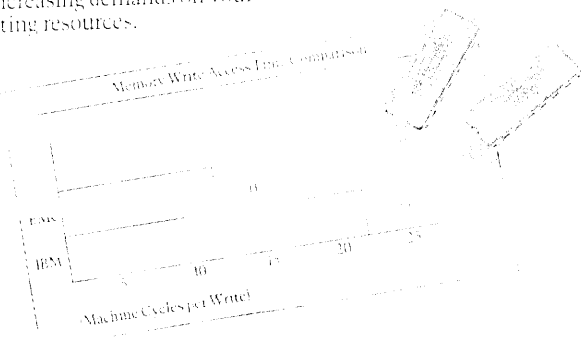


...most high performance 4381's... start with...
 memory... IBM's main storage cards...
 main storage upgrades... IBM's main storage cards...
 computer of 1970.

That's because our EMC provides main storage upgrades which perform memory writes twice as fast as IBM's main storage cards.
EMC's Main Storage Cards Run Cycles Around IBM's Cards.

How do we do it? Simple. Our upgrades use newer technology to perform a memory write in 11 processor cycles. It takes IBM's upgrade 22 cycles to perform the same memory write. This means our upgrades increase the availability of main storage to your 4381 processor and take advantage of otherwise wasted processor cycles.

With EMC main storage upgrades you avoid the expense of a model upgrade while still getting the performance you need to meet increasing demands on your computing resources.



...upgrades... IBM's main storage cards...
 IBM's main storage cards... IBM's main storage cards...

...start with reliability. All our upgrades start...
 the 4381 undergo a 100-hour test and burn-in procedure...
 including qualification in a 4381 computer.

Then there's your \$20,000 savings on your SMP upgrade and a guarantee that your upgrades will have no effect on your IBM maintenance service.

Plus our continuous leases, immediate delivery and responsive service programs.

To find out more about EMC's high-performance main storage upgrades for your 4381 computer, call today or write. EMC Corporation, Natick Industrial Centre, Natick, MA 01760.

For more information, call today:
1-800-EMC-EMC
 in MA, call 617-655-6600

...EMC Corporation... Natick, MA 01760...
 ...EMC Corporation... Natick, MA 01760...

No one is more committed
 to your success.

PC To Main Always T

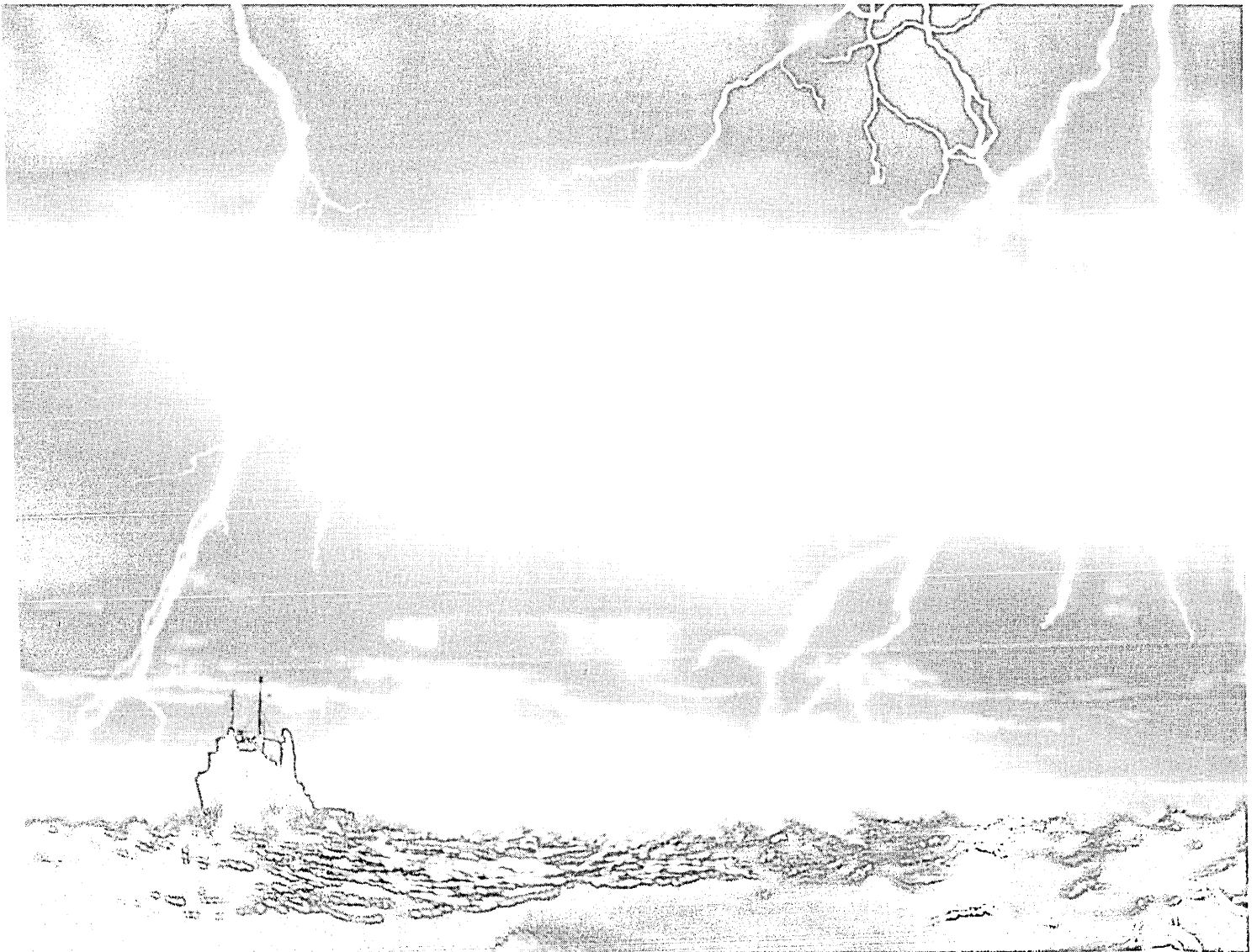
The Gulf of Mexico is one of the more unusual business environments serviced by Businessland.[®]

With 30 PCs, each on its own oil rig, linked to one mainframe back on shore, it poses some interesting problems in the area of connectivity. And with some of the rigs 100 miles off-shore, the service calls are sometimes a little more demanding than usual.

But give or take a few satellite links and helicopter rides, the setup itself is just the sort of installation Businessland handles for a lot of companies.

Now, compare that to the service we provide for our client, Fidelity Investments, in Boston. A business that lives by its computer system every minute of every day.

When they decided to relocate 600



frame Isn't his Easy.

of their people across town, we were responsible for relocating their computer system, including 150 PC to mainframe connections. The fact that everything worked flawlessly was expected. The fact that not one of their people lost even an hour of trading time during the move took a little extra doing on our part.

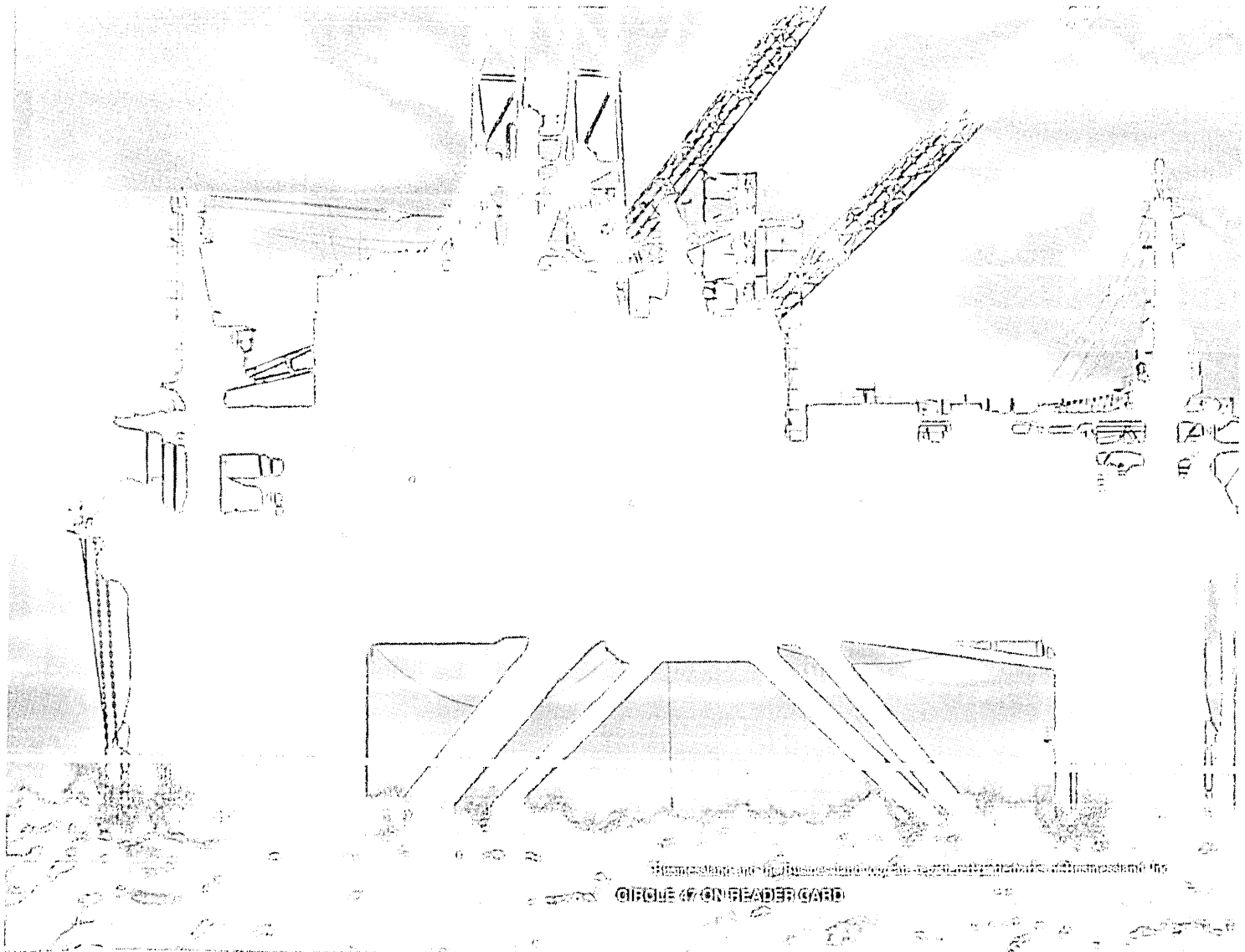
It's this commitment to service and our unique experience in the field of

connectivity that enable Businessland to set up and maintain effective solutions for any business. And with 100 centers nationwide, we do it all across the country. And beyond.

Call 800-323-1000 for the center nearest you.

BUSINESSLAND

A Different Kind of Computer Company



© 1988 Businessland, Inc. All rights reserved. Businessland, Inc. is a registered trademark of Businessland, Inc.

Your Boss's Blood Pressure

Is there a better reason to buy VMCENTER?

Late reports. Security problems. Budget overruns. The color of your tie. There's a lot that can raise your boss's blood pressure. Yet for your sake as well as his, it pays to keep it down.

That's why it's so important to have VMCENTER on your side.

VMCENTER is the world's leading data center management system for the VM operating environment. It's a single, comprehensive package that can go a long way to keep things running smoothly—for yourself, for your boss, and for all your end users.

VMCENTER simplifies DASD management, resource scheduling, workload balancing, system accounting, and much more—all within a strong, flexible security framework.

The results: Better system performance. Improved user relations. Satisfied management. And tangible benefits on the bottom line.

Unique reporting system not only looks great, but actually works.

One thing bosses appreciate is initiative. As long as it makes them look good. And few things make them look better than VMCENTER.

Through powerful reports, VMCENTER helps optimize resource utilization while eliminating potential trouble spots. Not just on paper, but in the real world of day-to-day operations. Which is exactly what management is all about.

It's enough to make the boss feel like taking it easy. Which is great for the boss—and even better for you. Because as it turns out, you're the one who needs VMCENTER the most.

After all, you're the one who has to see to it that the work gets done.

You're the one they'll yell at if there's a security problem.

And come to think of it, where *did* you get that tie?

VM Software, Inc., 1800 Alexander Bell Drive, Reston, Virginia 22091.

Subsidiaries: VM Software (UK) Ltd., Reading, Berks., UK, Telex 851849921; VM Software GmbH, Frankfurt, W. Germany, Telex 841411204.

**VM Software
The VM Experts
800-562-7100
703-264-8000**

VM
SOFTWARE INC.

CIRCLE 48 ON READER CARD

1-DTM-861201

SOFTWARE AND SERVICES

UPDATES

Slowly but surely, things are heating up in the CD-ROM (compact disk read-only memory) market (see "High Noon for CD-ROM," Nov. 1, p. 78). Issues such as the adoption of an ANSI standard for this emerging medium, the slower access time of CD-ROMs vs. magnetic media, and the repercussions of piracy are now being debated among players in the industry.

The group laboring over the standard issue, dubbed the High Sierra Group, has reached a consensus on the key elements of its proposal, and ANSI validation is expected by this time next year, according to a report from Philips Subsystems and Peripherals Inc. Players in this group include software giant Microsoft, Apple, Digital Equipment Corp., Hitachi, and Philips. With such well-established companies betting on CD-ROM, industry watchers agree there is momentum and that the optical storage market (disks and players) will reach anywhere from \$2 billion to \$4 billion by 1990. It is now estimated to be \$200 million.

Because of the storage capacity of CD-ROMs, which hold up to 600MB of digital information on one side, they are ideal for large databases. Most of the CD-ROM products announced so far have been database related.

Datext Inc., Woburn, Mass., is in the CD-ROM business. Founded in 1984, the company takes existing databases from other suppliers, adds value to them in the form of additional information, and sells the package on compact optical disks. Datext gears its products to

the business and financial communities. Its newest products, recently announced, are CD/NewsLine and CD/CorpTech.

CD/NewsLine integrates current on-line news and information with historical business and financial data stored on a disk. It was developed in conjunction with Dow Jones & Co. and provides access to four Dow Jones News/Retrieval databases: Dow Jones News, the News/Retrieval World Report, Current Quotes, and Historical Quotes. This product is an add-on option to Datext's first product, CD/Corporate, which provides seven years of historical information, updated monthly, on all public companies traded on national and regional stock exchanges collected from six database suppliers. CD/Newsline incorporates Datext's proprietary menu-driven software, which handles the necessary switching between the CD-ROM and the on-line service transparently. The software also handles log-on and search routines so that users do not have to know the commands and syntax associated with on-line research. Information either from the CD-ROM or received on-line can also be transferred to micro software packages, including Lotus 1-2-3 and Microsoft Word. Subscription prices range from \$4,500 for 50 connect hours to \$53,000 for 1,000 connect hours.

Datext's newest database, CD/CorpTech, provides information on 12,000 public and private domestic high-technology companies. CD/CorpTech is priced at \$7,500 and is updated every three months.

HAL IS HERE

Lotus HAL is a companion to Lotus 1-2-3. HAL, Lotus says, enables both the novice and intermediate user to take advantage of the functionality of 1-2-3. Using English words and phrases, HAL has defaults for common tasks and can execute a series of 1-2-3 operations with one phrase. With HAL, users can hit the backspace key to undo the last command executed, link data in separate worksheets, and write macros with English language commands. HAL accepts thousands of phrases, Lotus claims, allowing users to, for example, specify locations on a worksheet using names such as "sales" or "January."

Lotus acquired the framework for HAL from GNP Development Corp. in January 1986. Lotus says it plans to make HAL work with other Lotus products in the future, Symphony being the first on the list. HAL is not copy protected, is available now, and works with all releases of 1-2-3. Requirements are personal computers from IBM, Compaq, or AT&T, and DOS 2.0 or higher. HAL resides in memory with 1-2-3 and operates with it; 512K is required. The price is \$150. LOTUS DEVELOPMENT CORP., Cambridge, Mass.

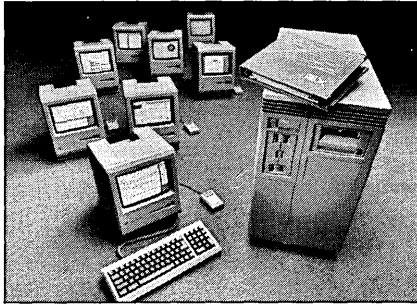
FOR DATA CIRCLE 326 ON READER CARD

APPLE TO VAX

Helix VMX is a multi-user applications environment from Odesta Corp. that allows users to create customized applications on a Macintosh and to run them without modification on a VAX under VMS, using the Mac as an intelligent workstation. Connections between computers in the system are made over an AppleTalk network or multiple internets connected to an Ethernet backbone.

Through Helix VMX, users have distributed access to the central applications stored on a VAX; changes made by one user are simultaneously updated on all screens in the system. Also, VAX users can work through the Helix and Macintosh interface, creating applications without using a programming language, and Mac users can tie into the centralized

SOFTWARE AND SERVICES



power of the VAX. Two levels of security, per user and per form, are provided.

Helix VMX runs on a Macintosh with 800KB of disk space and any VAX. A Macintosh Plus with hard disk is recommended for all individual application development. The product will be available in the first quarter of 1987. Two pricing structures will be offered: per user fees or per VAX license. The per user price is \$450 for each Mac connected to any VAX; licensing ranges from \$7,500 to \$20,000, depending on the VAX configuration. ODESTA CORP., Northbrook, Ill.

FOR DATA CIRCLE 327 ON READER CARD

PROGRAMMING LANGUAGE

Trees-pls, recently introduced by Avyx Inc., is a programming language for IBM PCs, XT, ATs, and compatibles initially developed for NASA by Information Sciences Inc., now the R&D arm of Avyx. This is the first commercially available product from Avyx. It is billed as a resource management tool that can be applied to scheduling, resource allocation, project control, and information management. Avyx claims it can manipulate tree structures, making it useful in artificial intelligence applications. Avyx is planning mini and mainframe versions of Trees-pls for release in about a year, and is currently working with vars and soft-

ware systems houses to develop vertical packages. Trees-pls is available now for \$995. AVYX INC., Englewood, Colo.

FOR DATA CIRCLE 328 ON READER CARD

PC TO TYPESETTER

Xchange is a program designed to convert word processing documents prepared on an IBM AT or equivalent to formats usable by standard telecommunicating typesetters. The files can contain text, tables, database files, and other types of code. Up to 512 different non-ASCII items can be identified for replacement to meet the typesetter's input requirements. With documentation, the price is \$395. Several I/O options, including Compugraphic, MCS, Powerview, and CCI connections, are available for \$75 each. Quadex systems without communications options are supported through an \$800 add-on program. EMULATION TECHNOLOGIES, Cleveland.

FOR DATA CIRCLE 335 ON READER CARD

PERSONNEL TRACKING

HR-Applicant Track from Mainframe Micros Inc. is an IBM PC program that allows human resources professionals to create, store, manage, and manipulate a database of information on job applicants. HR-Applicant Track can operate as a standalone product or can be integrated with HR-1, the vendor's PC-based personnel information system. The package allows users to select, update, or globally change hundreds of records with one command, according to the company. Reports and specialized forms can be generated. Using a proprietary micro-to-mainframe interface, the Information Link, users can upload or download information to an IBM mainframe or to applications programs such as spreadsheets or word processing.

Both HR-Applicant Track and HR-1 use Mainframe Micros's HR-Intelli-

gence development system and the Revelation relational DBMS designed by Cosmos Inc., Seattle, allowing up to 10,000 résumés to be stored. HR-Applicant Track can be used in a LAN, permitting up to 48 users simultaneous access.

HR-Applicant Track is copy protected and is available now for \$6,000. It requires an IBM XT, AT, or compatible, a 10MB hard disk, and 512K of memory. MAINFRAME MICROS INC., New York.

FOR DATA CIRCLE 334 ON READER CARD

"PICTURE" PROGRAMMING

Cortex recently announced CorVision, an application development tool for automating the software life cycle for Digital's VAX/VMS environment using a technique called picture programming. The technique allows users to create a visual representation of an application by diagramming the design and automatically generating the production-ready application directly from the pictures. A developer sits at an IBM AT-compatible workstation and defines an application using icons. The workstation is tightly



coupled to a central repository on a VAX, which stores application specifications, drives the format and content of the front-end workstation diagrams, and provides the input specifications to the back-end application generator on the VAX. In the design phase, a developer can diagram a complete view of the application and add custom logic to it using an action diagrammer and a very high level language. Once design is complete, CorVision generates the complete production-ready application for the VAX, which executes in optimized machine code. CorVision will be available in the first quarter of 1987 for \$50,000 to \$175,000, depending on VAX model. CORTEX, Waltham, Mass.

FOR DATA CIRCLE 337 ON READER CARD
—Theresa Barry

SOFTWARE SPOTLIGHT

FOR IBM MAINFRAMES

Alert/XP is a new dataset security product for IBM mainframes using DOS/VSE Version 1 and VSE/SP Version 2. This is Goal Systems' first security product. Its main function, says Goal, is to secure the resources accessible to normal batch jobs (including VSAM datasets, non-VSAM datasets residing on direct access devices, and tape datasets) and the level of access permitted to those jobs. Rules are created using menu-driven screens through CICS. The product does not require modifications to the operating system since it uses the security interface provided by VSE. It also offers a monitor mode facility to aid in implementation or to provide an audit trail of security activity. Available now, Alert/XP is priced at \$9,100.

QuikTask is Goal's new on-line in-

teractive application development system, which uses a "streamlined" COBOL-like procedural language that allows batch programmers with minimal COBOL or CICS experience to develop application systems. Ten subsystems are integrated into the package. They are on-line help, on-line training, dictionary, screen painter, language, editor, translation, test and debug, execution, and utilities. QuikExec is the subsystem that executes all QuikTask applications. It's available as a separate option. QuikTask is designed to run on IBM mainframes under OS/MVS, DOS/VSE, and CICS 1.5 and above. Available this month, the price is \$44,800 (MVS) and \$35,000 (VSE). Separately, QuikExec is priced at \$22,400 and \$27,500. GOAL SYSTEMS, Columbus, Ohio.

FOR DATA CIRCLE 325 ON READER CARD

Develop Better Systems Using Excelerator— Over 8,000 Systems Professionals already do.

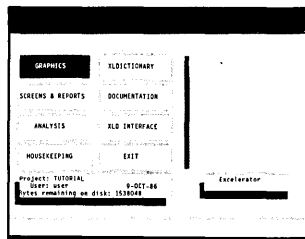
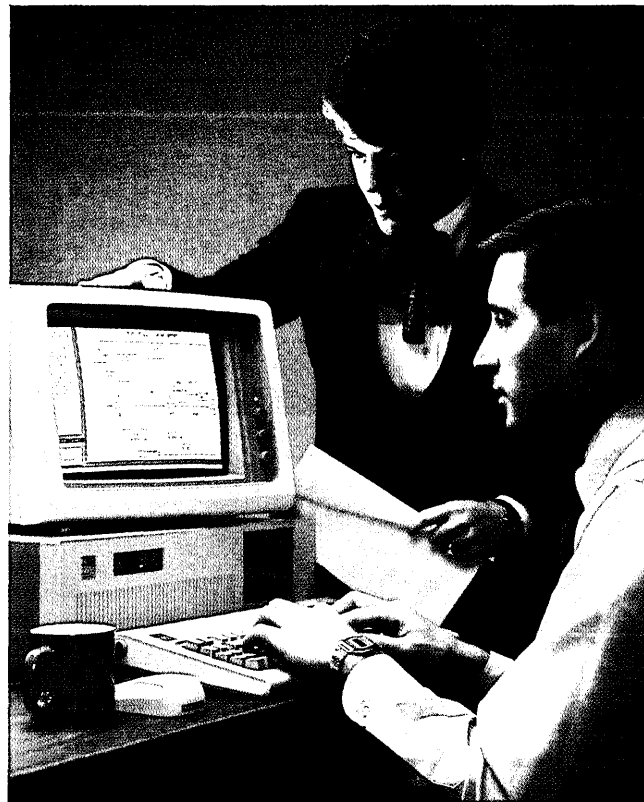
Many of the country's largest organizations have eliminated the tedious, manual process of systems specification. Instead they automate their systems analysis and design with Excelerator—the best-selling computer-aided software engineering (CASE) tool.

Their systems development teams use Excelerator in the early stages of DP projects to quickly create, analyze, and modify a design. With Excelerator's help they tackle large, critical projects such as customer billing and manufacturing requirements planning systems.

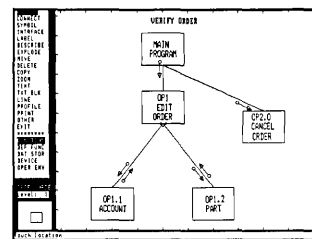
Excelerator's highly integrated, automated design environment helps them build accurate, consistent, complete, and successful specifications. Excelerator offers:

- Extensive graphics with a fully integrated dictionary
- Analysis facilities including "where used" reporting, level-to-level balancing, and extensive "ad hoc" reporting capabilities.
- Easy-to-use screen and report prototyping.
- Data sharing between analysts, projects, and host-based dictionaries.
- Documentation facilities that produce complete specifications documents.

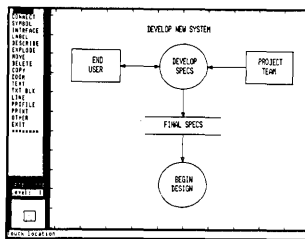
Your systems analysts and developers can join the more than 8,000 systems professionals who design better systems more efficiently—even systems



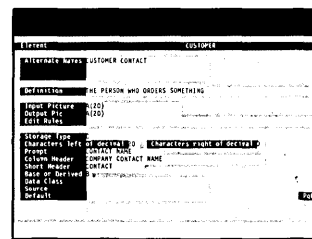
Main Menu



Structure Chart



Data Flow Diagram



Data Dictionary

with special requirements:

■ Excelerator/RTS lets you design time- and control-critical systems. It's being used to develop systems that will fly the next generation of commercial airliners.

■ For organizations with specialized development methods, we've developed Customizer which lets you tailor Excelerator and Excelerator/RTS to your own custom development environment.

Call 617-497-4473 to learn how you can develop better systems. Ask for our Excelerator information kit or order the \$30 Excelerator introductory package, which includes a 20-minute video and detailed product literature.

Excelerator[®]

Here's what users say:

“We cut nine months off a scheduled year-long project.”

“DP employees now tend to do the kind of documentation they had not done before because it was too complex. Now documentation is done the same way every time increasing standardization.”

“Communications during the analysis and design process is improved because systems analysts and end users can sit in front of the screen and review the design.”

Index Technology Corporation

The Leading Developer of Computer-Aided Software Engineering products



If You're Considering DB2,

If you're looking for the full power of relational technology, there's just one place to find it: SUPRA™ from Cincom®. Because no other DBMS gives you the advanced relational capabilities to reach such high levels of performance and productivity.

Not even DB2 from IBM®.

More and more companies with an eye for success are capitalizing on all-new, advanced relational SUPRA—companies like Heublein, Heinz U.S.A., Best Western and over 150 others. And it's easy to see why. Each day, they realize the rewards of the innovative *three-schema architecture* that enables SUPRA to soar above and beyond DB2.

SUPRA's advantages are clearly visible: Unmatched performance. Advanced relational implementation. Referential integrity. Integrated 4GL capabilities. Entity integrity. Redundancy management. Automated data design tools. Dictionary facilities. MVS, DOS and VM versions. And more. Much more.



You Better Face Up To SUPRA™

It's no wonder industry experts have called SUPRA the most advanced relational DBMS on the market.

Find out how SUPRA can take you to new heights of productivity. Send in the coupon, or call us today.

You'll soon discover why no other relational DBMS can face up to SUPRA.

See Why DB2 Falls Prey To SUPRA.

Please send me the following on SUPRA: Literature
 Electronic Brochure Seminar Schedule
 Please Have A Salesman Call Me

Return coupon to: Cincom World Headquarters,
2300 Montana Avenue, Cincinnati, OH 45211,
Attn: Marketing Services Dept. Or, call us toll-free at:

1-800-543-3010

In Ohio, 513-661-6000. In Canada, 1-416-279-4220.

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

DM120186



*"What we used to call competition,
we're now calling prey."*



The bigger they come, the harder you fall.

**Good news: Sorbus® now services the big IBM® 308X series*
So you can enjoy all kinds of power, without enduring all kinds of trouble.**

It only makes sense. We already maintain more IBM equipment than anyone but IBM. And we do it so well that a recent reader survey by *Data Communications* judged us the "Best Service Organization." Period. (Our price/performance ratio had been the best for years anyhow.)

And now our two-hour average response time, our 230,000 part-number inventory, and our quality on-site service are all available for your 308X. And for just about any peripheral you might have connected to it, including StorageTek™ hardware.

The bigger your mainframe, the more you need Sorbus.
Call today. 1-800-FOR-INFO.

Sorbus®
A Bell Atlantic™ Company

50 E. Swedesford Road
Frazer, PA 19355

IBM is a registered trademark of International Business Machines, Inc.

StorageTek is a trademark of Storage Technology Corporation.

*Available in most major metropolitan areas.

CIRCLE 51 ON READER CARD

READERS' FORUM

HOW NOT TO PROTECT U.S. HIGH TECH

Capitol Hill's current calls for protectionism against foreign competition are based largely on shortsighted views of the American economy. There is not enough recognition that our most competitive companies, including those in the computer industry, are already developing global procurement and marketing strategies that would be seriously disrupted by protectionist actions. Even more important, Congress needs to look at the direction in which those competitive industries are moving in order to create policies that support U.S. economic growth and jobs.

Today's computer industry returns a consistent trade surplus to U.S. coffers. As president of the Computer and Business Equipment Manufacturers Association (CBEMA), I'm familiar with the industry's balance sheet. Forty percent of its domestic manufactures are shipped overseas. It employs about 2 million Americans directly, and millions more work with computers in other industries. Over the past 15 years, the industry has enjoyed a 15% compound growth rate.

Growth is hampered by two important characteristics. First, high costs for product research and development must be amortized quickly because of the speed of technological change.

Second, extremely high price competitiveness among companies leads to a constant struggle to cut costs. Over the last two decades, for instance, we have witnessed a price decline of about 10% per year in the cost of computing power—a drop unmatched by any other industry.

To cope in this atmosphere, companies have developed global strategies. They tend to manufacture standard components in countries with lower labor costs, import those components into the United States for final assembly and integration, and then feed those products into both the domestic and international marketplaces.

Thus, protectionism for today's computer industry makes no sense at all. Tariffs or quotas on imported parts encourage companies to move final assembly out of the country, at least for all products intended for the international marketplace. A reduction in U.S. jobs would result. If companies attempted to keep those jobs in the U.S., the added costs of tariffs would price U.S. products out of the international market.

But protectionism makes even less sense for the computer industry of the future. By the end of the century, we expect our industry to have the following characteristics:

- Today's multinational computer company, with its set of worldwide subsidiaries, will evolve into a truly global concern.

There will be less and less difference between the power, prestige, and decision-making authority of the subsidiaries and today's parent company. Instead, a working relationship will have evolved in which the subsidiaries exercise considerable power and control.

- The world market for the large, integrated computer systems used by major businesses will be dominated by no more than five strategic alliances, primarily among international partners. It is doubtful that there will be any single-country companies of any consequence in the industry.

- The U.S. and Japan together will lead the world technologically. Both will be making major technical contributions. Japan is likely to be the world's dominant trading nation in terms of volume, with particular command of developing markets. But the U.S. will maintain its strategic edge in certain high-tech markets, as in its current dominance in software.

- Final assembly of computers will more commonly be done as close to the market as possible. With increasing use of robotics and automation, the labor component of pricing will drop to an international norm, making transportation costs far more significant as a percentage of total product price than they are today. Pacific Basin countries will increasingly have become manufacturing centers. But the U.S. will remain competitive because of computer integrated manufacturing.

This internationalization of the computer industry may not please those who would prefer that America keep technology under lock and key and use it as a club to keep the rest of the world in a subordinate position. But American companies cannot "go it alone" and expect to survive.

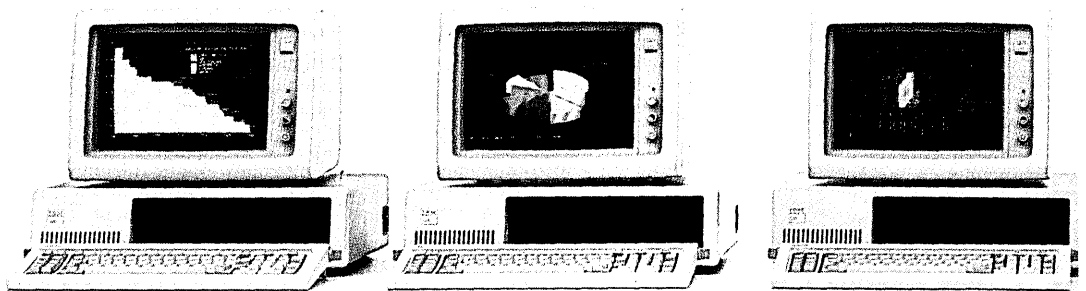
Fortunately, American business leaders are not as shortsighted as those English businessmen who, in the nineteenth century, attempted to prevent the rest of the world from setting up textile mills. We recognize that the transfer of technology is inevitable given the level of intelligence, education, and economic infrastructure that exists among our trading partners. American high-tech companies are instead looking to build a mutually rewarding future with our international allies through mutual support and the rapid dissemination of today's techniques that will lead to tomorrow's breakthroughs.

The U.S. Congress today perceives itself at a crossroads on trade. Despite the impulse to kick sand in the faces of our more successful trading partners, it should resist the temptation toward protectionism. Such resistance is the only way to keep America a vital player in the advance of international high technology.

Businesses react to business incentives and disincentives. Given the inevitable internationalization of the computer industry, protectionism is a clear disincentive. But even more important than avoiding the pitfalls of today is the need to look ahead clearly to tomorrow. For the sake of the nation in the next century, Congress should recognize that the future does not stop at national boundaries; it should vote with a long-sighted view.

—Vico E. Henriques
Washington, D.C.

Overnight IRMA has become the biggest picture maker in America.



IRMA 3279 Graphics

IRMAX PS Graphics

IRMAX APA Graphics

A lot of our customers have felt for a long time that IRMA™ ought to be in pictures.

And now IRMA is. With more graphics solutions in more communications environments than

anyone else on the market. IRMA has products that download, save, redisplay and print mainframe graphics right on the PC.

For example, with 3270 CUT-technology controllers you can

use IRMA 3279 Graphics™; users with DFT controllers can also choose IRMAX APA Graphics™ or IRMAX PS Graphics™.

With IRMAcom APA Graphics™ you can easily turn remote PCs into



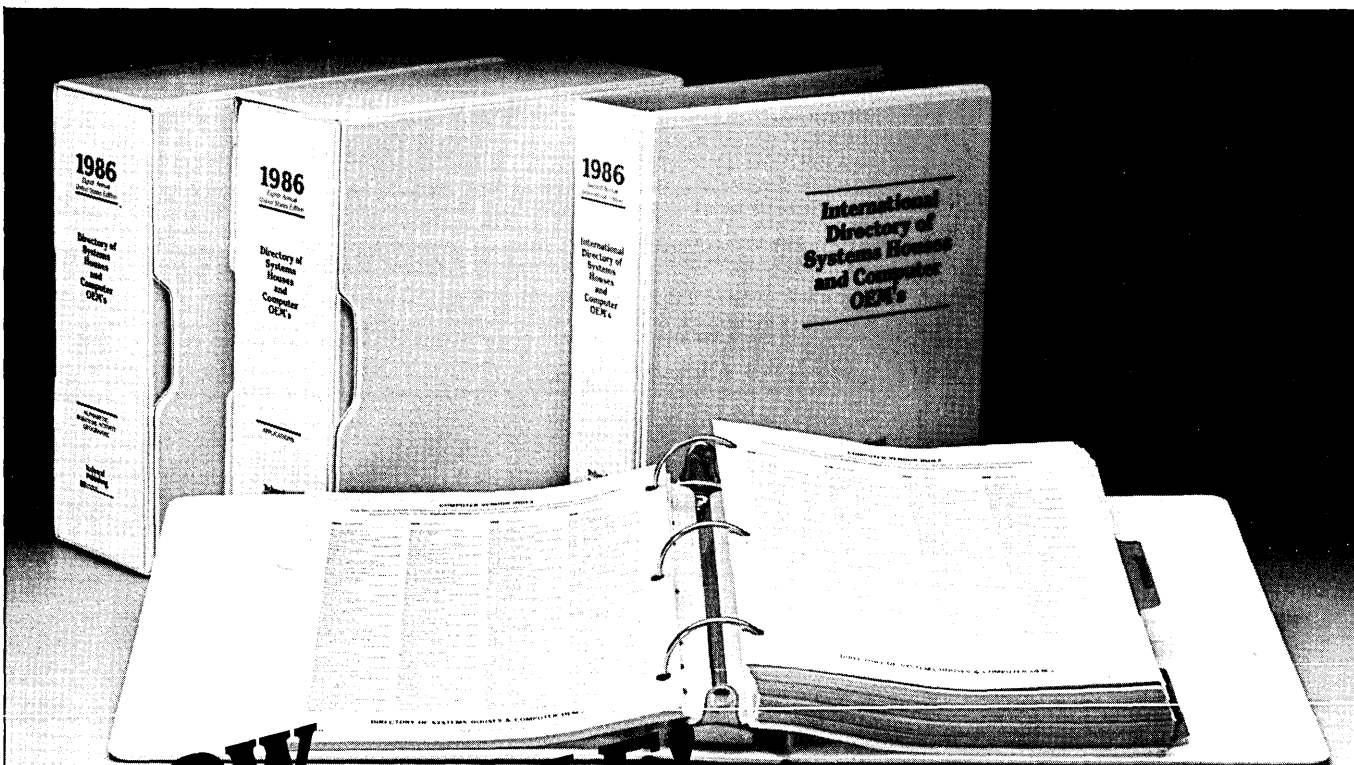
mainframe graphics workstations.

And now with IRMALAN APA Graphics,™ PCs on your IBM® Token-Ring or other NETBIOS-compatible LAN can all be doing great work in pictures too.

All our graphics products are compatible with the latest GDDM host software product on the mainframe side and IBM PCs, XTs, ATs and AT&T 6300s on the personal computer side.

For more information on DCA's graphics solutions, call us today at 1-800-241-IRMA, ext.507

dca®



NOW AVAILABLE!

**1986 Editions
Directory of Systems Houses
and Computer OEM's**

**International Directory of Systems Houses
and Computer OEM's**

Both of these unique compendiums have been fully updated and expanded to contain information never before included. The eighth annual edition of the Directory of Systems Houses and Computer OEM's contains over 4,200 U.S. value-added resellers. This is more than double the listings contained in the 1985 edition.

The second annual International Directory of Systems Houses and Computer OEM's lists more than 1,100 firms worldwide. This represents an 81% increase over the first edition published in 1985. Both directories have been expanded to 6 indexes...

- **ALPHABETIC INDEX**—Contains detailed information on all firms who qualified to be included in each directory.
- **BUSINESS ACTIVITY INDEX**—New in the 1986 editions. Companies are listed by their specific function as a value-added reseller. Hardware/Product OEM, Systems House/Systems Integrator, Dealer/Distributor/Commercial OEM, Software Distributor/OEM.
- **GEOGRAPHIC INDEX**—Locate OEMs/VARs by state/city in the U.S. directory and by country/city in the International directory.
- **APPLICATIONS INDEX**—Expanded to include 186 specific applications. Firms having expertise in each application are listed with address and phone number.
- **COMPUTER VENDOR INDEX**—Value-added resellers are listed by their principal computer suppliers. Model

names/numbers of computers purchased are included in each firms' listing.

- **PERIPHERALS INDEX**—Also new in the 1986 editions. Pinpoint sales organizations by the computer peripherals they purchase for resale. Thirty-eight separate peripheral devices are included.

More than just directories... profiles of the OEM, VAR, ISO market!

Both directories contain an entire section of market statistics which identify emerging markets, track industry growth rates and buying trends, and compare competitive market shares among vendors to the firms listed.

All data collected is analyzed, including the industries to which these OEMs/VARs market their products. Statistics appear side-by-side those of previous years for easy comparison.

Order your copies today!

The 1986 Directory of Systems Houses and Computer OEM's is available for **\$795.00 per copy**.
The 1986 International Directory of Systems Houses and Computer OEM's is available for **\$345.00 per copy**.
Both directories, when ordered at the same time, can be purchased for \$965.00.
Call today to order your copies of these comprehensive sources of computer OEMs, VARs and ISOs.

800-446-1233

Technical Publishing

BB a company of
The Dun & Bradstreet Corporation
199 Wells Avenue, Newton Centre, MA 02159
In Massachusetts
call 617-964-8890



**INVEST IN AN AREA
WITH GREAT GROWTH POTENTIAL.**

The mind, when properly educated, can do anything—from restructuring old financial systems to drafting plans for new cities.

And when you invest in the United Negro College Fund, you help students realize their potential—especially for helping you.

UNCF gives young people the opportunity to attend 41 private,

predominately black colleges and universities. Your contribution allows us to keep tuitions low and to grant financial aid to needy students. Otherwise, many of them wouldn't be able to attend college at all.

Our graduates have demonstrated their value to the world of business. They have become

engineers, technicians, accountants, managers, economists. Professionals who are helping to run businesses like yours from the ground up.

Invest where it counts. Send your check to the United Negro College Fund, Box K, 500 East 62nd St., New York, N.Y. 10021. And watch your investment grow.

**GIVE TO THE UNITED NEGRO COLLEGE FUND.
A MIND IS A TERRIBLE THING TO WASTE.**

©POLAROID is a registered trademark of the Polaroid Corporation. Photograph simulated.

WHAT POLAROID® DID FOR FILM WE DID FOR INFORMATION PROCESSING.



Needing information instantly is nothing new. But getting it is.

In fact, it's more than new. It's a technological breakthrough called EXPERT QUERY™, the newest component of INFORMATION EXPERT™.

Expert Query has the ability to access live data interactively. In realtime.

And Information Expert is the fourth generation technology that allows all your existing or new software to talk to one

another. Instantly.

Call Robert Carpenter at Management Science America, Inc. 404-239-2000. He's also an expert at giving you all the information you want. Instantly.

MSA SOFTWARE
INTELLIGENCE OF A HIGHER ORDER.

© 1986 Management Science America, Inc.

CIRCLE 3 ON READER CARD