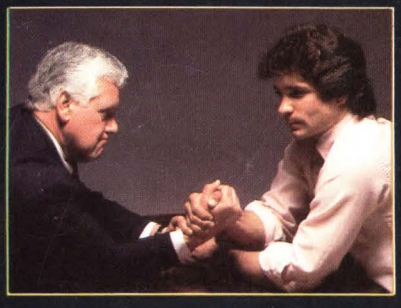
$4.00

Corporate Executives' Guide To Personal Computing

COMPUTER DECISIONS
MARCH 15, 1984
THE MANAGEMENT MAGAZINE OF COMPUTING
A HAYDEN PUBLICATION

Managers Rate The Major Micros

Our informal poll reveals the winners and losers in the race to be the most popular corporate micro.



User Autonomy Vs. Corporate Authority

Now that employees have micros, how can you direct them toward a goal without stifling innovation?

Micro Uses, Misuses, and Mistakes

Personal computers are remaking the workplace, but executives must ensure the changes are for the best.

Alternative Avenues To Personal Computing

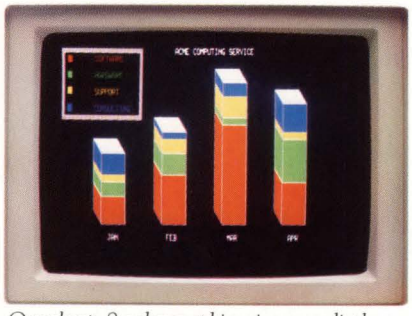
The best way to provide personal-computing power may be without personal computers.

SPECIAL ISSUE

s Professional Computer. are perform even better.

See the difference TI can make with these best-sellers and hundreds more software packages.

Word processing, data base management, advanced integrated programs...the Texas Instruments Professional Computer can help you meet virtually every business and professional need. But before you consider software alone, consider the hardware too.



Our sharp, 8-color graphics give your displays even more visual impact.

The better the hardware, the more you get from your software.

The TI Professional Computer's outstanding monitor resolution and 8-color graphics make best-selling programs like Lotus 1-2-3™ sharper, easier to work with.

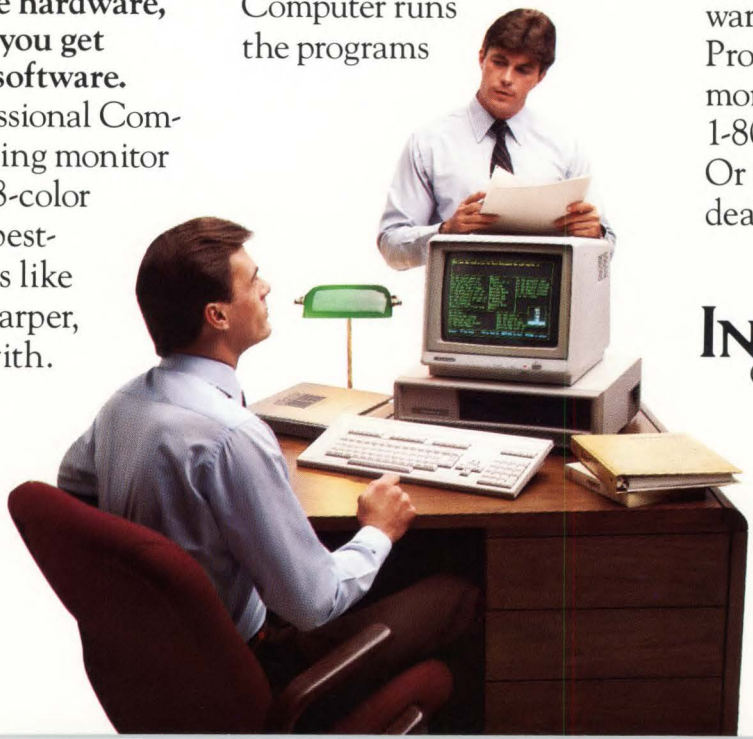
You can put three times the graphic information on screen–in both color and monochrome–so you'll be able to take even greater advantage of the best graphics programs. For best-selling word processing packages like WordStar,™ TI's comfortable, typewriter-style keyboard is a natural. Anyone familiar with a standard typewriter keyboard can start to work immediately, without re-learning key positions.

TI offers all the software you need.

So whatever your business needs, the TI Professional Computer runs the programs you need now, and the ones you'll want tomorrow. Thirty to forty programs each month are being developed by over 200 software manufacturers. You'll find them among hundreds of other software packages listed in the TI Software Journal.

Our easy to use keyboard makes word processing easier.

So get more from your software with the best hardware, the Texas Instruments Professional Computer. For more information, call 1-800-527-3500. Or visit the dealer nearest you.



TEXAS INSTRUMENTS

Creating useful products and services for you.

2773-04 SWR1

The Texas Instruments
It makes the best softwa

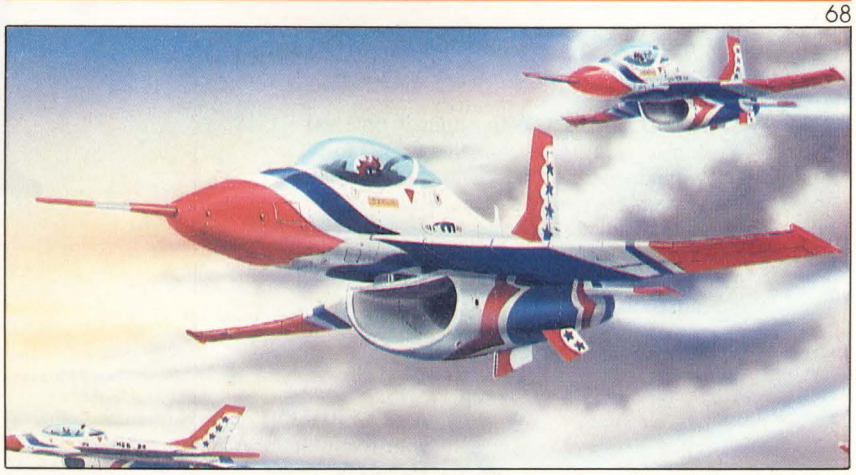
These best-sellers are among the most popular business software programs for microcomputers as reported in *Inc.* magazine, September, 1983.

The experts said it. Turn the page to find out why.

COMPUTER DECISIONS

March 15, 1984
Volume 16, Number 4
Copies Printed: 172,589

68



14

Mitel Announces This

1 A CALENDAR. With a built-in time and date clock. And an alarm that flashes to remind you of key appointments. A whole year's plans can be stored. Reminders automatically move to the next day. A bar chart shows you your entire week at a glance. And all calendars can be electronically mailed or printed and carried with you.

2 A TELEPHONE. Built right into your workstation. With your own alphabetic phone directory on the screen. Automatic dialing. And redialing. Using only the initials of the person you're calling. A record of how much time is spent on each call. Hands-free conversation through a speaker phone. Two lines that can be used simultaneously. Voice and data communications at the same time. And an interface with both Mitel and other PBX's.

3 AN ELECTRONIC MAILBOX. From your Kontact to anyone else's. Inside the company or out. Instant notification when mail arrives. Just one instruction sends a piece of mail to many people. Gather mail in your "out basket." Automatically send it later at lower long distance rates.

Introducing Mitel Kontact.™ The management workstation that fully integrates virtually every day-to-day task. Communications, time management, computing, and so much more. Plus the ability to do so many things simultaneously. Talk on the phone at the same time you're on-line with your mainframe computer at the same time you're checking your calendar at the same time you're printing your sales forecast at the same time...Compare the Mitel Kontact with any workstation on the market. And make sure you compare prices, too. You'll discover Kontact gives you much, much more for your money.

Six New Machines.

are it.

4 **A COMPUTER TERMINAL.** Send and receive information with your company's IBM™ compatible or DEC™ compatible computer. Access Dow Jones,™ The Source™ and other data banks. The telephone line and modem are built right in. Your Kontact memorizes the computer "lingo." To make data communications as simple as any other task.

5 **A PERSONAL COMPUTER.** Prepare a budget, forecast sales, plan the next quarter. With your ExecuCalc™ electronic spreadsheet. The answers to all the mathematical "what ifs" of your business. Access in the future to CP/M™ programs. Plus the ability to edit them with word processing. Send them to any other Kontact user. And discuss them on the telephone.

6 **A WORD PROCESSOR.** Whether you type with two or ten fingers. Eight function keys tell you exactly what to do. In everyday English. ExecuWrite™ is a sophisticated, full-featured, word processing package. Review and edit two files at once. Transfer text from one report to another. Integrate information created with your electronic spreadsheet.

There simply isn't any other system that does as much. At any price.

For more information call 1-800-MITELSX. In Canada call collect 1-613-592-6353.

MITEL®

BUILDING BETTER COMMUNICATIONS

CIRCLE 2

COMPUTER DECISIONS

Headquarters Office
10 Mulholland Dr., Hasbrouck Hts., NJ 07604, (201) 393-6000

Special Issue Editor: **Susan Foster Bryant**

Special Issue Managing Editor: **John Rymer**

Publisher/Vice President: **Don Huber**

Editor: **Mel Mandell**

Managing Editor: **Donne Florence**

Senior Editor: **David Whieldon**

Art Director: **Bonnie Meyer**

Midwestern Editor: **Jan Snyders** (815) 838-5280

Western Editor: **Martin Lasden** (408) 736-6667

Southwestern Editor: **Jennifer E. Beaver** (213) 548-7877

New England Editor: **Mary Miles** (617) 746-4441

Data-Comm Editor: **John Seaman**

Management Issues Editor: **David J. Kull**

Associate Art Director: **Lynn M. Holl**

Production Editors: **Claudia Nalven, Susan Trembly**

Copy Editor: **Barbara R. Ottenhoff**

Staff Writers: **Theresa Conlon, David R. Roman**

Editorial Support Staff: **Virginia M. Johnson**, Supervisor **Patricia McShane, Joanne Wendelken**

Staff Artist: **Laura Conca**

Contributing Editors: **Robert Carr Rick Cook Jordan Gold Joseph Hillhouse Dorie MacDonald Ilene McGrath Paula Stone**

VBPA ABP

COMPUTER DECISIONS (USPS 771-040 ISSN 0010-4558) is published 15 times a year for $35 per year by Hayden Publishing Co., Inc., 10 Mulholland Dr., Hasbrouck Hts., NJ 07604. Second-class postage paid at Hackensack, NJ 07602, and additional mailing offices. POSTMASTER: Send address changes to COMPUTER DECISIONS, P.O. Box 1417, Riverton, NJ 08077. James S. Mulholland Jr., President and Treasurer, and Philomena DiMeo, Secretary. Printed at Brown Printing Co., Inc. New subscriptions: COMPUTER DECISIONS is issued free of charge to qualified executives with active professional and functional responsibility in organizations that use computers and computer-based services and among computer manufacturers. Please fill out completely the Subscriber Qualification Form in the magazine. The publisher reserves the right to reject nonqualified requests. Subscription Rates: Qualified subscribers in the U.S. and Canada Free; Nonqualified in the U.S., Canada, Mexico, and Central America $35. Single copies $3.00. All other countries $45. Single copies $4.00. Limited quota of subscriptions available for persons outside the field served. Change of address: Fill out completely the Subscriber Qualification Form in the magazine, being sure to attach old mailing label in the space provided. Send correspondence with regard to editorial matters to address listed above. Unsolicited manuscripts will not be returned or acknowledged unless submitted with self-addressed envelope bearing sufficient postage for return. Address all other correspondence to COMPUTER DECISIONS, P.O. Box 1417, Riverton NJ 08077.

NEW! IBM PC and DEC PRO 350

SPSS/PC™

Statistical and Reporting Software

SPSS Inc. a leading producer of statistical software for over 15 years, with more than a half million manuals sold in 80 countries, is making micro waves with SPSS/PC and SPSS/Pro.™ Two powerful new statistical and reporting programs which were designed for the IBM Personal Computer and the DEC Professional 350.

POWERFUL STATISTICS

- **Crosstabulations**
- **Analysis of variance**
- **Multiple regression**
- **Over 25 integrated procedures**

TOTAL INTEGRATION

- **File management of large or small data sets**
- **Input & output to popular PC programs**
- **Flexible data transformations**

CUSTOM DISPLAYS

- **Automatic or custom reports**
- **Fully labeled tables**
- **Plots & graphs**

EASY TO LEARN

- **Simple English commands**
- **Tutorial & demonstration diskette included**
- **Comprehensive documentation for all levels of users**

SPSS inc.

444 N. Michigan Avenue
Chicago, Illinois 60611
(312) 329-2400

For the DEC Professional 350, and soon for the IBM PC with hard disk. To discover how SPSS can help you make waves, call us for the full story. (312) 329-2400.

CIRCLE 4

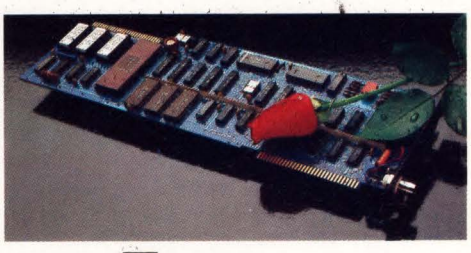
Connect with success.

IRMA™ is the industry's most successful IBM 3270 Decision Support Interface,™ with more than 25,000 installations.

IRMA, the first coaxial cable link between the IBM PC/PC XT and IBM 3270 networks, delivers the industry's best performance record. She's working successfully right now in more than 25,000 installations worldwide, giving PC users easy, economical mainframe data access, selection, storage and communication back to the mainframe.

And she's more capable than ever, with standard text file transfer software for VM/CMS and MVS/TSO mainframe environments, IBM 3278 Models 2, 3, 4 and 5 and IBM 3279 Models 2A and 3A screen support, plus optional APL Terminal Emulation.

If you want PC/3270 decision support that goes to work literally minutes out of the box, connect with success. With IRMA, the industry's most widely used and most thoroughly proven decision support interface. For information write DCA, 303 Technology Park, Norcross, Georgia 30092. Phone (404) 448-1400, TLX 261333 DCAATL. Or call us toll-free 1-800-241-IRMA. **Connect with success.**



dca®
Digital Communications Associates, Inc.

EDITOR'S MESSAGE

YOUR GUIDE TO PERSONAL COMPUTING

Who would have thought as this decade began that the phrase *personal computing* would come to mean so much?

The popularity of personal computing has caused corporations to rethink, and sometimes restructure, their information resources. Moreover, it has hastened the demise of some traditional work habits and accelerated demands for systems that provide the best information—and provide it "yesterday."

Like pet rocks and hula hoops, the personal computer was an unexpected success—"an insane success," to use Apple Computer founder Steven Jobs' favorite effusion. A big part of the success has been the personal computer's acceptance by corporate executives, managers, and professionals. Who would have guessed it a mere four years ago? At the time, personal computers seemed to be too new, too revolutionary.

The ability of individuals to do their own processing, manipulation, and analysis of data, rather than depend on the data-processing department, has serious implications for corporate management.

As management-issues editor David Kull observes in "Does the heavy hand defeat itself?"—our opening article (page 26)—personal computing brings the classic conflict between managerial authority and individual autonomy into sharp focus. On one side are professionals and executives who want to use personal-computing tools any way they see fit. On the other side is the sometimes heavy hand of corporate management. And that brings us to the mission of this *Computer Decisions* Special Issue: Helping corporate executives who plan, implement, and manage personal computing find a productive solution to the fundamental conflict between authority and autonomy.

Turning to the practical problems facing overseers of personal computing, "The right tool for the right job" (page 38) examines which tasks are most appropriate for personal computers.

Many corporations ease the transition from manual to automated procedures by clearly outlining policies and procedures on acquisitions, uses, programming, data integrity, and other issues. "Working out a winning strategy" (page 52) looks at why some policies succeed while others hinder the assimilation of personal computing. A related article, "Computing!" (page 68) examines how some corporations are helping users overcome their high-tech trepidation.

As personal computing takes hold in corporations, many managers are pleasantly surprised to find that users are the best source of new and productive applications. "Users: The new corporate heroes" (page 84) looks into the experiences of employees in five spheres of work—finance, personnel, marketing, manufacturing, and engineering.

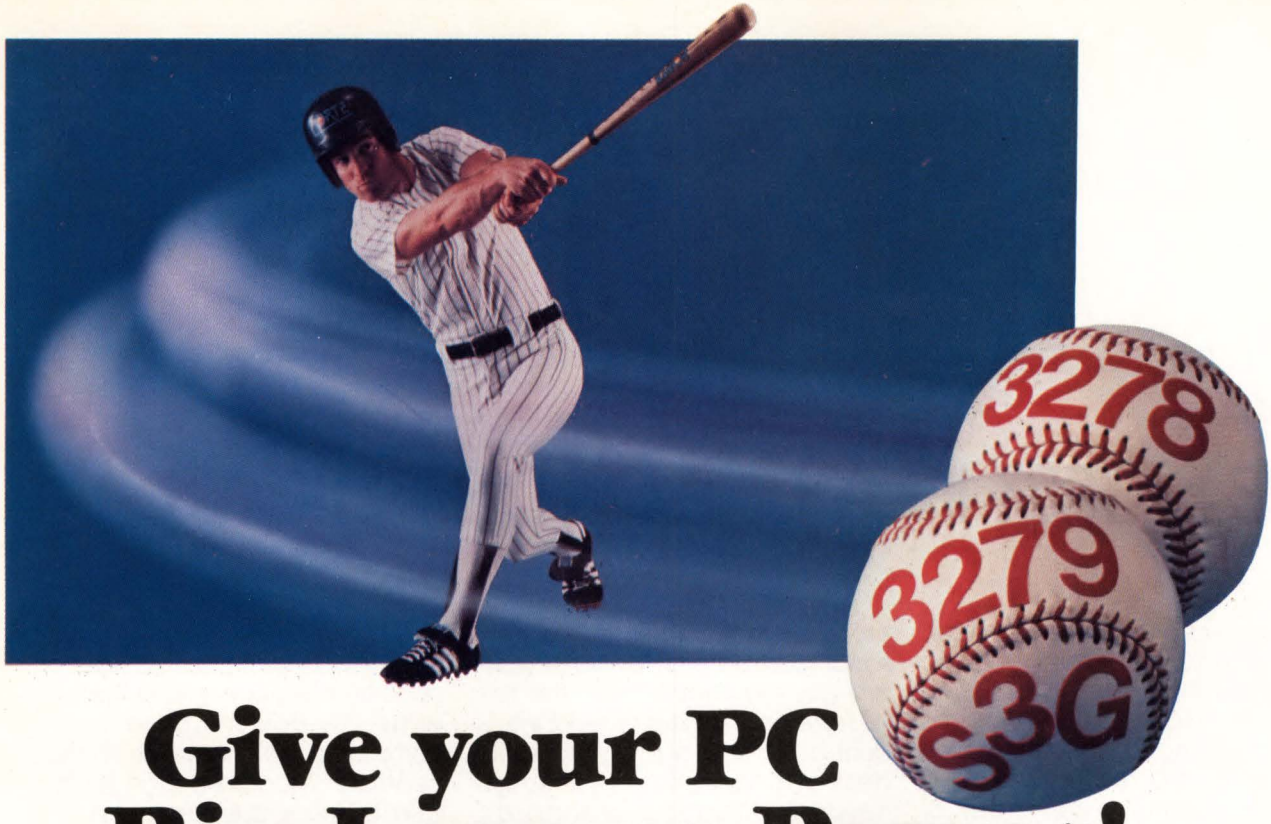
Personal computing was once a one person/one machine proposition, but today there are other alternatives. Terminals, word processors, mainframes, and minicomputers can be vehicles of personal-computing power, protecting yesterday's investment. "Alternative avenues to personal computing" (page 100) considers the options.

The personal computer may not be the only way to provide personal computing, but it is the most popular one. Which of the personal computers is most popular among corporate executives, and why? Turn to "25 managers rate major micros" (page 108) for the results of our informal poll.

Plans for today should anticipate and prepare for the future. How will personal computing change during the next five years? In "The dawn of the universal workstation" (page 122), a variety of experts peer into the future.

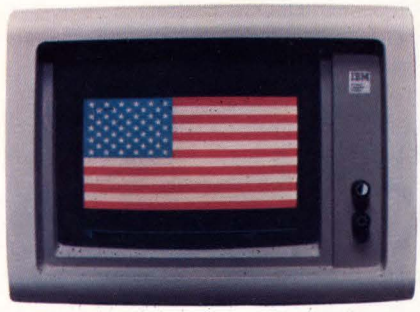
These articles do not offer formulas guaranteed to produce success. Rather, they offer advice that can be the foundation for an examination, or reexamination, of your approach to personal computing. Mastering the management of personal computing is a key challenge. As this decade progresses, the number of machines in organizations and the number of people for whom personal computing is an established workstyle will increase substantially. Much of your corporation's growth in profits will depend on your ability to control these forces—transparently, of course.

—Susan Foster Bryant



Give your PC Big League Power!

with Major League Graphics



With the Forte-PJ™ 3278/79 Emulator/Adapter Board, your IBM PC* or compatible system bats 1000 from both sides of the plate. You gain the speed and power of a coaxial cable-connected IBM 3278 display terminal while retaining all the functions of the Personal Computer. A single keyboard command moves you back and forth between DOS and terminal mode.

If your business game plan calls for color graphics, add the Forte-GRAPH™ 3279/SG3 Color Graphics Emulator/Adatper Option Board and unleash IBM's arsenal of S3G Programmed Symbols software (including GDDM™ and SAS/GRAPH™).

You'll have bar and pie charts, histograms and conceptual drawings at your fingertips, not to mention foreign language fonts, scientific notation and even your own custom-designed characters.

Whether you're working in color or monochrome, you can use PC spreadsheet programs and other packaged software to work with current data from your IBM host. Forte's automatic file transfer utility allows you to send, receive and store host files without ever leaving terminal emulation mode.

Forte provides all the hardware and software you need to emulate any full-function 3278 or 3279 terminal. Installation is a snap: no host hardware or software modifications are necessary and only one slot is required.

HOTLINE
(800) 233-3278

If you're ready to play mainframe ball with your PC, you're ready for Forte.

FORTE

Forte Data Systems, Inc.

1500 Norman Avenue • Santa Clara, CA 95050 • (408) 980-1750

Your Micro-to-Mainframe Connection

*Forte and all associated product names are trademarks of Forte Data Systems, Inc.
*IBM, IBM Personal Computer and IBM PC-XT are trademarks of IBM Corporation.
*GDDM is a registered trademark of IBM Corp.
*SAS/GRAPH is a registered trademark of SAS

CIRCLE 6

PREFACE

THE LATEST IN A LINE OF DEFINITIONS

Personal computing has been around a lot longer than personal computers. We define *personal computing* as accomplishing a task for which you alone are responsible on a machine, be it a computer or some other device. These tasks are self-paced and done without the help of others.

Placing the concept of personal computing in a corporate context, it becomes obvious that the idea long preceded the personal computer. To pin down a date of origin for personal computing, we might reach as far into the past as the invention of the abacus. The mechanical calculator, which was introduced for commercial uses during the 19th century, was the first machine to marry automation to the notion of personal computing.

Calculators are still widely used in corporations. But once executives, managers, and professionals could gain access to large computers, many traded in their calculators for terminals hooked to timesharing systems. These terminals became so popular (timesharing is still used by many corporations for structured tasks) that the costs for host-computer use and data transmission skyrocketed. Timesharing systems are not only potentially costly as personal-computing vehicles, but also are bound by a certain rigidity. If users need to do unstructured, ad hoc tasks, they have to find other means.

The alternative to the timesharing terminal is a computing device with capabilities beyond those of the calculator—a personal computer. Hewlett-Packard Co. may have been the first to seize on this idea when it introduced in 1968 a programmable desk-top calculator for engineers. By today's standards, these machines are primitive. They cost a hefty $5,000 each, but they afforded users the opportunity to *structure their own computing*, without waiting for the data-processing department to write timesharing applications. Wang Laboratories and other manufacturers introduced similar machines shortly thereafter.

The stand-alone personal computer made its debut during the late 1970s, and it took the notion of programmability a step further by offering users prewritten programs to help them do their own computing. The rest is history.

Personal computers quickly became hot items, both in the home and in the workplace. In corporations, they began to be used not only for ad hoc problems, but also as terminals tied into the superior processing power of mainframes and minicomputers.

Users who are plugged into central information resources add a new dimension to personal computing. They are no longer computing in isolation, so to speak, because they have an impact on the computations of other users. For example, users with access to the corporate database may change a piece of information, affecting the computations of other users.

Connections between micros and mainframes have given rise to a new kind of computing—*organizational personal computing*. While it's not strictly personal computing, it is more flexible than centrally structured computing. Corporations are just beginning to grapple with the issues of security, corporate cohesiveness, and efficiency raised by this kind of personal computing. The ways corporations can meet these challenges and cash in on the benefits of organizational personal computing are the subject of this issue.

Organizational personal computing can be viewed as a logical extension of a popular technology. However, it might also be viewed as a step in the evolution toward the integrated information resources experts have been talking about for years. Before we reach the day when mainframes, minis, personal-computing machines, and peripherals are productively tied together, certain technological barriers will have to be surmounted. But the issues are not strictly technological, as many corporations are discovering. Success with organizational personal computing depends on coherent, dynamic policies that address such issues as equipment acquisition, compatibility, training, security, maintenance, and ongoing system improvements. Mastering aspects of the organizational-personal-computing phenomenon may be the next step in your evolution as an executive in the integrated era.

—Mel Mandell

HOW TO GET AN IBM® PC FOR JUST $1995.

BUY A CHAMELEON.

The Chameleon by Seequa does everything an IBM PC does. For about $2000 less than an IBM.

The Chameleon lets you run popular IBM software like Lotus® 1-2-3™ and Wordstar.® It has a full 83 key keyboard just like an IBM. Disk drives like an IBM. And a bright 80 × 25 character screen just like an IBM.

But it's not just the Chameleon's similarities to the IBM that should interest you. Its advantages should, too. The Chameleon also has an 8 bit microprocessor that lets you run any of the thousands of CP/M-80® programs available. It comes complete with two of the best programs around, Perfect Writer™ and Perfect Calc.™ It's portable. And you can plug it in and start computing the moment you unwrap it.

So if you've been interested in an IBM personal computer, now you know where you can get one for $1995. Wherever they sell Chameleons.

The Chameleon by

SEEQUA COMPUTER CORPORATION
8305 Telegraph Road
Odenton, MD 21113

For the location of the Seequa dealer nearest you, call (800) 638-6066 or (301) 672-3600.

CIRCLE 7

"The office automation I bought for everyone in the corporation doesn't incorporate everyone."

Exxon stops the shock...with fully integrated office automation for everyone in the corporation.

Introducing the Exxon Business Support System.

The EXXON 750 Professional Workstation gives you the power to use data, graphs and text in any combination.

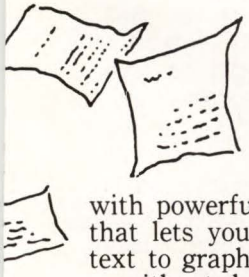
An office automation system that can't support everyone in your corporation can lead to some very shocking experiences.

The right power to the right people

That's why Exxon Office Systems now offers more practical office automation solutions that help everyone in the corporation to be more productive. With the Business Support System, Exxon extends its fully integrated line of office automation products to support managers, professionals, and administrators, as well as secretarial staff.

Exxon puts it together for everyone with a fully integrated system — with full communications flexibility that lets you access outside data bases and interact with most mainframe computers. Without the complications. Without the shock.

Office automation for those who shape the corporation



The Exxon Business Support System features the new EXXON 750 Professional Workstation, specifically designed with powerful, integrated software that lets you move instantly from text to graphics to data processing — without changing programs.

You can divide the high resolution bit-map display into several windows and work in a number of functions simultaneously. You can shift information from one window to another. You can preview the page layout, and produce an integrated text/graphics document on our quiet EXXON 965 Ink Jet Printer. Or on a color plotter.

Best of all, the flexible design of our new Professional Workstation is ready for adaptation to the most popular operating systems and network interfaces.

Tying everyone together

At the core of the Business Support System is the EXXON 8400 Series controller. With its UNIX*-based operating system, it can integrate all levels of workstations to share information and programs. Everyone can keep track of schedules and meetings with time management and calendaring functions, whether their workstation is an EXXON 500 Series Information Processor or a new EXXON 750 Professional Workstation. And everyone can send and receive messages easily with transparent electronic mail.

An expandable, shockproof family

Exxon protects your office automation investment by making every workstation —from the EXXON 500 Series to the new EXXON 750 Professional Workstation — fully expandable and upgradeable. So if you've already begun an Exxon system, the latest Exxon advances are completely compatible with our current product line.

And with our worldwide sales and service organization, you can be sure that when you need assistance, Exxon will be there.

That's how Exxon incorporates everyone — in one shockproof family.

For more information

Call 800-327-6666, write Exxon Office Systems, P.O. Box 10184, Stamford, CT 06904-2184, or use the coupon below.

We'll be happy to demonstrate how the Exxon Business Support System can help your corporation move into the future ... without the shock.

*UNIX is a trademark of Bell Labs.

COD 03 01

Exxon Office Systems
P.O. Box 10184
Stamford, CT 06904-2184

☐ Please send me more information about the Exxon Business Support System.
☐ Please have your representative call.

Name_____
Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Telephone _____

800-327-6666
IN CONNECTICUT, 800-942-2525

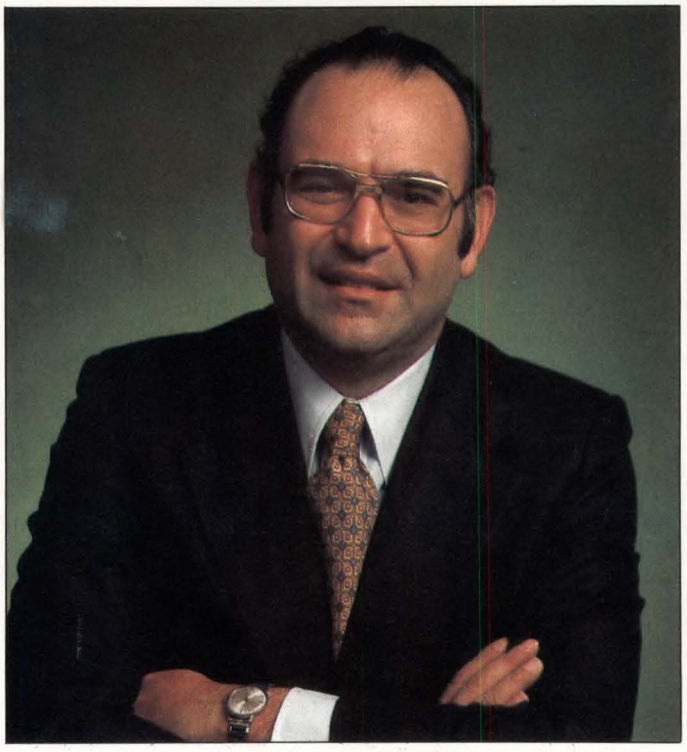
EXXON OFFICE SYSTEMS

The future...without the shock.

A PERSONAL OPINION

EPSTEIN—E.F. HUTTON

"There is no way you can economically justify networking personal computers."



Norman Epstein is executive vice president and managing director of E.F. Hutton & Co. in New York. As head of operations, he's responsible for managing the use of computers among the brokerage house's 16,000 employees. Epstein opposes the use of personal computers. They're overpriced for the level of performance and support they offer, he says.

Epstein speaks quickly, almost impatiently, interrupting to answer questions before they've been fully asked. In a short conversation with Staff Writer David Roman, he made a case for personal computing without personal computers.

Q: Why are you opposed to personal computers?

Epstein: Personal computing does not categorically necessitate the use of personal computers. There's tremendous pressure within organizations to perform personal computing, and that's why personal computers are being used. But they are very, very difficult to network, and they make it very, very difficult to control the integrity of programs and data. Besides, a personal computer is a fixed resource. If I use mine a lot, and you use yours a little, we can't average the power between them. If I need 2X of computing power, and my personal computer is rated X, there is no way I can get the power I need. No one person can exceed the capacity of the computer. Theoretically it's possible, but practically it's impossible.

And I would be wasting resources if I gave a personal computer to someone who didn't need personal-computing power, but needed access to information over a terminal. I'd be spending much more money than I have to.

Q: Do you have employees who want to use personal computers?

Epstein: We're running a corporation, not an adult camp. The employees don't tell us, 'I like this; I want it.' But no one stops them from buying personal computers. In fact, we have between 300 and 400 personal computers now—some of them for valid reasons, and some not. Some are performing functions that can't be done better otherwise. But that will change when we finish installing our new system.

The smallest computer I'll have then is a Data General MV/4000, which is not—by any stretch of the imagination—a personal computer. There will be 400 of these superminis. Attached to them will be roughly 10,000 terminals, and they will all offer the ability to do personal computing. Every account executive will have one—roughly 6,000 of them. Every secretary, accounts clerk, cashier, and officer will have one. Everyone in corporate finance and corporate development will have one. These are employees who want personal computing for portfolios and financial-

(Continued on page 17)

One of Japan's leaders would like to go to work for you.

Fujitsu, Japan's largest computer company, sends you their best. The new Micro 16s personal business computer. A combination of thoughtful planning, innovative thinking and quality craftsmanship. Just what you'd expect from a Japanese company that's been making computers for three decades.

The Micro 16s is a complete computer system. The options of other computers are our standards. For example, its price includes the CP/M-86® operating system, SuperCalc2™ electronic spreadsheet, WordStar® word processing, a high resolution color graphics monitor, and two microprocessors, the Z80®A 8-bit and 8086 16-bit.

The Micro 16s will run any of the more than 3,000 CP/M® software programs on the market today. Optional operating systems for the Micro 16s include MS™-DOS and the multi-tasking Concurrent CP/M-86.™

The Micro 16s also comes with a detachable keyboard, dual built-in 5¼" floppy disk drives, 128 kilobytes of internal memory expandable to over one megabyte, and expansion slots for future growth.

The unique and flexible design of the Micro 16s makes it easy to add advanced microprocessors of tomorrow, hard disks, mainframe communications or local area networking when the time is right.

Put a Japanese leader to work for you. Fujitsu's Micro 16s. For more information or the name of your nearest dealer call toll free 1-800-MICRO 16. Or write Fujitsu Microelectronics, Inc., Professional Microsystems Division, 3320 Scott Blvd., Santa Clara, CA 95051.

FUJITSU

Fujitsu's Micro 16s.™

SuperCalc2™ is a trademark of Sorcim Corp. WordStar® is a trademark of MicroPro International. CP/M-86® and Concurrent CP/M-86™ are trademarks of Digital Research, Inc. MS™ is a trademark of Microsoft® Z80® is a trademark of Zilog, Inc.

CIRCLE 9

DON'T PAY MORE FOR A PRINTER THAT DELIVERS LESS.

COMPARISON CHART	Printing speed (cps)	Avg. hours before repair*	User-changeable multiple interfaces	Mfr's suggested retail price
Diablo 630 API	40	4,000	YES	$2340
NEC 7700 Series	55	2,000	NO	$2595
Qume SPRINT 11/55 PLUS	55	5,500	YES	$1990

A simple comparison tells the whole story. Qume's new SPRINT 11/55 PLUS™ daisywheel printer is tops in performance, with a steady speed of 55 characters per second. Print quality that's second to none. And the industry's best reliability rating—equal to almost three years of all-day, five-day-a-week business use without a single repair.

That's nearly a year longer than its closest rival.

And the SPRINT 11/55 PLUS is a perfect fit for most popular business computers, via our inexpensive plug-in interface modules.

That means you won't have to change printers when you upgrade your current system.

It's this kind of value that has made Qume one of the largest manufacturers of letter-quality printers in the world.

So don't pay more for less. Choose Qume's SPRINT 11/55 PLUS—the best printer you can buy. *And* the best buy in printers. For more information, contact the Qume distributor nearest you. Or write Qume Corporation, 2350 Qume Drive, San Jose, CA 95131.

Qume's SPRINT 11/55 PLUS™ outperforms NEC and Diablo† for a lot less money.**

Qume printers. Your best investment in productivity.

Qume®
A Subsidiary of ITT

See distributor listing on opposite page.

*Mean Time Before Failure at 25% duty (manufacturer's published data)
**NEC is a registered trademark of Nippon Electric Company
†Diablo is a registered trademark of Xerox Corp.

A PERSONAL OPINION

(Continued from page 14)

management worksheets, tax strategies, option strategies. They want the ability to work with data that we would provide on-line by downloading them, and working them into models.

When our system is installed, we won't need personal computers. We will have personal-computing capacity and capabilities that far exceed anything now being done on personal computers. And I will give users the one capability no one else can give them. Everybody else in the company gives them products and ideas, but what they really need is time.

Executives have to ask the right question. The right question is, 'If a company had the network to provide the kinds of services I'm talking about, would it put in personal computers, or would it put in minis with terminals?' Just about everybody I've spoken to has said they'd opt for the latter. But corporations don't put in the kind of personal computing I'm offering because they don't have the network to accommodate it.

Q: Is it that you couldn't network them, or that you couldn't afford to?

Epstein: If you have the bucks, you can do anything you want. But, practically speaking, you must choose economically. And there's no way can you economically justify networked personal computers. Yet they've got to be networked. You can't just have employees working on their own personal computers with their own programs and their own data. You'd have chaos. And if you *do* find a way to do it economically, I'll beat you to death functionally.

Q: Couldn't you standardize on particular software packages and personal computers?

Epstein: Why? You're asking, 'What must I do with personal computers to make it look like what I'm doing now with minis?' That's ludicrous. And what happens when you have to upgrade your personal computers?

Q: Newer personal computers, like the IBM PC XT/370, can be attached to a mainframe. They aren't simply stand-alone machines, which you oppose. Do they change your ideas?

Epstein: No. They just reinforce what I'm saying.

Q: Doesn't your system require more sophistication of the user than a personal computer would?

Epstein: The opposite is true. The system is menu-driven. It uses standard software and a standard operating system, so the training is generic and uniform. The programs are very simple to use, yet very powerful. You can't compare the power of the personal computer to this system. You just *can't*. When you show someone Visicalc or Supercalc, and then compare it to our Spread (a financial-modeling package for mainframes and minis, licensed by Lupfer & Long of Hanover, NH), it looks like a pencil with an eraser up against a computer.

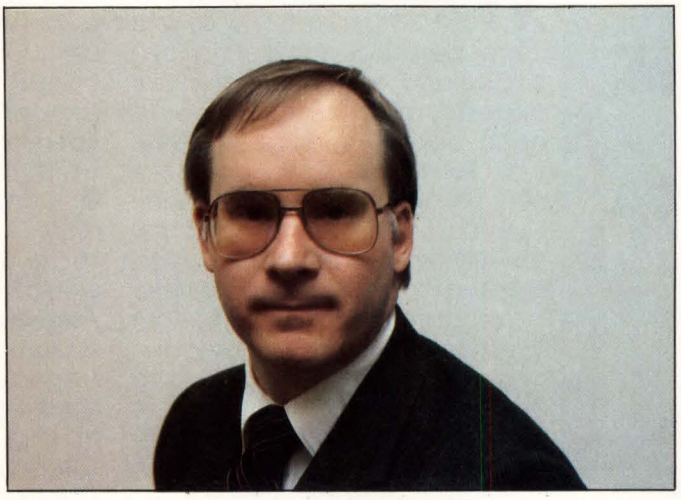
Q: Do you ever question your approach?

Epstein: I don't have a scintilla of doubt about what we're doing. We've really changed what we do, and the system makes us real pioneers in the last frontier. We've automated the hell out of everything else, but we've never really touched the branch offices before. All levels of the corporation will be directly affected by this. It's a massive commitment, but we are confident—completely confident—that this is the right way to go. □

CUPEC — 1st NAT'L. BANK/CHICAGO

"We want personal-computer applications to arise from genuine business needs."

Hundreds of personal computers are used throughout the First National Bank of Chicago, and it's the job of James Cupec, vice president, to see that they're used wisely and well. First National is the principal holding of First Chicago Corp., the country's 11th-largest commercial bank, ranked by assets. In an interview with *Computer Decisions'* David Roman, Cupec discussed the bank's modulated implementation strategy, which reduces development expenditures and takes the risk out of experimentation.



"We screen employees applying for personal computers to make sure they have a legitimate need."

Q: What kind of personal computers are you using?

Cupec: We've sort of standardized on the IBM Personal Computer. But we have other types of personal computers as well, for many reasons. Some of the reasons are historical. For example: We had Apples before there was an IBM PC. Also, we may buy a personal computer as an exception to the standard if we need a specific type of machine to run a specific application. We use Fortune from Fortune Systems for a multi-user database application. In addition, we have a small group that tries to keep up with the latest technology, and is constantly looking at all the new machines, although it mostly does that through leasing arrangements.

Q: Is it a problem having different kinds of computers?

Cupec: Not a big one, because we've made a conscious decision to standardize on the PC, and we don't actively invest in computers that aren't compatible.

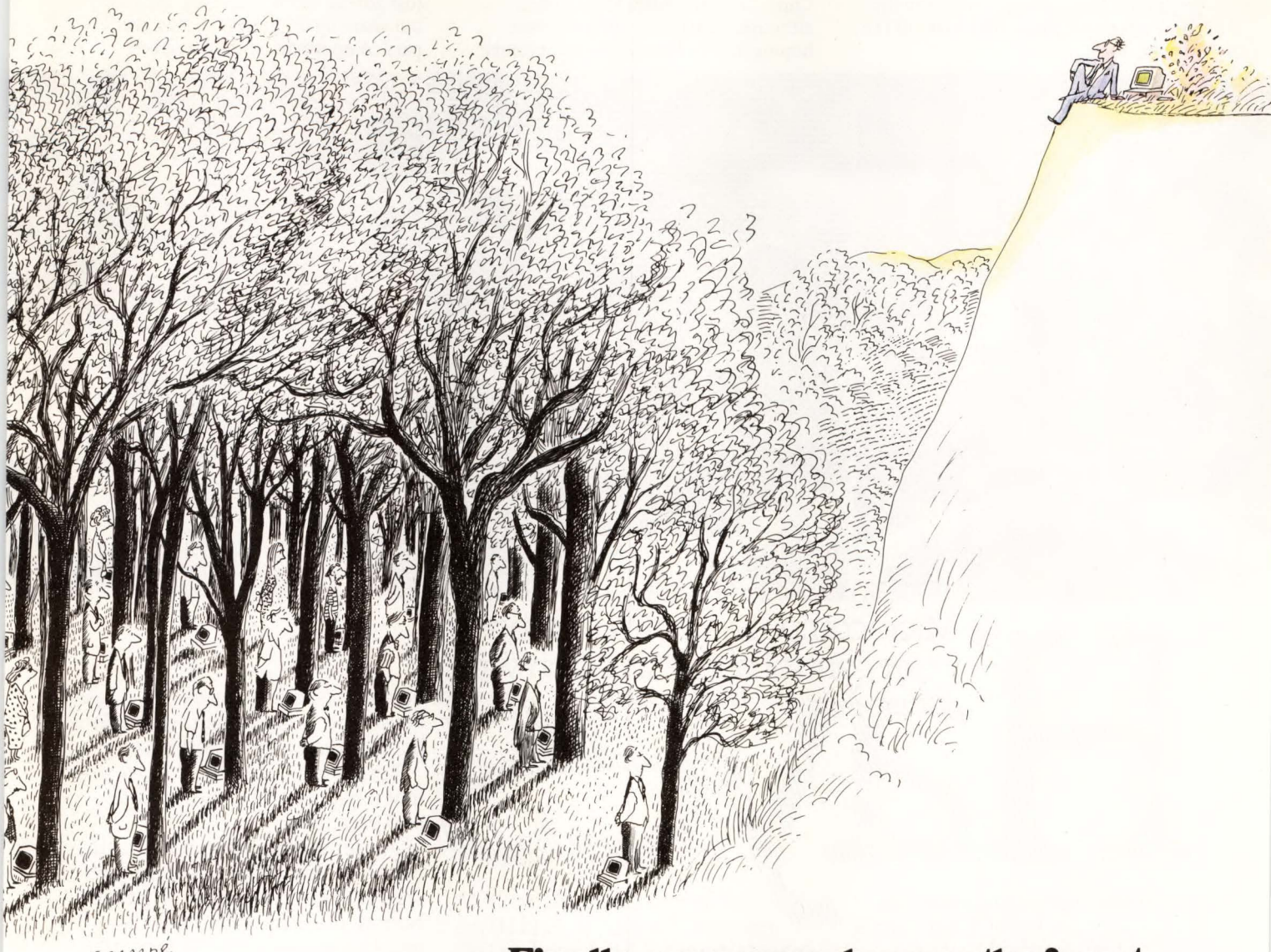
We didn't choose the PC because we thought it was the technological leader, but by standardizing, we'll solve ourselves a slew of problems. Other product lines won't progress as well as the IBM line, and by standardizing, we'll be able to take advantage of all the advancements IBM introduces. It also makes our training a little easier. We still have a problem keeping up with all the personal-computer developments, but that's minimized because of our focus on IBM equipment. And we still have users coming to us with questions about options or capabilities we don't know about.

Q: Do you have to encourage employees to use personal computers?

Cupec: I don't think we've ever had to encourage users. We do try to steer them toward the use of standard software packages, even though some risks are associated with that strategy. If we can get a business manager to understand, say, a spreadsheet package, then he or she can very rapidly develop scenarios. This lets us remove the middleman in some cases. The risk is that the manager will become so enamored of the personal computer that, instead of performing managerial duties, he or she will become a closet programmer.

Q: And to avoid this you just

(Continued on page 21)



Finally, someone who sees the forest. As well as the trees.

In their great rush to fill the office with personal computers, people lost sight of the ultimate objective. To work together more productively.

Then Sperry appeared.

With a remarkably simple solution. The Sperry PC.

It was personal, but not so personal that it would keep people from being part of a system.

It could run all of the software of IBM's PC.

It performed all the user-friendly functions people expected. It was, in fact, even friendlier than IBM's machine.

It had a more comfortable keyboard. A more dramatic display of graphics. And a high-speed "turbo" switch that allowed it to run 50% faster than IBM.

And it could keep people in touch with the most valuable resource an organization can have —the main computer.

No matter whose big system they have.

Sperry *or* IBM. Or both.

The Sperry PC.

Admittedly, big picture.

But then, that's what happens when you look at the forest. As well as the trees.

See how the Sperry PC can work for you. Call 800-547-8362, toll-free. Or write us. Sperry Corporation, Computer Systems, Department 100, P.O. Box 500, Blue Bell, PA 19424.

SPERRY PERSONAL COMPUTER SPECIFICATIONS

OPERATING SYSTEM MS DOS Version 1.25 or 2.0 with G.W. BASIC	KEYBOARD 84 keys, 6 ft. cord
MICRO-PROCESSOR High-Speed 16-bit 8088	AUXILIARY MEMORY Up to two internal 5¼" diskettes 10MB internal fixed disk when configured with single diskette.
DISPLAY SCREENS High Definition monochrome display. High resolution color display. IBM compatible graphics.	USER MEMORY Standard 128K bytes, expandable to 640K
	DIAGNOSTICS Power-on self test
COMMUNICA-TIONS Built-in Asynchronous	CLOCK Time-of-day with battery back-up

SPERRY

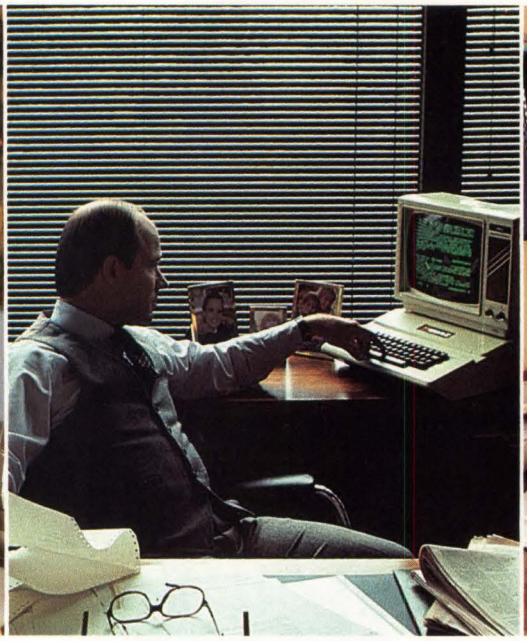
The Sperry PC. What the personal computer should have been in the first place.

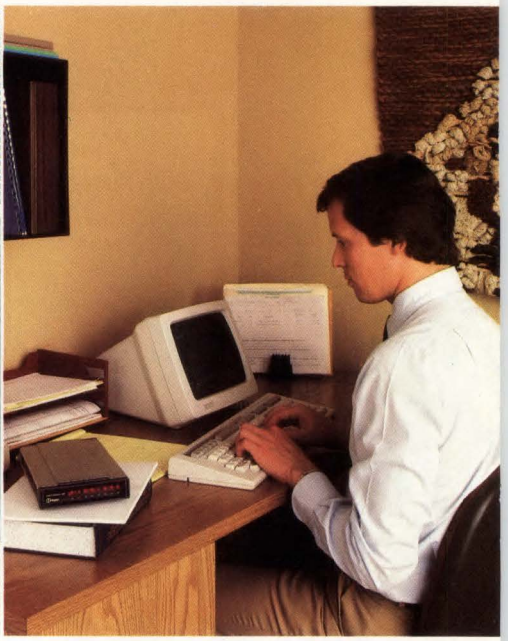
CIRCLE 25

To all reps: Price changes on following items effective immediately: No. 10-11A, 10-114A, 10-AL.

Chris: The latest offer looks better, although it's still not what we were hoping for. Try for another compromise.

Just got the word from Gary. Increased our share by 6%. If trend holds, we'll pass competition by third quarter!





Microcomputer communications? Get control of the situation with Hayes™

Microcomputer communications can present the DP/MIS staff with a tangle of mismatched hardware, user-hostile software, and a situation that can quickly get out of hand.

Hayes can help you avert that chaos, with a telecomputing system designed expressly for microcomputers.

A system so advanced, it's downright simple. Economical. And requires no handholding from you.

Hayes. The computer's telephone. Our Smartmodem 300™ and Smartmodem 1200™ connect to any desktop computer with an RS-232C port. They operate with rotary dial, Touch-Tone® and key-set telephone systems. At full or half duplex. And both feature self-test capabilities, as well as indicator lights and built-in speakers for monitoring calls.

The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. A built-in speed selector on Smartmodem 1200 automatically detects transmission speeds (110, 300 or 1200 bps).

Smartmodem 1200B™ is also available as a plug-in board for IBM® Personal Computers. And Hayes manufactures the Micromodem IIe® for Apple® II, III, IIe and Apple Plus computers, as well. It comes packaged with Smartcom I™ communications software.

Speaking of software, more programs are written for Hayes modems than for any other. And that impressive list includes our own incomparable communications software.

Smartcom II.™ Complete, menu driven software for the IBM PC, DEC Rainbow™ 100, Xerox 820-II™ and Kaypro II.™ Even first-time communicators will find success with Smartcom II. Screen prompts guide users in the simple steps it takes to create, send, receive, list, edit, name and re-name files.

Tasks like simultaneously receiving, printing and storing data–completely unattended–are easily managed with Smartcom II, because it takes full advantage of Smartmodem's capabilities.

The program reduces lengthy dial-up and log-on sequences to a single keystroke. It stores communications parameters for 25 remote systems.

Plus, there's an on-line help feature that explains prompts, messages and parameters.

Our reputation speaks for itself. Hayes has five years of solid leadership in the microcomputer industry. Nationwide availability through retail computer stores. Trouble-free factory service and call-in assistance. A limited two-year warranty on all hardware. And the most efficient telecomputing system available. Anywhere.

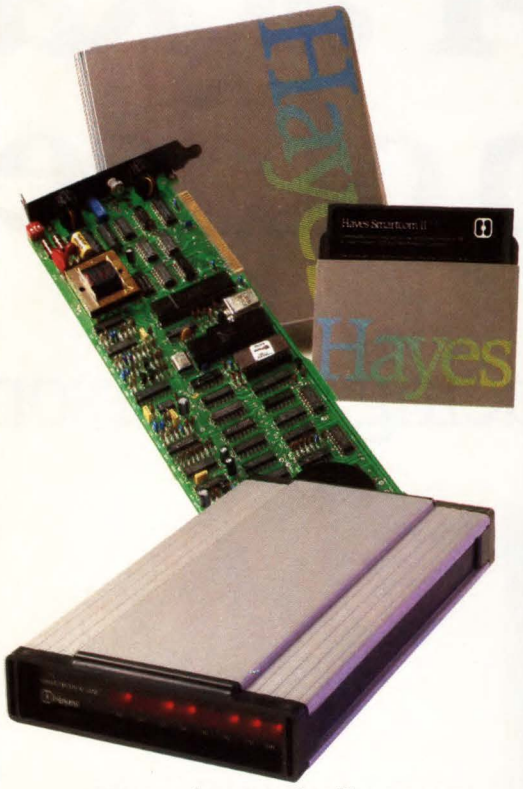
If you're involved in linking micros or setting standards for configurations, remember this. Everything your people need to know about communications can be summed up in one word: Hayes.

Hayes®

Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092. 404/441-1617.

Micromodem IIe is a registered trademark of Hayes Microcomputer Products, Inc.
Smartmodem 300, Smartmodem 1200, Smartmodem 1200B, Smartcom I and Smartcom II are trademarks of Hayes Microcomputer Products, Inc.
Touch-Tone is a registered service mark of American Telephone and Telegraph.
IBM Personal Computer is a registered trademark of International Business Machines Corporation.
Apple is a registered trademark of Apple Computer, Inc.
Rainbow is a trademark of Digital Equipment Corporation.
Xerox 820-II is a trademark of Xerox Corporation.
Kaypro II is a trademark of Non-Linear Systems.
Z8 is a trademark of Zilog, Inc.

Smartcom II communications software, currently available for IBM PC, DEC Rainbow 100, Xerox 820-II and Kaypro II.



Smartmodem 1200 for all computers with an RS-232C interface; Smartmodem 1200B plug-in board for the IBM PC.

Smartmodem Specifications:
Low Speed Data Format: (Smartmodem 1200 and Smartmodem 300) Serial, binary, asynchronous; 7 or 8 data bits; 1 or 2 stop bits; odd, even or no parity (0-300 bps).
High Speed Data Format: (Smartmodem 1200) Serial, binary, asynchronous; 7 data bits; 1 or 2 stop bits; odd, even, or fixed parity or 8 data bits; 1 or 2 stop bits; no parity (1200 bps).
Dialing Capability: Touch-Tone® and rotary-dial pulse dialing.
Command Buffer: 40 characters.
Commands: (unnecessary with Smartcom II software) A: Immediate answer. A/: Repeat last command. C: Transmitter Carrier. D: Dial command, including simple dialing, waiting for second dial tone, auto-dialing and other features. E: Local echo. F: Full/half duplex. H: Switch hook. M: Audio monitor. O: On-Line. P: Pulse dialing. Q: Quiet mode. R: Reverse originate/answer mode. S: 17 "Set" commands speed, escape code character, number of rings to answer on, etc. S?: Checks operational parameters above. T: Touch-Tone dialing. V: Verbal result codes.
Result Codes: (can be numerical/verbal): 0/OK: Command line ok. 1/Connect: Carrier detected. 2/Ring: Phone is ringing. 3/No Carrier: Carrier lost or never heard. 4/Error: Error in command line. 5/Connect 1200: Carrier detected at 1200 bps. (Smartmodem 1200 only.)
Audio Monitor: Two-inch speaker with volume control.
Rear Panel: On-off switch, power jack, RS-232C connector, modular phone jack connector, volume control.
Operation: Full or half duplex.
Data Rate: 0-300 bps and 1200 bps for Smartmodem 1200; 0-300 bps for Smartmodem 300.
Interface: RS-232C.
Intelligence: Z8™ microprocessor with 4K byte control program for Smartmodem 1200; Z8 microprocessor with 2K byte control program for Smartmodem 300.
Modem Capability: Bell System 103 or 212A compatible originate or answer mode for Smartmodem 1200; Bell System 103 compatible originate or answer mode for Smartmodem 300.
Receive Sensitivity: -50dBm for Smartmodem 1200; -45dBm for Smartmodem 300.
Transmit Level: -10dBm.
Registration: FCC registered for direct-connect to the nationwide phone system. Connects with modular jacks RJ11W, RJ11C, RJ12W, RJ12C, RJ13W, RJ13C.
Power Pack: U.L. listed 120VAC, 60Hz, 13.5VAC output.
Size: 1.5" × 5.5" × 9.6"

CIRCLE 12

A PERSONAL OPINION

(Continued from page 18)

promote the use of standard software?

Cupec: We're doing a little more than that. We've established an end-user assistance center to help users when they have a problem, so they don't have to do all the experimenting on their own. The goal is to familiarize them with the available packages, so they'll know which ones are appropriate for which problems, and they won't have to do their own programming.

We also screen employees applying for computers to make sure they have a legitimate need. If an employee requests a personal computer to perform an application that could be better handled through our internal timesharing or on an underutilized personal computer, we won't buy another one. We maintain records of what's been purchased, and we have a good inventory system.

Q: Do you help managers and users find ways to use their computers?

Cupec: Not really. Our corporate-systems approach is that all computer-system applications are rooted in actual needs. We don't manufacture solutions to problems that don't yet exist. We really want the applications to arise from genuine business needs.

To help our users, we've set up an internal computer-rental program. If a user thinks he or she can do a particular application with a personal computer, but isn't really sure about it, he or she can rent it from our internal group at a rate that will allow us to recover its cost. The employee can use the computer for 30 days, 90 days, or longer, if need be. At the end of that period, he or she can decide if it's worthwhile to buy one.

Q: Are there benefits to personal computers that you hadn't foreseen?

Cupec: They are showing us new ways to market our services. And we're now attempting to develop products that will work on microcomputers in our customers' offices. We're going to put out an integrated family of products that a corporate treasurer, or one of our correspondent bankers, can use, either as operations-oriented or decision-support tools.

Q: What new ways do the machines help you market your services?

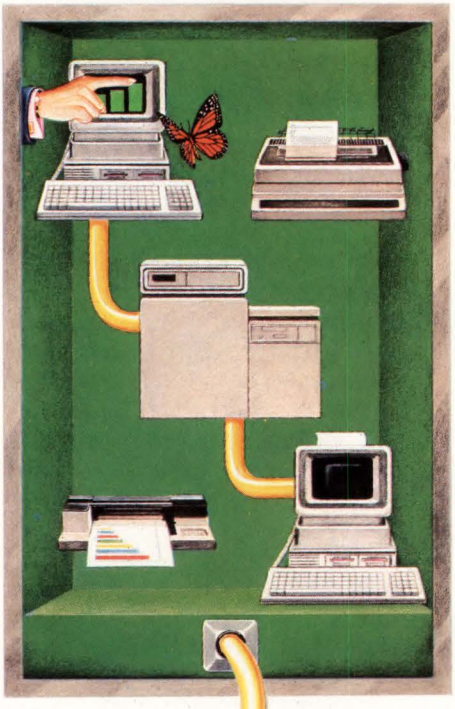
Cupec: Some of our lending officers are making reasonably good use of Grid Compass portable computers. They are taking them into clients' offices for on-the-spot analyses of loan agreements.

They might also use them for administrative purposes. Instead of going back to the office and writing a memo describing everything important that happened on a call—then having it typed and proofread—an officer can type a call memo into the portable and send it via telecommunications back to the office.

We're doing something similar with investments and portfolios. It's not on-the-spot analysis as such, but if a client asks one of our officers what an investment in a particular security might yield, he or she can reevaluate the portfolio and show it to the client. There's always a need to have the current value of a customer's portfolio on hand. If you're on the road, you can call up the Dow Jones News/Retrieval Service, get the current stock prices, and set a value for that client's portfolio on the spot. We're not very far along with that application, but I think it's obvious—if you look at the kind of personal computer we're using—that our uses are innovative. □

Hewlett-Packa surge in office

Introducing the Person



The principle is simple. Boost the productivity of individual PCs. Your people, your department, even your entire company will follow suit.

The first boost occurred when we introduced the touchscreen HP 150 as an office and managerial workstation. This made personal computing so much easier and faster that individual productivity soared.

Now the Personal Productivity Center combines the flexibility of the HP 150 with the power of our HP 3000 family of distributed computer systems.

You can shape each Productivity Center just the way you want it by adding other office and computing products from our extensive range.

You can link managerial and secretarial workstations. Create impressive presentations, merging business graphics and word processing. Store them on large disc files. And print them out on laser printers and color plotters.

Your PCs also grow more productive by increasing the range of software they can run. In addition to leading PC programs like 1-2-3™ from Lotus™ and popular word processing packages, they can use HP 3000 business software like our exclusive Desk-Manager. This combines electronic

rd touches off a productivity.

al Productivity Center.

mail, quick memo writing, personal filing and calendar functions. And each PC can access data processing systems and large corporate data bases.

Personal Productivity Centers can communicate with similar networks in other parts of your company, as well as your mainframes. Each system can expand to handle more than 100 workstations. And you can grow without involving your programmers in any software conversion.

So if PCs alone are making your people more productive, just wait till you see them all working together.

And you can see them right now by calling your local HP sales office listed in the white pages. Or write for complete information to: Hewlett-Packard, Dept. 27191, 19447 Pruneridge Avenue, Cupertino, CA 95014. In Europe, contact Henk van Lammeren, Hewlett-Packard, P.O. Box 529, 1180 Am Amstelveen, The Netherlands.

It could turn your whole company into a productivity center.

Productivity. Not promises.

HEWLETT PACKARD

The Visual Commuter:™ the heavyweight power and memory of a desk-top computer in a 16 pound briefcase.

Announcing the no-compromise computer. Commuter.™

No longer is it necessary to lug a 32 pound "portable" through airports. Or sacrifice features for convenience. Or even purchase one computer for your office and one for travel. Commuter is a breakthrough in portable computers. With all the capacity, capabilities, and features of a desk-top computer. In only 16 pounds.

Why buy a desk-top computer when you can carry a Commuter?

Commuter *is* a desk-top computer. It features a 16-bit 8088 processor. 128K of memory, expandable to 512K. Single or dual 5 1/4" floppy disk drives, each with 360K bytes of storage.

In or out of the office, Commuter becomes an executive work station: The full 80 column by 16 line optional flat panel display is easily removed to attach an external monitor or television set. And built in ports let you add hard disk, communications, and a wide variety of printers. Even the IBM expansion chassis.

But with Commuter, you not only get a computer for your office. You also get one for the road. Because Commuter gives you dimensions that no other desk-top computer or portable

VISUAL

Visual Computer Incorporated

in its class can: 15″ x 18″ x 3½″, with built in handle and briefcase-sized carrying case. Never has a powerful computer been easier to handle.

IBM® PC compatible. And downright sociable.

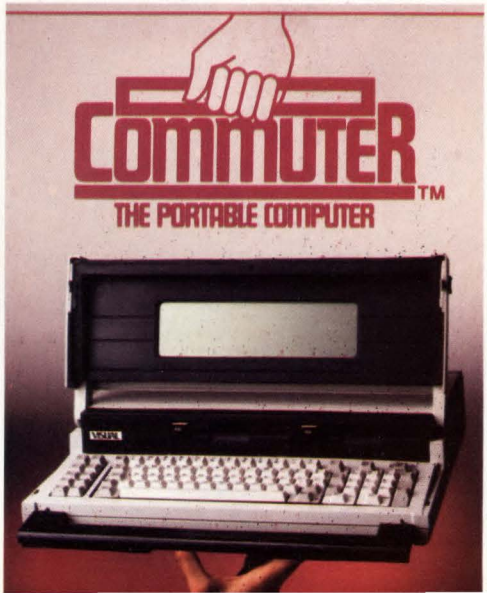
Commuter offers you a level of IBM PC compatibility unmatched in a portable computer. Commuter comes bundled with the MS-DOS™ operating system and GW Basic.™ Your commands are entered on a full 83 key keyboard with an IBM PC layout, including numeric pad and ten function keys. IBM compatible color graphics and monochrome support are built right in.

Unlike many so-called IBM PC compatible portables, Commuter can run virtually all of the software written specifically for the IBM PC. And Commuter's double-sided, double-density diskettes are directly transferable to and from the IBM PC. So you can take advantage of hundreds of available software programs: Business programs like Lotus® 1-2-3,™ VisiCalc,™ or WordPlus-PC.™ Games like Flight Simulator.™ Even educational software from Spinnaker.™ Right off the shelf. Without modifying a thing.

Pick up the perfect business partner for only $1995.

Why compromise? With its heavyweight memory, desk-top power, and 16 pound weight, Commuter is clearly the practical choice. But the best part is, at only $1995, you can pick it up for practically peanuts.

Try out Commuter at your local authorized dealer today. Or call Visual Computer at **1-800-847-8252.** (in Mass., call **1-800-462-5554**), or write Visual Computer Incorporated, 135 Maple Street, Marlboro, MA 01752 for more information.



Commuter. It can take your business places it's never been.

AUTHORITY VS. AUTONOMY

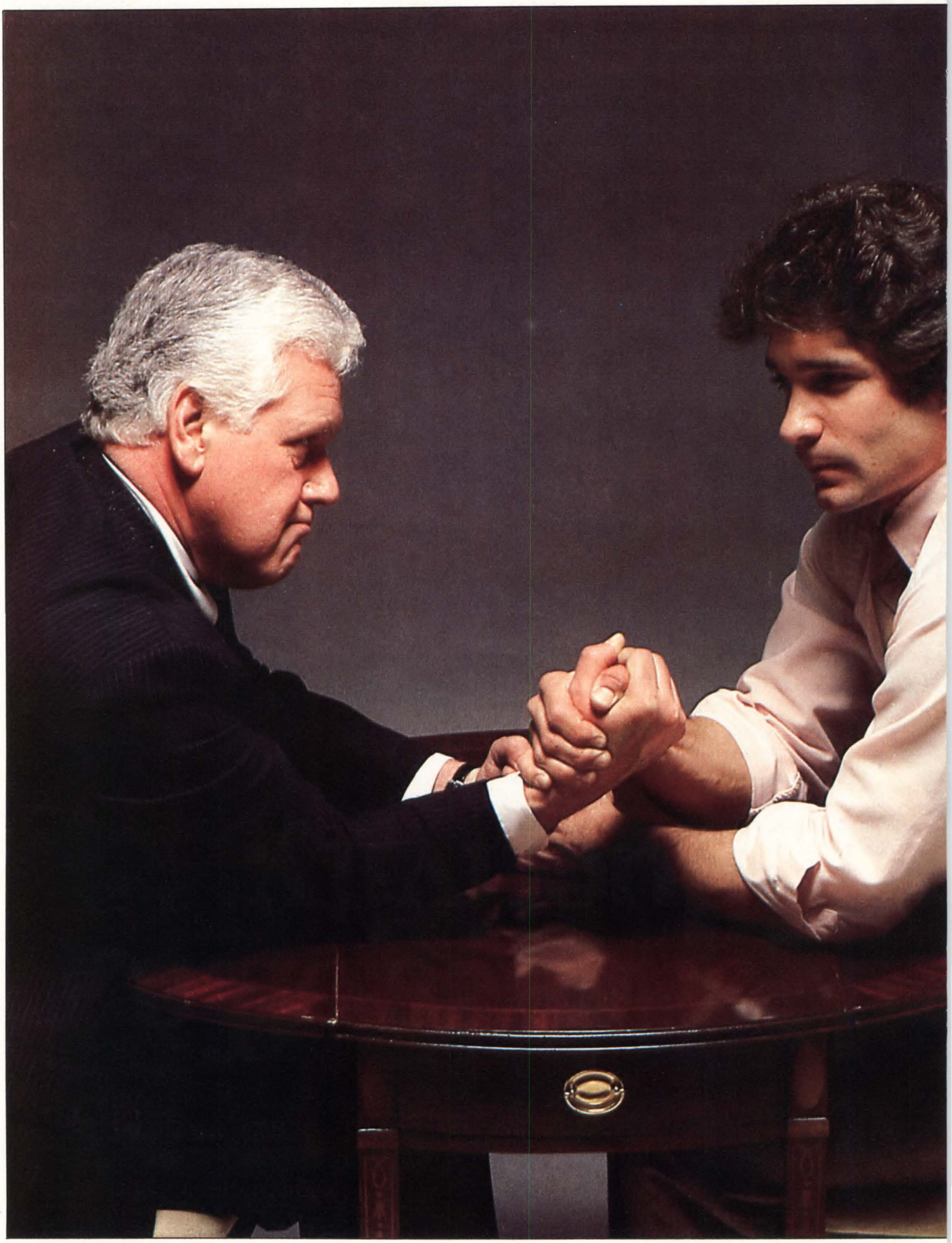


Photo by Alan Bernstein

DOES THE HEAVY HAND DEFEAT ITSELF?

Should a corporation direct employees toward a goal, or allow them to find their own creative way? Personal computers bring this classic management question into sharp focus.

by David Kull, Management Issues Editor

An executive who has painstakingly developed his own programs and data for financial forecasting, when told of his company's plans to network personal computers, replies: "If anyone touches my machine, I'll kill him. . . ."

A CEO, advised by data processing that a corporate inventory has uncovered a host of incompatible personal computers, decrees that the company shall buy only one model. . . .

There is something about personal computing that stirs emotions among easygoing employees and pulls extreme reactions from otherwise reasonable business leaders. On one hand, using a computer to leverage the work of your mind is, as its name states, *personal*. Ideally, the individual employs the machine to translate ideas and information into intricate structures of intelligence, a process as intimate as thinking. On the other hand, a corporation may understandably fear that the power of personal computers and other personal-computing tools, if not carefully controlled, will not fully support organizational goals.

The divergence of individual and organizational points of view over personal computing mirrors the classic division between laissez-faire and strict management philosophies. But while the issues specific to personal computing parallel the general argument (individual creativity carries special benefits; while technological and economic considerations call for some central controls), assimilation of personal computers is a separate question. Other personal-computing options—mainframe-based microcomputer software, supercharged terminals—are not difficult to control. However, a company implementing personal computers must explore their unique implications for and requirements of the corporate culture. This approach will reveal the most effective implementation strategy as it illuminates the organization's basic management philosophy. Confusing the problem with the context, or ignoring the background completely, usually leads to overly strict policies and lost opportunities.

"Corporate struggles over the introduction of personal comput-

AUTHORITY VS. AUTONOMY

ers may be an actual problem or a symptom of deeper troubles in the organization," asserts Ian Mitroff, professor of business policy at the University of Southern California, Los Angeles. "If a company has managed the question of freedom vs. control well in general, it shouldn't have any trouble managing personal computers."

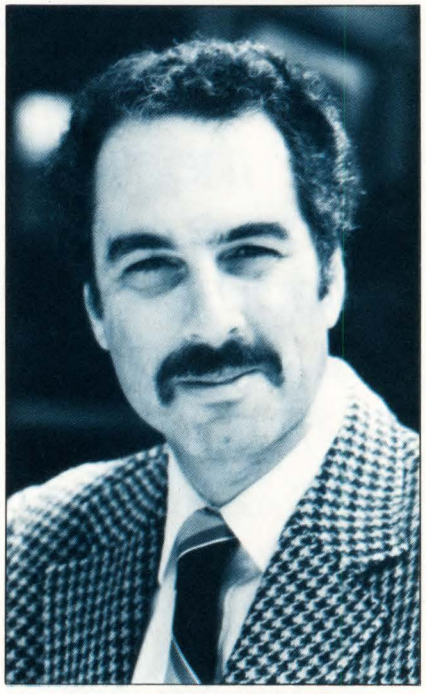
The opposite is also true. A corporation's underlying troubles may be stirred up, and perhaps worsened, by the introduction of personal computing. In a troubled company, the corporate culture—the unwritten rules of conduct—may not easily accommodate aspects of the process.

For example, Mitroff says, "If one of the unwritten rules is, 'Don't share information; keep it close to the vest because it's power,' throwing in personal computers will only accentuate secrecy."

The organization should not count on technology alone to carry harmony and productivity into the workplace. The issues are primarily behavioral. A company adopting personal computers should decide how personal computing will promote characteristics it wants to foster and pare those that are undesirable. Executives, managers, and employees alike must perceive good reasons for acting in a particular manner. If the corporate culture does not provide incentive for creative, responsible computing, it won't happen.

"You can install electronic mail and put out all the memos you want asking employees to begin communicating," Mitroff argues. "But if they aren't used to sharing, they won't use the system; they won't magically become trusting."

A strategic campaign to alter



"Corporate struggles over the introduction of personal computers may be an actual problem or a symptom of deeper troubles."
Ian Mitroff, USC

organizational behavior is required in such instances. But it won't be an easy mission. Attempts to change long-established patterns must reverse a natural momentum and, sometimes, overcome entrenched interests. Data processing has traditionally been centrally controlled. Activities that shake this status quo, no matter how gently, will provoke defensive reactions.

Many companies overreact, says John J. Bray, president of Form Corp., Boston, which has trained thousands of executives in computing. "Because data processing has always been centralized, management views any individual computing as a threat to authority," he says. "The brass overreacts to the spread of personal computers by instituting very strict policies."

When directed against a perceived threat, strict policies—including restrictions on the models that can be purchased—can create the very resistance they're meant to counter. Employees are apt to feel that management is trammeling their rights to structure their own computing—that is, their thought processes. And they are apt to react too strongly.

Organizations that don't approach these conflicting interests with sensitivity risk losing many of the advantages of personal computing. In almost any business situation, the advantages generally become obvious at the local level only after some experimentation. The employees in charge of a promotional mailing list, for example, might discover that new names and addresses can be automatically gleaned from the company's own billing file.

Though organizations have legitimate reasons for centrally controlling personal computing, most management experts favor a relaxed attitude—particularly during the early stages of adoption, when individual creativity is likely to pay the greatest dividends. "When you want employees to think about new ways to use personal-computing tools as competitive weapons, you should step back and let ideas flourish," says Michael Scott Morton, professor of behavioral and policy sciences at the Sloan School of Management at the Massachusetts Institute of Technology, Cambridge.

Though Morton advocates a trusting approach, he nevertheless believes that managers should be given responsibility for making their departments' business aims clear. Employees should know that their personal com-

puting must be directed toward meeting tangible business needs. "There are so many tasks to be accomplished that no single executive can know exactly how they should all be done," says Morton. "You have a lot of very smart people in middle management; trust them to sort out the conflicts between personal and corporate goals."

In some corporations, employees accept fairly rigid policies from the start, often because the main applications are straightforward and amenable to mandated procedures. After personal computing has taken hold, controls can promote efficiency in any company. But Morton contends that, for most organizations in the early stages of adoption, "controls could act as a straightjacket, not as a means for helpful coordination."

Morton relates attempts to dictate how employees would use personal computers and other tools to mistakes made in the early 1960s, when organizations were implementing centralized data processing. Many companies tried to transfer their manual procedures directly to mainframes, and lost many of the advantages of the new technology in the process. Departments in the habit of updating files monthly, for example, often continued to do so—even when the computer allowed them to do it easily, and profitably, as often as they liked. Similarly, new and better ways of accomplishing tasks are possible through personal computing, but they can be discovered only through experimentation.

An organization's stance on personal computing can and should change as the technology is adopted by employees. Michael Treacy and John Henderson, also from MIT's Sloan School, have described four stages in the corporate adoption of personal computing, during which different management strategies take on increasing degrees of importance.

The stages begin with promotion, move through incorporation of day-to-day operations, and end with an economic-regulatory stance—the corporation institutes policies aimed at recouping its investment and controlling costs. The types of centralized involvement begin with organizational support, and progress through data management, development of a technical infrastructure, consolidation of operations, and ongoing evaluation.

The key in the early stages is to help individuals and departments with their own personal computing, Treacy says. As the number of users grows, the implementation stage begins, and the organization can move toward technical standards and data management. Treacy believes that mandated standards take on importance only during the later stages of adoption. Corporate-wide regulation of personal computing aimed specifically at controlling costs should begin only after it has become part of day-to-day operations throughout the organization.

The primary argument in favor of standards states that they are required to ensure compatibility of personal computers for communications. For most organizations today, Treacy says, this is not a legitimate concern. Few companies have enough personal computers to make compatibility a significant issue, he argues, and worries about future incompatibility are unreasonable. Further, because the equipment has only a three- to four-year lifespan, a company loses little if it seeks interconnectability after acquiring a host of diverse machines. But by putting off a decision, or limiting itself to one brand of equipment, an organization may miss out on technological developments.

"Companies that standardized on the Apple II yesterday are standardizing on the IBM Personal Computer today," Treacy says. "This means they're missing out on the benefits of Apple's Lisa, which may be substantial for some employees. The technology is evolving faster than these corporations can react."

Not everyone is sanguine about the compatibility issue. William Gallagher, president of Computers Simplified (Oakland, CA), has helped many large corporations train executives in personal computing, and he contends that arguments in favor of putting off the interconnectability question are based on "a wish and a prayer." Organizations might *hope* that technological advances will make compatibility easier to achieve, allowing existing programs and machines to commu-

Organizations can't count on technology alone to carry productivity into the workplace. The issues are behavioral.

AUTHORITY VS. AUTONOMY

nicate, he says. But there's not much evidence that such a development will come about soon.

Even if an organization successfully connects incompatible machines, it may be adding to its training headaches. The time that employees need to learn a new technology represents a loss of productivity. "It usually takes me five to 10 hours to become proficient with a new piece of software—and I'm an expert," Gallagher says. "The typical employee might need a week."

Despite these concerns, Gallagher has seen large corporations vacillate over the kind of personal computers they will support. One large bank, which had an Apple users group with hundreds of members, announced that in the future it would support only the IBM PC—it would buy only PC-compatible software and provide training exclusively on that machine. Although users were allowed to continue with applications already in place on their Apples, many were distressed by the new directive. In fact, several managers who had been instrumental in developing Apple applications left the company as a result of the edict.

Many corporations are standardizing on the IBM PC, even though it's not the best personal computer for all jobs and their reasons for choosing it are not always logical, says Gallagher. One questionable justification he's heard from several executives is the belief that they'll never get fired for buying IBM PCs. Returning to Ian Mitroff's point about the relationship between corporate culture and successful personal computing, a company that frowns on innovation among its middle managers is not likely to gain maximum advantage from the new technology.

Michael Treacy would leave the decision on whether or not to standardize to end users. Users should have the machines they want, he contends; if they want units that will communicate, they'll ask for interconnectibility. Intelligent support from MIS will help them see the advantages of communications and other advanced functions.

Strictly regulating personal computing is like telling employees how to arrange their desks.

"MIS should provide leadership, not authority," Treacy says. "It should keep an eye toward the future, but not let the future dominate its thinking today."

The approach to personal computing taken at the Gillette Co. in Boston demonstrates how a corporation can weigh user autonomy against central controls—and shift that balance over time. According to John di Targiani, Gillette's vice president of information systems, influential users helped MIS draft a personal-computing policy incorporating considerable flexibility. The company, through a committee made up of the directors of administration and project management, and plant and divisional controllers—among others—provides support for four kinds of personal computers, allowing exceptions to that limitation if users can make a good argument for them.

When the microcomputer poli-

Finally A Printer More Advanced than Your Software. Lear Siegler's VersaPrint™ 500.

Lear Siegler's new VersaPrint™ 500 Series printers – professional business printers for micros, minis and mainframes – utilize the full potential of your most sophisticated business software and are ready for even more.

Just one VersaPrint printer spans virtually all business applications: cut sheet letterhead correspondence, high volume continuous reports, financial spreadsheets and even complex color graphics. You can match the broad capabilities of such popular software programs as Lotus 1-2-3.®

Lear Siegler VersaPrint™ 500 Series printers combine with professional computers and/or Lear Siegler video display terminals for ideal workstations.

You can have 72x72 and 144x144 dot per inch graphics for design applications on the same high volume, dot matrix printer that gives you 136 columns for reports and 224 columns for spreadsheets. All on an NLQ printer that's quieter than a typewriter.

VersaPrint printers connect to your system via RS232 serial interface or Centronics type parallel interface. You can run it at 180, 90 or 45 cps for draft, memo or NLQ quality. And it's so reliable, you won't have to change printheads for 1½ years.

Four VersaPrint models are available. To the basic Model 500, the Model 510 adds cut sheet feed, the Model 520 adds color printing, and the Model 530 adds both cut sheet and color. Short form tear bar option is available.

The VersaPrint Series is from Lear Siegler, world's favorite terminal manufacturer. It's backed by full service centers with walk-in Express Depot™ service, on-site service and extended warranty serving 3,000 cities nationwide.

And VersaPrint printers are made in America – designed, engineered, manufactured and shipped from our Anaheim, California facility.

For more information and a complete demonstration call your local Authorized Distributor or, for quantities in excess of 250 units, your Regional OEM Sales Office.

Call Lear Siegler at **800/532-7373** for the phone number of an authorized distributor near you: Advanced Technology · Continental Resources · The Datastore · Data Systems Marketing · David Jamaison Carlyle · Digital Source, Inc. · Dytec/South · Gentry Associates · Kierulff · Marva Data Services · Peak Distributors, Inc. · Pioneer (Standard, Harvey, Gaithersburg) · Wyle Electronics

Distributor Sales & Service: Boston *(617) 456-8228* · Chicago *(312) 279-7710* · Houston *(713) 780-9440* · Los Angeles *(714) 774-1010, ext. 219* · Philadelphia *(215)* 245-4080 · San Francisco *(415) 828-6941* · England *(04867) 80666* · From the states of CT, DE, MA, MD, NJ, RI, VA and WV *(800) 523-5253.*

OEM Sales: Chicago *(312) 279-5250* · Houston *(713) 780-2585* · Los Angeles *(714) 774-1010, ext. 582* · New York *(516) 549-6941* · San Francisco *(415) 828-6941* · England *(04867) 80666*

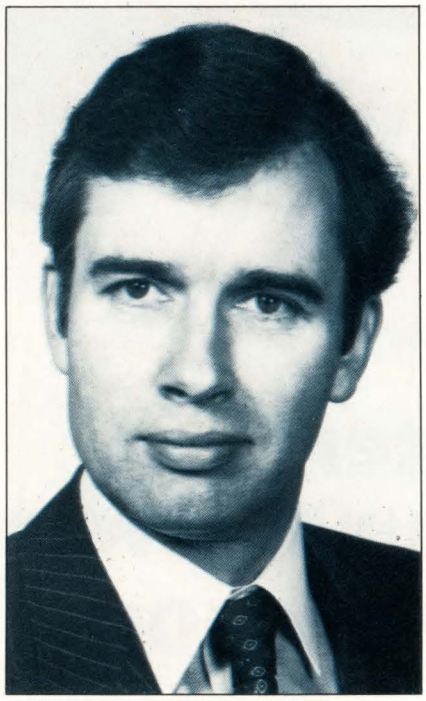
LEAR SIEGLER, INC.
DATA PRODUCTS DIVISION

901 E. Ball Road, Anaheim, CA 92805
(714) 774-1010

1-2-3 is a registered Trademark of Lotus Development Corp.

CIRCLE 13

AUTHORITY VS. AUTONOMY



"When you want employees to be thinking about new ways to use the computer as a competitive weapon, you should stand back and let ideas flourish."
Michael Scott Morton, MIT

cy was instituted in 1982, the committee enforcing it tended to accept even weak arguments. In one case, an executive claimed a need for portability, which was not a feature of any of the supported models. Although the committee felt it would be more efficient for the executive to acquire two machines from the approved list—one for the office, one for home—it granted his request. At the time, the group felt that fostering user acceptance of personal computing outweighed the need for strict adherence to standards.

The committee has since adjusted this view. Since personal computers are now firmly entrenched in the corporation, says di Targiani, "Lately, we've been taking a tougher stand on exceptions."

Personal computing raises autonomy-vs.-authority issues beyond the technical considerations of standards and compatibility. The new tools can alter long-established procedures to such an extent that organizations and managers may well feel they are losing track of their employees' activities. Is time spent at a personal computer really productive? Is the work produced with the machine really what the company has to have done? Most observers believe that these are nothing more than traditional personnel-management concerns. Good managers keep in touch with their employees, guiding those who stray from pursuit of the collective task back into the fold.

Still, managers must cope with several unique aspects of personal computing—some actual problems, some only perceived. In doing so, they'll be directing the vast changes personal computing is bringing to the workplace.

Some executives worry that employees will be so enticed by the computing segment of their jobs that they'll neglect other important tasks. They fear, for example, that the engineer who loves to make plots using graphics software will spend too much time making plots and not enough time *engineering*.

Consultant Tom Willmott of International Data Corp., Framingham, MA, sees potential for wasted time as individuals explore the capabilities of their personal-computing tools. "Executives won't be playing Pac Man at their desks," he says. "But they might spend too much time on tasks outside their job descriptions. Not everyone should spend 20 hours learning a spreadsheet program from the ground up."

Willmott points out that this is a traditional management problem. Coffee pots, telephones, and other office fixtures have long provided potential distractions. Managers should be aware of the potential for inefficient computer excursions, which may not be as obvious as other time-wasters like personal telephone calls. They should, however, be handled in the same fashion.

Many executives and other employees become enamored of personal computing. Do they face the danger of becoming part-time computer programmers and analysts when they're supposed to be managers, engineers, and secretaries? According to MIT's Morton, this is a minor problem.

"Not that many people are really entranced by the technology," he adds. "For those who are, after the first six months or so, reality sets in and the pressure of getting work done forces efficient use of the computer."

Michael Treacy, who worries little about holding beginning users to technological standards, also feels managers should guide individual computing toward collective goals. They should keep in touch with their departments' progress in adopting personal computing just as they would for any other major change or project. Employees who become used to going their own way with their machines might resist standards later, when the organization is ready to consolidate personal-computer operations.

To provide effective guidance, managers need not be whizzes at the keyboard. They must know only enough to broadly understand what their employees are doing with their computers. Wil-

(Continued on page 36)

SIX IBMs ALL IN ONE CIE

It's like getting five IBM terminals free.

In a CIE-7800, you get plug compatibility with the IBM 3178 and all five models of the 3278 series. Yet, a multi-model CIE-7800 costs less than any single one of those IBM terminals.

Both smaller and bigger at the same time

What meets the desktop is a far more compact terminal, too. The CIE-7800 is 40% smaller than any IBM.

But, through the ingenuity of CIE/ACM design, what meets the eye is a screen over one-third larger than IBM's.

The CIE monitor also rotates and has an upward tilt of from 0 to 20 degrees for adjustable viewing. And it weighs less than 20 pounds, so it's easily moved. It's user-friendly to the *nth* degree.

22 keyboards

The detached, low profile keyboard has an 87-key IBM compatible layout. And it can be user-configured into any of nearly two dozen U.S. and international keyboards, all of which give you a continuous adjustment angle of from six to 11 degrees.

Alternate DEC® and HP 2622 personalities

The CIE-7800 is available with *concurrent* alternate personalities. With a single command, you can switch to DEC VT100,® or HP 2622, or IBM 3101-3104, or IBM 3275/3276-2 (bisynch single station), while still retaining IBM 3178/3278 compatibility. No other terminal is as versatile. Not one.

New CIE-7850 "add-in" intelligence

The new CIE-7850 is more than just an add-on. It's an add-in. As shown below on our screen, you simply plug the 7850 into the Coax-A line between the controller and terminal to give you access to both on-line mainframe processing power and local intelligence.

The CIE-7850 conducts concurrent operations in either 3178/3278 or its local intelligence mode, which is *100% IBM PC compatible.*

To learn more, just contact ACM, Inc., Suite 540, 3857 Birch Street, Newport Beach, Ca. 92660. Or call toll free 1-800-854-5959. In California, call 1-800-432-3687.

C.ITOH ELECTRONICS ACM

® DEC and DEC VT100 are Registered Trademarks of Digital Equipment Corp.

CIRCLE 14

CP/M, CBASIC and PASCAL MT+ are registered trademarks of Digital Research, Inc. SUPER CALC 2 is a trademark of Sorcim, Inc. Personal Pearl is a product of RSI Corporation. dBase II is a product of Ashton-Tate Corporation. BSTMS is a product of Byrom Software Corporation. CP+ is a product of Taurus Software Corporation. The Source is a servicemark of Source Telecomputing Corporation. IBM is a registered trademark of International Business Machines Corporation.

Four-Phase is helping more than 2,000 DP managers win the productivity game.

Now it's your turn.

It's easy to win the distributed information processing game when you play it with the Series 4000 from Four-Phase. The Series 4000 is an integrated, growth-oriented system designed to communicate within your IBM environment. No other vendor gives you so many functions for so many years at such affordable prices. In the distributed processing arena, that's the way to score points with both end-users and top management.

You win the DDP game with software.

Four-Phase provides one of the most impressive and complete collections of software ever offered from one company. Our packages make integrating Four-Phase computers remarkably easy. And guarantee a logical growth path for years to come. Here's just a sample of what we provide:

Interactive processing: VISION®—For creating custom applications from order entry to transaction processing. It provides a high level of functionality that can be used in any distributed environment. And VISION is easier and faster to program than COBOL.

Word processing: FOREWORD®—Our powerful shared-logic word processing system allows text to be entered, stored, edited, distributed and printed.

Graphics—For business graphics, the Graphics Management System (GMS/IV) gives you an easy way to condense and conceptually present data that's easily understood by decision makers.

COBOL—Industry standard COBOL is used to write programs for handling keyboard-entered data and general batch processing.

When they want PC's, you've got them!

If your end-users are like most these days, they're clamoring for their own personal computers. We play that game, too. Because at the flick of a switch, our multifunction terminals suddenly become stand-alone PC's. So now you can give your users the distributed processing capabilities they need, AND the personal computers they want. All in one integrated system.

MFE

The action starts with the Multifunction Executive.

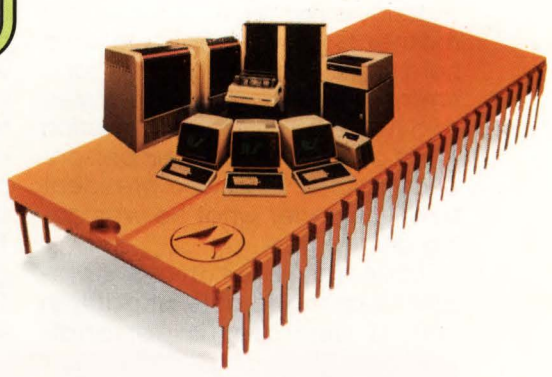
The key to the Series 4000 game plan is the Four-Phase Multifunction Executive (MFE). This unique and powerful control program monitors each multifunction terminal in your system. Its ability to run multiple software programs allows your users to perform 16 different tasks from any terminal on the system. And each of your users can access all of our software packages with one keystroke. You get maximum distributed processing capability and control.

Plus, MFE dynamically allocates selected peripherals so that each device can be used by more than one program. The result—MFE eliminates the need for multiple processors, duplicate terminals and other peripheral devices at installations that require concurrent execution of software.

2,000 winners can't be wrong!

Four-Phase was the first company to introduce the integrated approach to multifunction distributed processing. Today, there are more than 15,000 installed Series 4000 systems, helping people like you manage the information needs of over 150,000 end-users. And every machine is backed by our Customer Support Operation and over 1,000 field service people to provide continuing support and reliability at every level.

Four-Phase customers have been winning the DDP game for years. You can, too. To find out how, call us today at 1-800-529-6050, ext. 1599. In Arizona, call 1-800-352-0458, ext. 1599. For a free poster of this illustration, write to us at 10700 North De Anza Blvd., M/S 52-6A9, Dept. P., Cupertino, CA 95014.



MOTOROLA INC.
Information Systems Group

Four-Phase Systems
The Office Automation Company

AUTHORITY VS. AUTONOMY

As personal computing became established at The Gillette Company, the microcomputer committee tightened its stand on exceptions to standards, says John di Targiani, vice president for information services.

(Continued from page 32)

liam Gallagher tells of training a corporate vice president to use a spreadsheet program. After generating his first report in just a few moments, the executive said he'd recently asked a staffer for a similar document. "The employee said he could provide information in just a few hours using his personal computer," the vice president said. "I wonder what he was doing all that time."

While the executive's comment was made at least partly in jest, it illustrates a personal-computing pitfall managers should avoid: They should recognize that individuals take to the technology in very different ways, depending on their own outlooks and capabilities, the kind of work they do, the quality of the data they have on hand, and the machines and programs with which they begin. Also, the machines have limits, and managers shouldn't expect too much. Interactive, *friendly* programs can entice employees into attributing intelligence to the computers, which can lead to irrational expectations and decisions.

Some oversold executives who discover how ordinary the personal computer's contribution actually is tend to discount its usefulness. On the other hand, programs that display harsh messages or make it difficult for users to recover from mistakes reinforce the fears of those who approach a keyboard with trepidation. The variety of possible responses to computers argues in favor of organizations allowing individuals latitude in employing them, while it points up the need for informed support.

Policies governing personal computing should leave room for, and even encourage, different work habits. But since information is clout, organizations may fear that the use of microcomputers and other personal-computing devices will cause unexpected shifts or concentrations of power. These concerns are usually exaggerated, most experts contend. The flow of information via personal computers usually conforms to established patterns.

Consultant Willmott calls the question of selfishly protected files a "non-issue." Managers might resist sharing microcomputer-developed information not out of proprietary feelings, he says, but because of the time, expense, and inconvenience of passing it along. These issues can be dealt with through proper organizational support.

USC's Mitroff points out that a corporation with a tradition of open communications will have little difficulty accommodating and taking advantage of the individual's increased ability to process data. MIT's Morton notes that managers may well keep some files secret from their bosses. But he likens these documents to the personal notes and rough drafts that employees have always kept tucked away in their desk drawers. These idiosyncratic, private aids used to get work done ultimately contribute to the efficient operation of the organization, but the corporation serves no purpose by trying to gain access to them.

In a sense, attempting to strictly regulate personal computing is like trying to tell employees how to take notes, arrange their desks, decorate their offices, and think about the problems they're asked to solve. The personal computer holds out the promise of new, better solutions. But these solutions are the products of individuals, who, even as they contribute them to the corporate good, will feel the pride of creation. Companies operating in an increasingly complex world, faced with increasingly complicated tasks, must respect these feelings by acknowledging the contributions and granting their employees the freedom to produce them. □

Confusing the problem with the context often leads to overly strict policies and lost opportunities.

Simware Delivers Protocol Conversion, PC Support ... and more.

Unique communications software
SIM3278™ is the unique, low-cost software communications package that transforms micros and ASCII video display terminals into simulated full screen 3278s. What's more, SIM3278 installs in minutes on VM or MVS systems, works with most terminals, supports from one to a thousand workstations, and operates without any additional hardware or software modifications.

More than just a protocol converter
SIM3278™ is loaded with extras no hardware converter can provide. Features such as on-line help, personal computer support, and a session manager that allows each workstation, including real 3270's to initiate up to 12 concurrent interactive sessions.

The Micro-to-Mainframe link
SIM3278™ has the added capability of providing the full screen micro-to-mainframe link for most personal computers, without having to install additional micro boards. Extended features for the IBM Personal Computer include attached printer support and file transfer during full screen operation.

SIM3278 from Simware
Today's cost-effective software solution. Get all the details and arrange for a trial demonstration today. Call (613) 235-6736

SIMWARE
a practical approach to communications

Simware Inc.
969 Bronson Avenue
Ottawa Ontario
Canada K1S 4G8

Telephone (613) 235-6736
Telex 053 4130

MICRO USES, MISUSES AND MISTAKES

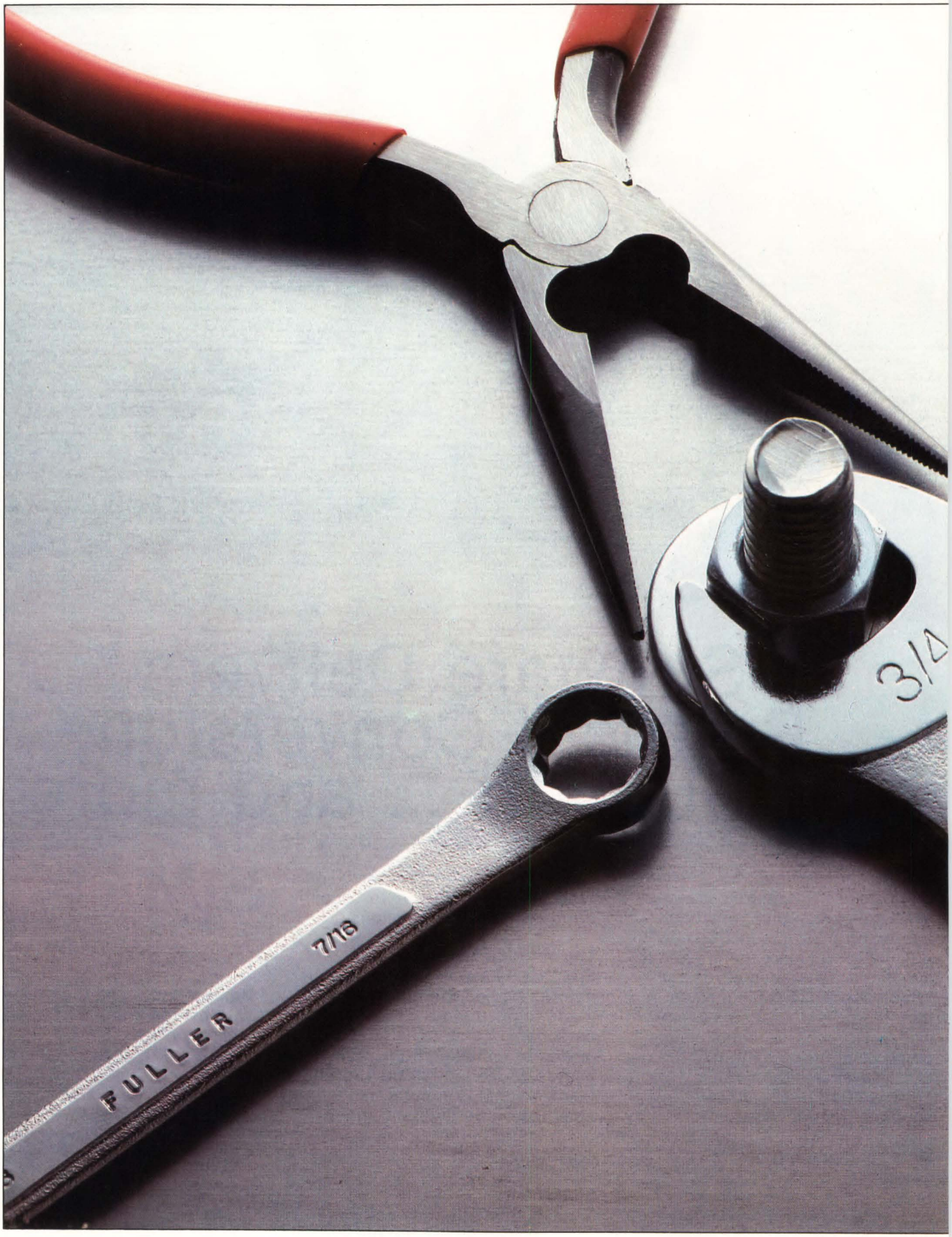
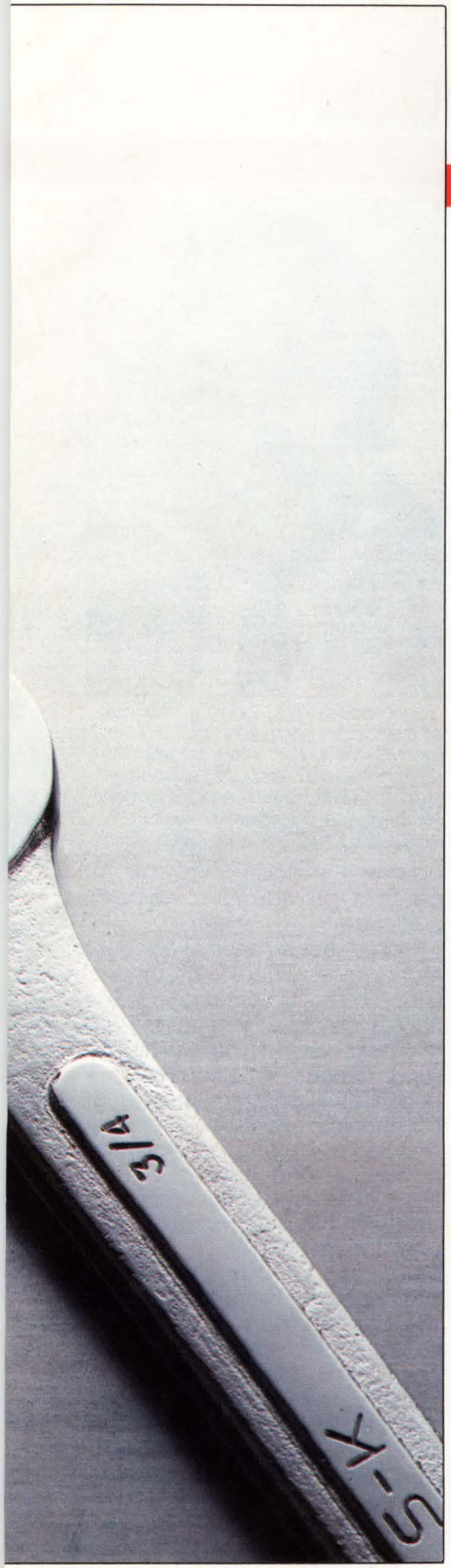


Photo by Bill Oliwa



THE RIGHT TOOL FOR THE RIGHT JOB

The personal computer can be a powerful productivity raiser, but if it is used for the wrong tasks, it can cause corporate distress.

by Joseph Hillhouse

Few devices in recent years have aroused expectations as great as those for the personal computer. Some proponents believe the personal computer is in the vanguard of a revolution that will reshape the way we work and even think.

One such enthusiast, Richard L. Deal, a consultant based in Burke, VA, credits the personal computer with having demystified computers, reversing the alienation associated with fast-paced high technology. The microcomputer has the power to capture the heart and sharpen the mind, says Deal. "The structure and discipline of working on a personal computer makes you a better problem solver, even if the calculations don't help you," Deal says. "One of the most important aspects of the personal computer is that it forces employees to adopt a structured way of thinking."

If it fulfills its promise, the personal computer gives productivity an unprecedented boost by letting managers and executives manipulate and analyze information as never before. But as the possibilities expand, so do the dangers of careless mistakes and even willful abuse. As a business tool, the personal computer comes fully loaded with risks as well as benefits. One security analyst, in an advertisement published last year, labeled the microcomputer "the electronic office's Dr. Jekyll/Mr. Hyde."

The double life of the personal computer presents managers with a twofold challenge. Obviously, they must channel the positive influences of personal computers toward corporate goals, but they must also head off mistakes and prevent misuses. It's great that fewer employees are intimidated by the technology, but authorized computer users who possess more enthusiasm than experience can inflict terror on corporations through honest human error. Their mistakes may be much more frequent—and more alarming—than the more publicized intrusions of hackers.

Part of preventing misuse and mistakes is the establishment of security procedures. But managers can also prevent problems by helping employees understand the limits of their machines to ensure that they aren't used for inappropriate or wasteful tasks.

Mistakes are probably inevitable in the early going. During the last three years, Ritch Gaiti, vice president of the office-systems group at Merrill Lynch, Pierce, Fenner &

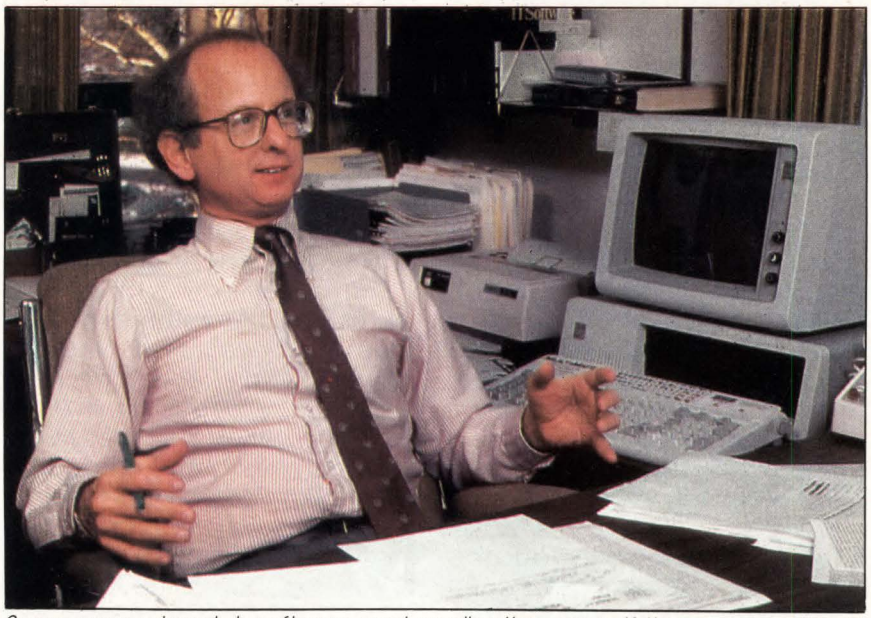
MICRO USES, MISUSES AND MISTAKES

Smith, New York, has witnessed real progress among account executives at the nation's largest brokerage firm. But at first, he says, failures outran successes by a ratio of 10 to one. "We had no control; the right software wasn't available; and some of the users were incompetent," Gaiti says. "There were lots of reasons for failure. Most of all, they had high expectations and were getting poor results."

Gaiti's job is to help reverse that abysmal success-failure ratio by providing support and education. The account executives are fairly independent operatives who won't stand for policy dictums, he says. Instead, Gaiti's group provides the executives with a lot of "hand-holding," in the form of classes and a newsletter, a special hot line for questions, and special software tailored to their needs by in-house staff. Although such coaching and support are less dramatic than setting snares for hackers, they are just as important to corporate success.

Ignoring or banning personal computers to avoid the mistakes of uninitiated users would be a major mistake, outweighing many, many little ones. Like Merrill Lynch, other corporations are becoming aware of the problems that accompany the promise of personal computing, and they're acting. Price Waterhouse, the New York-based Big Eight accounting firm, surveyed 240 accounting, data-processing, and auditing officers in 100 companies last fall and found that 81 percent of the companies have policies covering the acquisition of personal computers and software; 74 percent provide training for users; and 73 percent integrate personal-computing planning with overall systems planning. Some of the other results were more worrisome, however. Only 52 percent of the companies have established policies governing the use of personal computers; only 22 percent provide users with a manual "or other documentation" explaining management policies; and only 19 percent provide data-security guidance.

Corporations must control their mix of personal computers, but also must restrain users who attempt to match the advance of technology step for step, says Thomas Ottman, second vice president of data processing for Travelers Corp.



Some users mismatch software and application, even if they are provided with good off-the-shelf packages, says Norman Agin, vice president of Martin Marietta Data Systems.

Frank S. Baker, a senior account manager at Price Waterhouse, finds the results encouraging. The figures indicate a trend toward greater corporate control of personal computers, he believes. The relatively high percentage of companies exercising their authority over microcomputer acquisition and training is a reflection, he says, of the amount of attention focused on those issues over the last 18 months. With so much recent publicity about data security, he feels confident the other numbers will improve.

"Most organizations are up to about their knees," Baker says. "Before they get waist-deep, they need to address these other policy concerns, and we think they will. This is part of a natural progression. Companies will respond to the need and overcome the problems."

Perhaps the turning point in the evolution of personal-computer use in any given corporation is the realization that micros are not the right tools for some jobs. This epiphany must be shared by managers and employees alike if a corporation is to move beyond the mistakes and misuses of the early days to fulfillment of the promise of personal computing.

Most surveys of corporate micro use identify the same core applications as being most popular. They include project management, spreadsheeting, business forecasting and budgeting, statistical analysis, database management, text processing, communications, and graphics, and are collectively known as decision-support systems. In most cases, says Hannah Blank, a vice president at Chase Manhattan Bank and author of *Mastering Micros* (Petrocelli Books, $25), a how-to manual for novices, personal computers are brought in to handle jobs that are a high priority for the manager involved, but a low priority for the data-center staff.

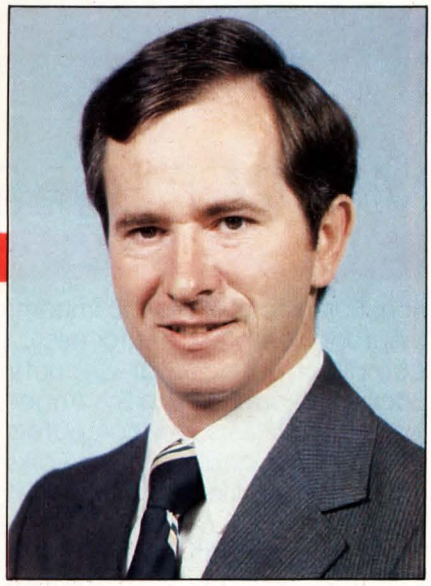
Rule Number One for these uses reads: Tasks performed on a personal computer should be scaled to its relative limitations. When John F. Rockart, director of the Center for Information Systems Research at MIT, and Judith Quillard, the assistant director, studied personal computing at 10 major corporations, they found three fundamental limits. The applications should not be functionally complex; they should involve relatively small amounts of data; and they should not compromise corporate accounting practices, says Quillard.

Perhaps the first distinction that must be made is between *production data processing* and *decision support*. Heavy number-crunching and highly repetitive paperwork functions are, as a rule, more efficiently performed on mainframe computers than on either timesharing systems or personal computers. For reasons of security, the same is generally true of applications involving sensitive, financial, personal, and proprietary data.

Whether a particular task should be performed on a microcomputer often has less to do with the type of application than its scale and complexity. For instance, Richard Deal, the consultant, relies on a microcomputer to manage three separate consulting businesses, but to perform certain complex modeling functions and simulations, he makes use of a commercial timesharing service.

"It's not entirely useful to talk in terms of application," says Robert Freeman, senior research analyst at Input, a market-research house in Mountain View, CA. "Often, it's the scale of the function, the scale of the task that makes the difference in determining whether it belongs on a microcomputer."

File size—the amount of storage required—is another limiting factor, says Judy O'Connor, manager of the information center at Travelers Corp., the Hartford, CT-based insurance carrier. If running a task on a microcomputer requires using more than one floppy disk, O'Connor believes the task should be moved to a host computer.



By centralizing data and applications for downloading by personal-computer users, corporations can reduce the incidence of entry errors, says Jack Ewers, manager of systems planning and integration for Honeywell Inc.

Others argue that failing to put even relatively simple programs, if they have broad application throughout the corporation, on widely available online, or timesharing, systems is a mistake. Some companies, however, replicate simple programs for each additional end user. In a study published in 1981, Rockart noted that so-called "prototype programs" developed on timesharing systems for eventual conversion to the mainframe, in many instances, never make the transition. Today, a similar situation arises out of the relative ease of developing and testing programs on microcomputers. Some prototypes will probably become permanent solutions, frustrating the worthy goal of efficient design and use of corporate information-processing tools.

Many corporations have both personal computers and timesharing systems, and there's no reason the two can't productively coexist. *How* they should work together is quite another ques-

"If I gave a man nothing but a hammer to work with, he'd start treating everything like a nail."

—Freeman, Input

MICRO USES, MISUSES AND MISTAKES

tion. For instance, Mark Burnham, assistant vice president for microcomputer services at Security Pacific National Bank in Los Angeles, believes personal computers strung along local-area networks will put timesharing systems out of business.

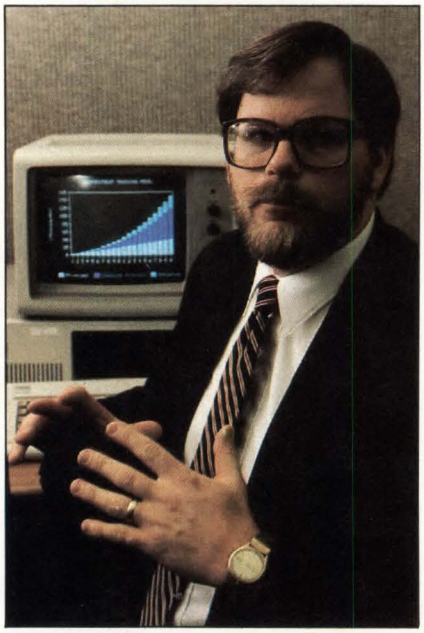
Many corporations are sidestepping the question for the moment by adapting personal computers for use as terminals. At General Motors Corp., Detroit, micros are being used to assist design and manufacturing engineers. But, says Laird Johnson, director of applications development, GM eventually plans to tie "a considerable number" of IBM Personal Computers into mainframes and superminis as "windows into our data."

But separating the right jobs from the wrong ones for personal computers doesn't always come down to a question of mainframe vs. micro. One of the key questions growing out of the personal computer's rapid conquest of the office is whether to automate certain tasks or continue to do them *manually*. Just as some manual jobs belong on a host computer, others probably are best left alone. Barbara Muselli, assistant to the president at BankAmerica, San Francisco, found this to be the case with the bank's two-year-old Executive Office Automation System.

"You have to be careful not to automate inefficiency," Muselli says. "We considered automating the executive calendar, for example, but to me, the most efficient way, the fastest way to keep that calendar is still with a pencil and eraser."

The choice may depend on the situation. Arthur E. Higinbotham, a division vice president for 3M Co., St. Paul, MN, has found that after putting his division's executive-meeting schedule on the computer, he can locate in just five minutes a time slot when 10 or 15 high-level executives can be brought together. The job used to take a secretary half a day on the telephone, he says.

Donn Parker, computer-security consultant with SRI International, believes that the discipline employees acquire from using micros may improve data security.



Many corporations that are now separating tasks to be done on personal computers and those to be done on timesharing services will soon be able to put everything on networked personal computers, says Mark Burnham, assistant vice president of Security Pacific National Bank.

Still, Higinbotham agrees that some things are easier to do without the computer. He, for instance, prefers to flip through the telephone directory when looking for a corporate number, instead of running through the directory in the computer. And an attempt to keep his personal finances on a computer at home has convinced him that any system that involves the "double entry" of data—if you still have to keep paper records, as well—will use up more time in data entry than it will save through rapid calculations.

Double work certainly classifies as an inefficiency. Higinbotham is also concerned about the impact of office automation on the division of labor between executives and secretaries. If an executive does in 10 minutes what a secretary used to do in 12, he suggests, the net result is a loss to the company. "We need to make sure," he says, "that managers aren't doing what secretaries used to do, that we're not actually increasing the cost of getting the job done."

A good many failures suffered by novice microcomputer users are rooted in fundamental misconceptions about the amount of effort and expense required to achieve success. To expect miracles is to invite disappointment and discouragement. "A lot of office automation is pick-and-shovel work," says Barbara Muselli of BankAmerica. "People really don't want to get into it, and it's even harder to do when you're under constant pressure to

(Continued on page 46)

My boss told me, "To get ahead, get Knoware™ fast!"

THE KNOWLEDGE COMPANY

Knoware™

Knoware teaches you to use a personal computer—in no time! Knoware gives you software programs you can use—all the time!

Knoware makes personal computer learning enjoyable.
Knoware combines a unique educational experience with intriguing entertainment. Thanks to its friendly format, you'll finally be able to say with confidence, "Now, I can really use my personal computer."

Knoware makes personal computer learning easy.
You don't have to wade through written instructions or a stack of manuals. All the help you need is right in Knoware itself. It's clear, concise, and free of computerese.

Knoware makes personal computer learning worthwhile.
In a few hours with Knoware, you'll be comfortable with six of the most important business applications used every day.

Basic programming | **Spreadsheet applications** | **Financial decision making**
Database management | **Text editing** | **Simple graphics**

Knoware is a tool you can use at work or at home.
Your Knoware learning experience doesn't end when you've been through Knoware once—or even twice. You've only just begun. Knoware includes a number of starter-kit software programs to get you going with your own personal computing.

Spreadsheet | **Individual Retirement Account Planner**
Database Manager | **Financial Decision Support**
Text Editor | **Calendar**
Pie and Bar Graphs | **Metric to English Measurement Conversion**

Knoware is where to go first.
If you own a personal computer or are thinking of buying one, get Knoware...fast! And start profiting

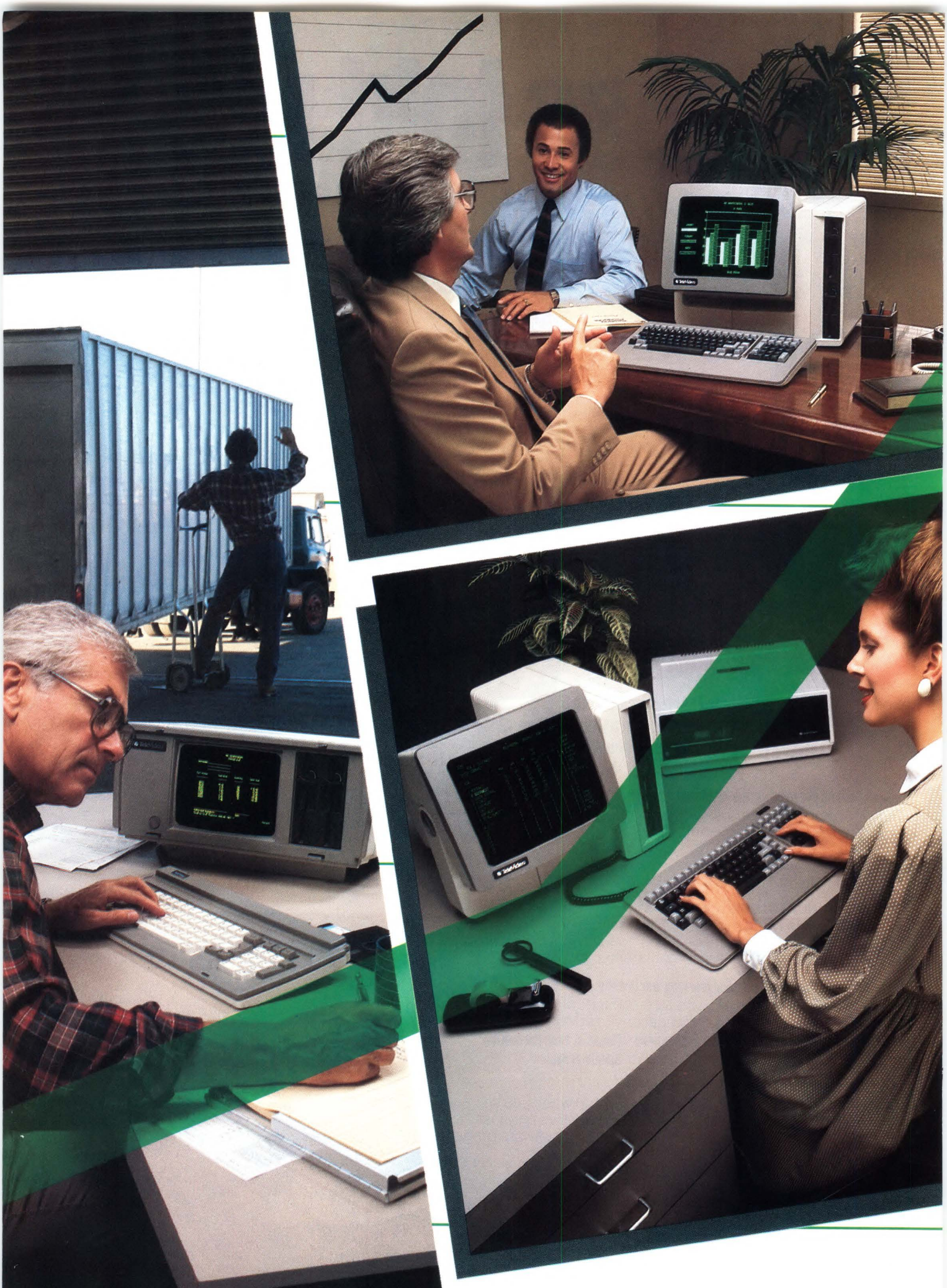
Available on Apple® II + and IIe, 64k
IBM® PC and XT, DOS 1.1 or 2.0, 128k, color graphics

For information about how you can get Knoware fast contact your retail dealer—or write or call us at 617-576-3825.

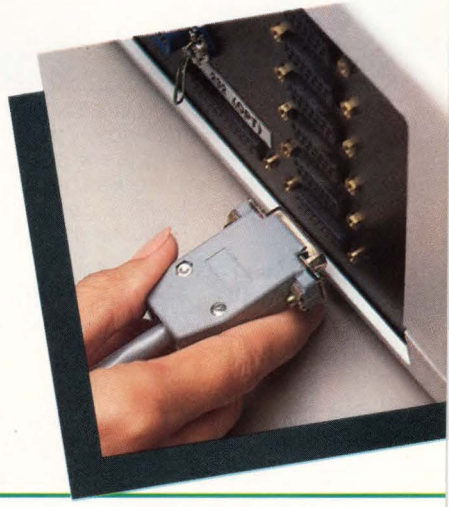
Knoware

301 Vassar Street, Cambridge, MA 02139

"Jenkins, take a memo. Anyone in this company who doesn't understand personal computers (and I know who you are!) had better get Knoware fast!"



PLUG INTO THE NETWORK BOOM.



Nobody networks like TeleVideo, the world's leading multi-user systems manufacturer. Our Integrated Systems Design makes the entire TeleVideo line fully compatible. That means networks and multi-user systems can be created by simply plugging into our 6 or 16 user Service Processors. They incorporate existing TeleVideo computers in a shared-resources environment with no alteration of CP/M® programs. Software investments are protected as the system is upgraded to the power of a multi-user network. Making TeleVideo your best single-vendor solution.

Adding stand-alone computers or our work stations tailors storage and offline capabilities to the exact application. Our Network Service Processors can also interface with mainframes through IBM® protocols to create satellite networks. For more information call the TeleVideo sales office in your area.

Southeast (404) 447-1231 • Mid-Atlantic (703) 556-7764 • Eastern (516) 496-4777 • Northeast (617) 890-3282 • South Central (214) 258-6776 • Rocky Mountain (408) 745-7760 • Southwest (714) 476-0244 • Midwest (312) 397-5400 • Northwest (408) 745-7760 • Southern Europe (33) 1.687.34.40 • Central Europe (31) 2503-35444 • International (408) 745-7760

GET IN ON THE BOOM.™

TeleVideo Personal Computers

TeleVideo Systems, Inc.

IBM is a registered trademark of International Business Machines Inc. CP/M is a registered trademark of Digital Research Inc.

CIRCLE 18

MICRO USES, MISUSES AND MISTAKES

"You have to be careful not to automate inefficiency. Take the executive calendar, for example. The fastest way to keep that calendar is still with a pencil and eraser." Muselli, BankAmerica

(Continued from page 42)

automate without interrupting the delivery of services to the executive."

In most cases, she says, the gains are likely to be measured in "increments of five minutes," not hours. However, she says, "saving a busy executive five minutes is a real accomplishment."

Jonathan Kadis, an associate in the research program in telecommunications and information policy at the Columbia Graduate School of Business in New York, has encountered similar situations.

"Employees expect to sit down, plug in the micro, and watch it handle every bit of data they've gathered over 20 years," he says. "They really don't have what they need to get those data into a useful form. They forget that micros don't have the power or the support of mainframes."

A powerful indicator of eventual success or failure is whether users are going into personal computing with a clear idea of what they want to accomplish, Kadis says. "I've seen people staring at their micros wondering what to do with them," he says. "They buy them and don't know what to do with them."

Ritch Gaiti of Merrill Lynch has seen it happen, too. The trouble begins with the notion that the machine is magic. "Most of the people who have succeeded with this technology were looking for something very specific when they started out," Gaiti says. "The ones who fail have no idea what they wanted to do."

Hannah Blank of Chase Manhattan believes some users stumble at first because they don't have enough time to learn. Users should be familiar with the micro's operation before attempting to automate crucial activities. Blank and Barbara Muselli of BankAmerica both emphasize the importance of allowing enough time for a smooth transition from the manual world to the micro.

General Motors Corp. is one of the corporations sidestepping the choice between personal computers and centralized personal computing services by adapting micros for use as terminals, says Laird Johnson, director of applications development.

The sum of these false or abandoned starts may be a considerable collection of misconceived investments. Indeed, for some employees, it is a mistake to invest in a personal computer at all, Gaiti says. Some users discover too late that they don't have the energy or perseverance, or else that they can't fit the microcomputer into their "business style." Unfortunately, some newcomers give up after pouring from $5,000 to $10,000 into equipment, software, and training, he says.

Corporations aren't helpless when it comes to novices, however. Merrill Lynch charges a nominal fee for the support of Gaiti's staff and a license for the in-house software to weed out less-than-serious potential users. Hannah Blank believes many investment mistakes can be avoided by choosing software before hardware.

Blank recognizes that her approach cannot always be followed to the letter. Compromise may be necessary to satisfy corporate policy on the acquisition of microcomputers, for instance, or to fulfill the user's own plans to share information with colleagues. The point is, however, that the best results come from having the best possible software. Software should never be considered as an afterthought, but it often is.

Corporations can also provide a safety net for the users who do get started. Procedures for backing up valuable data *and programs* will prevent costly, frustrating losses. Blank suggests preserving three generations of important files, printing data from time to time, and making sure that properly prepared, or "initialized," disks are on hand to

THE THINGS COMPUTER USERS HAVE NO POWER OVER.

A whole host of natural and human disasters can shut your electric power down at any time.

And lost power can cause your personal computer serious trouble. Big blocks of data can be garbled and wiped right off your discs. Your computer's main memory can go blank and sensitive electronic components can even be damaged.

Protect your data and your business profits from the power line with Elgar's Uninterruptible Power Systems. Our desktop-size UPS monitors power from the line and when it fails, a battery back-up takes over and runs your computer long enough for you to shut your system down safely.

So don't leave your data unprotected another day. For more information or to order, call Elgar toll-free 800-227-3800, Ext. 7006. Major credit cards are welcome. To receive a 24 x 36 inch poster of our "Power Disaster" scene, enclose $2.00 for handling and write Elgar, Department P, at the address below.

ELGAR SAVES THE DATA

ELGAR

An Onan/McGraw-Edison Company

8225 Mercury Court
San Diego, CA 92111

CIRCLE 19

MICRO USES, MISUSES AND MISTAKES

store data. To guard against catastrophic failure, Judith Quillard of MIT warns that applications that are critical to the individual user or the organization should be identified, copied, and properly documented.

"Critical applications don't always belong on a mainframe," Quillard says. "But if a critical application is going to run on a microcomputer, it has to meet the same standards for backup and documentation as a mainframe package."

Creating good documentation is tedious and time-consuming, and unless something goes wrong, probably thankless as well. Having good documentation, however, can be essential in those times of trial. For that reason, if for no other, the vast majority of micro users should forget about writing their own programs. Howard Frank, president of Contel Information Systems in Great Neck, NY, and a former consultant, asserts that micro users who write their own software are doomed to suffer in the 1980s many of the same agonies suffered by data-processing staffs in the 1960s. In both cases, the injury will have been self-inflicted and will be largely attributable to poorly documented software.

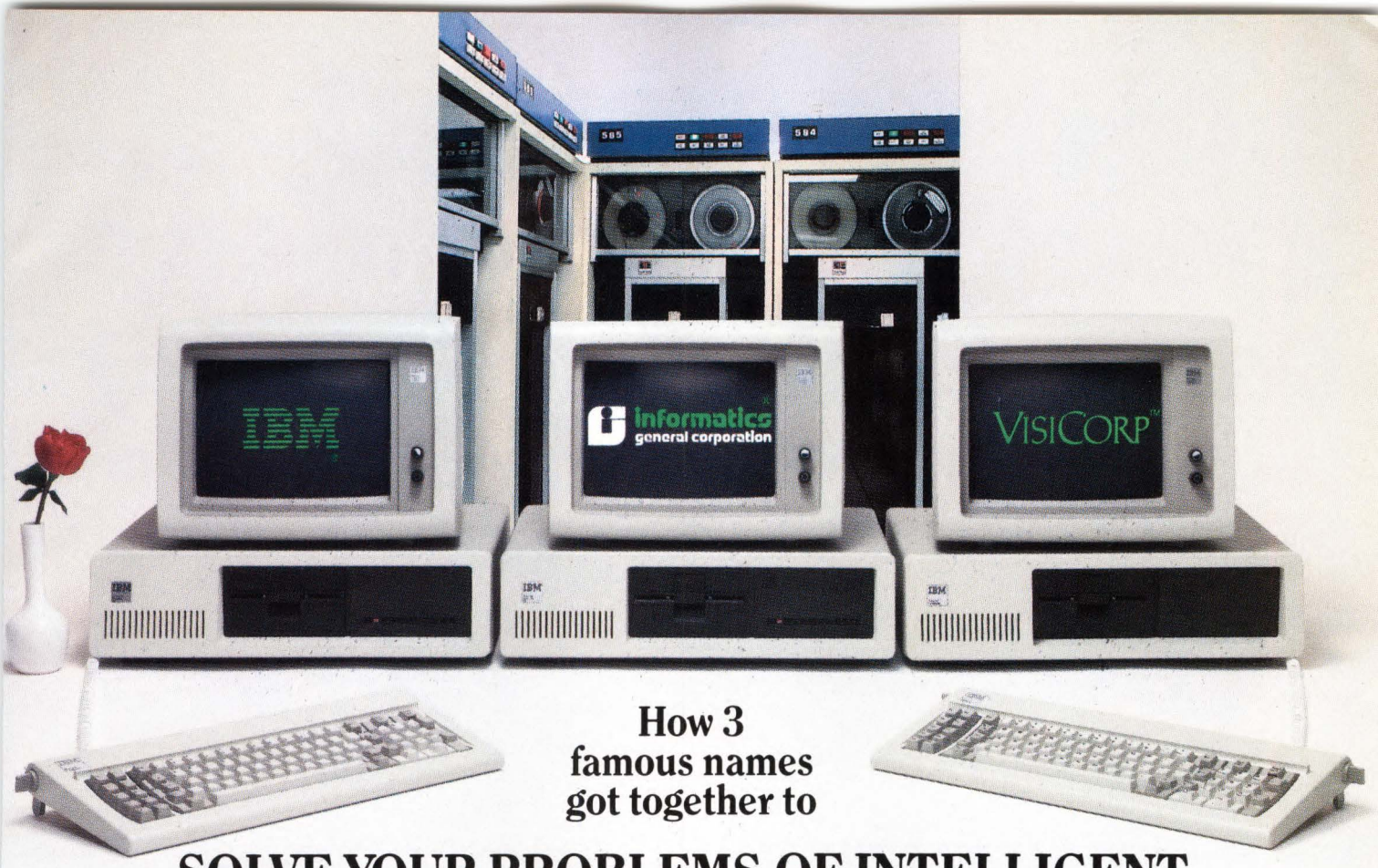
"Even computer programmers hate doing it," Frank says of the work involved in providing documentation. "End users aren't going to do it. And that's where the real danger lies."

Hannah Blank agrees that allowing users to write their own software is a mistake, but she cites another reason for leaving software development to professionals. In most cases, she says, it's a waste of time and effort for users to write programs. "Companies are losing a lot of valuable time because employees insist on trying to reinvent the wheel," she says. "There are employees out there who just don't realize what's available in the way of off-the-shelf software."

"Authorized users can inflict terror on corporations through honest human error."

Even with good off-the-shelf software, of course, it's still possible to go astray. For instance, Norman Agin, vice president of Martin Marietta Data Systems, says that many users mismatch software and application. He cites a recent survey that found that, although more than 30 percent of the respondents were using personal computers for database management, fewer than 10 percent were using database software. This situation is especially unfortunate, Agin says, because database management should be the "core module" and "integrator" for all the applications being run on a personal computer.

Agin believes the problem is largely due to the most popular spreadsheet and integrated software packages, like Visicalc (from Visicorp) and 1-2-3 (from Lotus Development Corp.), having been oversold to an unsophisticated public. "The vendors do a super job of advertising," Agin says, "and so employees use the packages whether they are appropriate or not." (He also admits that he is not a wholly impartial observer. As the head of a recently acquired Martin Marietta subsidiary, Mathematica, Princeton, NJ, he is in the business of developing and selling microcomputer software, in addition to being responsible for supporting



How 3 famous names got together to

SOLVE YOUR PROBLEMS OF INTELLIGENT MICRO TO MAINFRAME CONNECTION.

Get the answers you're looking for—with the VisiAnswer Software System from Informatics®, the leader in mainframe to micro integration.

VisiAnswer™ is the breakthrough result of a unique team effort between Informatics Corporate Micro Systems and VisiCorp™ products working with the IBM® Personal Computers.

VisiAnswer solves the timely problems plaguing data processing professionals.

Available now, VisiAnswer is the micro to mainframe system that helps you:

- Manage *and* control the integration of microcomputers with your current mainframe.
- Provide your company's micro end-users access to specific mainframe data.
- Maintain *security*/control of restricted portions of your corporation's data.
- Supply end-users access to *current "live" information,* instead of information that's historical and obsolete.
- Intelligently access *all* mainframe data.

VisiAnswer makes your job easier and more efficient than ever.

Now, with VisiAnswer, you can maintain a high level of data processing efficiency for everyone who needs access to mainframe data. It delivers intelligent solutions that make current mainframe data accessible to your end-users in an orderly fashion. That makes their jobs *and yours* easier and more accurate—something senior management will appreciate.

VisiAnswer was designed by the best minds in the business to fit your business.

You get Informatics' expertise in data access technology and mainframe system software, plus, VisiCorp's expertise in user-friendly micro software. We chose the IBM Personal Computer for its leadership in delivering business solutions, and IBM chose us as a value-added remarketer.

So you get a system that works with *all* data bases on IBM mainframe systems. And your end-users can expect data that is immediately usable with all Visi Series Products and other products utilizing the VisiCalc® file format.

Find out how VisiAnswer products can fit into your Personal Information Center as an integral part of your unique business strategy.

Get the facts on VisiAnswer—
the intelligent micro to mainframe connection.
Mail this coupon today or call toll free

1 800 227-3800 Ext. 911

(In Canada, call collect, 0 416 488-7192)

informatics
general corporation
THE SOFTWARE ENGINEERS

VisiAnswer Information Coupon

Mail to: Informatics, Free VisiAnswer Information,
P.O.Box 1452, Canoga Park, California 91304

I want to know how VisiAnswer can provide intelligent solutions to my micro to mainframe problems.

☐ I'd like to see VisiAnswer at work. Please contact me to arrange a free, no-obligation VisiAnswer demonstration.

☐ I'd like more information on VisiAnswer. Please see that I get the full details, without cost or obligation.

Your Name _____ Title _____

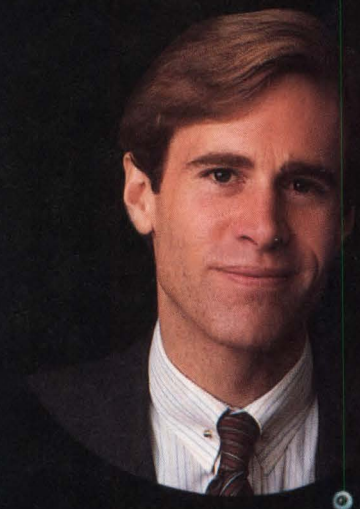
Company Name _____ Phone No. (Include area code) _____

Address _____

City _____ State _____ Zip _____

911 CD-AV

"Thoughtware, How Good A Manager Am I?"



Thoughtware is new, easy-to-use software that will help you see and understand how to become a better manager. It's a unique series of personal, computer-based management diagnostic and training programs.

How good a manager are you? Thoughtware Module 1.1 "Assessing Personal Management Skills" will tell you. This program is a three-part, comprehensive self-assessment of your personal attitudes, behavior and understanding as they relate to your effectiveness as a manager.

Unit 1 assesses your leadership style by examining the degree to which you are task- or people-oriented and how you use communication, teamwork, participation, initiative and support to get results. It also assesses your understanding of what motivates employees, promotes teamwork, and the extent to which you provide feedback.

Unit 2 assesses your attitudes about setting goals and objectives, clarifying roles and responsibilities, and delegating. It also assesses the methods you use to improve employee performance and the ways you conduct performance evaluations.

Unit 3 assesses your personal effectiveness by looking at how you manage time and stress, how you conduct meetings and solve problems. The programs conclude with specific recommendations designed to address the weaknesses identified.

To introduce you to Thoughtware, we'll send you "Assessing Personal Management Skills" (which normally sells for $350), for only $150. (See adjacent column for details.) *Offer expires April 30, 1984.*

Thoughtware programs run on the following: IBM® PC, PC XT, PCjr and compatible PC's. Apple® II Plus and IIe.

Thoughtware®

Expanding The Universe Of Learning.

MICRO USES

microcomputers within the corporation.)

Robert Freeman of Input, the market research and consulting firm, also believes that the amount of software misuse reflects the reluctance of users who have become proficient on one package to begin learning another. The more dramatic the user's success with a software package, the greater the temptation to apply it to other, possibly inappropriate, tasks. Ironically, the tool becomes the master, and the master the tool.

It's as if I gave a man nothing but a hammer to work with," Freeman says. "Pretty soon, he'd start treating everything like a nail."

Integrated software offers the quickest way out of temptation, Freeman says, because it allows the user to master one system and apply that system to several functions. But the term "integrated" is loosely applied to some software packages, Freeman says. Before buying, users should look closely at what the packages allow them to do.

Some of the most serious mistakes don't show up for months or years. A manager may plan a program to respond to an immediate problem, and discover the problem is entirely different when the program is implemented six months later. So it is with personal-computing technology. Corporations should be prepared to respond dynamically to a dynamic phenomenon.

"It's a mistake to plan for the future based on immediate needs," says Robert Freeman. "Corporations must buy systems that are expandable and upgradable, and they shouldn't buy from companies that may not be around in a few years."

If last year's events are an indication—Osborne Computer's

The organization that substitutes user friendliness for training is probably making a security mistake, says Robert McKenzie, senior consultant with Advanced Information Management Inc.

rise and fall, IBM's growing domination of the office-micro market, and the disappointing performances of major players like Digital Equipment Corp. and Apple Computer—the range of probable survivors is bound to get smaller. Because personal computing has been around longer than the IBM PC, some of the pioneers got caught in the transition from the pre-IBM market to the post-IBM reality through no fault of their own. In the future, however, the executive that doesn't take this market reality into consideration will shoulder the blame for any hardships that result.

Many experts, including Howard Frank of Contel, see compatibility and connectivity as among the least troubling problems facing microcomputer users today, in large part because a "black box" solution can usually be found or created. But the unchecked proliferation of devices, of course, can turn a simple prob-

(Continued on page 132)

POLICIES AND PROCEDURES

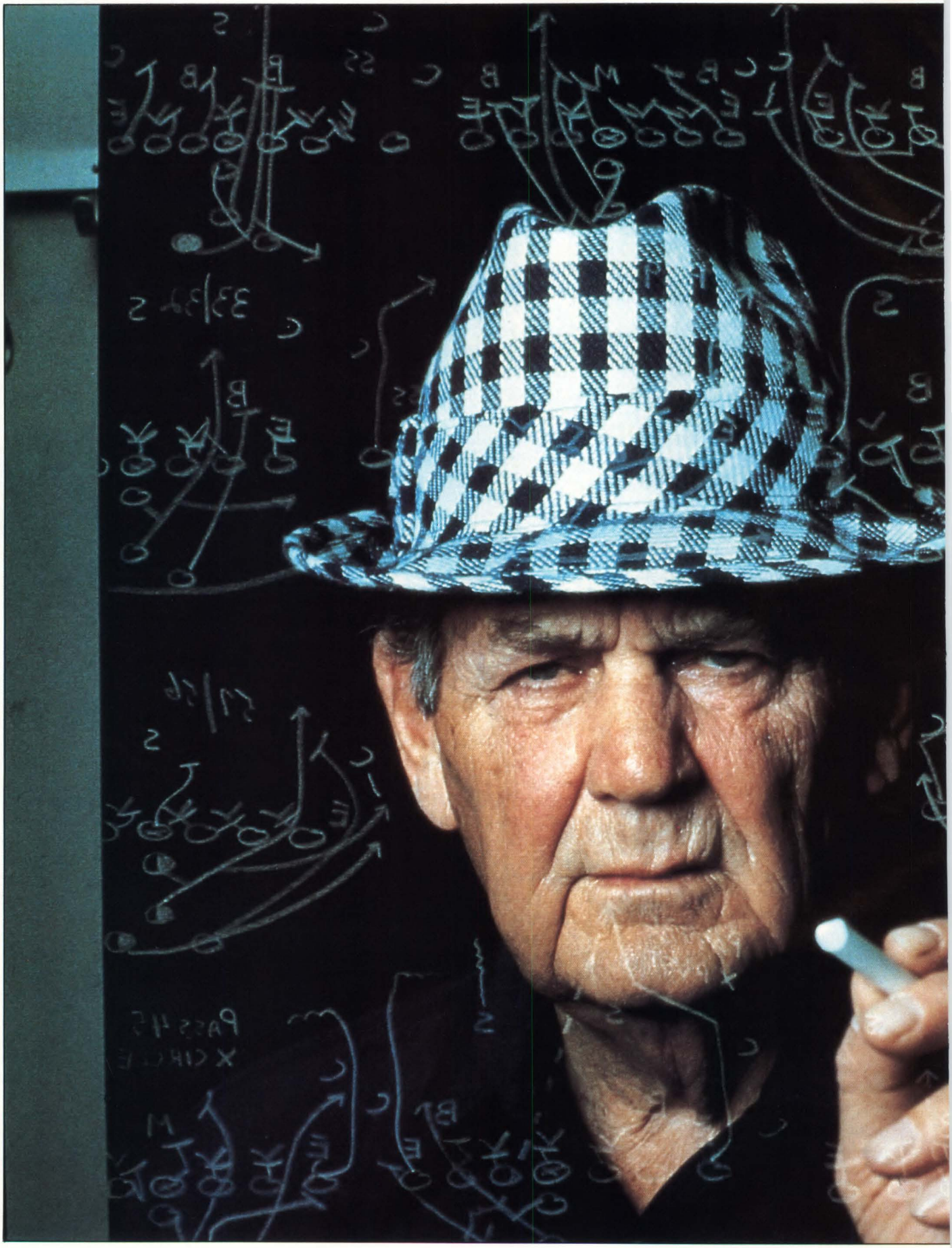
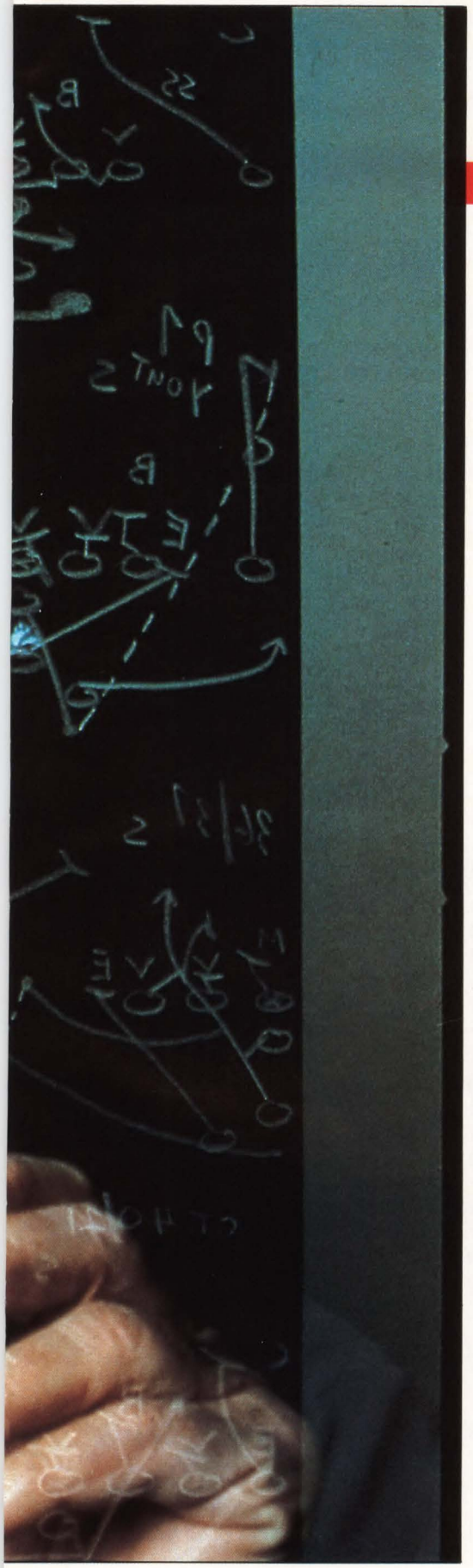


Photo by Neil Leifer/Sports Illustrated



WORKING OUT A WINNING STRATEGY

The game plan for making personal computing and corporate goals a winning combination requires effective policies and procedures.

by Martin Lasden, Western Editor

"It doesn't pay to overanalyze the small differences between personal computers. The main benefit, initially, accrues to the user working one-to-one with the machine. It's more important to get something done than to be perfect in your equipment selection."

"I'm convinced that personal computers are evil. With them, there's no way to control the quality of programs or the integrity of data. Instead of taking the time and money to build centralized databases, you're taking the easy way out—and that will cost much more in the long run."

End to end, the above proclamations delineate the escalating debate being waged across corporate America over the merits of personal-computer power. On one side are enthusiasts who see tremendous benefits accruing from this power and support its immediate proliferation, as expressed above by Robert H. Long, editor of *MicroBanker*, a Hudson, MA-based newsletter. On the other side of the debate are those who, like E.F. Hutton's Norman Epstein, see only the seeds of chaos and "evil" in the machines. They want nothing to do with personal computers.

Somewhere in the middle lie the sentiments of the realistic majority. Faced with the irreversible reality of personal computing's entrenchment in executive ranks, this middle-of-the-road group more than likely acknowledges that corporations get significant benefits from using the machines. But it is also aware of the potential problems—and wonders how it can minimize or prevent them. The central issue, of course, is control.

There is no question that personal-computing mania has hit corporate America—and that the personal computer is the tool of choice. The figures speak for themselves. Last year, the number of personal computers owned by the First National Bank of Chicago jumped from 70 to 200, and the bank is bringing in five to 10 new machines each week. Meanwhile, the Ford Motor Co. in Dearborn, MI, is adding 25 personal computers per week. And in Hartford, CT, Travelers Insurance Co. has 13,000 personal computers on order or already installed, and expects to buy about 12,000 more within the next five years.

None of the other personal-computing technologies can claim such devotion. Mainframe- and minicomputer-based systems are widely used, but their use is not growing and they don't raise the same issues as stand-alone microcomputers. While corporate America seems to have fallen in love with personal

"You have to make it easier for users to go the company's way." Alloway, consultant

computers, there is in this grand affair a strong element of ambivalence. For, contained within the power to increase productivity and enhance creativity, there is also the potential to foment chaos.

"It's like buying your kid a Saint Bernard puppy," observes Richard Byrne, a Los Angeles-based consultant. "At the time it seems like a good idea." According to Byrne, the biggest challenge posed by personal computing in corporations is how to increase the power of individuals without weakening the organization. "How do you leverage personal competency and at the same time retain corporate commitment? If employees become more powerful without working toward the same goals," he adds, "you end up leveraging chaos."

In most employees' minds, "personal computing" is a *personal* activity engaged in to enhance *personal* power. Personal computers are the Me Decade's contribution to the workplace. Much of the rhetoric that goes into selling personal computers is geared to getting people excited about having their own computer. And so, to speak of controlling personal power in this milieu—even in the broadest terms—is to invite charges of heavy-handedness.

Peter Keen, formerly a professor of management at the Massachusetts Institute of Technology (Cambridge) expresses the skittishness provoked by the mere uttering of the word *control*. "The moment centralized data processing promulgates anything about 'controlling' personal computers, users substitute the word 'preventing,'" he writes. "They see this as yet another plan by dp to protect its territory."

Because *control* is a loaded word, Kean suggests adopting *guidelines* for users. Others call them *policies* or *procedures*, but no matter which description you use, no matter how heavy-handed or easygoing they are, their purpose is to help managers maintain control. How do you ensure equipment compatibility? Data integrity? Security of the data and the machines in which they are stored? Accounting for investment tax credits and depreciation? And how do you ensure that personal computers will increase personal power in such a way as to serve, rather than conflict with, corporate goals and interests?

There are many approaches to these questions, ranging from dictatorial edicts to collaborative procedures to laissez-faire faith in employees. Trying to control personal computing without alienating employees is a tightrope walk. The risks of ineffectual approaches are clear: incompatibility and a flood of confusing and conflicting reports. At the same time, safeguards instituted to prevent these and other potentially harmful problems can damage employee morale. Consider these questions:

- Security: Should you keep personal computers under lock and

One company's policy

Rules are indeed fragile. Make them too strict, and you thwart creativity and invite dissention. Make them too loose, and employees will ask why they exist. Here are excerpts from an actual personal-computer policy promulgated by the Irving Trust Co., New York. Take note of the tone as well as the substance of the policy. According to William B. Sklar, vice president, the policy seems to be working.

Getting a microcomputer: The most important thing you have to do is demonstrate that you need it and can justify its cost. Microcomputers can be justified if they increase productivity, reduce staff, take the place of existing or planned equipment, or provide a service that no other department within the bank can provide.

The Administrative Automation Services Group (AASG) is available to help you make these determinations, as well as offer limited use of its own microcomputers. This will help you determine exact applications and software requirements before you decide to make a request for a specific configuration.

Software: Applications software meets a specific need that cannot be met easily or completely using a general-management software product. It can be purchased as a package, written by users, or written by a consultant. Such software is developed using procedural languages like Basic.

AASG recommends that this type of software either be purchased as a package (when available) or contracted for development by a consultant. In these situations, AASG will ad-

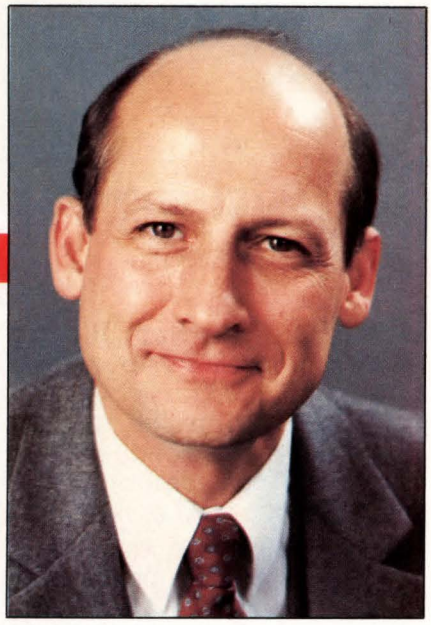
key? Should you make employees walk through magnetic fields to wipe out any data they may be trying to smuggle out on magnetic media?

- User programming: Should you prohibit users from doing their own programming? If they write programs, should you make them follow extensive documentation procedures?
- Cost controls: Should you turn MIS into a policing organization that keeps track of equipment, software, and training expenditures?
- Data integrity: How should you limit access to corporate data?

At E.F. Hutton, Norman Epstein's answer is simple: You can't control personal computers. That's why he's dead set against the machines—but all in favor of personal computing. In place of personal computers, Epstein has provided personal-computing capabilities through minicomputers connected to dumb terminals, thereby preserving the control of centralized machines and avoiding the headaches that scattered personal computers can bring. (For more on this subject, see "Alternative avenues to personal computing" in this issue.)

"My position is very popular," Epstein claims. "We're providing online, real-time data to our employees. There's no way a personal computer can be cheaper or more usable than a menu-driven terminal attached to a big computer."

At this writing, about 200 personal computers are being used at E.F. Hutton branch offices, but



Robert Rudkin's attempt to control personal computing with rules and regulations didn't work. He's had better success acting as a consultant to users.

Epstein says they will be traded in as soon as terminals can be installed. An estimated 100 personal computers reside in the home office, but here, as well, Epstein takes a tough stand: "I would expire before I would allow personal computers to tap into an E.F. Hutton database!" (Hutton does permit its brokerage customers to tap into a financial database via personal computers and terminals that in some instances it sells.)

To the extent that Epstein can pull it off, he may indeed save his company a lot of headaches. But these are heady times, and the allure of a "personal machine" is proving to be tough to resist. "Sure, there are potential problems," says Robert Long. He advocates a shoot-first-ask-questions-later approach. "But that's no reason to shut off creativity and innovation. I say, let the users experiment."

Long's message is tantalizingly bold, and its appeal is enhanced by the fact that when it comes to satisfying users, a lot of MIS/dp departments just don't have very good track records. "So, bring the machines in!" the users cry. "And the hell with your controls." That sort of sentiment makes control an unpopular, even nasty, job. Nevertheless, if personal computers are going to gener-

vise the user on preparing a requirements document as the initial step in software acquisition. Users should, whenever possible, avoid writing their own programs or modifying packages when the end objective constitutes a part of a permanent operating process, requires maintenance of extensive data files, or involves sequentially executing a number of programs.

Communications: 1.) Although IBM 3270 emulation is available for microcomputers, it is not recommended at this time. Rather, TTY (ASCII 300/1200 baud) (teletypewriter) communications is recommended. 2.) All contracts for outside, dialup services must be negotiated by AASG. Depending on the nature of the service, it may require reporting by State Banking Regulation G101 and by the (federal) Bank Services Corporation Act. The AASG is responsible for coordinating such reporting.

Security: Data that may be confidential or subject to interest by outside parties must be protected. Additionally, any proprietary information should be handled in a manner similar to all other customer and bank data. Equipment and programs must be protected from theft and unauthorized use. Some applications may require additional security and control measures.

Documentation: It is the user's responsibility to develop appropriate procedures and documentation for each application program used or developed.

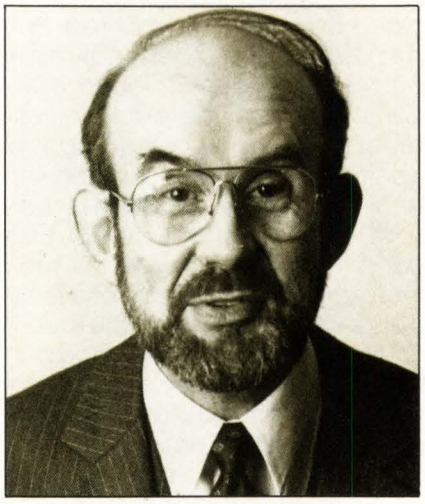
Selecting a micro: AASG will help determine the type of microcomputer you need. At present, we have limited you to three main vendors, but will continue to review all new offerings.

ate less trouble than they're worth, somebody will have to do it. Maybe MIS/dp managers or user-department heads—or maybe even divisional general managers. But somebody will have to do the hard work.

Why? By itself, a personal computer is not a very powerful device. It processes words, electronically updates your calendar, runs an electronic spreadsheet, and so on. But your options bottom out quickly unless you're willing to enter a lot of data. To get the most out of a personal computer, you really need to tap into pertinent databases. And that means you need to be able to communicate.

That message may be lost on novice users whose knowledge of computers is limited to what they pick up from office gossip and slick ads. To those with a clear view of the near future, that need should be obvious. However, unless the machines are compatible, you're pretty much out of luck. The most direct route to compatibility is to order employees to use the same machine. Herein lies the appeal of a one-machine standard—and of the IBM Personal Computer.

It's not that the IBM PC stands head-and-shoulders above the rest; in fact, for many applications, some say other machines are better. But when the PC was announced, the influence of the giant behind it and its lock on thousands of mainframe data centers around the country almost ensured that it would become an instant de facto standard for a good chunk of the market. Software developers have quickly learned that this is the machine to create packages for, and corporations have assumed that there will be more professional software available for this machine and the fast-growing roster of those compatible with it. To be sure, it's a self-fulfilling prophecy. But, as everyone in business should know, self-fulfulling prophecies are often the most reliable.



Buying personal computers for your employees, says Los Angeles consultant Richard Byrne, is like buying your kid a Saint Bernard puppy. "At the time it seems like a good idea."

So, faced with a dizzying number of hardware choices, many companies are going with the most cut-and-dried policy: If you want a personal computer, it has to be an IBM PC (or at least a personal computer that runs the same software. Vendors of such machines include Compaq, Eagle, and Columbia.) Among the companies with one-machine policies is Cadbury Schweppes Inc. in Stamford, CT. Kathleen McDonald Fermeglia, personal-computing analyst, expresses the party line: "Why make extra headaches for yourself? By letting in just one brand, we don't have to work double-time to make machines communicate with one another. It just works.

"We knew we had to standardize," she adds. "Otherwise, all hell would break loose."

Similar sentiments are expressed by MIS/dp managers all over the country who are responsible for making the machines talk to one another. "What do you do with an oddball machine left by an employee who quits?" asks the head of dp at a midwestern financial-services company. "If it's an IBM, you just pass it on to the person who makes the next valid request."

Looking to exploit the potential of personal computers, however, some companies aren't buying the IBM-only philosophy. They recognize that some machines, for certain applications, are better than others. There are also those who believe that solving technical-compatibility problems is actually easier than trying to persuade users to comply with a one-machine rule.

One such manager is Robert Rudkin, the head of office automation at Diamond Shamrock Inc., a Dallas-based oil, gas, and chemical producer. Three and a half years ago, his department put together a manual filled with user regulations. But from the outset, it was ignored. Observes Rudkin: "If the department head has

"Managers are responsible for ensuring data integrity. If they can't, they shouldn't be managers."
—Schefer, General Foods

ARTEMIS:
The Thoroughbred of Project Management

Metier Management Systems introduced the first project management system on a minicomputer seven years ago. In ensuing years, ARTEMIS has been refined and expanded into the most powerful race horse on the track. A veritable Triple Crown Winner, ARTEMIS offers unparalleled depth, easily used, fully integrated and compatible systems across processors ranging from the IBM-PC through a brand new line of minicomputers and on to the IBM and compatible mainframes.

The continuity and compatibility of ARTEMIS on a mainframe processor marks a significant advancement in our industry for Metier. This new capability allows projects to be controlled independently on micro and minicomputers and summarized on a central system for uniform reporting. MIS staff can direct the overall system design, act in an advisory capacity, and be relieved of daily requests for reports and system modifications.

Today more than 550 ARTEMIS systems are supporting a wide variety of industries and government organizations. The thoroughbred nature of ARTEMIS and Metier's "user comes first" philosophy have driven Metier to the top. In 1983, INC. magazine ranked Metier 7th in its listing of the 500 fastest growing private companies.

If your business is project oriented, ride the control system born and bred to win: ARTEMIS.

METIER

5884 Point West Drive
Houston, Texas 77036
(713) 988-9100
Attn: Bruce Meyer

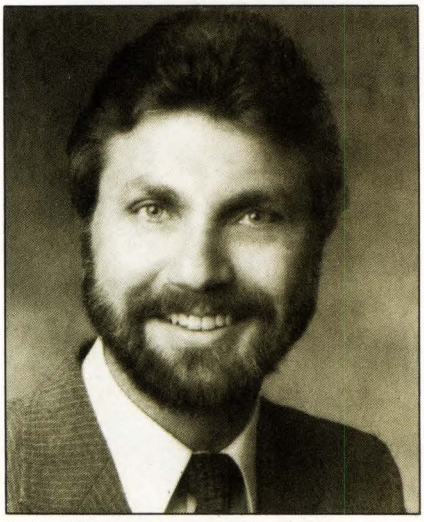
Sales and Support Offices in: Houston, Texas; Newport Beach and Burlingame, California; Alexandria, Virginia; Woodbridge, New Jersey; Englewood, Colorado; Southfield, Michigan; Orlando, Florida; Boston, Massachusetts; Caracas, Venezuela; Coyoacan, Mexico; London and Sheffield, England; Aberdeen and Edinburgh, Scotland; Nevilly-Sur-Seine, France; Turin, Italy; Taeby, Sweden; Sandvika, Norway; Dusseldorf, West Germany; Gouda, Netherlands; Dhahran, Riyadh, and Jeddah, Saudi Arabia; Abu Dhabi and Sharjah, United Arab Emirates; Istanbul, Turkey; Singapore; Seoul, Korea; Hong Kong; Jakarta, Indonesia; Sydney, Australia; Tokyo, Japan.

CIRCLE 22

the power to buy a calculator, he or she can go out and buy an Apple. And that's exactly what happened. You can take an unbending posture and say, 'You can only buy IBM PCs.' But that's easier said than done."

Rudkin stopped trying. He now operates as a consultant, advising rather than dictating which personal computers should be purchased to maintain compatibility. "If you work hard enough, you can make anything communicate with anything," he says. At Diamond Shamrock, there are IBMs, Wang Professionals, and Apples on employees' desks. Rudkin has also given his blessing to a variety of software packages.

Besides wanting to satisfy the tastes of individual users, there is another reason a corporation might, or might not, let a thousand flowers bloom. It has to do with how the corporation perceives the future. Looking down the road, those who have embraced an IBM-only policy see the massive amount of software that has been and will be produced for the machine. And they see the potential networking problems of a multi-micro setup. "Knowing that we want to network these machines," says Jim Franks (a pseudonym), the dp manager for an east-coast manufacturer, "it would be shortsighted to go any other way."



Establishing rules is only one way to control personal-computer use, says consultant James Haner. You can also influence behavior with written guidelines.

At one point, Franks notes, his employer was about to make an exception. A piece of software available only for another machine—a Victor—was judged to be superior for a database management system that would help operators field customer complaints and questions. But between the time the need was identified and the machine bought, comparable IBM software had been introduced. So, the company didn't have to compromise the policy after all; it just canceled purchase of the Victor personal computers and bought IBM machines. For Franks, this episode further reinforced his view that going with IBM is the only way to go.

James Haner has a different perspective. Now a consultant at Computers Simplified Inc., Oakland, CA. Haner recently left a local savings and loan association for which he was the personal-computer project manager. He believes the technology will evolve to eliminate all compatibility problems. And from that per-

A sample procedure

Consultant James Haner advocates a personal-computer acquisition procedure that starts with the following set of questions. Users should complete the form before requests for personal computers are considered, he says.

1. Please describe the function(s) that will be performed on the requested personal computer and the anticipated frequency of use. Please attach an example of the desired output, including formulas used and source of input, if available.
2. Have you discussed with the personal-computing manager the use of existing automated resources (mainframe computer, office systems) to accomplish this processing? If so, please indicate the person(s) contacted.
3. What benefits (cost reduction, increased productivity, improved management information) do you anticipate as a result of acquiring a personal computer?
4. If you have already investigated personal computers (equipment and programs), are there any specific items you require? For example, specific software, special printing capabilities, etc.
5. Have you considered using the personal computers available in other departments? If not, please state the reasons that warrant a dedicated machine in your department. For example, confidentiality of data, immediacy, frequency of use, timely processing.
6. What budget amount have you established for this acquisition, including software?
7. Since custom-programming is not offered, have you evaluated the time and skills required of your staff to implement this acquisition?

ONE LANGUAGE. ONE SOLUTION.

PC/FOCUS

PUT THE DATABASE POWER OF A MAINFRAME IN YOUR PC.

Now you can turn your Personal Computer into a mainframe-level applications development system with **PC/FOCUS,** the most powerful DBMS available for your PC.

As a tried-and-proven, user-friendly, 4th generation system, PC/FOCUS gives you the ability to query and report from files, build systems and manipulate data. It incorporates a relational database, screen manager & report writer, and offers dramatic abilities in graphics, financial modeling and statistical analysis.

But unlike older database technologies which require training and practice to master, PC/FOCUS uses simple English statements you can learn in minutes! In fact, just a few moments of familiarization with **TableTalk;**™ its new natural language window, is all that's needed for even a novice to become immediately productive.

Best of all, PC/FOCUS lets you download data extracted from mainframe files and DB's, then upload data and procedures from the PC to the mainframe for production execution. So your PC becomes almost as powerful as a mainframe, and you become almost as capable as a trained systems analyst.

Let PC/FOCUS with TableTalk™ unlock the mainframe power hidden within **your** PC. For details, fill out and mail the coupon or write to **Don Wszolek, Dept. P2, Information Builders, Inc., 1250 Broadway, New York, NY 10001.**

Dear Don;
Yes! I'd like to unlock the mainframe hidden in my PC with **PC/FOCUS**. Mail full details to:

NAME_____

COMPANY_____

TITLE_____

ADDRESS_____

CITY_____

STATE_____ ZIP_____

TELEPHONE_____

INFORMATION BUILDERS, INC.

New York: (212) 736-4433 • Washington, D.C.: (703) 276-9006 • St. Louis: (314) 434-7500 • Chicago: (312) 789-0515
Dallas: (214) 659-9890 • Palo Alto: (415) 324-9014 • Los Angeles: (213) 615-0735 • Houston: (713) 952-0260
Dealer Inquiries Invited.

CIRCLE 23

spective, he doesn't see any good reason why users should have to wait for IBM software when superior software might be available for another machine. Furthermore, he doesn't see any good reason why users should be forced to spend time learning how to use an IBM when they're already accustomed to something else.

"I know one individual," Haner says, "who developed his own program for the Apple. Now, he has to spend three months reentering data and trying to learn a new machine. That flies in the face of the very reason people buy personal computers—to do things faster and better."

Establishing rules that say "You can't do this" or "You can only do that" is one way to control employees. The idea is to influence behavior by setting up parameters. But there's a subtler approach. You can say to users: "We won't restrict your activities and you can buy anything you want. *But*, if you want help from us, you must follow these guidelines. If you don't follow them, you're on your own."

Such a policy could be called laissez-faire with a coercive punch. It is an approach that gives the policy-maker and the employee clearly defined responsibilities. It is collaborative, and yet sets out strict limits of corporate tolerance.

Robert Alloway, president of his own consultancy in Lexington, MA, strongly advocates this approach. "Control goes hand in hand with support," he says. "If you control without giving support, your controls will be seen as intrusive.

"You have to make it easier for users to go the right way," Alloway continues. "If you hand-hold and offer employees all the support they could ever want, who'd refuse it? And by offering that kind of support, you really find out who's doing what." The last point is vital. Support programs allow managers to monitor personal-computer usage in a natural, unthreatening way. That's important to any effort to maintain accountability, security, and data integrity.

For Ron Parkes, assistant vice president in the automation division of European American Bank in New York, this approach is more than just a theory—it's exactly what he does. "By making our services attractive," he says, "we promulgate a standard. And that standard is adhered to 99.9 percent of the time."

At European American, a sort of social contract exists. Dp is not part of the sign-off process per se, but before any computer-purchase orders are processed, dp takes a look at them. If there's a problem, dp calls the user in for "consultation."

In place of personal computers, Norman Epstein, executive vice president of E.F. Hutton, has provided personal computing on dumb terminals hooked to minicomputers.

"We can veto the purchase," Parkes says. "But users almost always end up agreeing with us, because we have the support to offer." Parkes notes, however, that a couple of departments have rejected corporate support, and chosen to go out on a limb with equipment that the vendor in question could not maintain. "I'm trying to bail them out now," he says. "But I trust that, after these episodes, they won't go against our advice again."

Is the denial of support a big enough stick to maintain cooperation? Jim Franks doesn't think so. He calls the laissez-faire approach a pipe dream, because if someone buys an incompatible machine and runs into trouble, "sooner or later, you will get involved." Franks adds: "Everyone, you presume, is doing company business on the machines, so the company is responsible for their efficient use. We don't let employees choose the desks they want; I see no reason why it should be different for computers."

Of course, the issue of control goes much deeper than what kinds of machines you allow onto the premises. There's the much dicier problem of trying to control what employees do with the machines. And, again, among those who are attuned to the personal freedom rhetoric, such intentions are not likely to be well received. Images of bosses looking over subordinates' shoulders will no doubt be conjured up. And yet, the potential for chaos resulting from uncontrolled use cannot be denied.

Data integrity is a primary management concern. If employees are collecting dissimilar data, plugging them into their spread-

Robotic Disk Handler

RDH-100S ADC's standard-setting disk handling peripheral that allows any computer to mass-produce diskette copies!

Now PC-to-minicomputer users can easily make either multiple 8" or 5¼" "floppie coppies"—and convert the RDH-100S from one to another in under 4 minutes!

Single-Format Software Developers, System Integrators and Large Distributed System Users: Your computer can get the added capability of "Floppie Coppier™" with the simple RS232 interface of ADC's high-performance Robotic Disk Handler—Model 100S. Automatically loading and unloading up to 100 diskettes without operator intervention, the RDH-100S uses patented gentle fingers that eliminate the disk destruction risk of other, not-so-sophisticated handlers. The RDH-100S is highly reliable, too—over 4000 hours MTBF and only 0.5 hours MTTR!

Multiple Format Users: ADC offers you both low-volume and high-volume "Floppie Coppier" systems to choose from—the IC-455 controls simultaneous dual sided copying of 8", 5¼" and 3½" diskettes. ADC's IC-475 loads all your floppy data into a built-in winchester which can then direct the RDH-100S to produce the desired number of copies for each successive floppy. And for high-volume production, ADC's new Series 4000 can control up to 16 simultaneous diskette handlers—each with its own built-in RDH—and you can copy both sides of double-sided diskettes at once!

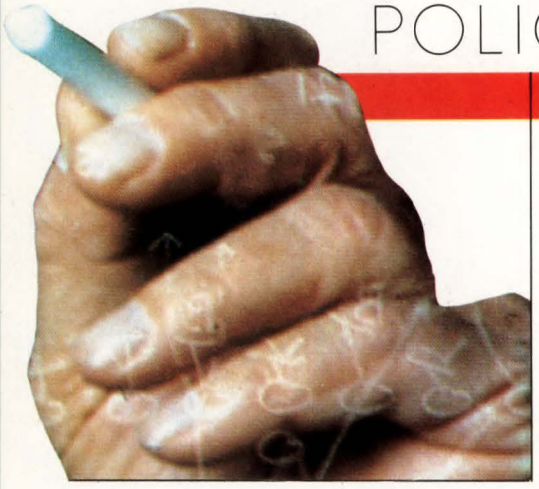
Whatever your "Floppie Coppier" needs, ADC has the system to suit you—and you're assured of high-speed efficient duplication with the Robotic Disk Handler!

ADC APPLIED DATA COMMUNICATIONS

14272 Chambers Road, Tustin, CA 92680
(714) 731-9000

First and still foremost in media duplication and test technology

CIRCLE 24



sheets, and manipulating them with their own processing power, contradictory conclusions that will not be easily reconciled are likely to be drawn. Confusion and waste will be the result.

To keep this problem within manageable bounds, companies of any substantial size are compelled to build comprehensive databases that give the far-flung personal computers a common pool to tap. By design, the pool resolves whatever discrepancies might exist in data used by different departments.

But even under the best conditions, allows William Synnott, senior vice president at the First National Bank of Boston, data integrity is difficult to enforce. "We're building a corporate database system right now," he says. Even when it's complete, however, the trafficking of "unofficial" figures will likely continue.

To lessen the confusion, Synnott suggests tacking a logo to all reports that use the official data so as to easily distinguish them from those based on contraband. If this idea is implemented, Synnott predicts, all reports that don't have the logo will be treated with instant suspicion. "This problem isn't as acute when would-be analysts use pencils and paper because you are immediately suspicious," he says. "But, you tend to assume that a report on a computer-generated printout is based on accurate data and must be right."

Because data integrity is so critical, one insurance carrier in the midwest has actually decided to prevent users from purchasing any personal computers until the appropriate databases can be developed. The prevailing sentiment at this company can be summed up this way: It's better to build the dam before the flood. That leaves the dp director with the unenviable task of keeping users at bay. He's already turned down some 50 requests.

"We don't want to wait five years to get every standard nailed down," the executive says. "But I think we can wait a year to establish some hardware and software standards and resolve some of the data issues." Those issues are expected to be resolved sometime this year, when the gate will be opened; an estimated 200 personal computers will pour in during the next 12 months.

Some corporations, however, can't afford to wait. "Regulation is a bad word around here," says Ed Schefer, vice president of information services at General Foods in White Plains, NY. "If the company waits for us to figure out what it wants, we'll miss a lot of opportunities." At General Foods, according to Schefer, individual managers are responsible for ensuring data integrity. If they can't control the problem, Schefer argues, they shouldn't be managers. Schefer points out, though, that whatever misuse of personal computing exists, it's far outweighed by the benefits.

How do General Foods' managers tackle the tough job of ensuring data integrity? Well, concedes Robert Judge, associate director of division support, in actuality, they don't. "To say that definitive steps and procedures have been implemented to handle the problem would be stretching the point," says Judge. (Apparently, Synnott's official codes and markers identifying real corporate data are the most practical ways to preserve data integrity.)

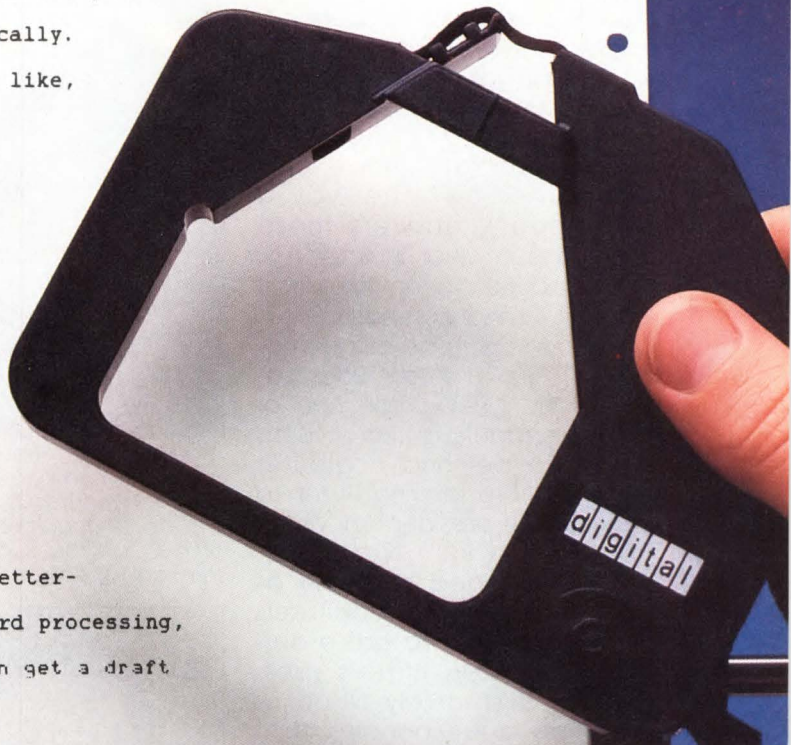
The dp director at the insurance carrier that's stalling for time is not swayed by Schefer's argument. "You can always take advantage of more opportunities, but you don't have infinite resources. So, when deploying those resources, there's a balance to be struck between realizing opportunities and establishing controls." And, all things considered, he says, waiting a year to get serious control issues resolved is not an unreasonable price to pay for order.

Ultimately, personal-computing policies and procedures must give the powers that be the right to veto requests for personal computers. Control, after all, comes down to having the power to say "No," and make it stick. But a corporate policy that contains such a final word doesn't have to be harsh for users. By setting up the right checkpoints—like signoff

How do you control personal computers without squelching the sort of creativity that the machines are supposed to enhance?

Changing our ribbon is a snap.

Most printers make you fool with a messy ribbon.
But with Digital's Letterprinter 100, all you have to do
is snap in one of our replacement cartridges.
You'll instantly get at least 5 million more characters' worth of ink.
Easy, isn't it?
The fact is, everything about the Letterprinter 100 is easy.
For example, with just a flick of a finger you can select
up to five different typefaces. Or let your
computer do it for you, automatically.
If you can't find a typeface you like,
we'll customize one for you.
Now why would the world's second
largest computer company go to
such lengths to make the
Letterprinter 100 so
accommodating?
Simply so it can spend more
time doing what you bought it
to do in the first place.
And that's printing crisp, clear
manuscripts and graphics. From letter-
quality like you see here for word processing,
to high speed printing so you can get a draft
page in only 10 seconds.
The Letterprinter 100 works with any of
Digital's personal computers or video terminals. And it's a snap to use.
See the whole family of Digital's Printers, including the
daisy-wheel LQP02 and the low cost Personal Printer, the LA50.
For the distributor nearest you, call 1-800-DIGITAL, extension 700.
Or write Digital Equipment Corporation, Terminals Product Group,
2 Mt. Royal Avenue, UP01-5, Marlboro, MA 01752.



CIRCLE 11

digital

procedures and cost-benefit analysis requirements—a corporation can help users determine in advance when the answer is going to be "No"—or at least when management will recommend that the user share a nearby machine. Providing a consistent framework in which to judge user requests for personal computers will mitigate the effect the negative answer can have on the enthusiasm of *all* users.

How elaborate should procedures be? The way a company answers these questions is a clear indicator of just how cautious or enthusiastic it is about personal computing.

When he was head of information systems at Pfizer Pharmaceutical Inc., New York, one of Jeffrey Landau's duties was to coordinate personal-computer activity. Before leaving Pfizer to become vice president of MIS at Izod LaCoste Inc., New York, Landau described that role as that of a patron: "I protect users from themselves." To get a personal computer, Pfizer's users have to satisfactorily fill out a one-page questionnaire that asks what the machine will accomplish and why a personal computer is best for the job; whether the function to be accomplished is already being done, and how; how the necessary data will be entered; and which software will be used.

The procedure is slanted to the users' perspective, said Landau. Because it is in their terms, they respect it. "Notice that we don't ask, 'How much money will you save?' or 'How many hours a day will it be used?'" he said. "Those are typical questions asked by dp managers. I've heard dp managers say, 'If you won't use the machine at least three hours a day, you can't have one.' That's ridiculous. We don't cost-justify telephones that way. Why do it for personal computers?"

Landau has said "No" on occasion. "One time, someone proposed an application that would have required one work-year to enter all data into the computer. The user just didn't understand what was involved. Another time, a group wanted a much larger configuration than it needed. It was like a 17-year-old wanting a first car; you purchase a subcompact Ford, not a supercharged Ferrari. We insisted on a Ford. Of course, we didn't make any friends on that one," Landau adds.

A good way to ensure data integrity when personal computers are implemented is by tacking a logo to all documents that use official data, says William Synnott of the Bank of Boston.

The Transportation Division of Westinghouse doesn't buy personal computers, it leases them to avoid getting stuck with obsolete machines as technology changes, says Marvin A. Thurn, manager of integrated systems.

Being the one to say "No" to users won't win managers any popularity contests. But before you actually reject a purchase request, remember that there's a thin line between vetoing waste and missing potential benefits.

By simply getting their hands on the machines, novices discover applications they could never have anticipated. Thus, a policy might anticipate a certain level of so-called waste. "We don't want to quash the potential for useful applications," affirms Fermeglia at Cadbury Schweppes. "But we expect some kind of thought to go into the decision to purchase a personal computer. No one here would dare ask to spend $4,000 on *anything* without trying to justify it."

To help determine whether or not there is hidden potential to be tapped, Fermeglia works with uninitiated users to explore possible applications before a machine is actually bought. Her refusals tend to be open-ended. Rather than turn users down flat, she'll more likely tell them to wait until reasonable applications are found; until they can be given the proper training; or simply until their orders are processed.

She has her own informal policy on orders. When they start to pile up, Fermeglia consults department heads to find out which

We'll put your electronic office plans in motion.

With Award-Winning UniTek™ Adjustable Keyboard Pads by Haworth. Place keyboard pads on any work surface or table, and we'll put your ideas in motion. In-out, side-to-side, swiveling back and forth, or tucked away from view, IBD Gold Award-winning UniTek Adjustable Keyboard Pads will accommodate.

Then add to your options UniTek panel-mounted freestanding, mobile, and carousel designs, and the support of TriCircuit ERA-1®, the most versatile powered-panel system you can imagine. And make your move to the electronic office today, with Haworth.

Send for the "UniTek Electronic Support Package": Haworth Inc., One Haworth Center, Holland, MI 49423 U.S.A.

HAWORTH

OFFICE INTERIOR SYSTEMS

CIRCLE 26

requests have top priority. Priority is determined by the employee's rank. But Fermeglia also factors the manufacturer's expected delivery date into her list of priorities. And if an application is clearly useful, Fermeglia places an order immediately—before all the required signoffs have been made. "It's risky," Fermeglia acknowledges, "but it's less risky than making a user wait three months because a couple of signatures—which will be forthcoming—haven't come in yet." Anyway, Fermeglia claims, she has yet to be proven wrong.

Besides screening out frivolous requests, many corporations make users go through red tape because it enhances central control. Red tape is the vehicle through which caution is enforced. By insisting upon multiple signoffs and waiting periods, a company can stop personal computers from proliferating faster than it can keep track of them, support them, or control them. If the number of personal computers grows too quickly, bands of users might be left out on a limb—without the proper training or support. There's also the uneasy feeling that personal computers have to be proven as personal-computing tools in the corporate setting.

Franks believes more than 90 percent of the managers in his company can use personal computers effectively. But, he says, "We think we should walk before we run. This is a conservative company, and personal computers are still a big unknown. A prospective user has to prove him- or herself before he or she can get a personal computer." In fact, the large manufacturer that Franks works for has a particularly strict, centralized policy on acquiring personal computers. All purchases must be specifically budgeted, and are subject to review just like any other budget item. In addition to the departmental-approval process, all requests must be approved by corporate MIS. And because the company is worldwide, the requests must be processed through New York headquarters from as far away as Africa.

"Six months ago," Franks says, "I thought the controls here were a little too rigid. But one benefit of this policy is that we know where the machines are; that gives us a head start in taking the next step—networking and interfacing the personal computers with our mainframes. . . . Of course," Franks hastens to add, "this is not to say that there aren't a lot of machines out there that we know nothing about."

Another way companies exercise caution is to lease rather than buy personal computers. Paine Webber, the New York-based investment-brokerage house, is doing just that. And according to company vice president Steve Kelsky, the primary motive is to maintain flexibility. "What was true a year ago is not true today," he observes. "The technology is changing rapidly. By acquiring the machines on a one-year lease, we avoid getting locked in."

The Transportation Division of Westinghouse Electric Corp., based in West Mifflin, PA, has a "risk leasing" policy for volatile categories of equipment. "We've been purchasing peripheral equipment that we believe is stable," says Marvin A. Thurn, manager of integrated management systems. "But most of the personal computers we're adding are leased because they are subject to tremendous change."

"I'd expire before allowing personal computers to tap our databases."
Epstein, E.F. Hutton

Coming after the Me Decade, it's no surprise that personal computing—billed as an opportunity to seize personal power—was so quickly embraced in corporate America. And it is precisely because of that "personal" allure that control is such a thorny issue. Moreover, with personal computers being not only the personal, but also the popular machine, there are many more users to worry about.

Clearly, in terms of administration, the most stress-free approach is collaboration with users: trading support for cooperation, rather than imposing rigid rules. And among academics and consultants, it is the preferred approach for the time being. There may come a time when users are sophisticated enough—or machines friendly enough—to substantially devalue support. What carrots could be offered then?

In the midst of the current buying spree, where the "gee whiz" enthusiasm has yet to taper off, it may be premature to ask such a question. But one question that might be worth asking is whether the hazards of personal computing are indeed counterbalanced by the potential benefits.

Arguing on the one side are managers like Norman Epstein at E.F. Hutton who take a dim view of the whole affair. But not every personal-computing honcho has Epstein's clout or resources. Most have to rely on their wits and political skills to cope with the Me Generation's favorite machine. □

CONTINENTAL RESOURCES
We deliver what you need.

WE ALSO OFFER

1. A full line of software!

2. Ribbons, paper, and supplies of every description!

3. Rental, leasing, and purchase plans for every need!

CALL FOR DETAILS

* IBM Personal Computer XT is a trademark of International Business Machines Corporation
** Rainbow 100+ is a trademark of Digital Equipment Corporation
*** Lotus 1-2-3 is a trademark of Lotus Development Corporation

Two personal computers that are **great for business**

If you're looking for a personal computer for your company, Continental Resources offers you two of the best: The **IBM Personal Computer XT*** and **The Digital Equipment Rainbow 100+****.

The **IBM PC XT** is a high-performance system made even better with Continental's value-added graphics options. The IBM PC XT features 128K RAM (expandable to 640K), a 360K 5¼" diskette drive, a 10-megabyte fixed disk drive for fast, reliable data storage and retrieval, a high-speed 16-bit microprocessor, full-featured keyboard, and the expansion capability to meet nearly every need.

Digital Equipment's Rainbow 100+ is an advanced system designed to run both 8 and 16-bit software. The Rainbow 100+ features 128K RAM (expandable to 896K), 800K 5¼" diskette drive, a 10-megabyte fixed disk, 105-key keyboard, and the flexibility to grow as your business grows.

And, to get you started, Continental will give you the invaluable **Lotus 1-2-3***** multifunction software package, absolutely free (a $495.00 retail value) with the purchase of either of these fine computers.

Selection. Support. Total Service. That's what you get when you buy from Continental.

Whether you need a dumb terminal, disk drive, high-speed line printer or an advanced graphics system, we can deliver what you need. Products of almost every description from virtually every industry leader.

Not ready to buy? Continental offers a host of rental or leasing options — one is sure to meet your needs.

But Continental doesn't just offer great selection. We provide a total support package unmatched in the industry. Our nine offices provide sales, technical and service support backed by more than 20 years experience. You're assured of the most informative, professional assistance available — before and after your purchase. And Continental even supplies complete, on-site service.

Not sure of what you need? Our specialists will evaluate your needs and recommend the right system for you. And that means software, too. And supplies like ribbons, printwheels, and paper — even complete workstations.

So give us a call the next time you need computer equipment. Continental Resources. We deliver what you need.

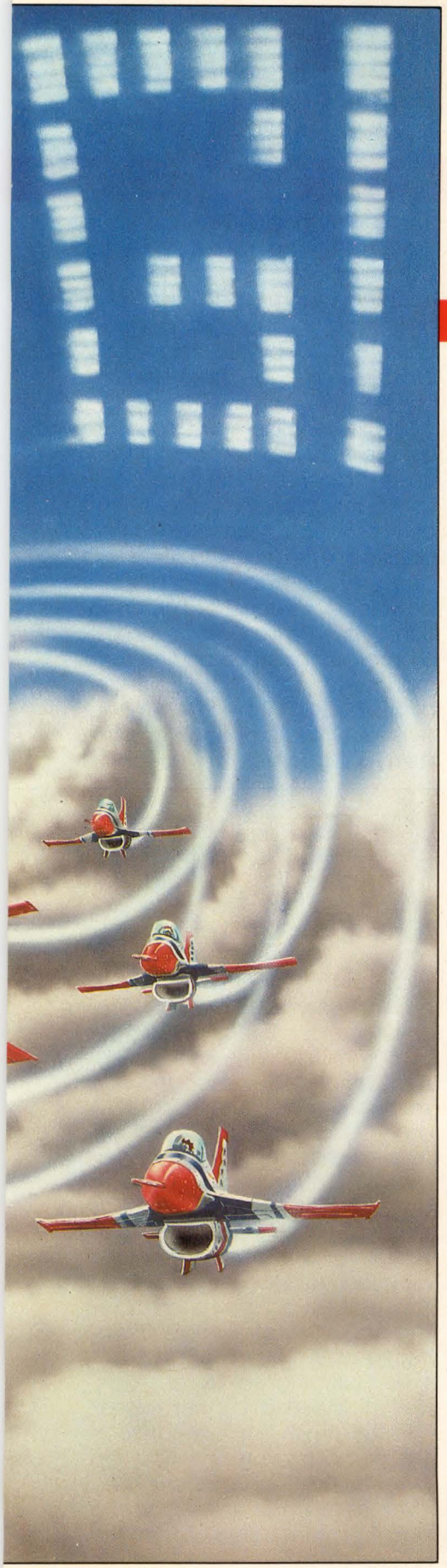
CR

CONTINENTAL RESOURCES, INC.
175 Middlesex Turnpike, Bedford, MA 01730

Boston Area (617) 275-0850
New York NY (212) 695-3206
Northern NJ Area (201) 654-6900
Philadelphia Area (609) 234-5100
Chicago Area (312) 860-5991
Baltimore-Washington DC (301) 948-4310
San Francisco Area (408) 727-9870
Los Angeles Area (213) 638-0454

PROMOTING PERSONAL COMPUTING

Illustration by Harold Brooks



Promoting corporate personal computing means both making sure the phenomenon gets off the ground and that its flight is smooth.

by Jennifer E. Beaver, Southwestern Editor

The Zen masters would approve of the way Manufacturers Hanover Trust promotes personal computing. The big New York-based bank encourages its employees to make personal computing a part of their working lives, but at the same time, it tightly controls it. Is this a case of one hand undoing the other's work? Not really. These strategies, though contradictory, aren't what they first seem to be. Through them, Manufacturers Hanover hopes to both take advantage of personal computing's benefits and avoid its managerial pitfalls.

As part of its strategy to encourage personal computing, the bank makes equipment and education accessible to employees. Its 10 New York personal-computing centers answer users' questions, provide up-to-date information on hardware and software, and teach employees to use equipment. Company-run computer stores in five branches offer employee discounts on computers. The bank even lets those who wish to try personal computing use IBM Personal Computers in the center. Novices who want to take computers home or to their offices can borrow IBM-compatible Compaq portables. "Our facilities serve as an introductory educational tool to raise employees' awareness of personal computing," says Richard Groppa, vice president of operations.

Yet Manufacturers Hanover also imposes tight restrictions on the purposes for which personal computers can be used. According to Groppa, all requests for personal computers must be channeled through and approved by the office-automation department. "Personal computers can be overwhelming," he declares. "Without a stringent policy, employees might use them for typing memos or for other inappropriate purposes. We want to make sure computers are used for what they do best."

Manufacturers Hanover's promotional efforts may seem to be inscrutable contradictions, but they are producing the desired results, says Groppa. The store, the loan policy, and the computing center have encouraged many reluctant employees to tap the potential of this new technology. At the same time, the bank's controls have helped maintain data integrity and compatibility. The bank's strong promotion of IBM Personal Computers has allowed it to connect all micros, through its privately owned Geonet network, to its IBM 308X, NCR, and DEC 20 mainframes and to each other. And, Groppa claims, very few employees try slipping personal computers in through the back door.

As Manufacturers Hanover's policy proves, successful corporate programs to promote personal computing do more than acclimate employees to hardware and software. A successful program sparks em-

PROMOTING PERSONAL COMPUTING

ployees' imaginations and motivates them to use personal computers to solve business problems. Promotional programs can also lay the groundwork for networking and mainframe-microcomputer connectability, and help managers keep tabs on who's doing which tasks.

Not all promotional strategies are as cooly considered as that of Manufacturers Hanover. It took a crisis to convince Merrill Lynch, Pierce, Fenner & Smith of the importance of a promotion strategy. "Two years ago, the spread of personal computers was almost uncontrollable, and the home-brewed software that was floating around frustrated everyone," recalls Jack Halbert, director of the personal-computing division for the giant New York-based brokerage house.

The bootleg software was not only frustrating, it was dangerous to the company. Some account executives performed analyses and distributed reports that did not comply with the strict requirements of the Securities and Exchange Commission, recalls Halbert.

To combat this problem, Merrill Lynch launched a low-key campaign to promote use of the IBM Personal Computer XT. But to this day, it doesn't try to ram the high-storage-capacity micro down anyone's throat. "We don't tell our users what to buy; personal computers are an out-of-pocket expense for them," explains Halbert. "We hope that because we're developing software for IBM machines and because we have so much off-the-shelf programming available, users will decide that, in this company, IBM products are the best ones to buy."

Merrill Lynch's in-house software has helped lure some maverick users back into the fold. "Our in-house programs are the only products that allow micro users to effectively access our corporate database and easily download spreadsheet information," says Halbert. For example, a program for office and regional managers, currently being tested by 30 IBM PC XT users, lets managers download budget and expense information to chart

GREAT EXPECTATIONS, POOR ACCEPTANCE

How much should top management expect employees to achieve immediately after they're exposed to personal computing? Not much, if the experience of Insilco Corp., a Meriden, CT, electronics manufacturer, is any indication. Even high-level executives need time to adjust.

On the orders of the CEO, eight of Insilco's divisional executives were supplied with portable computers. But seven months after the program began, five of the eight executives still weren't using their portables.

"I hesitate to say it, but it all started as an experiment," says Peter Meehan, president of The Computer Circuitry Group (Research Triangle Park, NC), one of 15 Insilco subsidiaries. "Our chairman decided that to operate in the twentieth century, executives have to learn what these machines are all about. And with nothing more than that belief, our search for the right personal computer began." The Grid Compass portable computer was chosen.

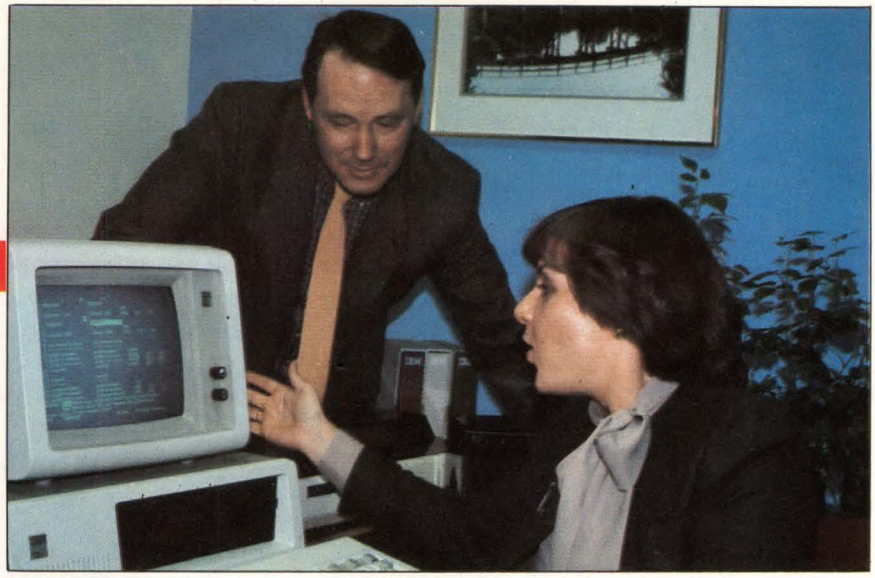
If the genesis of this idea was spontaneous, the search for the right computer was more deliberate. Edward Hackett, director of management services, and Bruce Schmidt, a consultant, headed the search, assisted by the executives. Says Hackett: "We gave the executives a demonstration of the Grid and the Compaq, the portable compatible with the IBM Personal Computer. We examined the pluses and minuses of each. The Grid won on the basis of ease of use and ease of learning. It caught the executives' attention; it was really their decision to buy it."

Hackett also looked for guidance to a personal-computing program at United Technologies Corp. in nearby Hartford, CT. United Technologies had acquired 1,100 IBM PCs for its executives. "United Technologies was using Context Management Systems' MBA software, which has many of the same features as Grid's software for the Compass. However, the Grid software was much easier to use."

The next step of the implementation of personal computing for Insilco executives was training. "Grid's reps gave us two days of training," explains Meehan. But for the executives, the training sessions were only the beginning of a longer learning process. They spent a lot of time, initially, on false starts. Peter Meehan concedes: "Neither I nor any executive in this company has reached the point where the Grids are used even as much as an hour or so a day." Seventy percent of the

financial trends. The program helps sales managers keep track of the daily production of each account executive and monitor the various sales categories. Halbert hopes to attract 300 users once the system has been tested completely.

Although Halbert's department encourages use of one brand of computer, it doesn't push personal computing on employees. In fact, it tries to hold off some potential users. "We make sure they know what they're getting into in terms of time and money invested," explains Halbert. "It takes a lot of time to enter and maintain data, and the company wants its account executives to spend less time computing and more time selling."



A personal-computer subsidy program helped Chase Econometrics/IDC gain a commitment from users to support the company micro policy, says Randi Arendt (right), personnel manager.

That's why Merrill Lynch would really rather see its employees use information-retrieval terminals than personal computers—they take less time to learn to use. But terminals simply don't pack the thrills that personal computers do, and wisely, the brokerage hasn't tried to damper employee enthusiasm for personal computing. It offers discounts on IBM PCs and Apples, as well as education, software, and advice.

Companies with more aggressive plans for personal computing often use subsidy programs to encourage the phenomenon. Micro-mainframe

by Theresa Conlon, Staff Writer

time he uses the Grid, he's experimenting, often at home, says Meehan. "All of us haven't jumped at this opportunity to the same degree," he says. "Some of us are still befuddled by the learning process. It takes a fair number of hours of stumbling and trying to remember what to push and why—especially to move from place to place on the screen—to get comfortable with the keyboard. If you are not willing to spend that 20 hours or whatever it takes to feel at ease, you are not going to advance beyond that initial discomfort."

Time, or lack thereof, is another barrier to the executives' acceptance of the Compass portables. Few executives have enough time to learn—a major consideration for corporations implementing a new personal-computing technology. However, Hackett attributes the fits and starts of the personal-computing program to another factor. From the start, he says, the program was plagued by the lack of database-access software for the Compass. The executives could not get into Insilco's database with the machines. "As a start-up operation, Grid doesn't have a great deal of software for its machines yet," says Hackett.

The three executives who are using the machine have been automating several functions. "Quarterly, we plot productivity measures of our various subsidiaries," says Bill Bear, a vice president. "We enter the data on the Grid and the graphs appear automatically. It's a real time-saver." Another vice president, Greg Howey, uses the Compass to analyze acquisition possibilities, using data obtained online from the Dow Jones News/Retrieval Service.

Interestingly enough, clerical employees, like the secretaries of the eight executives, are finding applications for the portables. Is this a case of workers being more adept at the new technology than their bosses? No, says Bear: "The clerical applications are easier and have more immediate payoffs."

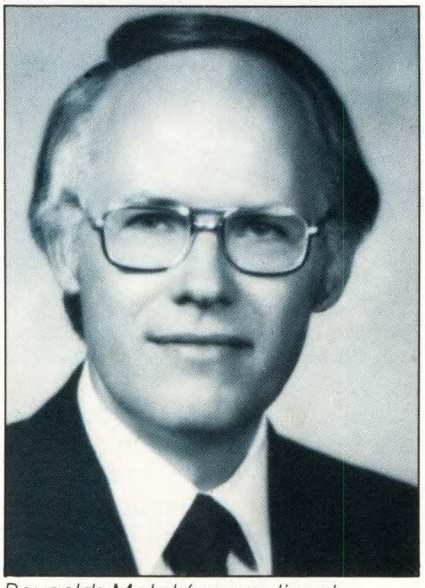
Despite the halting progress at Insilco, the executives have no intention of abandoning their portables. Several new developments may speed progress. Late last year, the Grid Server was installed at the company. The package allows each of the executives to access the corporate database using the portables. Hackett plans another training session, and is working on a "mini-database" of financial and operating information specifically for the eight executives. "The book isn't closed here yet," he asserts.

PROMOTING PERSONAL COMPUTING

connectability was one of the incentives for the $500,000-a-year subsidy program at Chase Econometrics and Interactive Data in Waltham, MA. Established in 1982, the program offers employees two options for purchasing IBM PCs from Computerland retail stores.

By buying the computer outright from Chase, a worker receives $100 a month for three years; if he or she leases it, $100 is deducted from the cost per month over the same period. Either way, the user saves about 50 percent of the computer's cost. Upkeep and security are the employee's responsibilities. A purchaser who leaves the company within the first year of the contract must pay the balance of the computer's cost to Chase. For users wishing to expand their horizons, Chase offers a 100 percent tuition-refund on personal-computing training courses.

As a result of the subsidy, a good working relationship has sprung up between users and the information-processing department. "We've got a firm commitment from our micro users to support our overall computer strategy, which is centered on IBM compatibility," asserts Randi Arendt, Chase's personnel manager and director of the subsidy program. "A few personal computers are still coming in through the back door, but not nearly as many as before."



Reynolds Metals' promotional strategy includes training fees, says John Alexander, administrative director.

Last year, Chase suspended its subsidy to save money. Despite the tax credit Chase receives for its leasing option, the program's half-a-million-dollar annual cost was steep. Arendt hopes rosier business conditions make it possible to resume the program next year.

As the prices of personal computers are driven steadily downward by competition, a subsidy program may become unnecessary. For example, Gilbert-Commonwealth, an architectural-engineering firm in Reading, PA, used to offer a healthy discount on Commodore 64s. Personal computing wasn't a job requirement, and many engineers bought machines for home use. Now, since employees can get a better deal by comparison shopping, the company has discontinued its subsidy program.

But that doesn't mean Gilbert-Commonwealth has stopped encouraging personal computing. Realizing that its promotion program must change with the times, Gilbert-Commonwealth donates facilities to a company computer club and has arranged for vendor support, says Donald Preis, president of the club.

This club, initially a case of the blind leading the blind, according to Preis, "was formed so that technological idiots like myself could exchange ideas about hardware and software," he says. "Now 210 members meet twice a month." The club provides a library of public-domain software, a newsletter that outlines the joys and frustrations of certain programs, and volume discounts on disks and other equipment. Computer-savvy club members themselves answer most technical questions that crop up. The comradery is comforting, especially for novice users. Says

United Technologies will give personal computers to executives who complete a National Training Systems Executive Workshop.

The Rixon PC212A... The Perfect Modem For Your IBM® PC ...Only $499

$25 Rebate On the PC212A

Contact your local retail computer store for details.

The Rixon® PC212A offers you the only 300/1200 BPS full duplex card modem with auto dial and auto answer that plugs directly into any of the IBM PC® * card slots. Because the Rixon PC212A was designed specifically for the IBM PC, it is loaded with user benefits.

The PC212A eliminates the need for an asynchronous communications adapter card and external modem cable, this alone saves you approximately $190. The PC212A provides an extra 25 pin EIA RS232 interface connector, a telephone jack for alternate voice operation, and a telephone line jack for connection to the dial network. Without question, the PC212A is the most user friendly, most reliable, and best performing modem for your IBM PC. An internal microprocessor allows total control, operation, and optioning of the PC212A from the keyboard. A user friendly HELP list of all interactive commands is stored in modem memory for instant screen display. Just a few of the internal features are auto/manual dialing from the keyboard, auto dial the next number if the first number is busy and instant redial once or until answered. In the event of power disruption a battery back-up protects all memory in the PC212A. In addition, the PC212A is compatible with all of the communication programs written for the Hayes Smartmodem™ **such as CROSSTALK.™+Also available for use with the PC212A is the Rixon PC COM I,™ ⋇ a communications software program (Diskette) and instruction manual to enhance the capabilities of the PC212A and the IBM PC. PC COM I operates with or replaces the need for the IBM Asynchronous Communications Support Program. The program is very user friendly and provides single key stroke control of auto log on to multiple database services (such as The Source SM&), as well as log to printer, log to file transfer and flow control (automatic inband or manual control). PC COM I is only $49.00 if purchased at the same time as the PC212A. The PC212A comes with a 2 year warranty. For more information contact your nearest computer store or Rixon direct at 800-368-2773 and ask for Jon Wilson at Ext. 472.

PC212A .....$499.
PC212A WITH ASYNCH PORT .....$539.

SANGAMO WESTON Schlumberger **RIXON** INC.
2120 Industrial Pky., Silver Spring, Md. 20904
301-622-2121 TWX 710-825-0071 TLX 89-8347

* IBM is a registered trademark of the International Business Machine Corp.
** Hayes Smartmodem is a product of the Hayes Stack ™ series, a registered trademark of Hayes Microcomputer Products Inc.
\+ CROSSTALK is a trademark of Microstuf Inc.
⋇ PC COM I is a trademark of Rixon Inc.
& The Source is a servicemark of Source Telecomputing Corp.

The Rixon PC212A Card Modem

Another Modem Good Enough To Be Called RIXON

PROMOTING PERSONAL COMPUTING

Preis: "Nobody laughs if you ask a dumb question."

Corporations are growing increasingly aware that personal computing isn't a mechanical function, but rather a state of mind. And they're tailoring promotional efforts to raise employees' consciousness. "We're trying to get employees to think in terms of personal computers," says Rob Potter, director of training at Tektronix in Beaverton, OR.

Employees of Tektronix can have almost any personal computer they want. The company's buckshot approach resulted from its reorganization a year ago into five autonomous divisions. "We're moving away from bureaucracy. By breaking administration into smaller blocks, we've removed impediments to creativity, making it easier to respond to changes," explains Potter.

Tektronix supports its several thousand users with discounts, an in-house computer store that sells surplus equipment, and an in-house evening education program that has employees standing in line for admission. Potter offers a dozen introductory courses, two programming courses, and a few courses on home computing. Attendees of the latter bring their Texas Instruments or Commodore computers along, tucked under their arms. Most of the courses run between 20 and 30 hours and last about a month. They cost $1.50 per credit hour. Seventy-five percent of the cost is picked up by the company.

Potter is confident—almost nonchalant—about his employer's ability to deal with all its incompatible hardware and software. "Most of the personal computers we're buying will be outdated in a couple of years anyway," he explains. "If we ever want to tie our computers together we'll be able to rely on the improved software coming down the road."

The personal-computing centers operated by Manufacturers Hanover Trust help raise the awareness of employees, says Richard Groppa, vice president of operations. They also help the bank guide users toward common goals.

A training program should address both the enthusiastic and the timid user.

Reynolds Metals, Richmond, VA, has developed an unconventional alternative to subsidies and discounts. Reynolds makes employees pay for the privilege of learning to use personal computers.

Everyone at Reynolds, from managers to clerks, can attend a one-day seminar for $75 apiece. Developed in-house, "Productivity through Automation" focuses on how personal computing can help employees do their jobs better. Applications such as electronic mail, word processing, spreadsheets, and file transfers are stressed.

An employee who finishes the class is informed enough to determine if he or she needs a personal computer, says John Alexander Jr., general director of corporate administration. He says that free seminars, like free advice, are not valuable. "We promote, but we do not mandate," he explains. "We let those interested in personal computing come forward."

Personal computing became part of Reynolds' corporate strategy in 1980, when the metals producer launched a drive to provide every salaried employee with access to the information needed for his or her job, and to double each worker's productivity by 1990. To implement its goals, Reynolds culled professionals from the 250-strong corporate dp department to advise on equipment selection.

(Continued on page 78)

Reliable.

You can count on 3M diskettes. Day after day.

Just like the sun, you can rely on 3M diskettes every day. At 3M, reliability is built into every diskette. We've been in the computer media business for over 30 years. And we've never settled in. We're constantly improving and perfecting our product line, from computer tape and data cartridges to floppy disks.

3M diskettes are made at 3M. That way, we have complete control over the entire manufacturing process. And you can have complete confidence in the reliability of every 3M diskette you buy.

Look in the Yellow Pages under Computer Supplies and Parts for the 3M distributor nearest you. In Canada, write 3M Canada, Inc., London, Ontario. If it's worth remembering, it's worth 3M diskettes.

3M hears you...

3M

CIRCLE 29

Number 2 in an instructional series from Wicat.

THE CLASSIC METHOD OF

You know, bringing up applications software is just like bringing up a new baby. You stay up around the clock. Teach it everything you know. Help it get bigger and smarter every day. And before you know it, your software outgrows its old computer.

So you get a bigger computer. With a brand new operating system. But when you give the original machine the old heave-ho, out go all those wonderful applications right along with it.

At Wicat though, we realize how much your software means to you. So we created the first family of totally compatible grown-down mainframes.

Every one of them gives you the same mainframe operating system. Our own MCS, or the industry standard UNIX.® Plus nine mainframe language compilers.

COMPUTER UPGRADES.

Best of all, we've grown all this raw mainframe power down into a whole range of sizes. From a single-user desktop to a full-blown 48-user system. So you can start with an $8,000 machine and move all the way up to a $100,000 machine. Without losing one iota of your original software investment. And without abandoning your original hardware.

If you'd like to know more, call or write us for complete information. Wicat Systems. P.O. Box 539, 1875 South State, Orem, UT 84057. (801) 224-6400.

We'll show you how to hang on to your software investment. And how to upgrade without taking a bath.

WICATsystems™

The grown-down mainframes.

UNIX is a registered trademark of Bell Laboratories.

CIRCLE 30

PROMOTING PERSONAL COMPUTING

(Continued from page 74)

After an employee completes the optional seminar, an advisor helps him or her write a proposal outlining the cost benefits of personal computing in his or her job. After all a department's proposals have been submitted, they are reviewed by a committee. The employees who can save the corporation the most money can choose between an IBM PC, XT, or Displaywriter, a stand-alone word processor.

Reynolds' method may be unusual, but so far it's working. At the end of last year, 200 personal computers were being used. According to Alexander, the company is almost halfway toward realizing its goals. By presenting employees with this challenge, Reynolds engendered team spirit—everyone is shooting for the same target. By forcing employees to compete for personal computers, the company sparked would-be users' imaginations and encouraged them to think for the good of the operation. At Reynolds, everybody wins: Employees get personal computers and the corporation benefits from good ideas.

A major challenge in promoting personal computing involves successfully integrating the equipment into the workplace. If you can get its cooperation, the corporate data center can be valuable during this stage of promotion. Tying personal computers into the central database lets employees both take advantage of powerful machines and access a consistent, up-to-date source of information. That ensures that all employees will be computing with the same facts and figures—not the potentially skewed versions of them—and that only those employees with a need to know have access.

Executives may resent being trained by a subordinate. Save in-house trainers for staff and middle managers.

Not all dp managers, however, have either the time or the inclination to cater to the needs of personal-computer users. After all, the purpose of the data center is to manage corporate-wide information; the end user is concerned primarily with individual projects. Says Jay Sedlik, vice president of National Training Systems (NTS), Santa Monica, CA: "Some management-information service/data-processing (MIS/dp) departments consider personal computing a threat to organized information processing; others look at it more productively—as an expansion of data use."

At United Technologies (Hartford, CT), John Bennett, corporate dp director, spearheaded a $5 million campaign to place micros in the hands of *trained* personnel. Directed by the information-processing division, the voluntary program gives personal computers to more than

WITH THE PASSWORD™ MODEM AND TELPAC™ BEN FRANKLIN COULD HAVE PUBLISHED THE FRIDAY EVENING POST.

The Password™ modem and Telpac™ software deliver text fast, far, cheap, and letter-perfect. Fast? Ten times faster than an expert typist (and four times faster than most other modems). Far? Crosstown or crosscountry. Letter perfect? Multiple accuracy checks of your text are just one editorial benefit. Cheap? Thousands of words by phone lines, for less than express mail. And if the text is to be typeset, the cost will be half or less – the proofreading zero!

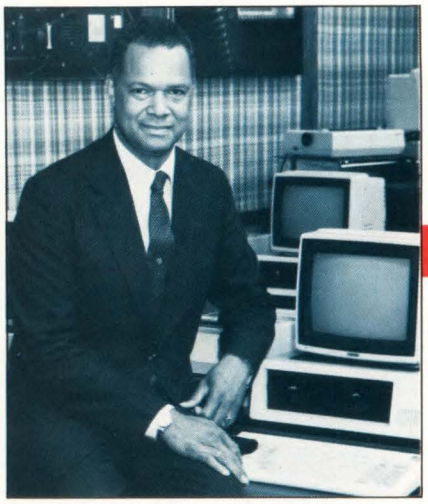
Password is USR's virtually automatic modem: 300/1200 baud, auto dial/answer, auto mode/speed select, two-year warranty. $449.* Telpac, the USR friendly telecommunications software package, $79. Write or call for complete descriptions – both Telpac and Password do far more than this!

U.S. ROBOTICS INC.
1123 WEST WASHINGTON • CHICAGO, ILLINOIS 60607

CIRCLE 31

*Suggested list for Password complete with power adapter, phone cable, RS232 interface.

Password, Telpac, and USR logo are



John Bennett, United Technologies' corporate dp director, encouraged personal computing but maintained central control of information systems.

PROMOTING COMPUTING

1,000 executives at such divisions as Otis Elevator, Carrier, and Pratt & Whitney when they complete an NTS Executive Computing Workshop.

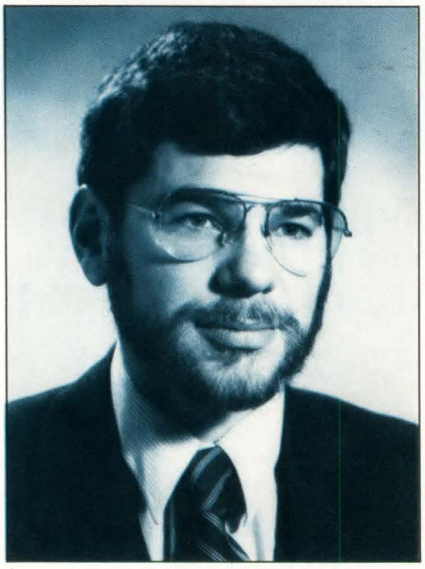
Bennett's rationale in exposing executives to personal computers is deceptively simple: "To deal effectively with the next phase of the computer revolution, our management must acquire first-hand experience with computers and software."

Yet, the executives aren't expected to fiddle with their new personal computers for hours at a clip; some may never touch their machines after they complete training. Does that mean the program has failed to help them? Hardly. Bennett believes knowledge of personal computing can make executives better managers. Even if they don't operate the machines, their understanding of the personal computer's abilities will help them conceive and direct projects incorporating its use. "The program helps executives understand what automation can do for their departments," he says.

To support and control micro use at the local level, Bennett instructed each of the divisional MIS/dp managers to take the training course before the executives did. He admits that they didn't want to be pried away from their daily work and resisted anything related to personal computing. But Bennett claims the effort was worthwhile. "The project may take dp managers away from what they did in the past, but it pushes them toward what they'll be doing in the future," he says.

Setting the stage for personal computing doesn't happen overnight, and Bennett insists that the data center start gearing up for it as soon as possible. "If you lose the battle over personal computers, you lose control over your information," he says.

This battle begins when an information-processing center with no plan for providing access to personal computers while maintaining data integrity, clashes with a group of users who want to yank the information out of the mainframe, manipulate it, and send it back. Long before the first skirmish erupts, the data center should start providing the means for information to be passed to personal-computer users. And the users, for their part, should patiently wait to tap the corporate resources. "The new users haven't been through the horrors of the 1960s, when dp managers learned the hard way to standardize and maintain information," explains Bennett.



Merrill Lynch promotes personal computing to control software use, says Jack Halbert, personal-computer director.

The Executive Computing Workshop at United Technologies revolves around the use of Context Management Systems' MBA package, electronic mail, and the Dow Jones News/Retrieval Service. Before class convenes, each participant receives a manual written in clear, unthreatening English. The manual outlines course objectives and describes applications for personal computers.

Each class has no more than 16 students, each with his or her own IBM Personal Computer configured with 256 Kbytes of memory, an MX-80 Epson printer, a color/graphics monitor, and a modem. The three-day class—led by two instructors, a technical expert, and a micro-proficient executive—begins by introducing users to simple commands and culminates with an exercise that simulates the production of a movie. Using their new skills, the executives review concepts for new movies with the computer's communications capabilities; write proposals and counterproposals with the word-processing feature; and develop budgets with the spreadsheet-analysis and graphics features. The program costs the company approximately $900 per student. A new program, also for executives, features Lotus Development Corp.'s 1-2-3 package and costs $695 for a two-day session.

Corporations with no in-house training facilities either subsidize courses or seminars, which employees take in their own time, or hire professional trainers. An astonishing variety of organizations—ranging from start-up video makers

to big universities to technical and professional associations—are available to instruct employees in personal computing.

Industry observers predict that millions of users will need such guidance in this decade. And Dataquest, a Cupertino, CA, market-research house, predicts training will capture about one-quarter of the $14 billion spent on personal computers by 1986. Bill Gallagher, director of a posh computer camp for adults, comments on the need for professional trainers: "Most people have an intuitive knowledge of how gear-driven machines work, but have no such analogy for computers. On top of that, the manuals provided with the machines are just about impossible to understand."

An effective training program addresses two problems. First, there are the advanced learners who are already using personal computers on the job. Progressive and enthusiastic, these users require little prompting or handholding. But, left to their own devices, they can fill the office with back-door computers that are unable to communicate with the host computer or with each other. Also, employees working on their own computers can develop their own databases—which may be redundant or contain erroneous data. Thus, training is a control strategy.

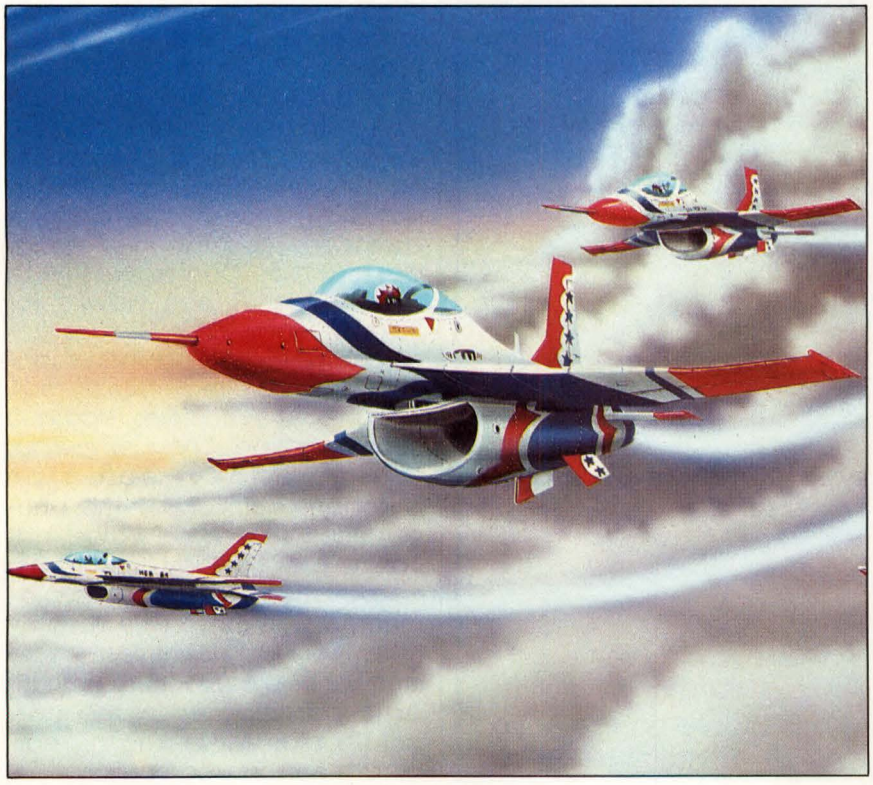
A training program also must help users who are afraid, or even resentful, of the technology. A study by NTS suggests that one person in 10 has serious misgivings about computers. Another report from Norwalk, CT-based International Resource Development asserts that this attitude combines three fears: the general fear of working with computers, the fear of failure, and the fear of being replaced by a machine. An effective promotion program will help employees overcome their reluctance to use the machines. Thus, training is a productivity strategy.

Corporations realize that personal computing isn't a function, it's a state of mind.

Sedlik of NTS recommends workshops rather than self-study programs. "Those who are nervous about computers won't make time to learn about them on their own," he says. A workshop provides both a forum for questions from the enthusiastic and guidance for the nervous, he adds. NTS uses a pre-workshop survey to team the computer-savvy and the computer-shaky so that both can work toward a single goal—productive personal computing.

For political reasons, outside instructors may be essential if executives make up the student body. "Executives are a special breed, and they require special handling," says Karen Orton, NTS business manager. "Most in-house trainers are too nervous around them to be very effective." Executives, for their part, may not care to be instructed by someone below them on the corporate totem pole. Save in-house trainers for peer groups and middle managers.

Each training method has its own pros and cons. For example, training videodisks don't run on personal computers, so they don't provide hands-on experience. Installed in an out-of-the-way corner in an information center or library, however, these same videodisks are a cheap

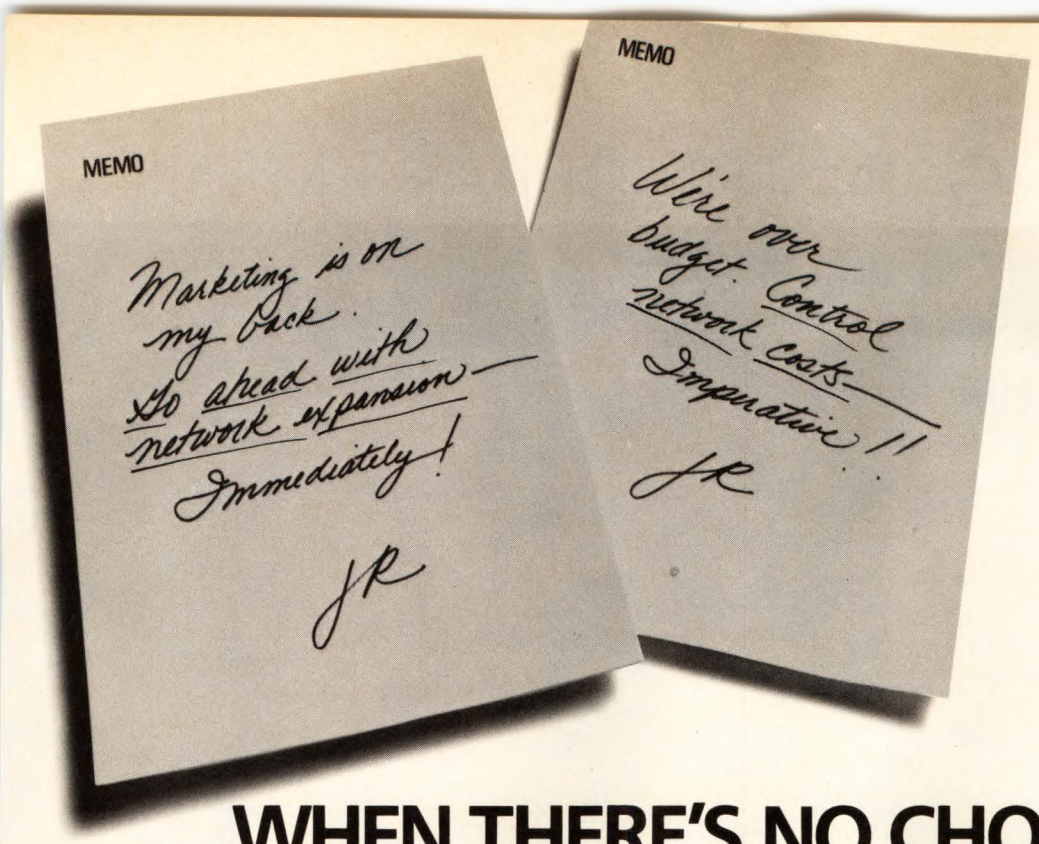


way to expose tentative users to the joys of computing. A step-by-step walk through Visicalc on videodisk, marketed by Micro Learning Concepts (New York), costs $99. The vendor also makes an introductory disk that helps users get over what might be their biggest fear: turning on the machine.

Seminars featuring hands-on training may cost more, but they go a long way toward making computers less threatening. At executive-training camps run by Gallagher's Computers Simplified Inc., the get-away-from-it-all atmosphere, fueled by French wine and Brie, makes users realize that computers can be fun. Relaxed by plush surroundings at Lake Tahoe, NV, Palm Springs, CA, or the California wine country, novice users spend from one to four days greeting the central processing unit, getting acquainted with the random-access and read-only memory chips, and making friends with the computer. The cost for a typical weekend is $295, which includes a workbook, reference text, and practical experience—and wine, of course.

The Institute for Advanced Technology, the Rockville, MD-based subsidiary of Control Data Corp., provides seminars on technological topics via teleconferencing. One offering, a three-hour lecture, will deal with the effects of personal computers on the corporation. "This is for executives whose data-processing department is afraid that personal computers will overload the information system, or for a dp manager who wants to foster a positive attitude toward personal computers. It's a generic program for anyone who has questions about micros in business," explains Warren Baise, executive producer of the teleconferencing program. Broadcast from Washington to hotels across the country, the seminar costs $195. Companies with satellite dishes can view it for $3,000. Representative questions are answered during the broadcast; others are replied to by mail.

The more executives read and hear about personal computing, the more they realize an important truth about the phenomenon: The world's most advanced technology won't help corporations if it's not implemented with those who use it in mind. Providing incentives for your staff will help make them enthusiastic participants in the corporate plan for promoting corporate personal computing. □



WHEN THERE'S NO CHOOSING, CHOOSE ICOT.

More personal computers. More workstations. More remote locations.

Everyone seems to be demanding *more* of your 3270 network. And management says, "Do it—but do it for less."

It's a tough spot to be in, unless you know about ICOT's Virtual Terminal System™ protocol converters. In place in your network, they deliver the compatibility everyone wants and the economy and flexibility you need.

You can make inexpensive asynchronous terminals and printers compatible with your BSC or SNA/SDLC network. A single terminal can access multiple applications and multiple hosts. And personal computers can be included easily in your network. All without expensive software modifications.

You have the flexibility of either dial-up or leased-line communications, letting you choose the option that's least expensive for your situation. Plus the option of adding ICOT's value-enhanced 3270 lookalike terminals.

It can all be done easily. Economically. With a built-in flexibility that makes future expansion fast and simple.

And when you use ICOT's protocol converters, we back them up with our expert installation, service and engineering support.

Now you don't have to choose between expansion and economy. Just choose ICOT. To find out more about the ICOT Virtual Terminal System, call or write:

ICOT Corporation
830 Maude Avenue, P.O. Box 7248
Mountain View, CA 94039
(415) 964-4635
TWX 910-379-6479

COMPUTING IN THE DEPARTMENTS

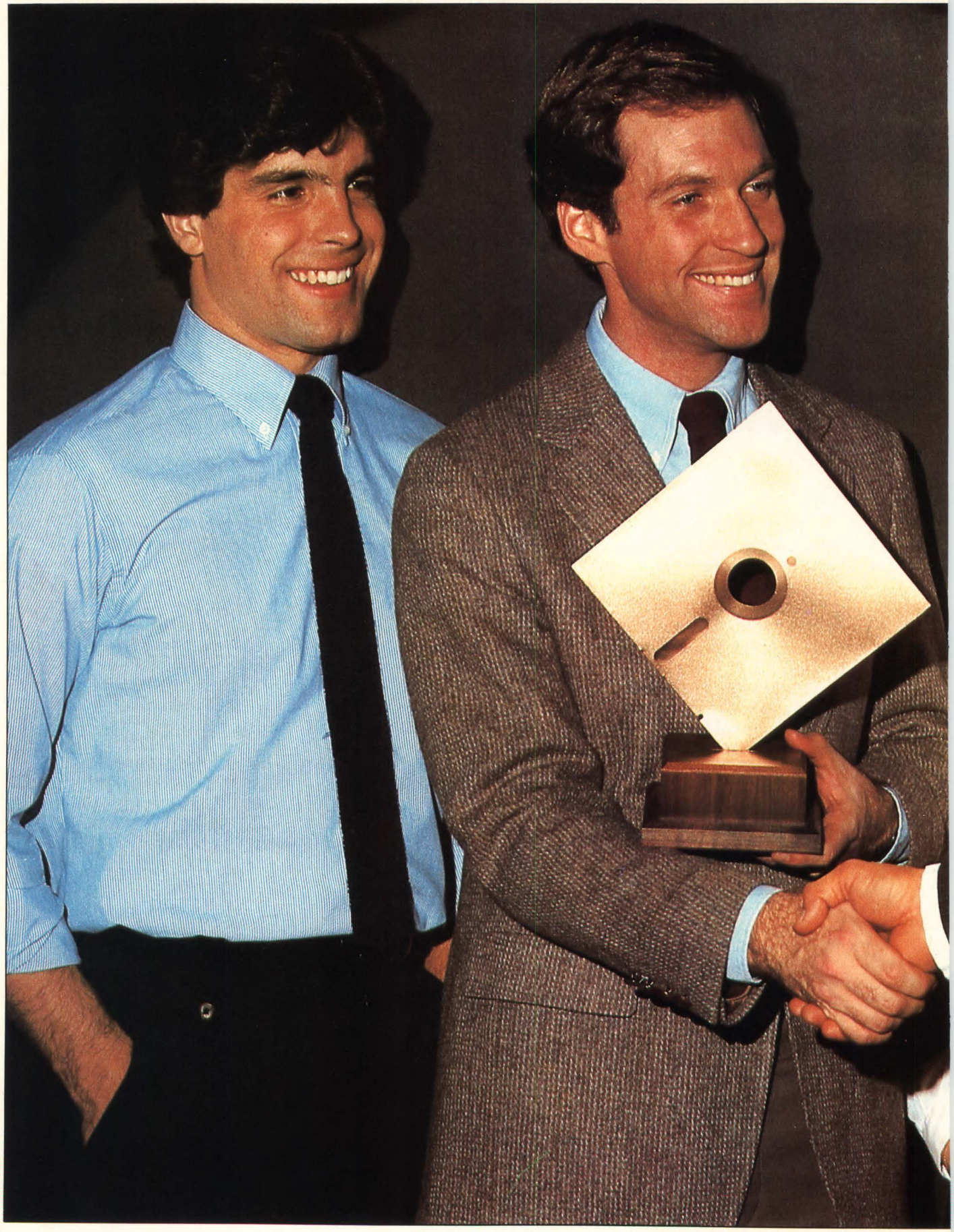


Photo by Ted Hardin

USERS: THE NEW CORPORATE HEROES

Personal computing is giving employees in every department the power to become corporate heroes.

by David R. Roman, Staff Writer

The personal computer has matured in a few short years from a show-off gizmo and tinkerer's diversion to an integral work-a-day tool in user departments. It has achieved this status despite different—even contradictory—interpretations of how it may best be employed. Because it has few limits, each department within a large corporation can make the personal computer uniquely its own.

In some departments, personal computers simply automate tasks that were once handled manually. In others, the machines are not merely automating, but also are improving, operations. They've taken on tasks and responsibilities that previously were unforeseen or impossible to perform.

When the personal computer improves a single department's operation in this way, making it more successful, it contributes to corporate success. The results may not show up in dollars immediately, but they will show up somewhere—in some improvement or some operating advantage—and eventually they will make their mark on the bottom line.

One reason for the personal computer's widespread corporate acceptance is its relatively modest pricetag. Many departments feel no need to cost-justify their purchases. Nevertheless, they expect a quick return on investment.

Robert Martin, a principal analyst at the corporate level of Eaton Corp. in Cleveland, says it would be difficult for each division at his company to justify its personal-computer purchases with hard figures. But he's certain the machines have proven their worth. Whether they have paid, or will pay, for themselves has never been questioned, and he speaks for many departments when he says "a fast payback is the least of our concerns."

Personal computers are hot items, and some companies simply feel that their employees must have them. Why? "As soon as your users get personal computers, they'll start to become knowledgeable about them," says Thomas Walters, senior systems analyst in corporate data processing at Cargill Inc., the giant commodities trader in Minneapolis. "Once they learn how to use some of the software packages, they'll begin to see how much faster their jobs can be done."

Workers know their own routines best, and are probably best qualified to say where personal computers can most effectively be employed in their departments. Robert Petersen, an accountant in the tax department at Snap-

COMPUTING IN THE DEPARTMENTS

On Tools in Kenosha, WI, favors user-developed applications of personal computers over uses planned at the corporate level. "You can't say, 'Let's do this,'" Petersen says. He maintains that finding applications for a personal computer is a real process. "You go through your everyday procedure and then say, 'This might lend itself to the micro.'"

This method works with the six accountants and a single Radio Shack TRS-80 Model 16 in Petersen's department. "We just sit down with whatever we're working on," Petersen says, "and as we go through it, an application might suddenly occur to one of us."

Robert Chamberlin, assistant vice president of human resources at Connecticut Mutual Life Insurance Co. in Hartford also believes that, with time, his employees will find ways to maximize use of personal computers. He's planted the seeds for micro use; now he's waiting for them to germinate and sprout. "I went to great lengths to make sure that anyone who wants to send a message to one of our field offices must do it via one of our IBM Personal Computers," he explains. "At this time, the PC is being used only as a terminal, but the next time someone sits down at it, he or she may see the next step—using it as a personal computer—is easy. As the employees start using the machines, their imaginations will get turned on. Even if they just perform modest applications, the drudgery will be gone from their work, and their jobs will be more interesting."

There's an array of factors to consider and a grab bag of choices to make when implementing personal computers, but it seems that any combination of choices can produce a winning application. Reviewing the circumstances of successful applications within departments common to most large corporations—finance, personnel, engineering, manufacturing, and marketing—doesn't give a definitive explanation of how the personal computers should be used. No department holds the patent on innovative use, and some applications just aren't performed in any departments. But personal computers can manage pension portfolios, inventories, or transportation schedules. They can be used as instructional or recruiting tools. There's even a software package that helps engineers design sails for ships. And new hardware and software innovations appear just about every day.

When workers become excited about the possibilities of personal computing, their enthusiasm can spread throughout their department and the entire company.

FINANCE

At Atlantic Richfield Co. in Los Angeles, enthusiasm about personal computers was catching. Some workers in the internal auditing department bought Radio Shack 100 portable computers because they were tired of waiting for time on a terminal just to access the corporation's Amdahl mainframe. Since they weren't really doing any computing, just editing text while preparing reports, they found that they could type their reports directly into the Radio Shack 100s. Later, the reports can either be stored on the mainframe, or sent over regular phone lines to be printed on one of Arco's Xerox 860 word processors in Los Angeles, Dallas, or Chicago.

"We're in the position to make the proper business decisions quickly, and at a low cost." Kneitel, DuPont

Eric Stanford, supervising data-processing (dp) auditor, noticed how a couple of his auditors were using the portable 100s. "The machines were satisfactory text editors, and I realized it would be very cost effective to do our editing that way instead of on the mainframe," he says. "We'd save a lot of connect time, too."

A dozen more portables are on order now, and Stanford anticipates even greater demand for them. "Our interest in personal computers is expanding, and we're looking at a lot of functions besides text editing. We're thinking about other ways to use them for our audits. We'll probably buy a lot more."

Many companies only become active in the management and use of personal computers after employees have already started to use them. Terry Turzynski, an account representative in the MIS department at Abbott Laboratories, the pharmaceutical manufacturer in Chicago, believes that after a certain point, manage-

ment *must* help workers get optimum use of their micros. "We figured that if we didn't take the responsibility, the users would do it themselves," Turzynski says. "Now we have a group that does nothing but look at new equipment. It looks out for the future. At least we have the expertise to analyze equipment; the individual user divisions don't. We just want to get users off on the right foot."

Top management may worry about how skillful employees are with personal computers, but it seems that the expertise of users or the extent of their planning is not directly related to their success. At Scott Paper Co. in Philadelphia, individuals had only vague ideas about what they would do with their machines, but they acquired them anyway.

"Some employees thought they might find ways to save money; others thought they could save time," says Carlton Harris, strategic-planning manager for Scott's natural-resources division. "Many just thought they might be able to use the computers *somehow*, and as it turns out, they could."

"As employees start using personal computers, their imaginations get turned on."
Chamberlin, Connecticut Mutual

Personal computers are hot items, and some companies feel that the employees must have them.

Carlton's staff now performs financial projections, prepares quarterly forecasts, and plans some budgets on IBM PCs running two spreadsheet packages: Visicalc, from Visicorp, and Lotus 1-2-3, from Lotus Development Corp. Many of the tasks, he says, "just didn't get done before the PC was brought in. The applications are too small to bother putting on a mainframe. With a personal computer, though, it makes sense."

Cargill Inc. also found micros were well used for applications that are out of the mainframe mainstream. "We're doing some record-keeping chores and some miscellaneous calculations," says Thomas Walters.

But the primary use for the IBM PCs at Cargill was not planned or even foreseen until after the machines arrived. In the financial department, they are used to control access to outside databases, a task that once required several operators. Using Visicalc, a file-management package called T.I.M. III from Innovative Software Inc., and a communications program called Cross Talk from Microstuf Inc., a PC can communicate with other computers over the telephone. It pretty much runs the show when it accesses outside timesharing services.

"Banks make balance reports available through timesharing," Walters explains. "We used to have an operator who dialed up the service on a dumb terminal, logged on, and gave the password and an ID. Then the operator would be asked a series of questions. Pretty soon, the reports would start coming back. When it was finished, the operator would sign off. Now, the PC controls the entire conversation with the timesharing service. We need an operator to start the computer and maintain the conversation file."

This method is an obvious timesaver. "Since we're getting our reports faster, they're available to the people that use them sooner," says Walters. "We've all but eliminated the need for the operator. But we haven't gotten rid of any of them, we've just reassigned them."

Like the employees at Scott Paper, investment professionals at New York Life Insurance Co. in New York didn't have a particular use planned for their personal computers. "We just wanted to get them into our office and let people learn how to use them," says Larry Fields, investment vice president. "But we hoped we'd get some value out of them too." The department has. Fields' staff of 25 investment professionals now uses eight IBM PCs and four IBM PC XTs to perform the work it used to do with calculators and spreadsheets, or through timesharing. Using Visicalc, staffers can project the carrier's earnings by analyzing possible stock purchases and other financial transactions.

"We can play around with different what-if scenarios," Fields

COMPUTING

Many departments feel no need to cost justify their personal-computer purchases.

explains. "We can, for example, look at what would happen to the earnings of a particular stock if one segment of the economy improved and another got worse. We can also examine what we could do with a chunk of money, and what the impact on our stock portfolio would be if we bought or sold some stocks."

Five of the department's micros connect the carrier to the electronic information services of brokerage houses and banks, expanding the amount of information at the investment professionals' fingertips. "These machines have brought us out of the Middle Ages," Fields says.

Most of the workers in Fields' office had no experience with computers, but a few of the younger staff members—fresh out of college—helped to generate user enthusiasm. Visicalc made the introduction simpler—it was a good, friendly teaching tool. "We didn't want to train anybody for days just to learn how to use one program," Fields says.

Eaton's Robert Martin agrees that Visicalc "is an excellent training tool," but users at the manufacturer had a different introduction to computing—timesharing. "We used to contract with an outside timesharing service offering a powerful modeling language," says Martin. "We also had a modeling language on our mainframe. Now we've put that power at the elbow of the decision-maker." About 100 micros, mostly IBM PCs, are being used for financial planning and decision support.

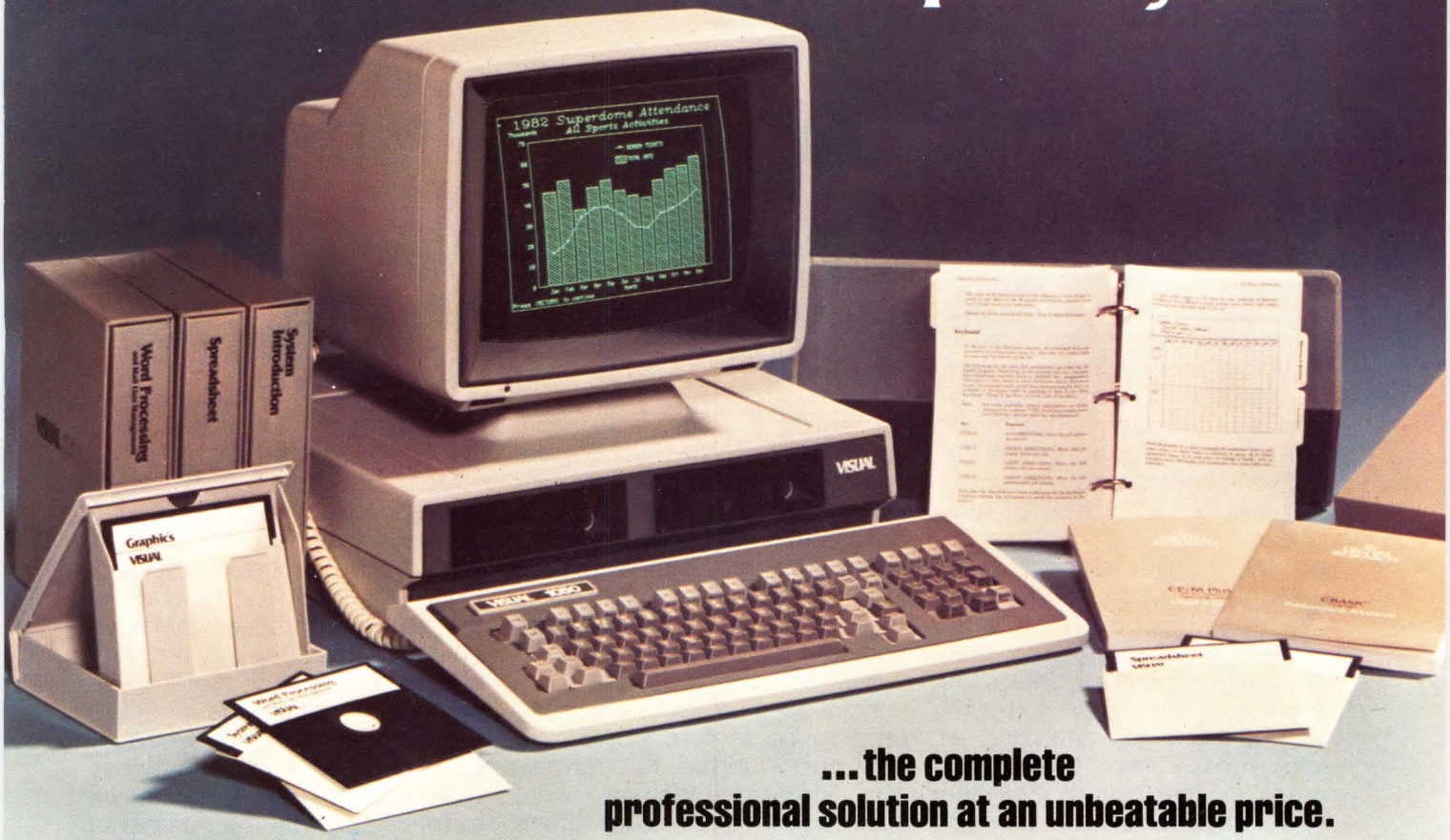
Familiarity with mainframe-based modeling has supported the widespread use of Lotus 1-2-3 on the personal computers for financial planning. The newer approach has cut Eaton's substantial timesharing costs. "Financial planning is something every operation has to do," Martin says. "Corporation-wide, it's the most effective use to which microcomputers can be put. We're saving about $150,000 this year that we would have spent to develop and execute models on an outside timesharing service."

Timesharing systems also paved the way for personal-computer use in financial applications at Abbott Labs. "Timesharing had whet finance's appetite," says Robert Steinmeier, a senior systems analyst at Abbott's corporate MIS center. "The users had become comfortable using a computer system; the barriers had been broken. When the micros came in, the users were primed and ready."

At last count, there were 90 personal computers in use throughout the company. "We mostly use DEC Professionals and Rainbows, and IBM PCs," says Steinmeier. "Spreadsheet packages, like Multiplan (from Microsoft Corp.) and Lotus 1-2-3, are used for typical financial applications. Most of the time, they help create monthly or year-to-date reports. Right now, they're doing away with the 'grunt work.' A few years ago, a given clerk or analyst manually prepared tons of spreadsheets. Most of this has been transferred to the micros. They also give us a little more expanded capability," Steinmeier adds. "Some functions we perform on them are a little more sophisticated than what we used to do through timesharing."

The next step is to introduce middle managers to the machines' decision-support capabilities. We want to provide a convenient way to access data, says Steinmeier. If they can access databases and put some of

VISUAL 1050 Personal Computer System



...the complete professional solution at an unbeatable price.

Complete Solution The VISUAL 1050 is an advanced personal computer system designed especially for managers and professionals. It comes complete with top-rated software and high-performance hardware... all fully configured for easy set-up and simple operation. The VISUAL 1050 costs much less than other full-feature personal computers and comes with everything you need to tackle important professional jobs, right out of the box.

Words, Numbers and Graphics The VISUAL 1050 solves more professional problems than any other computer in its class. Whether you work with words, numbers, or graphics, the VISUAL 1050 speaks your language. You get *WordStar,*™ *MailMerge,*™ *Multiplan*™ and Digital Research's *DR Graph*™... leading software packages for word processing, spreadsheet and graphics. And all have been specially adapted to share data and perform as an integrated software family.

	VISUAL 1050	IBM™ PC	Apple™ IIe	DEC Rainbow™
Base System Price[1]	$2,695	$2,750	$2,390	$3,495
Serial Port (RS232)	STANDARD	$119	$195	2 STANDARD
Parallel Port	STANDARD	$119	$180	STANDARD
Bit-Mapped Graphics	STANDARD	$240	STANDARD	$845
Word Processing Software	STANDARD	$200-$500	$200-$500	$200-$500
Spreadsheet Software	STANDARD	$200-$300	$200-$300	$200-$300
Business Graphics Software	STANDARD	$200-$400	$200-$400	$200-$400
Communications Software	STANDARD	$100-$200	$100-$200	STANDARD
COMPLETE SOLUTION PRICE	**$2,695**	**$3,928-$4,628**	**$3,465-$4,165**	**$4,940-$5,540**
Dual Drive Capacity	800 KB	640 KB	280 KB	800 KB
Graphics Resolution	640 x 300	640 x 200	280 x 192	800 x 240
Keys on Keyboard	93	83	63	105
Standard Memory	128K	64K	64K	64K
Optional Winchester	YES	YES	YES	YES
Tilt and Swivel Display	YES	NO	NO	NO

1—Includes CPU, Standard Memory, Keyboard, Display, Two Disc Drives, and Operating System.
Based on manufacturers' information available February, 1984. VISUAL 1050 includes 128K User Memory standard.

Communications, BASIC and More... You get *Terminal Emulation* software which turns your VISUAL 1050 into a powerful ASCII terminal for dial-up access to remote computer resources. And you get *CBASIC*® for custom programming applications. *CP/M Plus,*® a new and improved release of CP/M, allows your VISUAL 1050 to support hundreds of popular third-party packages.

Unbeatable Value $2,695 is the total retail price for the VISUAL 1050. You get the best and most popular software packages, ready to run on hardware which offers the features and quality you should demand. Two high capacity disc drives. 128K memory standard. Fast, bit-mapped graphics. Full size green screen. Standard printer and communication ports. Rugged 93-key keyboard with special WordStar engravings. You can't buy a more complete hardware and software solution at anywhere near the price.

VISUAL **See for yourself**®

Visual Technology Incorporated
540 Main Street, Tewksbury, MA 01876
Telephone (617) 851-5000. Telex 951-539

that information into models, we'll see some benefits. Right now it's too hard for them to access databases. And I can't tell a $70,000-a-year manager to take a week just to learn database-access techniques." Steinmeier believes the managers will be able to access the data themselves with nonprocedural languages.

RCA Corp.'s approach to personal-computer use is more cautious. The conglomerate has consciously tried to coordinate and control the growing use of micros. "You can't just put them out there and let employees do their own thing," asserts Michael Cofone, staff vice president of corporate-information systems and services.

Nevertheless, the RCA has entrusted its entire financial-reporting operation to micros. The 24 corporate divisions each collect financial information on IBM PCs. This information can then be sent to the corporate mainframes in Cherry Hill, NJ. "We developed an in-house software system that gathers key financial data from our divisions," says Cofone. "The information can be manipulated and standardized. Then, when it's sent to our mainframes, it is consolidated."

"We just wanted to let our people learn how to use personal computers." Fields, New York Life

Workers are probably most qualified to say where the machines will be effective.

Performance reports and financial data on sales and profits used to be sent to RCA's New York headquarters through the mail. Sometimes the data were called in over the phone. "There was no uniformity to the system," Cofone says. "The information we needed was standardized, but the way we got it was not. Now, the reporting is standardized and all the information is comparable. After data are consolidated in Cherry Hill, reports are sent to headquarters in New York."

PERSONNEL

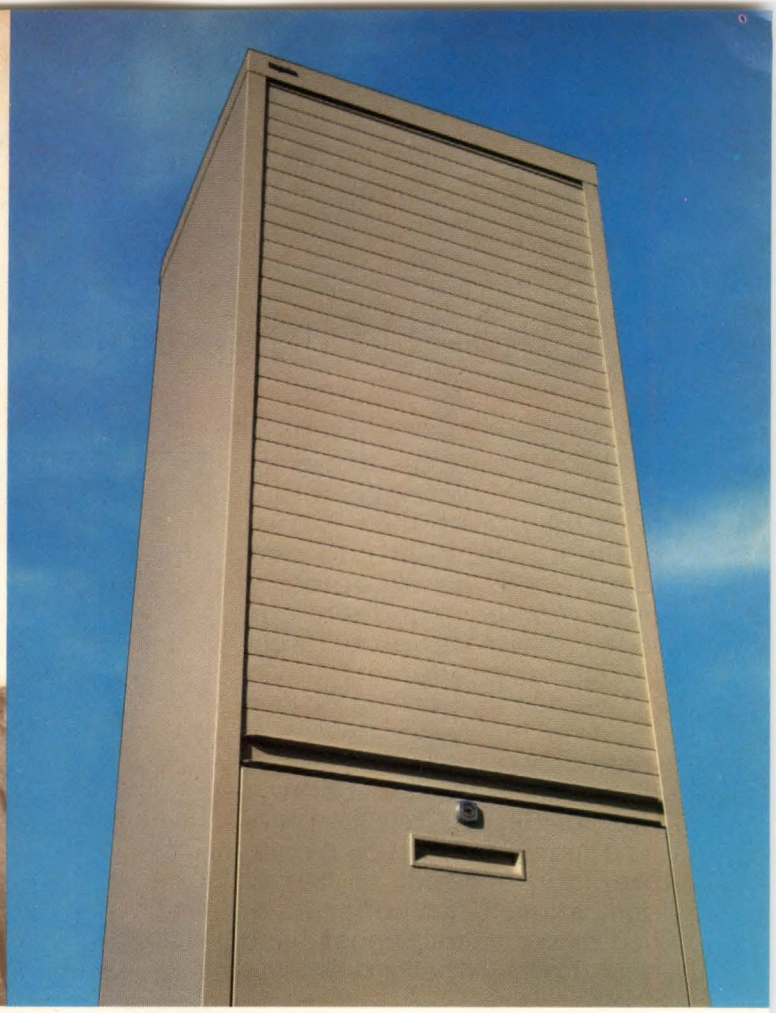
Each company will find its own way to use personal computers within particular departments, but the motivation for acquiring the machines can be as individual as the applications, as a look at a few personnel departments reveals.

"One of our responsibilities is to train employees to use personal computers," says Robert Ellwanger, explaining why his department was among the first at New York Life to use micros. Ellwanger is staff associate in the human-resources-development division. "We developed several training programs to make people more aware of what these systems can do," he adds. The division has one IBM PC and one PC XT.

Many applications have been developed for the personal computers since their introduction. "They've become management tools that track the progress of the clerical staff," Ellwanger says. "We're more on top of what people are doing now. Before, we could look around to check if they were busy, but we really couldn't account for what they were doing. Using Visicalc, we maintain data on the number of hours an employee spends on a particular project. We can compare that with the number of hours that were planned for that activity. So the micro alerts management to a project that is falling behind schedule, and perhaps requires more staff. Before, management just didn't have this kind of information."

The human-resources department at Connecticut Mutual Life Insurance is also using personal computers to manage workers better, but its machines were acquired under quite different circumstances. Connecticut Mutual was IBM's first national account for the Personal Computer. It received 1,000 PCs in March 1982, a little more than six months after the machine's introduction. Most of them went to Connecticut Mutual agents, but the human-resources department picked up three. "First, we evaluated potential uses, and then worked up some applications," says Robert Chamberlin.

One of those applications is a job-evaluation system that helps managers de-



1893. Architects discover up is better than out.

1984. IBM PC users discover up is better than out.

The proposition is easy enough to grasp. When space is at a premium, build skyward.

That's why Wright Line designed its PC WorkCenter to take up more vertical space and less horizontal. Let's face it, few offices embracing personal computers today were designed to accommodate an additional piece of substantial furniture.

Designed particularly for IBM Personal Computer Systems, our PC WorkCenter takes as little as 18″ × 24″ of floor space. Believe it or not, that's less space than your average office chair takes.

Our vertical ergonomic design provides for more efficient and convenient access to all computer components. The unit's storage capacity accommodates software manuals, diskettes and supplies, so every thing you need is all in one place. There's virtually no disruption to your normal work habitat.

As for security, just roll down the locking tambour door for overnight protection against theft and unauthorized use.

An internal cable management system protects against wire damage while leaving nothing underfoot. The master switch with circuit breaker allows you to activate the whole system with just the flick of a switch. And locking casters are ready to roll in seconds for shared use in other offices.

The PC WorkCenter is available in 50″ and 63″ heights, both well within acceptable height limits of contemporary office environments.

Wright Line has been supporting IBM for 50 years. First in the computer room, now throughout the office. And the way things are going, the sky's the limit.

For more information on our PC WorkCenter or for a complete catalog of PC support products, contact Wright Line, 160 Gold Star Blvd., Worcester, MA 01606.

Wright Line
A UNIT OF BARRY WRIGHT

CIRCLE 35

COMPUTING IN THE DEPARTMENTS

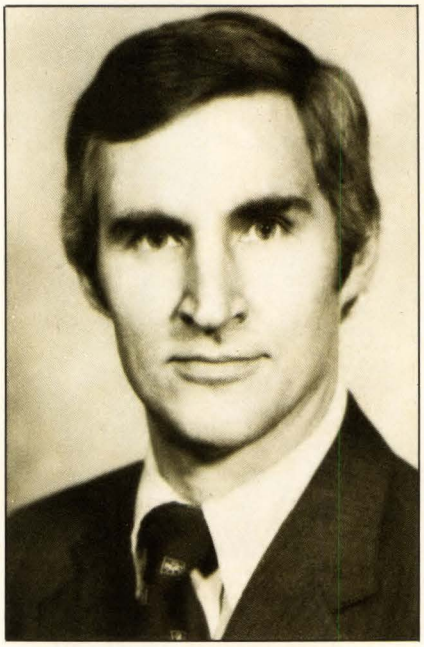
fine the responsibilities of a particular position. By arranging jobs in a hierarchy, and then differentiating the skills and performance levels expected of each worker, managers can sharply define their expectations for each employee.

"We can look at any job and examine the responsibilities of that position in terms of the job above and the job below," Chamberlin says. "We can fine-tune that job with much greater precision. It leads to better administration, and better utilization of our salary budget." The department primarily uses Lotus 1-2-3.

Chamberlin's department also is providing more services to employees using the micros. "We are extending a wider range of choices for health benefits," he notes. "Before we had the Personal Computers, employees had only one choice. But now, we can give them many options in their medical and dental coverage, so they can get the plan that's most appropriate."

Personnel applications for micros at another giant—Bechtel Corp. of San Francisco—were developed for the cost benefits they offered. "The reason we brought in the personal computers was to offset costs from using the mainframe," says Sid Simon, manager of personnel-information systems at Bechtel. "We examine a lot of salary surveys, and it's always easier to look at that kind of information once it's been plotted. The cost of using our mainframe to get those graphics was extremely high. We just felt it would be easier to get an IBM Personal Computer and a plotter." Simon's department uses an HP 7470A plotter from Hewlett-Packard Co.

Salary planning and administration are other applications that have been put on micros. A manager can now model the salary increases of his or her entire department. "Though you have to stay within the guidelines the company has set, you also want your better workers to get the best raises," Simon says. "Now we can look at what the salaries of 50 workers would be if we spread the increases among all of them. And it only takes a few minutes. When it was calculated manually, it took hours."



"I already see that the use, and the users, of personal computers are diversifying." Harkness, Kendall

Bechtel intends to put job-site payrolls on personal computers so each construction or project site can manage its own operations. "We have job sites in remote areas of the United States and overseas," Simon says. "It's better for them to be self-sufficient. We developed a job-site payroll system with dBase II (from Ashton-Tate), so when the information is reported back to headquarters, it's in a standard format."

ENGINEERING

Some companies set standards for the personal computers and applications software that can be used within user departments. Their goal is to control uses and expenses. If software is so readily available, they reason, why waste time and money writing their own?

This reasoning is sound when applied to most employees, but some managers believe it shouldn't apply to all. Certain professionals are granted dispensation from the rules, either because they are trusted to make good use of their micros, or because they have simply been granted the indulgence of having them.

Though Visicalc and Lotus 1-2-3 have proved useful in almost every department, engineers may find them unsuitable. By definition, popular software packages are too general for engineering tasks. "There's not a great deal of software available for technical workers," says Michael Cofone at RCA, "but these professionals are more skillful at developing their own." Cofone's attitudes typify those of many companies toward engineers and their personal computers.

Take the case of Allen-Bradley Co. in Milwaukee. There, electrical engineers began using Commodore VIC-20s, which are primarily home or game computers, to perform engineering tasks. Their accomplishments demonstrate the engineers' ingenuity, says Steven Bomba, director of corporate technology development. "Engineers are a self-sufficient lot, and if you give them the right tools, they can accomplish amazing feats," he says.

Bomba is now hunting for a microcomputer that will serve as an engineering workstation. The

ones he has looked at are expensive, but that does not discourage him. "I'll buy workstations before they're cost effective," he says, "just so our engineers will be able to take advantage of the next step toward engineering productivity. Engineers are very expensive, so I've got to do something to maximize their effectiveness. I do that by putting all kinds of good equipment around them."

Many engineers are given special license with their micros. If left to find their own uses for them, they surprise no one when they write their own software; then they confirm the trust they were given when they create useful applications. At Tektronix Inc. in Beaverton, OR, engineers have not only written their own programs, but have designed their own microcomputers. And since the computers are their own creations, the engineers feel personally responsible for the machines' successful implementation. Starting with a microprocessor, the engineers add an operating system, then configure a keyboard and display, local storage, and whatever else is needed. Software is written to perform specific tasks.

In addition to the homemade personal computers, the company owns commercially-available microcomputers. "We use over 50 different kinds," says Thomas Bohan, manager of the scientific computer center at Tektronix. He says one of his biggest challenges is supporting home-grown micros. In fact, he has a staff that does nothing else.

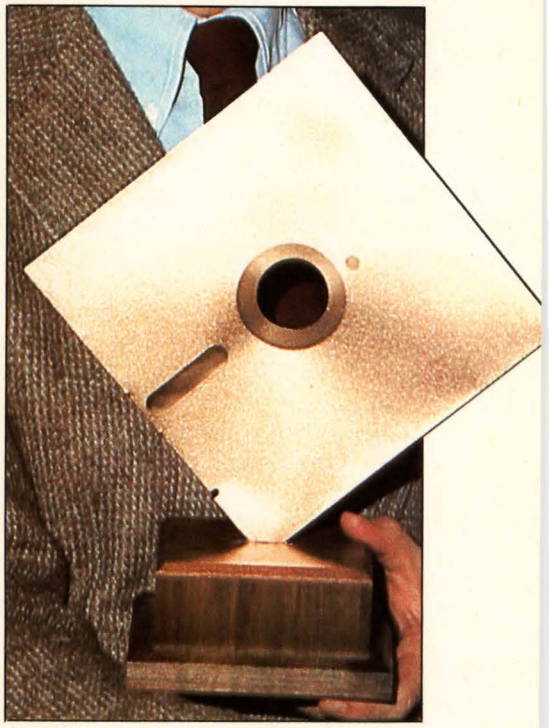
The amalgam of micros at Tektronix helps with product testing and development. Since the microprocessors that are used to build personal computers first became available, Tektronix has used them to develop testing applications for its manufacturing operations. The two developments naturally dovetailed. "There was a need for testing machines, and the microprocessors were there," Bohan says. "Workers have a personal stake in seeing these machines work, because they've developed them. They're used for data gathering, online testing, or diagnostics."

The testing application is particularly beneficial. "It's very complete," Bohan says. "We can do a lot of testing that couldn't be done before. Some of the micros evaluate the components that go into our terminals. We can test thousands of specifications of a product, many of which are defined by government regulations."

Meanwhile, at Bechtel, engineers "are pretty much writing their own programs," according to Carl Eben, manager of corporate-services support for the information-services group. "They're very unique and specialized, of course. But there are a fair number of relatively small design programs running on micros."

Initially, the Apple II was the micro of choice for Bechtel engineers. But Eben hasn't seen an order for an Apple in a long time.

Personal computers are hot items, and some companies feel that employees must have them.



"The IBM PC and XT, and the Hewlett-Packard Series 80 have really caught on," he says.

At Eaton Corp., repetitive designs are being churned out by personal computers. "They aren't nearly as powerful as CAD/CAM (computer-assisted design and manufacturing) systems, says Robert Martin, "but we're not looking for that. They're helping the engineer who has to handle the drawings that come straight off a specification sheet, and who's done them several times before. If the engineer is the only person at that location, the cost of a CAD/CAM system isn't justifiable. So the personal computer is a good graphics aid."

A Hewlett-Packard HP-86B is performing similar functions for chemical engineers at Abbott Labs., but users there are managing with standard software. They didn't have to write their own. "HP probably has the most extensive engineering software," says John

Wolek, manager of business systems for Abbott's Chemical and Agricultural Products Division.

"The micro can perform the calculations that help us figure out the size of, say, a mixing tank," Wolek continues. "We can get an idea of what we need for the mixer, the cooling rates that will be necessary, the size of the motor that's needed. Some of this used to be done on scratch paper. Otherwise we had to contract out parts of the design."

Vought Corp., the large Dallas-based aerospace manufacturer, is managing many of its large defense contracts using Apple IIs running Visicalc. Each contract is overseen by an Apple.

"Each contract is broken down into tasks," explains William Hurt, manager of technical analysis for planning, "and each task has a budget. You can look at the progress of those tasks on a weekly or monthly basis, and you can tell if something has to be changed. Maybe you have to recalculate the amount of labor or materials needed, or the amount of computer time you'll use. Then you have to get a new estimate for the total cost of the contract, and maybe a new estimate for its completion date. Project officers are responsible for their contracts, and they can't let the costs get away from them. This information can be tracked on the micros. If everything is going well, there's no problem. But if the project officers see one task getting out of line, they'll know it needs management's attention, and they can go to work on it."

MANUFACTURING

Manufacturing operations have challenges similar to those of engineering departments when it comes to using personal computers. There's little software available for manufacturing applications, per se. Personal computers may perform applications that help support manufacturing operations—like at Eaton Corp., where *every* operation has to do some sort of financial planning—but such use alone hasn't integrated personal computers into daily procedures. At Eaton, corporate-level analysts are single-minded in their view of personal computers: They are decision-support tools. And since effective personal-computer use for manufacturing applications hardly fits in with this concept, there is little support from the corporation for the use of micros in manufacturing. "In fact, we discourage their use," says Robert Martin.

"We discourage micros, but uses are developing from the bottom up."
—Martin, Eaton

Still, the applications are being developed. "There are some very good things being done," Martin concedes, "but uses are all developing from the bottom up. If one plant manager talks to another one, the applications get shared. But we don't encourage that sort of thing."

Corporate-level managers in the industrial and energy sector of TRW Inc., Cleveland, are a little more open-minded about bringing personal computers into manufacturing applications. They don't presume to know where the machines can and can't be used. They don't oppose their use, but they do give division managers the responsibility for success. "It's really up to the division managers to justify use of personal computers," says Thomas George, director of materials and quality for TRW's I & E sector. "They can't evaluate all of the applications, but they do know their people best."

Hewlett-Packard Series 80s are used throughout the I & E sector. George is not sure how many there are, but he says there's little advantage in counting the number of units. Says George: "The question is: Are they getting results? The answer is a resounding 'Yes.'"

The machines are used for quality-control. They are connected to gauges that test the capabilities of I & E's products—airplane propellers and turbines. The software for these applications was written internally. "It's worth it to have software customized for your own particular needs," George asserts. "The micro lets you examine the manufacturing process. You can take a sample of the product and test it. You can take as many samples as you want. Then you get an indication of any corrections that should be made. If the process capabilities are deteriorating, then you shut down the operation. Ultimately, you won't even have a sample. The micro will be so fast, you'll test every part. You'll have complete process control."

At last count, 29 IBM Personal Computers were deployed for manufacturing applications at Kendall Co., the health-care-products manufacturer (Boston), says Warren Harkness, director of business-systems consulting. He expects the number to get larger. "We have a whole

HAYDEN INTRODUCES BILL OF MATERIALS SOFTWARE FOR COMPANIES WITH BIG NEEDS.

AND A SMALL COMPUTER.

Until now, if you had materials problems and didn't own a mainframe or a minicomputer, you were out of luck. Operations like repricing items as the price of component parts changed were a real headache. And making sure that all parts were on hand to complete an order was next to impossible.

That's because there has never been Bill of Materials software designed for microcomputers. Or wasn't, until now.

Big Bill of Materials Features for a Small Computer.

With Hayden's Bill of Materials for micros, now companies can get all the features of Bill of Materials software without spending up to $10,000 for hardware. It's also integrated with the Hayden Inventory system, and our menu-driven program easily allows even first time users to simplify their materials problems.

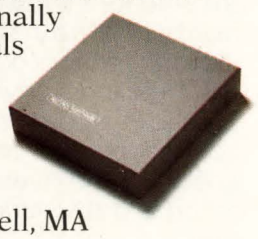
Here are just a few samples of the time-saving and cost-efficient features included in Hayden's Bill of Materials software package:

- Provides both single-level and indented parts list reports.
- Supports up to 10 levels of subassemblies.
- Parts lists are automatically printed with current costs.
- Automatic recalculation of product cost using current component costs.
- Where-used report specifies all parts lists where a component is used.

Compatibility.

Hayden's Bill of Materials is compatible with any computer that can run CP/M,™* or MS/DOS™** and will soon be available for IBM's Personal Computer as well.

Visit your local dealer and ask for a demonstration. You'll discover that finally there really is a Bill of Materials software package for micros. And for only $199.00, you don't have to pay a big price to get it. Or call 1-800-343-1218 (In MA 617-937-0200). Hayden Software, 600 Suffolk St., Lowell, MA 01853.



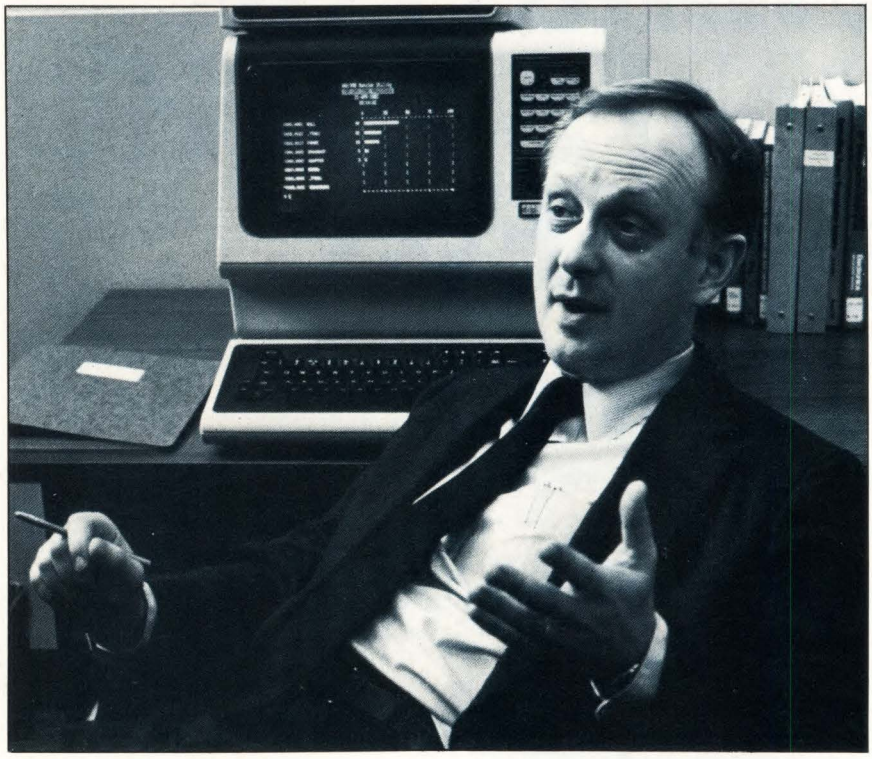
*CP/M is a trademark of Digital Research.
**MS/DOS is a trademark of Microsoft Corporation.

Bill of Materials

HAYDEN SOFTWARE

CIRCLE 36

COMPUTING IN THE DEPARTMENTS



"Engineers are expensive, so I've got to do something to maximize their effectiveness." Bomba, Allen-Bradley

procedure for ordering micros," he says. "There's a justification matrix that examines what the proposed application is and how it is presently being done. Manually? Through timesharing? What's the cost of the manual effort? What will we save by doing it on a micro?"

Under such close scrutiny, the first personal computers at Kendall paid for themselves in only six months. "They skimmed the cream in terms of hard-dollar savings," Harkness says. "We offset timesharing costs, reduced clerical staff, and put an end to overtime. Now the average payback period is a little longer—about a year.

"The biggest savings are manifested in higher productivity," he continues. "At the manufacturing plants, the PCs forecast use of materials, schedule production, analyze supply requirements, perform monthly production analyses." Many of these applications were performed manually before the PCs were brought in, or were performed to a lesser extent by a financial-modeling package on a timesharing service. Harkness finds that better analyses can be done by Visicalc or 1-2-3 on the PCs.

Although the dramatic cost savings at Kendall are mostly in the past, Harkness expects personal-computer use to grow steadily. "I've already noticed that the uses, and the users, are diversifying," he says.

MARKETING

Our users wouldn't write their own software—I hope," says Andrew Giroux, a consultant with corporate-resources facilities at Westinghouse Electric Co. in Pittsburgh. When his company acquired its IBM PCs, Giroux says, "personal computing was growing fast." It was easy to find software, so "it didn't make sense to invest a lot of time in programming."

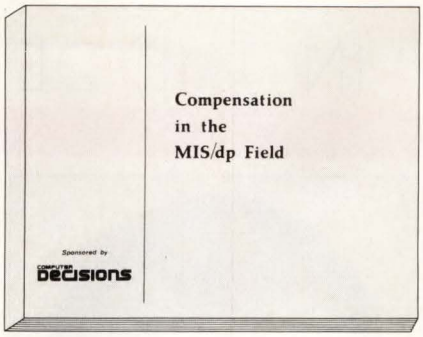
Unlike engineering or manufacturing departments that may have to improvise a little in order to make good use of personal computers, many marketing departments have found standard software packages well-suited to the sales effort, whether the packages function as assistants to sales reps, or perform simpler support functions.

At Westinghouse, personal computers work behind the scenes assisting the marketing department. Few are used as stand-alones. "Mainly they are used as super terminals," Giroux says. "They are connected to two or three applications running on mainframes from different vendors. Order entry is one application, and they're also used in our electronic-mail service." The PC users now have access to more information, and in some cases more functions, than they had with dumb terminals. Most of them are hooked up to IBM mainframes, but some also access Primes, and a few are linked to a Hewlett-Packard mini.

Giroux believes using the PC to emulate more than one kind of terminal is "an intelligent way to proceed, because you only need one device to access different computers. Some of our people were using two terminals to perform two different functions." Several approaches are being used by Westinghouse employees to make the PCs emulate different terminals. Giroux says the "most satisfactory" is the Irma interface board from Technical

New—Just Released! The Most Valuable MIS/dp Salary Study You Can Buy

Compensation in the MIS/dp Field



Sponsored by *Computer Decisions*, this tightly-packed, 346-page report provides the most intensive study of salaries, salary ranges, and bonuses ever attempted in the MIS/dp field. For 35 job functions, ranging from Junior Key Entry Operator to Top MIS/dp Officer, it reports all compensation data:

- By 16 levels of supervisory responsibility
- By geographical location—total U.S., U.S. by seven regions (including & excluding major metropolitan areas), and 25 metropolitan areas & states
- By 25 types of employer
- By total MIS/dp budget
- By number of employees
- By annual sales of manufacturing/extractive and non-manufacturing organizations and utilities
- By total assets of financial organizations
- By insurance policies in force
- By education, experience, & sex

An invaluable tool for determining the "right" salaries in the MIS/dp field. $195.00

Complete & mail today for your 15-day FREE Trial Copy—No Obligation!

Abbott, Langer & Associates • Dept. CD • 548 First Street • Crete, IL 60417

Yes! I certainly can use *Compensation in the MIS/dp Field* in my work. Please rush my copy to me immediately! (If I'm not satisfied, I'll return it within 15 days and not be charged for it.)

☐ Check No. _____ for $195.00 is enclosed.
(Ill. residents add 6¼% sales tax.)

☐ Bill my employer, adding a small charge for shipping and handling.

Signature: _____ Name (type or print): _____

Title: _____ Employer: _____

Street Address of Employer:* _____

City: _____ State: _____ Zip: _____

*U.P.S. will not deliver to a P.O. Box number. Please give street address.

CIRCLE 37

COMPUTING IN THE DEPARTMENTS

Analysis Corp.

At E.I. du Pont de Nemours, Wilmington, DE, personal computers are thought of as more than stand-ins for terminals. Equipped with Visicalc and Visifile, or with Lotus 1-2-3, they replace terminals that once bogged down the mainframe. "Personal computers make excellent stand-alone information systems," says Arnold Kneitel, systems consultant with the Polymer Products Department. "They don't tie up the lines to the mainframe, and they don't bog it down."

The members of Kneitel's department who are using personal computers have automated an information-retrieval process that used to be handled manually.

In the department, workers with IBM PCs enhance sales efforts by providing information about past sales, inquiries, or almost any communication between DuPont and a particular customer. "We build databases using a lot of information," Kneitel says. "If a sales representative calls in, we can tell him or her whom we've received inquiries from; whom we've heard from in the last three months within a particular region; what kind of call it was; and what our response to it was. Clerks used to keep logs of such information. Sometimes they could find what was requested and sometimes they couldn't. Now we have a better handle on our information."

At Equitable Life Assurance Society, New York, it was the sales force itself—the insurance agents—that began to use personal computers to manage information. Personal-computer use had actually started with one agent in Philadelphia, but his success attracted

"The personal computer is a management tool that tracks staff and projects."
Ellwanger, New York Life

the attention of other agents, and of top management. His personal computer soon became a model that was imitated by hundreds of Equitable agents. The Philadelphia agent had found the perfect software package to run on his Osborne portable computer, Life Star from ECTA Corp., and it was fundamental to the enthusiasm that followed. The package helped him draw up on-the-spot insurance proposals for prospective clients.

This method was much faster, and more precise, than the other agents' standard procedure. If, for example, an agent wanted to propose life-insurance coverage for a prospect, he or she would gather the available information and draw up a proposal. That proposal—or sales illustration—would be processed and priced on an IBM mainframe at Equitable's New York headquarters.

Because agents preferred to have a proposal to show a prospective client during their first meeting together—before any real discussion about coverage requirements took place—the proposal would frequently be based on guesswork. Follow-up proposals also had to be sent into the New York home office. This was time-consuming and—depending upon how many proposals had to be sent before a deal was struck—frustrating. Insurance agents for other carriers had avoided these hassles for years using portable terminals to access data in their carriers' mainframes from the customer's home, so the Philadelphia agent's application was hardly technically advanced. But the ECTA proposal software was a significant improvement over the methods previously available to him. Life Star originally was based on Equitable's rates.

How were one man's practices adopted company-wide? "There's a very good network between the agents," says Deborah Douglas, manager of the agents' personal-computer advisory service at Equitable. "They share information with each other and with upper management, especially when there's a success story involved."

Word must have spread fast; Richard Friedman, formerly a member of the advisory service, and now an assistant vice president at Equitable, says that between 300 and 400 Osborne computers were purchased by agents over a nine-month period.

Although the agents were the leaders here, they were not without top management's support. In June 1982, only a few months after the Osbornes started to spread throughout the agencies, one of Equitable's executive vice

presidents got into the act. "He had been shown the software by an agent," says Friedman, "and he thought it was marvelous. So he subsidized one set of software for each agency, chipping in $800 towards the $2,000 price of the software. Most of our agencies bought it. The agents found the software specific to their needs. They made money with it, and success followed success." The carrier even arranged for some discounted purchases of the Osborne 1.

Agents now tend to use IBM Personal Computers and Wang Professional Computers to generate sales illustrations, since Life Star is offered on those machines as well. (The Osborne had fallen out of favor even before Osborne Computer's financial collapse. The agents were attracted to the more-powerful 16-bit micros, although a few picked up Osbornes for as little as $900.)

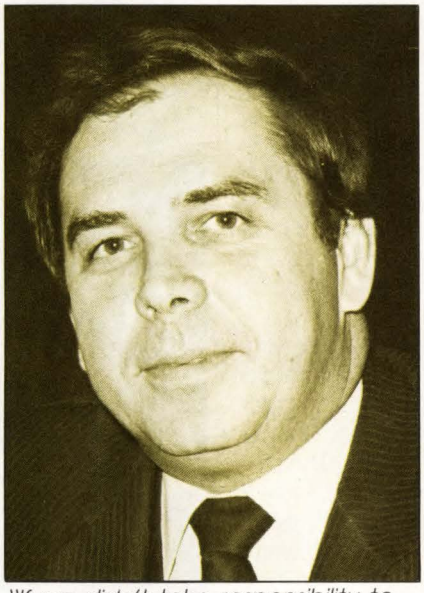
Portability was never sacrificed, Douglas says, because the Osbornes were never really used as portables. The agents are confident of the hardware, she says, but insecure about their own abilities to make it work right every time. So instead of risking a mistake in front of the customer, the illustrations are prepared at the office or at the agent's home. "They still get fast information," Douglas says. "They can prepare many illustrations over a short period of time, and get the information to a customer the next day."

The success of personal computers at Equitable can be measured by the avid interest of the agents. They assumed the cost of their individual systems, Douglas says, and they had little difficulty justifying the expense to themselves. "They encouraged other agents to buy them," she adds.

The personal computer has few limits, so each department can make it its own.

Personal-computer use at another large insurance carrier was without benefit of the grass-roots momentum and enthusiasm that made it so successful at Equitable. But top management at Connecticut Mutual Life gave agents a stake in the 1,000 Personal Computers the company ordered from IBM. "The agents put up their own money, so it was up to them to justify the cost of the machines," says William Dowty, vice president at Connecticut Mutual. "The testimony we hear indicates that the PCs have been more than cost-justified."

When the PCs were brought into Connecticut Mutual, every one of them was hooked up to the carrier's IBM 3081 mainframe in Hartford. (Again, Connecticut Mutual's experience stands in sharp contrast with Equitable's, where the personal computers are stand-alone devices.) This way, says Dowty, "we can download the insurance-proposal service from the mainframe to the PCs, and the agents can give customers rates quickly. They don't have the expense of going back to the host."



"If we didn't take responsibility to manage the use of personal computers, users would do it themselves." Turzynski, Abbott

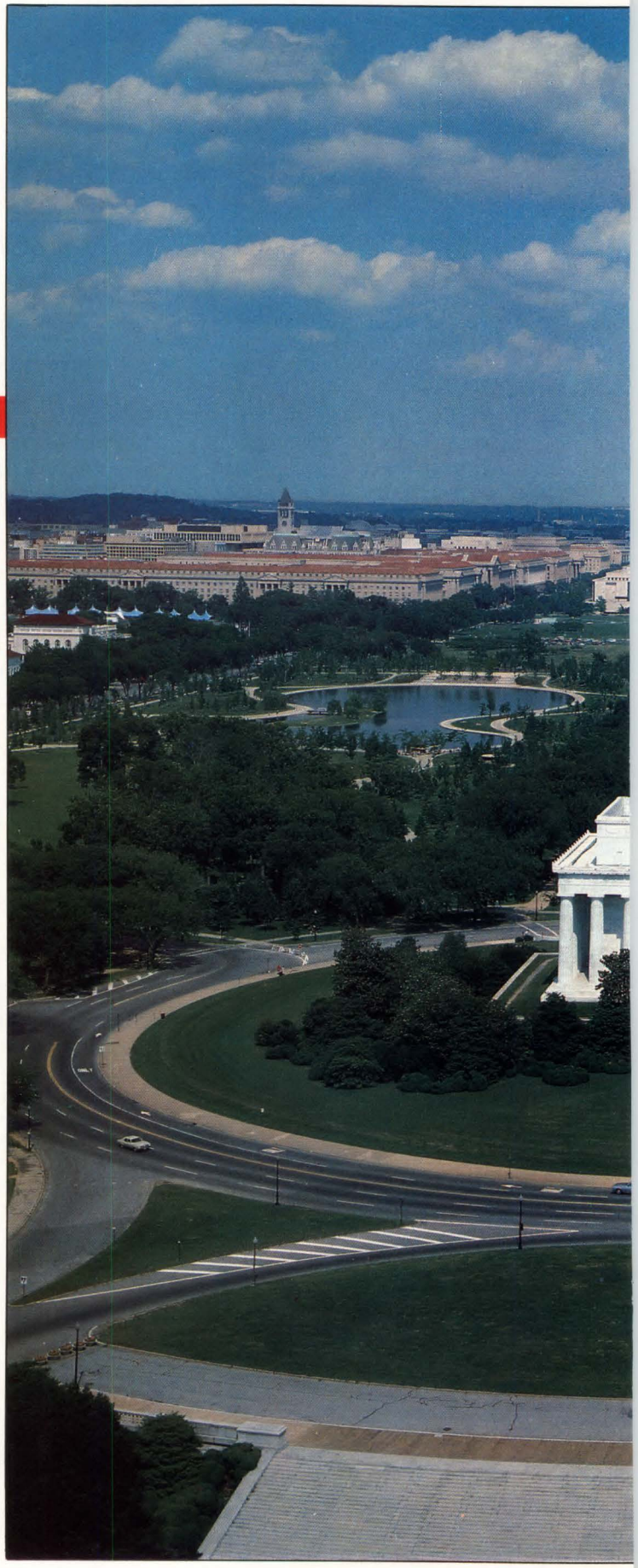
Dowty figures that 600 of the PCs are at Connecticut Mutual agencies, or "in the field." There are 300 machines in Hartford, and the remaining units are either in the company's depot service center or in inventory.

Because the company was such an early user of the Personal Computer, and because Dowty insisted they all be tied to the host mainframe, there was little choice but to write the terminal-emulation software in-house. "There was none available when we went into this," Dowty says, "so we wrote our own."

Each department's use of personal computers is molded by individual need and either managerial or employee ingenuity. But when a single department reaches for more power and achieves more control, it is taking a real step toward strengthening the entire corporation. It broadens the company's range of vision, expands its information-handling capabilities, makes it more responsive to either its employees or its customers, and perfects the process by which it creates its products. This nipping, and tucking, and smoothing of the operating process supports the corporation's first and final objective—to operate profitably. Personal computers support this objective just by being open to users' imaginations. □

ALTERNATIVE AVENUES TO PERSONAL COMPUTING

by Rick Cook



Prestige is often an important factor in decisions to buy stand-alone personal computers for managers and professionals. However, prestige is a short-lived luxury. At bottom, employees want personal computers to prepare budgets, do financial modeling and data analysis, and perhaps knock out an occasional memo, and the microcomputer isn't the only way to provide those functions. In many cases, it may not even be the best alternative.

Other technologies are being modified to provide superior computing power to individual executives, managers, and professionals. Terminals and word processors can be enhanced with modules and software that let them imitate personal computers, while microcomputer-like software is being written for mainframes and minicomputers.

These alternatives don't provide clones of personal computers any more than a tricked-up micro is a stand-in for an IBM 3270 terminal. But that's not necessarily a disadvantage. In some cases, the alternatives make for superior solutions.

Corporations with large investments in word processors and terminals can add personal-computing functions to these resources, significantly reducing the cost of providing personal computing to users. In addition, enhancements can extend the usefulness of peripherals like mass-storage devices and high-speed printers. In many cases, enhancements provide stopgap office-automation solutions, giving corporations that are unsure about the direction they should take more time to plan.

"The value of these products is that they buy time for corporations to figure out long-range plans for office automation," says Michael Marshall, product manager for Tower Systems International, Irvine, CA. "The micro arena is changing so rapidly that it's often more cost-effective to wait until the dust settles before making commitments to equipment."

The alternative avenues to personal computing may be enticing for other reasons. They let corporations control the software their employees use. And the enhancements for terminals don't sacrifice the advantage of database access ter-

Photo by FPG/Guidry

Some corporations have found they can give professionals personal-computing power sans personal computers.

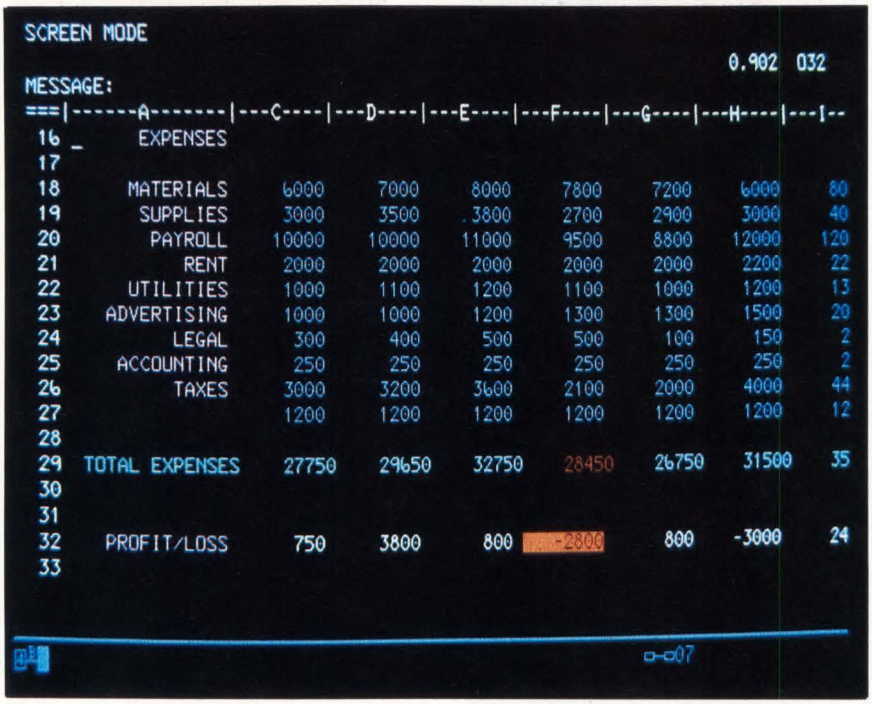
minal users take for granted.

These alternatives haven't received the same notice as personal computers. They get none of the same hype and hoopla, but they're out there. Many manufacturers of terminals and word processors offer modules that will let their products act as personal computers, although independents also offer enhancements for equipment they don't manufacture. Several offer modules that plug directly into minicomputers or mainframes to provide personal-computing power to any connected terminal.

"Managers just want to offer users better functions for the same cost as personal computers or less," says Marty Gruhn, director of research for The Sierra Group, an office-automation consultancy in Phoenix, AZ. "The appeal of doing it on existing equipment is pure economics."

The alternative avenues might also be more closely attuned to the future of personal computing and office automation, Gruhn contends. "The personal computer is really a transitional product," she says. "With hindsight, it will be viewed as the tool that introduced decision support to executives and managers. But within five years, the personal

BIG MACHINES GET PERSONAL



With a package like Mega Group's Megacalc, the limits of personal-computer spreadsheets don't apply. Some packages can create and consolidate more than 200 separate spreadsheets.

computer as we know it will not be the delivery system for these functions."

The future for large organizations lies in networks of intelligent workstations tied to mainframes and minis in tightly integrated unity, says Gruhn. Terminals and workstations will have considerable built-in computing power, and will handle many chores now performed on personal computers. But they will primarily be designed as gateways to larger computers and other resources.

The shift from stand-alone computers to integrated personal-computing machines has already started in some corporations. It is becoming increasingly difficult to tell whether some of the new "executive workstations" are very intelligent terminals or specialized personal computers. The Veterans Administration's information center for the western region, for instance, is testing Micromate, a $1,075 terminal add-on device from Personal Micro Computers Inc. "Using Micromate, one of our departments—say, the fiscal department working on a spreadsheet—can access a large database," says Walter Metcalf, special-projects coordinator. "The user can get information via modem, stick it into a terminal, and play around with it."

Some of the substitutes for personal computers already offer users a richer range of functions. The micro-style spreadsheets for minis and mainframes, in particular, allow users to tackle assignments beyond the capabilities of personal computers. The personal-computing alternative spreadsheet packages differ considerably from the large-system financial-modeling software that has been around for years. The new packages are designed to combine the capacity of a large computer with the simplicity, ease of use, and quick response of a personal-computer program.

"Some micro spreadsheets offer 2,000 columns by 740 rows, but a personal computer doesn't have enough memory to handle the maximum," says Randy Whiteside of The Mega Group Inc., Irvine, CA. With a package like Mega Group's Megacalc, however, those limits don't apply. A mainframe can fold many megabytes of information into a single spreadsheet. Megacalc and similar packages create and consolidate up to 200 separate spreadsheets.

Another big advantage of the alternative avenues to personal computing is their compatibility with other corporate information resources. They let users get at the valuable information in the corporate database without compromising central control and standards. Software that lets micros communicate with mainframes is becoming widely available, but most of the alternative approaches handle the hookup better.

A personal computer running terminal-emulation software can't be compared to a terminal, says Michael Denning, executive vice president of Phaze Information Machines Corp., a Scottsdale, AZ, alternatives manufacturer. "The emulation is incomplete with IBM 3270 emulators, resulting in performance glitches," he says. Still other alternatives offer a hybrid solution. The Direct 1025 from Direct Inc. combines the capabilities of a microcomputer with those of a terminal. The device runs the CP/M 2.2 operating system, giving users access to a

wealth of applications software. But it can also be used as a terminal supporting Hewlett-Packard's V/3000, V/Plus, and Rapid/3000 screen-management and data-entry programs on the HP 3000 minicomputer.

The ease of working with data from a large computer makes these alternatives superior to micros in the eyes of some users. "I've already been able to run data into Megacalc from our Time Sharing Option library (from IBM)," says Gary Wulf, user-services-section supervisor for the State of Montana. "The data format is simple enough so that I can write programs that put data into spreadsheets Megacalc can read."

Most of the large-system enhancements support several users, although usually not more than one at a time, and some terminal add-ons are portable. For James Crawford, a member of the senior technical staff at Johns Hopkins University in Baltimore, portability is the most attractive feature of Micromate. The university runs several personal-computer centers, but it also has an extensive network of terminals on campus and at an associated research hospital and a physics laboratory.

Crawford is evaluating Micromate as a way to add greater personal-computing capabilities to the terminal network. "The Micromate lets us provide powerful personal-computing facilities that can communicate with other terminals without having to drag equipment around," he says. A Micromate weighs 8 pounds, considerably less than many "transportable" micros. Crawford uses the unit on Z-19 dumb terminals (from Zenith Data Products) in his office, home, and at the university's space-telescope facility. "I just pop the Micromate into my briefcase," he says.

"With hindsight, the personal computer will be viewed as the tool that introduced decision support to executives and managers. But within five years, it won't be the delivery system for these functions."
Gruhn, Sierra Group

And then there's the issue of control. Terminal and word-processor enhancements are a compromise between mainframe-based facilities, which give management near-total control, and personal computers, which are extremely difficult for management to control. The personal-computing alternatives fall between those two extremes, and that alone makes them attractive to some.

"We don't have a corporate policy against personal computers, but it's like pulling teeth to get one approved," says Jerry Anthoney, manager of information-center services for Anheuser-Busch Companies, St. Louis. The giant brewer insists on strict cost justifications before approving employee requests for personal computers. However, some managers who can't meet the stiff cost-justification standards or can't find a machine to share still need to do chores like spreadsheets, says Anthoney.

To accommodate them, Anheuser-Busch recently installed Megacalc on its IBM 3033 mainframe. "This is the way we can answer user demands for functions like Visicalc spreadsheets,

MESSAGE:

	A	C	D	E	H	I	N	O	P
1	INTERNATIONAL								
2	MANUFACTURING		INCOME & EXPE						
3		JAN	FEB	MARCH	JUNE	JULY	DEC	TOTAL	
4	INCOME								
5	SALES	30000	35000	38000	30000	40000	63000	492000	
6	RETURNS	1500	1900	1450	1500	2000	3150	24300	
7	NET INCOME	28500	33100	36550	28500	38000	59850	467700	
	A	C	D	E	H	I	N	O	P
14	ADVERTISING	1000	1000	1200	1500	2000	1000	20400	
15	LEGAL	300	400	500	150	200	100	3200	
16	ACCOUNTING	250	250	250	250	250	250	3250	
17	TAXES	3000	3200	3600	4000	4400	8000	55200	
18	INSURANCE	1200	1200	1200	1200	1200	1200	14400	
19									
20	TOTAL EXPENSES	27750	29650	32750	31500	35550	45550	426950	
21									
22	PROFIT/LOSS	750	3800	800	-3000	2450	14300	40750	
23									

This Megacalc display looks like one produced with Visicalc. The mainframe program is also as easy to use as the micro package, says Jerry Anthoney, manager of information-center services for Anheuser-Busch.

BIG MACHINES GET PERSONAL

The OIS family of word processors from Wang Laboratories can run CP/M, a widely used personal-computer operating system, vastly expanding their functionality. The OIS Model 40 is pictured.

and do it cost-efficiently," says Anthoney. "The users who have experience with Visicalc (a popular spreadsheet program) say Megacalc is just as good."

Despite the advantages of these alternatives, however, there are substantial drawbacks, particularly when it comes to software. The number of applications programs for various enhancements—particularly those for word processors—is limited. More than 65 different data-recording formats are used for 5¼-inch disks. Nearly every computer manufacturer has its own format, and the format an enhancement recognizes may not match any of them. If the enhancement's drives won't read the disk, you can't load the applications software. This drawback only applies to 5¼-inch disks. Most manufacturers of 8-inch disks have conformed to the IBM format, so most disk drives can read most disks. However, a lot of software isn't available on 8-inch disks because it's an older format.

One solution to this shortage of application programs is a disk-translator program, which lets an enhanced terminal or word processor read foreign disks. A typical program lets a machine read disks for 20 personal-computer models. Translators facilitate easy transfer of data files, such as documents created using a word-processing program. However, unless you have the right translator program for your machine, you may not be able to get a program loaded in the first place.

One warning: The copy-protection schemes embedded in most personal-computer software can prevent you from copying a disk that's been reformatted by a translator. These schemes can be circumvented with the aid of other programs, but that requires a certain amount of effort by a fairly skilled programmer. Also, you should consider the legal implications.

Some enhancement vendors, such as Computer Concepts, solve the incompatibility problem by providing disk-copying services. Computer Concepts will provide copies of programs to users of the Microbridge enhancement for the Wang 2200 minicomputer, says Greg Dean, president.

In addition, many software houses provide copies of their products in custom formats—although at a higher-than-normal price. Even if this conflicts with a software vendor's normal practice, it may be willing to make an exception to get a large order. A corporation that needs 200 copies of a particular program won't have much trouble getting them.

Depending on a corporation's outlook and goals, these limitations may be a blessing in disguise. For an organization that wants to limit the software available to users, the "hassle" for employees of getting usable unapproved packages serves the purpose. Incompatibilities don't guarantee that a computer-savvy employee won't convert a desired package to run on a terminal enhancement against management injunctions, but they make it unlikely that *most* users will do so. However, if a company is striving to provide users with freedom of choice, the limitations are a nuisance.

Of course, organizations may also decide to stick with the software provided specifically for an enhancement. In some cases, the users don't have any choice because the systems don't use disk drives. Rather, software is supplied on another medium. Northern Telecom, for instance, provides about a dozen popular personal-computer programs on streaming

Want to hook IBM?

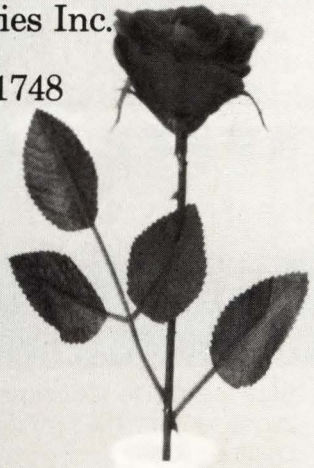
Terminals. Personal Computers. ASCII devices. Hook them all into the IBM world with the new AVATAR™ PA1000 Protocol Converter.

The PA1000 provides low-cost IBM 3278/2 terminal emulation and coaxial connection to an IBM 3274/3276 cluster controller. Then, a single keystroke switches you back into the asynchronous world through an auxiliary RS-232-C port to access other computer systems, public information services or copy a screen to a printer.

Our microprocessor-based unit provides user-selectable rates up to 9600 baud, terminal keyboard configurations, screen management and local or remote print functions. And, you can hook the PA1000 to a modem for remote dial-in access.

Simple, economical access to the world of IBM, just when you thought there was no answer. At $995, getting hooked has never been so affordable. For more information on our AVATAR PA1000 Protocol Converter, contact

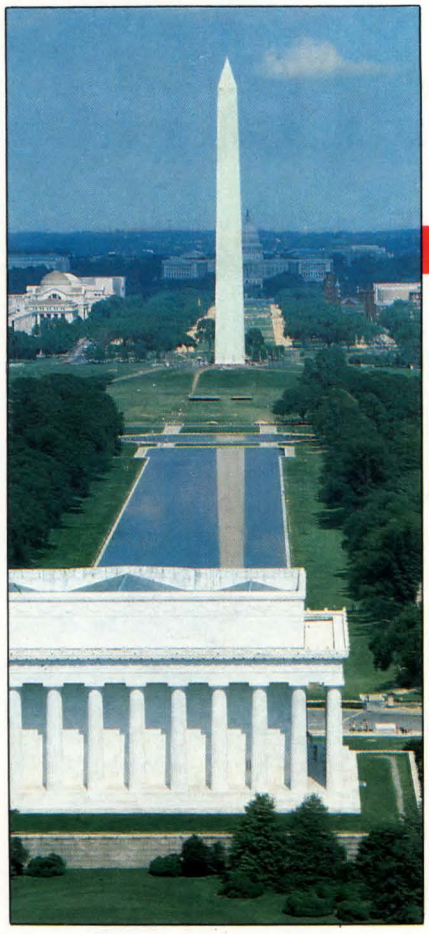
Avatar Technologies Inc.
99 South Street
Hopkinton, MA 01748
Or call us at
(617) 435-6872.



AVATAR™

Making IBM smarter since 1983.

IBM is a registered trademark of International Business Machines Corp.



BIG MACHINES

tape for the personal-computing enhancement it offers for its cluster processor.

The question for the many corporations that have already made sizable investments in personal-computer software is: How much of it can be transferred to enhanced word processors and terminals? The answer is: Some, but not all. Some micro software doesn't run on a terminal or word processor without being almost rewritten.

Corporations considering alternative avenues to personal computing must consider another limitation. Just as a personal computer with a terminal emulator is not interchangeable with a terminal, a terminal emulating a personal computer is not a personal computer. Despite their common origin, fundamental differences between the two machines limit a terminal's ability to perform like a personal computer, even if it is running a micro-style program.

Large computer systems are characterized by very fast access to main memory, high processing speeds, and fairly slow communication with users. A personal computer has slower memory access, much slower processing speeds, and much quicker communication with the user. Personal-computer software quite naturally reflects the characteristics of personal computers. It puts only moderate demands on processing speed and memory access, but depends on a very high rate of data transfer to the screen. Some of that software just isn't the same when it's run on an enhanced terminal.

The reason is technical. A terminal is designed to communicate with its host computer, the location of the processing power, via a serial interface. Early microcomputers were designed the same way. Today's personal computers, however, assign the terminal's jobs to a keyboard and video monitor, which are tied directly to the computer. They treat the screen as part of their random-access memory, enabling them to update information on the screen much more quickly than a mainframe can update a terminal.

In addition, some popular programs sacrifice portability to achieve faster screen updating. This is especially true of some software written for the MS-DOS operating system used on the IBM Personal Computer and its compatibles. (The IBM PC actually uses a modified version of MS-DOS called PC-DOS.) Rather than use a personal computer's operating system to display information on the screen, these programs call on the graphics routines in the computer's read-only memory. Programs written for the IBM PC and PC-DOS make heavy use of this display method, and that is one of the reasons PC-DOS programs are poor candidates to run on an alternative machine. (One popular program that uses this technique extensively is Lotus 1-2-3; that's why it won't work on a personal-computing alternative.)

Programs using the CP/M operating system have fewer barriers to conversion for alternative personal-computing machines. The original version of CP/M assumed that the user had a terminal hooked to a personal computer through a serial interface, in much the same way a terminal is hooked to a large computer. MS-DOS, which was written after CP/M, generally assumes the monitor will be hooked directly to the computer's processor.

For all the potential advantages of terminal enhancements and alternative software for mainframes, no one—except Gruhn—expects personal computers to disappear from offices anytime too soon. "I don't expect our enhancement to replace our personal computers," says Paul Davoust, product manager for Hewlett-Packard's personal-software division, which has a version of Visicalc for the HP 3000 minicomputer. "I expect it to work along with them."

Indeed, looking at enhancements and personal-computing software for big machines as either/or alternatives to stand-alone micros is narrow-minded and perhaps a little naive. These devices afford more alternatives to managers charged with building networks that unify all of the corporation's information resources. In some cases, these products make very good sense—the kind of sense that can contribute to your prestige as a shrewd decision-maker. □

Rick Cook is a free-lance writer based in Phoenix, AZ. He frequently writes about personal computers.

ONE SIZE FITS ALL VS. CUSTOM TAILORED

Remember the item you bought with the "one-size-fits-all" label? Maybe the arms were too long. Or it bagged at the waist. Or you buttoned it at the neck and found you couldn't swallow. So you vowed to choose more wisely next time.

Computer Decisions knows that "one-size-fits-all" doesn't fit anyone well. That's why we're not an all-purpose computer magazine. Or a general business publication. Or a newsweekly for the entire industry.

We custom-tailor our editorial to fit a single audience. Management. The MIS director who has come out of the back room into the boardroom. The corporate exec who's becoming more deeply involved with information resources. The financial vp who's suddenly buying not only his own personal computer, but a whole corporate information system. The Computer Decision Maker with purchase power for what you sell.

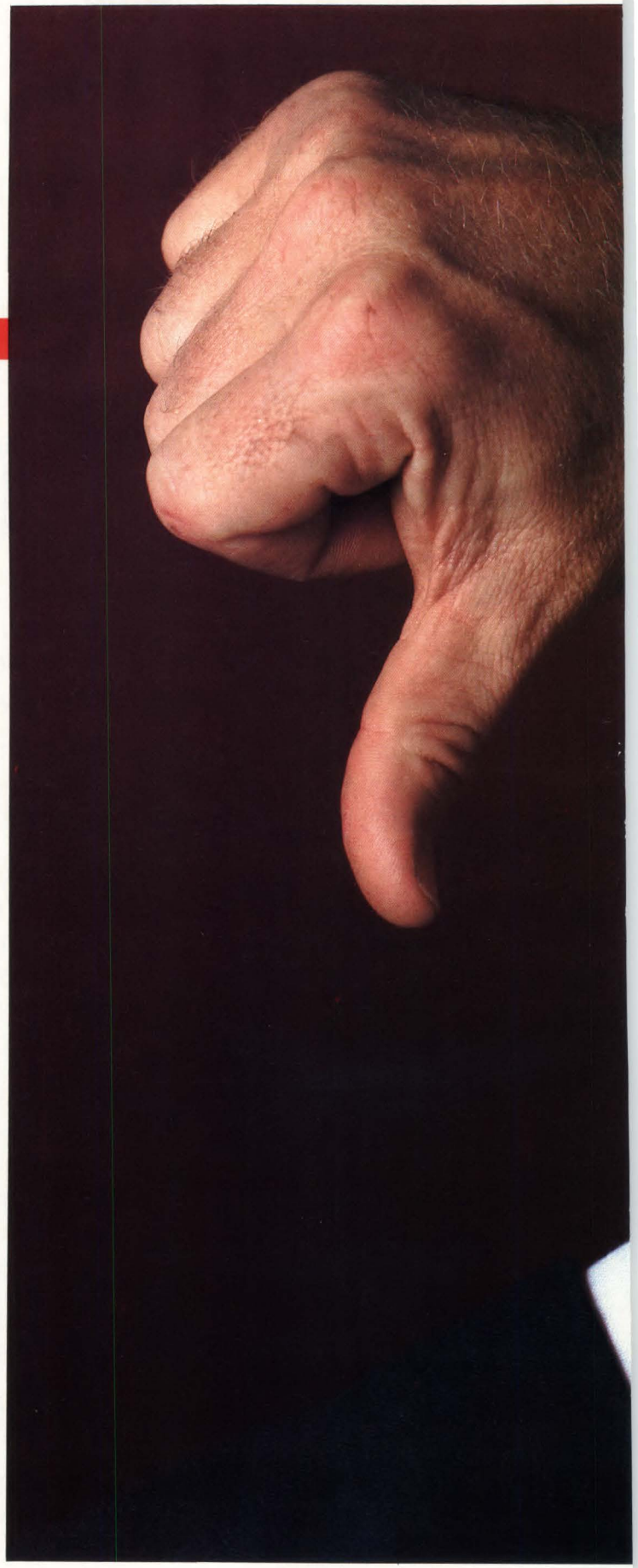
We tell our 100% management audience one thing: how to manage their human and information resources for greater profit and productivity. With practical, non-technical application features on MIS strategies, data communications, software, office automation, mainframes, personal computers, peripherals. And they read us consistently, from cover to cover. Because we tell them better than any other publication.

So when you think of buying a "one-size-fits-all" publication, think again. And remember that *Computer Decisions* is custom-tailored for management.

Your Advertising And 160,000 Computer Decision Makers A Perfect Fit

25 MANAGERS RATE MAJOR MICROS

by Jordan Gold



Are the top personal computers all they're cracked up to be, or are IBM, Apple, DEC, Xerox, and the rest of them little more than designer labels? A poll of 25 managers, conducted by *Computer Decisions* with the help of the Microcomputer Managers Association, suggests that when managers acquire a corporate personal computer, they don't expect to get the perfect machine. Rather, they buy a micro that satisfies one or two corporate requirements.

For example, not all of the respondents whose organizations have IBM Personal Computers are happy with them. Many managers bemoan the fact that its keyboard departs from the standard IBM-typewriter layout. Others complain about the inadequate networking and mainframe-communications software available for the machine (although there is more communications software for the PC than for any other micro) and the relative incompatibility between the different versions of PC-DOS, the machine's operating system. Other faults cited include the single floppy-disk drive in the hard-disk version of the IBM PC, the PC XT; and IBM's inadequate support of such early software as Easywriter 1.0, a word-processing package, and Fortran compiler language.

Yet the IBM PC is a favorite among corporate managers, and it wouldn't have attained that status if it didn't offer a number of outstanding characteristics and business advantages. Several of the respondents to the poll considered the PC's expandability and memory capacity major attributes. The vast number of third-party vendors, providing everything from memory and add-on boards to disk drives and cooling fans, also enhances IBM's popularity.

The survey indicates that some managers didn't choose the IBM PC for its overall quality or special features, but for the intangible benefits tagged onto the name IBM. One overwhelming benefit is the wealth of good business software available for the IBM PC. "No machine is head and shoulders above any other in features or price. My company's choice, the IBM PC, doesn't even represent the best hardware available," says Howard Ingram, personal-computing specialist for the Collins Transmission Systems division of Rockwell International

Photo by Bob Ward

A poll of managers gives the IBM Personal Computer some high marks and some low marks. How do they rate the personal computers you have?

Inc., Richardson, TX. "However, the wide variety of software developed for it more than compensates for its shortcomings."

For another manager, knowing he'll be able to count on IBM for service and support 10 years from now is reason enough to buy its personal computers. "None of the personal computers available really meets my company's needs, and so I go with IBM for security," he explains.

Intangibles are important when managers choose one personal computer over another. For some users, owning an IBM is a matter of prestige. "It's those three letters," one respondent comments. "None of the executives in my company even thought about using a personal computer until IBM came out with one." And as another manager puts it, "Many executives think the IBM PC looks impressive on their desks."

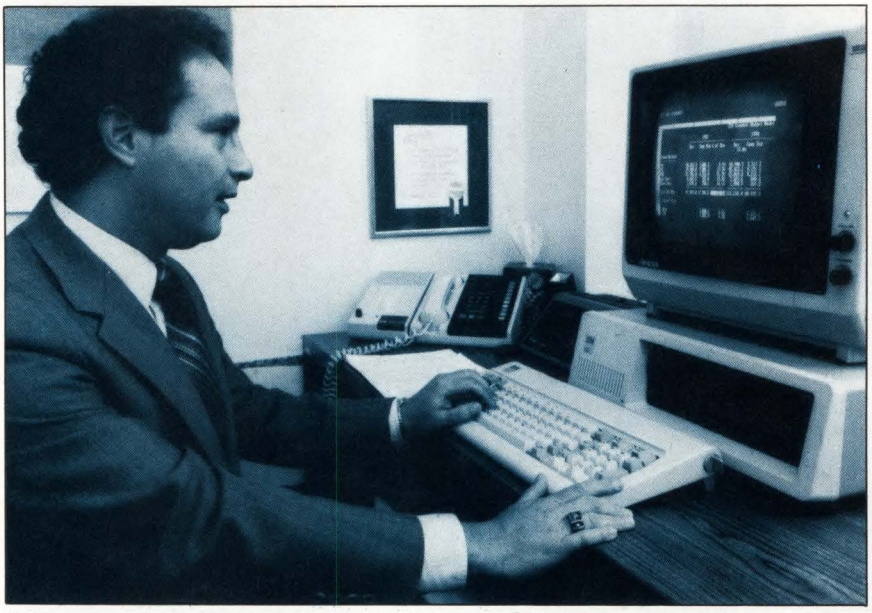
For whatever reason, and despite the drawbacks, 17 of the 25 managers surveyed have chosen

PERSONAL COMPUTING SURVEY

the IBM Personal Computer as their corporation's standard. The managers in the poll represent major corporations in a variety of industries. (The poll was conducted by telephone and was never meant to be a "scientific survey.") Of these managers, six had installed fewer than 10 computers, five had installed between 11 and 50, another five had between 50 and 100, and three had more than 100. The other personal computers favored in as many as two companies were the Xerox Model 820 and the Apple II.

The personal computers mentioned most often as second choices are two models that have been around awhile. The Apple II was listed as the second-most-used personal computer in eight organizations, half of which own more than 10 personal computers; the Tandy/Radio Shack TRS-80 was the second choice of five companies, three of which own more than 10 personal computers. Ford Motor Co., Dearborn, MI, uses more than 400 IBM PCs, Apple IIs, and TRS-80s in its overseas operations. (Ford's standard personal computer in domestic operations is the Victor 9000.)

For most of the respondents, Radio Shack and Apple computers represent early standards. Organizations that have been using personal computers generally started with the Apple II or the Radio Shack TRS-80 Model III and graduated to the IBM PC or a look-alike. "The IBM PC is more expandable than the Apple," one manager comments. "It has more memory capacity and more features like upper- and lower-case letters, high resolution, a lot of disk storage, and a built-in numeric keypad."



"There were many problems with the Apple III in the beginning, and it's too late for a comeback."
Belfer, Chase Econometrics/IDC

One computer is highly regarded by some respondents, even though it isn't a favorite in any of the organizations polled. That machine is the Apple Lisa. "Everything on the Lisa is a good example of what software ought to be like," declares Charles C. Hoerner, manager of office systems for McKesson Corp., San Francisco. For Hoerner, software should be easy to use. "Apple has done a fine job with Lisa," he says. "Unfortunately, because so little software is available, Lisa may never be a corporate success. Software creators will continue to beat their brains out in the competitive market for products that run on the IBM PC."

The Apple III, successor to the Apple II, was barely mentioned by respondents. One respondent suggests that the problems that attended the machine's introduction in 1981 are responsible for its lukewarm corporate acceptance. "Apple blew the introduction of the Apple III," says Don Belfer, vice president of computer systems for Chase Econometrics/Interactive Data Corp., in Waltham, MA. He believes the Apple III is still struggling with the poor reputation it earned during its early days. And now that the bugs are finally being worked out, users are implementing more powerful 16-bit personal computers, against which the 8-bit Apple III can't really compete. "There were so many problems with it in the beginning, and now it's too late for a comeback," he says.

Many of the respondents say they and their organizations have cautiously approached personal computing. Twenty-nine percent of the corporations represented have fewer than 10 of the computers designated as the

"Respondents are acquiring micros equipped with sophisticated tools and greater memory capacity."

standards. "We have only four IBM PCs," says James Fortney, manager of management-systems planning for Litton Data Systems, a division of Litton Industries (Van Nuys, CA). "But we only established the IBM PC as our standard two months ago. Besides, we're installing a big local-area network and want to make sure all equipment is compatible before it's installed."

Litton has ordered a dozen more IBM PCs, but Fortney considers the PC an interim machine. "We don't think any vendor has all the right answers," he says. "But because MS-DOS has become the de facto standard in operating systems, and because IBM has its own version (PC-DOS), the PC is our choice."

"Graphics software doesn't provide the high quality managers need."
—Kneitel, Du Pont

Managers in the poll most often mention limited networking and communications capabilities as the drawbacks of personal computers. "Managers want to use computers as multi-function terminals," asserts John Hart, manager of office systems for Avon Products Inc., New York. "They want their computers to communicate with each other and with the world but also to be versatile enough to stand alone."

Avon has made its more than 400 personal computers a major part of operations, according to Hart, and the Eagle Personal Computer, an IBM PC compatible, is the corporate standard. "We're very close to making our personal computers perform as multi-function terminals," Hart says. "We're in a pilot program with Digital Equipment Corp. using personal computers with a VAX 750 super-minicomputer. The VAX works almost as a controller, allowing the personal computers to exchange data."

Compatibility with an existing central computer has become such an important requirement that for many managers it answers the question of which machine is best. "We have

RATINGS OF 25 MANAGERS

	IBM PC/XT	Apple II/III	TRS-80 II/III	Victor 9000	DEC Rainbow	Honeywell MS 610	Xerox 820	Apple Lisa	Eagle PC
Preferred model	17	3	1	1	1	1	2		1
Ratings (1-5)									
Documentation	3.4	3.7		4	4		5	3	3
Ease of use	4	3.4		4	5	5	5	4	5
Return on investment	4.2	5		5			3.75	5	5
Productivity	4.18	4		5	3		4	3	3
Overall rating	3.95	4		4.5	4	5	4.4	3.75	4

	IBM PC/XT	Apple II/III	TRS-80 II/III	Victor 9000	DEC Rainbow	Honeywell MS 610	Xerox 820	Apple Lisa	Eagle PC
Preferred peripherals									
Disk drives									
Davong hard disk	2								
Manufacturer's	14	3		1			2	1	
Pegasus hard disk	1								
Tandon	1								
Tallgrass hard disk	1								
Printers									
Anadex	1	1							
C. Itoh		1			1				
Centronics		1							
DEC					1				
Diablo	1							1	
Epson	14	5							
Honeywell dot-matrix							1		
IDS	1								
NEC Spinwriter	3				1				
Okidata	4	1							1
Tandy			2						

PERSONAL COMPUTING SURVEY

IBM mainframes," says Fortney, "and using a single brand reduces maintenance problems." He adds that although the IBM PC is the standard at Litton Data Systems now, future personal computers by Wang Laboratories might be made a co-standard. Litton has Wang minis, as well as IBM mainframes.

Some of the managers in the poll base their personal-computer selections solely on their corporation's networking requirements. As Barry Pierce, manager of information-processing technology for Gilbert/Commonwealth (Reading, PA), says, "We want to build a network of personal computers, word processors, and large computers. Xerox micros meet our requirements. The Model 820 isn't the best personal computer, but it integrates into our system—and that's more important to us than (processing) speed."

The Xerox 820 is a building block in Gilbert Commonwealth's long-range plans for office automation. Its system will eventually comprise 100 workstations, including the Xerox 860 word processor and the 8010 Xerox Star word-processing system. "We chose Xerox computers for their abilities to communicate with each other, to use such Ethernet services as electronic mail, and to access high-speed laser printers," explains Pierce.

The importance of communications even shows up in the respondents' opinions of peripherals. Of the peripherals rated by managers in the poll, those that provided communications—the Irma communications board from Technical Analysis Corp. and Cullinet Software's micro-to-mainframe board—are receiving a lot of attention. "There's also a crying need for software that transmits information from DEC to IBM or DEC to Wang, and so on," adds Hart. "Modems are too error prone for the job."

All of the personal computers rated in the poll fare well in the key categories of ease of use, productivity, and return on investment, although several managers pointed out that the benefits of a personal computer sometimes cannot be measured.

Of course, ease of use, or user friendliness, is a relative term, and managers attach varying degrees of importance to it. "Ease of use is in the mind of the user," asserts Mayford L. Roark, executive director of systems for Ford Motor Co. "A third of any staff has a flair for computing and picks it up unassisted. Another third can be coaxed and trained. But a final third will always have trouble—they have an emotional resistance to the technology."

Does that mean user friendliness is a hoax? Not really. Some computers appear so difficult to use that both enthusiastic and reluctant users become intimidated and never learn to use them.

On a more specific note, Litton Data Systems' Fortney blasts IBM's selection of a nonstandard keyboard for the IBM PC. "I don't understand IBM's approach to the PC's keyboard," he says. "People who have been using the IBM 3270 terminal are lost when they sit down at the PC." The Apple II's keyboard isn't any better, he continues. "Apple has a truncated keyboard that doesn't

"Managers most often mention limited networking and communications as the drawbacks of personal computers."

DIMENSION.
THE MOST POWERFUL, MOST COMPATIBLE PERSONAL COMPUTER YOU CAN BUY.

Introducing the capability the world has been waiting for. A single personal computer able to handle Apple,® IBM,® TRS-80,® UNIX™ and CP/M® based software.

The Dimension 68000 Professional Personal Computer does it all. It actually contains the microprocessors found in all of today's popular personal computers. And a dramatic innovation creates the environment that these systems function merely by plugging in the software.

Add to this the incredible power of a 32 bit MC68000 microprocessor with up to 16 megabytes of random access memory.

Dimension. At about the same price as the IBM® PC, it's obviously the best value you can find. For more information ask your dealer or call us at (214) 630-2562 for the name of your nearest dealer.

A product of
Micro Craft Corporation
4747 Irving Blvd., Suite 241
Dallas, Texas 75247. ©1983

CIRCLE 39

have function keys."

Fortney believes a "shell," a feature that provides menus with user instructions or prompts, would be helpful on the IBM PC. "Wang requires front ends on all software written for its personal computers," he says. "Menus are better than memorizing commands. Not only are such systems easier to learn, they also are easier for an infrequent user to understand."

Despite the personal computer's highly touted ability to raise productivity, managers in the poll have a tough time quantifying increases. True, a computer may help an employee complete a task in less time, but it also permits more iterations of the task to be performed. The amount of time saved is not as important as what's done with it, the managers say. "Personal computers let you trade time for quality," says Gilbert Commonwealth's Pierce. "When a proposal is prepared manually, there's usually only enough time for one or two drafts. But the ability to easily write and rewrite on a personal computer lets a professional produce a more accurate and well-rounded proposal."

Playing devil's advocate, Pierce points out a problem associated with the greater capabilities personal computers give workers. "Let's say the computer prevents a $1 million mistake on a proposal. If your incorrect figures were a million dollars too low, the computer would have cost you money. If they were a million dollars too high, the computer would have made you money."

Computers provide a fast return on the money invested in them, largely because of their

(Continued on page 118)

RATINGS OF 25 MANAGERS

	IBM PC/XT	Apple II/III	TRS-80 II/III	Victor 9000	DEC Rainbow	Honeywell MS 610	Xerox 820	Apple Lisa	Eagle PC
Preferred applications packages									
Spreadsheets									
1-2-3	17						2		
Multiplan	4			1			2		1
Perfectcalc (Eagle Calc)							1		1
Report Manager (Victorcalc)				1					
Supercalc	1				1				
Visicalc	6	4	1						1
DBMSs									
Condor	1						2		
dBase II	4	2			1		1		1
DB Master		1							
Focus	2								
General Manager		1							
Infostar					1				
PC File									1
PFS:File/Report	1	1							
Profile Plus			1						
Sequitur	2								
TIM	1			1					
Visifile		1							
Communications packages									
3101 Emulation	1								
Crosstalk	2				1				
Manufacturer's	4						1		
PC/Intercom	1								
Saturn									1
Softerm		1							
Smartcom II	1								
Symware 3270A	1								

The Star of Team Xerox.

The Star 8010 professional workstation has always been known as a computer of dazzling capabilities—in graphics, information processing and document preparation.

But what some people may not know is that Star is also the key element in Team Xerox, a system of integrated office machines designed to work together like a team.

When part of an Ethernet network, Star can work with a wide array of word processors, mainframes, personal and business computers, printers, electronic mail and file services, facsimile terminals, communicating Memorywriters, other networks and, of course, other Stars. It also provides 3270 and TTY emulation.

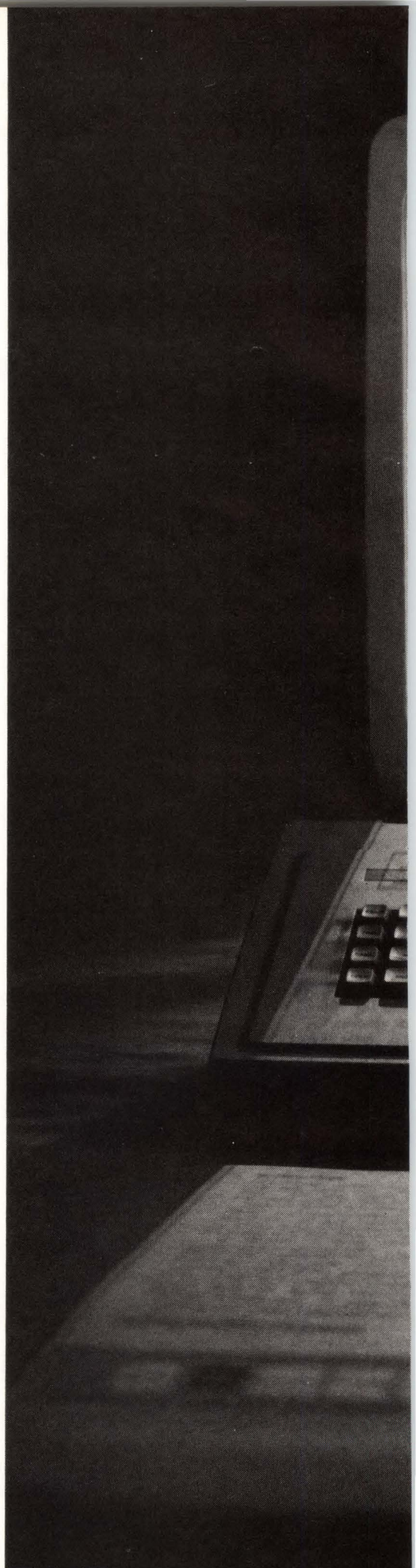
Its full 17″ bit-mapped screen lets you view two full pages simultaneously and open up to six documents at a time without covering up a previous document.

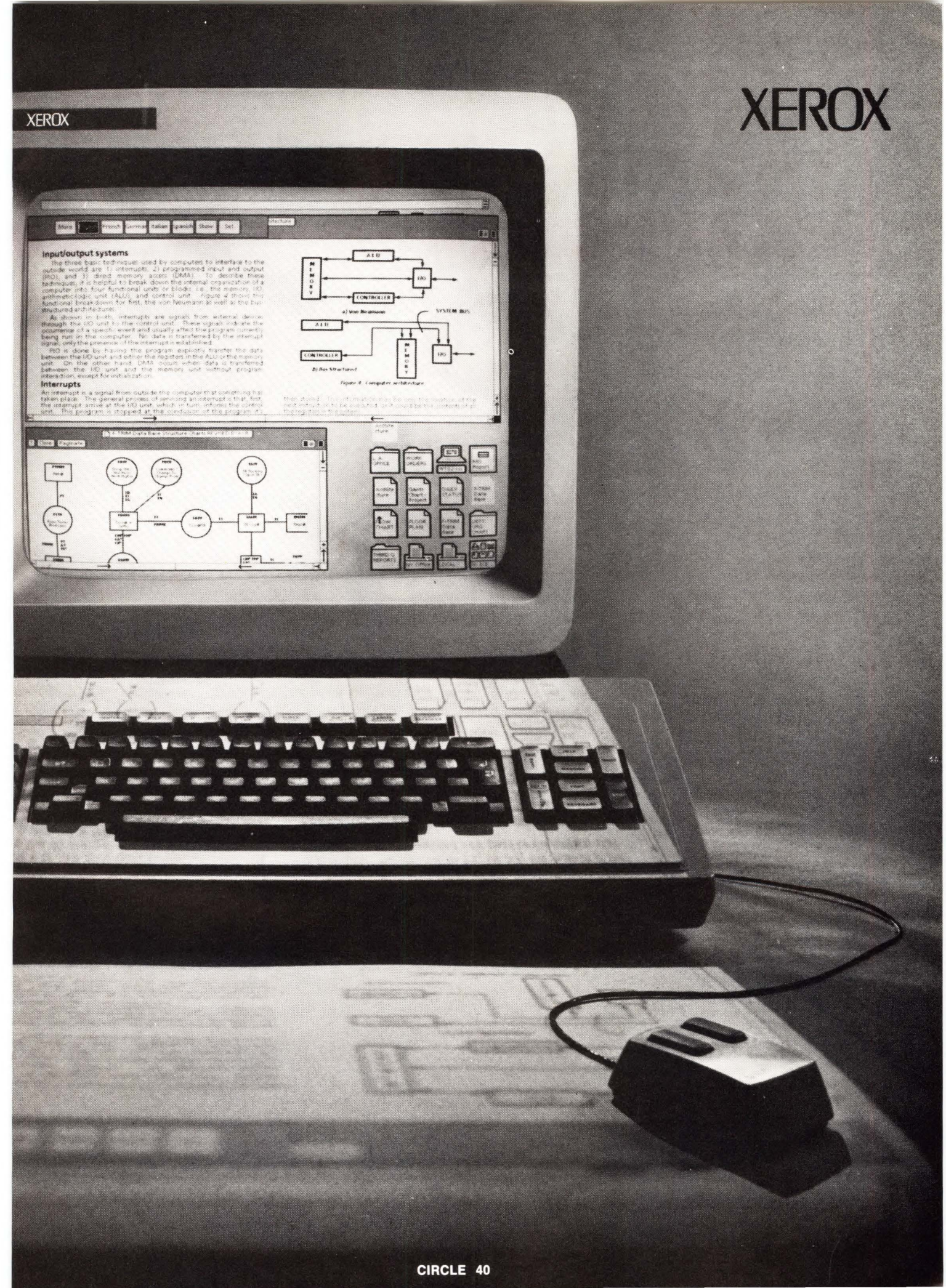
It's also the only workstation that can create and print documents in more than a dozen languages, including Russian and, for the first time, Japanese (Kanji as well as Katakana and Hiragana).

While other workstations may use Xerox innovations like the mouse, icons, windows, property sheets and combined text and graphics, Star simply does more with them.

For example, Star's extensive software is fully integrated, to allow you to work with text and graphics simultaneously. You can draw a flowchart right in the middle of a full page of text without having to resort to a separate program and limited buffer "scratchpad" or "clipboard."

In terms of capabilities, ease of use and overall value, the Xerox Star would definitely have to be considered the stellar workstation in the industry.




XEROX
XEROX
input/output systems
Interrupts
ALU
I/O
CONTROLLER
MEMORY
SYSTEM BUS

CIRCLE 40

PERSONAL COMPUTING SURVEY

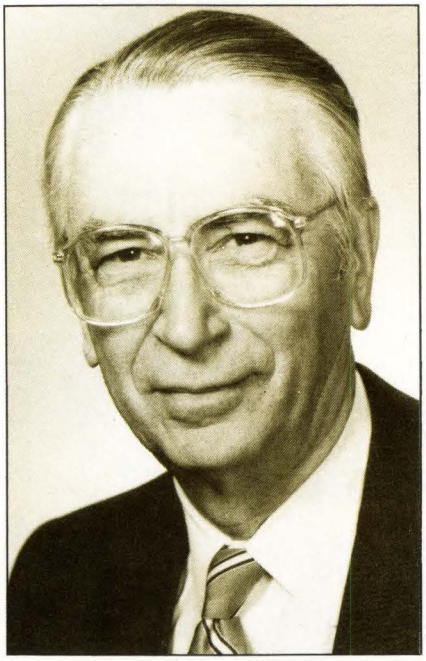
(Continued from page 114)

low cost. "Personal computers pay for themselves in much less time than our two-year payback standard," says Avon's John Hart. "In addition, although we're using the machines for the purpose we originally intended, users are taking them beyond our original expectations, providing us with an even better return on investment."

In the same vein, managers say what counts is not *how much* time is spent at a computer, but *how effectively* that time is spent. "It's like a telephone," says Rockwell's Howard Ingram. "You don't expect someone to talk on one for eight hours a day, do you?"

The poll suggests several trends in computer configurations. The respondents are acquiring personal computers equipped with increasingly sophisticated tools and greater memory capacity. Most of the machines typically have 256,000 bytes of main memory, two double-sided disk drives (or in an IBM PC XT configuration, one disk drive and a vendor-supplied hard disk), an Epson printer, a vendor-supplied monochrome monitor, serial and parallel ports, and a Smartmodem, from Hayes Microcomputer Products, operating at 300 or 1,200 bits per second.

However, computers purchased since the first quarter of last year suggest that managers have changed their equipment priorities. Those machines typically have 512,000 or more bytes of memory, color monitors, hard disks (often made by an independent vendor, since the PC XT has been in short supply), 1,200-bps Hayes modems, and Epson printers.



"A third of any staff has a flair for computing. Another third can be trained. But a final third will always have trouble." Roark, Ford

What does this trend toward more-powerful, better-equipped systems mean? "Most of the new user-friendly software includes online help functions, which require a lot more random-access memory (RAM) than older packages," says Litton Data Systems' James Fortney.

Even managers who don't have machines with large memory capacities emphasize the need for more memory. "We've bought upgrades to the Xerox 820 to make it both an 8- and a 16-bit machine, with 128,000 bytes of RAM in the 16-bit version," comments Gilbert/Commonwealth's Pierce. Another manager says his employer is loading its Apple IIs with "as much memory as they can handle—96,000 bytes, 128,000 bytes, or whatever."

Epson is the most popular line of printers among the responding managers, perhaps because IBM markets printers made by Epson. (If one of the managers surveyed has the IBM or any other manufacturer-supplied printer, the charts tally the vote for its actual manufacturer, if known—Epson for IBM, C. Itoh for Apple, and so on.) Okidata's printer was mentioned as a favorite by several companies, and the NEC Spinwriter was used as a secondary printer for word processing. The Hewlett-Packard 7470A Plotter was the only plotter mentioned by the respondents.

The most prevalent applications in the organizations represented in the poll contain few surprises. Spreadsheet analysis and database management are the most popular personal-computing tasks. Few managers mention word processing, perhaps because of the widespread assumption that word processing is a clerical task and because many secretaries already use dedicated word-processing equipment.

Responses from the managers suggest, however, that word processors are becoming passe as more and more corporations begin using personal-computer word-processing software like Multimate from Softword Systems on their micros. "The word-processing packages for personal computers are getting better," says Charles Hoerner of McKesson. He doesn't doubt that personal computers will eventually mean the end of word processors, but only after another round of improvements for word-processing packages. "The software and keyboard still don't quite match the best of the dedi-

"Ease of use is in the mind of the user."
—Roark, Ford

cated word processors," he explains. "Before, when users needed word processing, we told them to buy a word processor. Now we steer them toward personal computers."

Accounting isn't a widespread use for personal computers in the corporations represented in the poll. Indeed, the managers discourage use of accounting packages on stand-alone machines, fearing the corporate books will be muddled.

Graphics is apparently an application that hasn't yet found favor in corporations. "Graphics software doesn't produce the high quality managers need for business graphics," complains Arnold Kneitel, systems consultant for E.I. du Pont de Nemours, Wilmington, DE. "We need more precision, greater resolution, and a smoother line."

Many of the managers in the poll complained about the dearth of computer furniture. "Furniture design and the amount of space in a personal-computing workstation are important issues," says James Fortney. "There's a tendency to reduce the space allotted to employees, but to increase productivity you have to equip them with tools, which take up space. There's a big need for office furniture designed to accommodate computers."

Although most of the managers agree with Fortney, few are using special furniture. "The return on investment isn't there with ergonomic furniture," McKesson's Hoerner comments. "How do you justify buying an $800 chair?"

When it comes to the best way to purchase computers, the managers are almost evenly divided between buying direct from manufacturers and buying from dealers. (Independent sales organizations aren't prevalent among the organizations represented in the poll, and turnkey suppliers aren't used at all.) Most firms are so uncertain of the advantages of either major purchasing strategy that they purchase from dealers *and* manufacturers—despite disappointing ratings for both. IBM, in particular, draws harsh criticism for the inferi-

"We don't think any vendor has all the right answers."
—Fortney, Litton

or quality of its sales support.

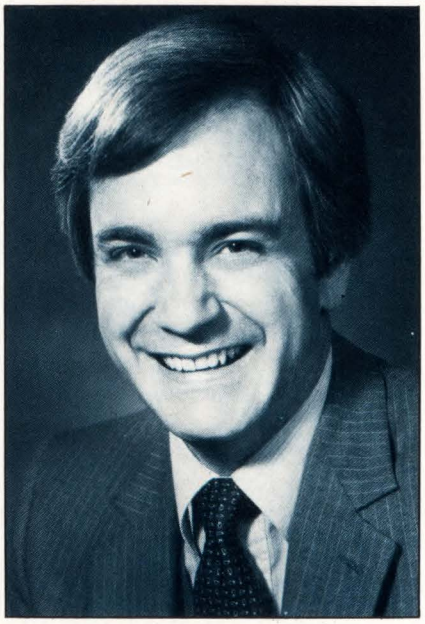
"IBM's pre-sale support is abominable," says Hoerner. "Sales reps in its product centers think they know everything, but they don't. One guy insisted to me that the Displaywriter (a dedicated word processor) couldn't communicate with the IBM PC. He was wrong, of course. Another time, we were put on the waiting list for some boards that were out of stock, but were never called when the boards came in. IBM should forget retailing."

Big Blue admits that the success of its personal computer has led to delayed shipments of computers and parts, but adds that the product centers will soon have streamlined supply lines. An IBM spokesman also divulged plans to set up a toll-free customer-service hot line. *(Continued on page 120)*

RATINGS OF 25 MANAGERS

	IBM PC/XT	Apple II/III	TRS-80 II/III	Victor 9000	DEC Rainbow	Honeywell MS 610	Xerox 820	Apple Lisa	Eagle PC
Maintenance and support ratings (1-5)									
Hardware									
Dealer	3.2	4			5				4.5
Manufacturer	3			5		4	5		
ISO	3.5								
In-house	4.7								
Software									
Dealer	3.8								
Manufacturer	3.5	5		5	4		2		3
ISO									
In-house	5	5							
Training									
Dealer	3.6								
Manufacturer				5					
ISO									
In-house	4.4				4.5				

PERSONAL COMPUTING SURVEY



"IBM's pre-sale support is abominable. Sales reps in its product centers think they know everything, but they don't."
Hoerner, McKesson

(Continued from page 119)

The spokesman also insisted that "the only way an IBM PC and a Displaywriter can communicate is through a 5520 administrative system." Hoerner, however, maintains that "the connection is a trivial matter, involving a $750 interface, an asynchronous modem, and an acoustic coupler." This comes as no surprise, however. Most managers in the poll agree that none of the major computer manufacturers is helping to meet end-user needs. "That's understandable," Hoerner reasons. "The major vendors are pumping out iron. The really creative solutions are coming from software companies. Hardware manufacturers don't and shouldn't have the vision to market software solutions." (Of course, it can be argued that some hardware vendors are striving for better software solutions like those found on Apple Computer's Macintosh.)

Although many of the companies represented in the poll provide their own hardware support, most rely at least partially on their vendor's toll-free hot line for solutions to software problems. These phone services receive mixed reviews at best. Ashton-Tate's hot line for its dBase II database management system is "deplorable," asserts one manager, whereas Softword Systems' hot line for its Multimate word-processing package is called "outstanding" by another. Managers somewhat immodestly rate their own in-house support services as vastly superior to outside sources.

When asked which components break down most often, the typical response was, "Components really don't break down that often, but when they do it's usually the disk drives." The fact is, personal computers don't frequently break down. "Personal computers are much more reliable than mainframes," Hart says. "But they're so cheap we keep spares in case they fail."

Still, when the need for maintenance arises, many managers consider on-site maintenance their best option. The University of Arizona is one extreme—its micros for agricultural research are located in every county in the state. "On-site maintenance is an absolute necessity for us," comments Robert MacArthur, a systems analyst. "We can't afford to have personal computers shipped to a central location for repair."

McKesson Corp.'s circumstances are less extreme, but "We give all our Personal Computers on-site maintenance," Hoerner reports. "Employees take too much time to bring their machines back to the source for repair."

Corporations represented in the poll train employees themselves. Many have informal, one-on-one training or "neighbor help," as Rockwell's Ingram calls it. Some training programs are more extensive. A typical course includes an introduction to personal computers plus individual courses on each popular software package, like 1-2-3, Supercalc, or Wordstar. "We tried producing and distributing videotapes," Ingram says, "but it didn't work. An instructor is needed to answer questions. And the student needs to set the pace."

The subject of technical documentation was greeted by a managerial yawn in most cases. "Ninety-nine percent of our users never even bother to read the documentation," says Hoerner. "Reference guides are only important during training. Employees don't care about manuals," he says. "They want software packages that are self-explana-

"No machine is head and shoulders above any other."
—Ingram, Rockwell Int'l.

"When managers acquire personal computers, they don't expect to get the perfect machine."

tory and have an online 'help' screen."

Avon has made its manuals a little more friendly, according to Hart. "The documentation is very good, but it's a little extensive," he says. "We put together a mimeographed set of instructions that reduces the size of the technical documentation nine-tenths."

All in all, the managers say they're pleased with their choices. But whether this satisfaction indicates that any one brand is superior is questionable. After investing a chunk of the company's assets in a product, a manager is unlikely to voice displeasure with any purchase, good or bad.

Most managers also report strong acceptance of their choices by employees, another claim that must be qualified. Pierce of Gilbert/Commonwealth believes employees will accept any machine. "If you walked everywhere and I bought you a car, you might suggest ways to make the car run better, but you'd sure be happier with it than you were without it," he reasons.

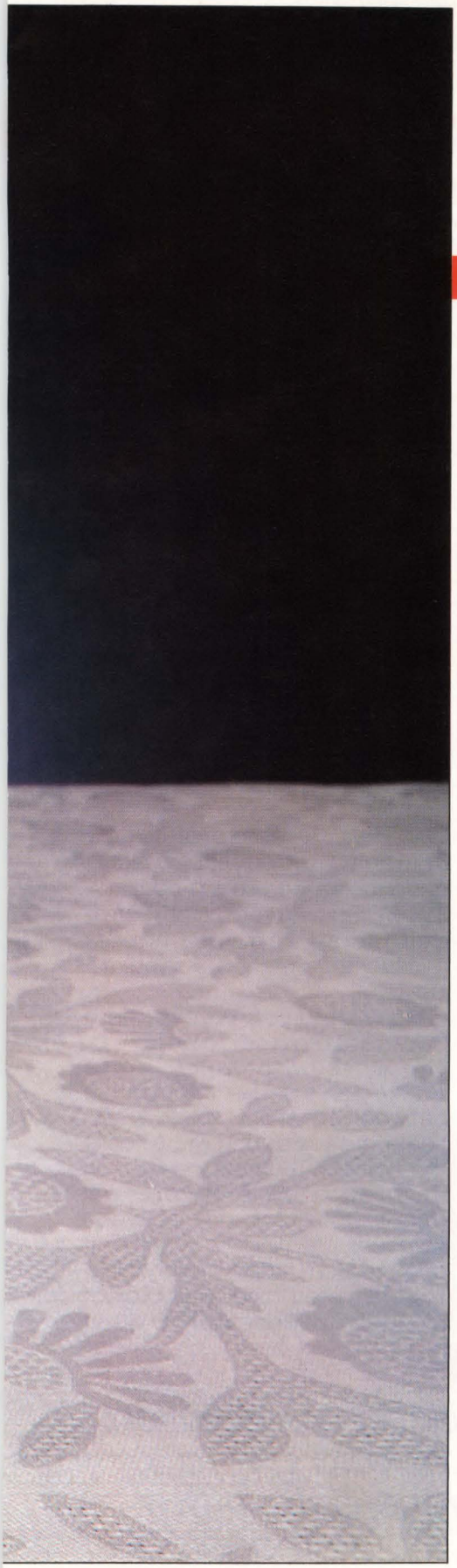
"Seventeen of the 25 managers polled have chosen the IBM Personal Computer as their corporation's standard."

What conclusions can be drawn from the opinions of 25 managers? Certainly no product can be called "the best" or "the worst"—though the IBM PC can be safely dubbed "the most widely used." What can be gleaned from this survey is that selecting the right computer depends on your needs today, your long-range plans for networking and communications, and your requirements for software and peripherals. Look at the big picture before you commit your corporation to hardware. □

Jordan Gold is a Fort Worth, TX-based free-lance writer.

THE FIVE-YEAR FORECAST

Photo by Rick Barrick



THE DAWN OF THE UNIVERSAL WORKSTATION

Today's stand-alone personal computer is the forerunner of the universal workstation.

by Robert Carr

We must study the future with the same energy with which we have studied the past, asserts John Naisbitt, author of the best-seller *Megatrends*. By pondering the present, we can see the future: "When we do, we will understand that a trend is not destiny."

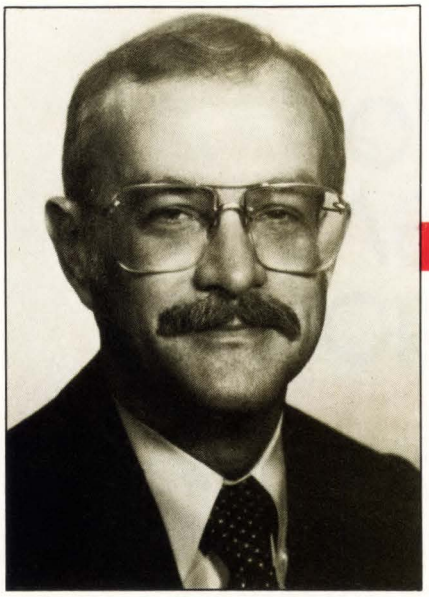
Naisbitt wasn't talking about corporate personal computing when he wrote those words, but he could have been. Many corporations that have glimpsed the benefits of personal computing are moving to implement it. Some are including personal computing in their designs for expansion. But as corporate managers plan, they struggle with a proliferation of fads, technological misconceptions, and just plain useless information. How can *anyone* anticipate the future of a technology that's changing so rapidly it even confounds so-called experts?

Shiny new standards are set and stars rise only to fall. IBM announces a memory chip that can hold some 520,000 characters just as a 256,000-bit chip enters wide use. Spin Physics announces a $5\frac{1}{4}$-inch floppy disk that can hold 10 million bits of information, roughly 30 times the capacity of today's most widely used floppies. New touch-sensitive screens, voice simulation, and all manner of sophisticated advances in personal-computer technology are equally difficult to figure into today's plans. Which of these technologies are mere fads? Which ones are available—without the bugs?

Despite the ballyhoo surrounding the stand-alone personal computer, its destiny is to be superseded by a different device, experts believe. In five years, most corporate personal computing won't be done on the stand-alones we know today. Rather, "universal workstations" combining data processing, decision support, office automation, and tele- and data communications will rise to prominence. The stand-alone personal computer will fade into the evolutionary past.

These new workstations might be called "knowledge work systems," says Harvey Poppel of Booz, Allen, Hamilton, a management consultancy based in New York. "Knowledge work systems will be more attuned to the style of managers and professionals," he says. "They won't be high-volume, high input/output systems. They'll be nonprocedural and automate basic business operations."

Technological advances are propelling corporations toward the universal workstation. But Richard L. Nolan, of the Lexington,



"American business is searching for leaders, *not* managers. *The role of the executive—the person who leads the organization—will expand."* Koehn, Security Pacific

FIVE-YEAR FORECAST

MA-based consultancy Nolan, Norton & Co., believes two groups of corporate employees are also driving forces. The first is executives and middle managers, who are beginning to realize that the ideal computing workstation combines all of the tools in the everyday office—terminals or personal computers, telephones, file cabinets, Rolodexes, dictating machines, and possibly even typewriters—in a single machine.

The second pressure group is from management-information systems/data processing (MIS/dp), Nolan believes. MIS/dp is advancing through its own stages of development (Norton first identified four stages in 1973 and has since added two more) and is now moving from time-sharing setups to workstations that interact with each other and centralized information resources, and have self-contained processing power as well.

Communications is the key to the goals of both groups. Investing workstations with every tool in the office is just the start. The transformation of the workstation will be complete when all functions are dynamically linked. "A small aspect of personal computing is number crunching," says Jack Karp, microcomputer expert at Gartner Group, Stamford, CT. "Personal computing is getting and disseminating information—and that's communications."

When these groups attain their separate goals, the result will be a communications grid that fans out from a data center, reducing the "information float" (the time between sending and receiving information) to near zero. A network of these workstations will transform corporations into integral organisms. Instead of a federation of departments held together by a common logo, all workers, functions, and transactions will seem to breathe together as one. The flow of information to and from one cell in the organism will instantaneously alter another cell as the transaction is recorded in the central computer.

Evidence of the movement toward this destiny abounds in today's state-of-the-art products, but they are only the seeds of much more functional offerings five years down the road. Technology is advancing so rapidly, says Karp, that anything's possible. "If technology continues at its current rate, Apple's Lisa personal computer, which processes 200,000 instructions per second, will process 1 million instructions per second by the end of the decade. By the end of the century, the rate will have increased to 11 million instructions per second. That's about the average rate of evolution in this technology—a tenfold improvement every 10 years."

Processing speed, of course, is only one factor that will shape the workstation five years from now. Software will be another vital component. Again, today's technology offers a preview. An integrated package that lets a user move information easily between financial-analysis, graphics, data-communications, data-base-management, and word-processing functions—often in "windows" on the same screen—is a closer approximation of the ways executives and managers work. In the manual world, tasks aren't completed in isolation as separate, unintegrated programs presume.

Apple Computer has already embraced this concept in the software for its Lisa and Macintosh computers, and IBM has made integrated "windows" a feature of its new 3270 Personal Computer, which is designed to be used in conjunction with mainframes. A host of independent software houses announced similar packages late last year.

Many observers believe these packages are a crude beginning. The ease with which these packages transfer information between functions varies wildly. Some are faster and more facile than others. The next generation of integrated software will smooth the transitions between functions, creating the illusion that one program is doing everything, experts assert. Shel Hall, project manager for PeachText 5000 at

"When we perfect speech recognition, an executive will be able to give a command and have the data in five minutes." —Thager, DEC

Peachtree Software, predicts this new generation of integrated software will hatch at the end of this year.

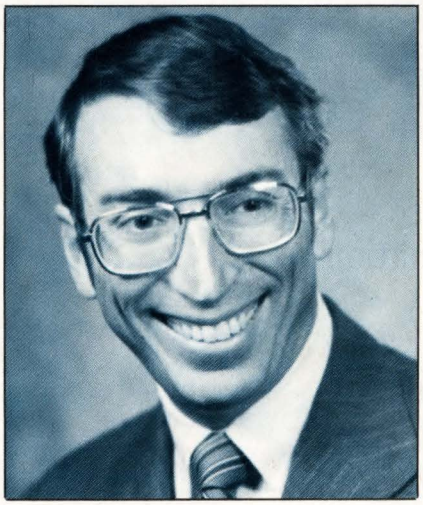
More sophisticated application generators will also be an important component of the workstation of five years hence. These packages will let users with only a rudimentary knowledge of programming develop new functions or modify existing ones. Applications generators will meet the needs of certain organizations—many corporations understandably inhibit users from writing their own programs—as an enhanced way to manipulate data.

The universal workstation of the future will be molded in part by today's efforts to design better ways for man to communicate with machine. The mouse, touch screens, voice control, light pens, and a host of hybrids are being offered as replacements for the keyboard, which is a barrier to many users. Each vendor is working to advance its own alternative. Texas Instruments and Digital Equipment Corp. (DEC) are concentrating on voice recognition, Apple on the mouse, and Hewlett-Packard on touch-sensitive screens.

Which is the best investment today and for the future? The answer to that question should depend on the task at hand and each user's preference. In five years, the question will be moot: Voice input, mouse, and touch screen, and maybe other alternatives will be offered on the same workstation. At the very least, managers will be able to pick whichever is most productive or most comfortable for a specific application.

Much of the attention will be focused on *conversation* as the ideal way for executives and managers to interact with their personal-computing machines. Eventually, practically all of the major personal-computer vendors plan to implement voice recognition because it is a more natural way to extract and manipulate data than the other alternatives.

The promise of speech recognition as an executive tool is considerable. "When we perfect speech recognition, an executive could say, 'Give me a report on the sales activity of the Chicago territory between July and November,' and in five minutes have the data displayed on a screen," says Vijay Thager, senior product manager in DEC's personal-computer group. Voice recognition probably will be limited to the executive suite and enclosed managerial office, however. The technology just doesn't fit in a crowded office, a limitation that has given Apple Computer, for one, reservations about pursuing voice-recognition systems.



"MIS/dp has to start restructuring databases and building the communications centers and networks of the future."
Nolan, Nolan, Norton & Co.

The ability to convert text to voice is expected to be perfected by 1989. DEC's DECtalk, announced last December, has this capability. It can also recognize speech, but most of its uses for the moment are educational. Voice output has obvious uses in electronic-message systems. At 7:30 a.m., an executive in New York could sit with a cup of coffee listening to the prior evening's electronic mail from the Los Angeles office as if it were coming over the radio. Text-to-voice systems also offer a quick way to run through reports and files, a la Hal, the supercomputer in the film *2001: A Space Odyssey.*

(Continued on page 128)

CAN YOU FIND THE IBM* 3278 HIDDEN IN THIS PICTURE?

It's right there.

Inside the Advanced Personal Computer from NEC Information Systems.

In fact, the Advanced Personal Computer is the best personal computer for direct connect 3278 emulation, with 3274 and 3276 controllers.

Get the advantages of personal computing plus direct connect 3278 emulation.

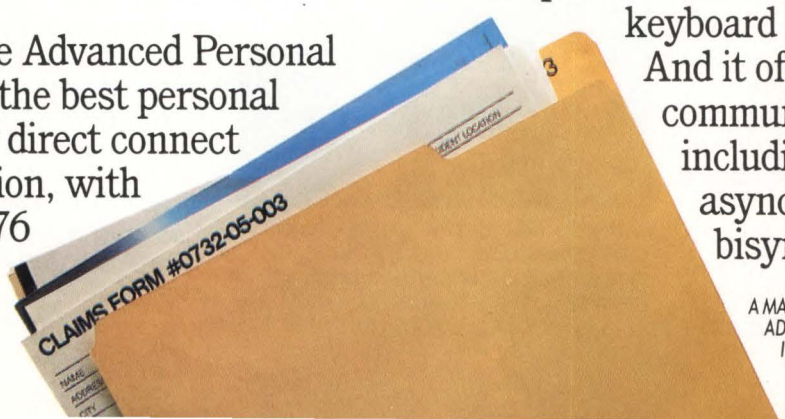
With the APC, your people will be more productive than ever before.

They can easily perform all their existing 3278 applications. Then, with a single keystroke, switch to a full function personal computer, quickly and easily.

WITH A SINGLE KEY-STROKE, YOU CAN SWITCH FROM 3278 EMULATION TO A FULL FUNCTION PERSONAL COMPUTER.

And the APC is fully compatible with all 15 different 3278 keyboard configurations.

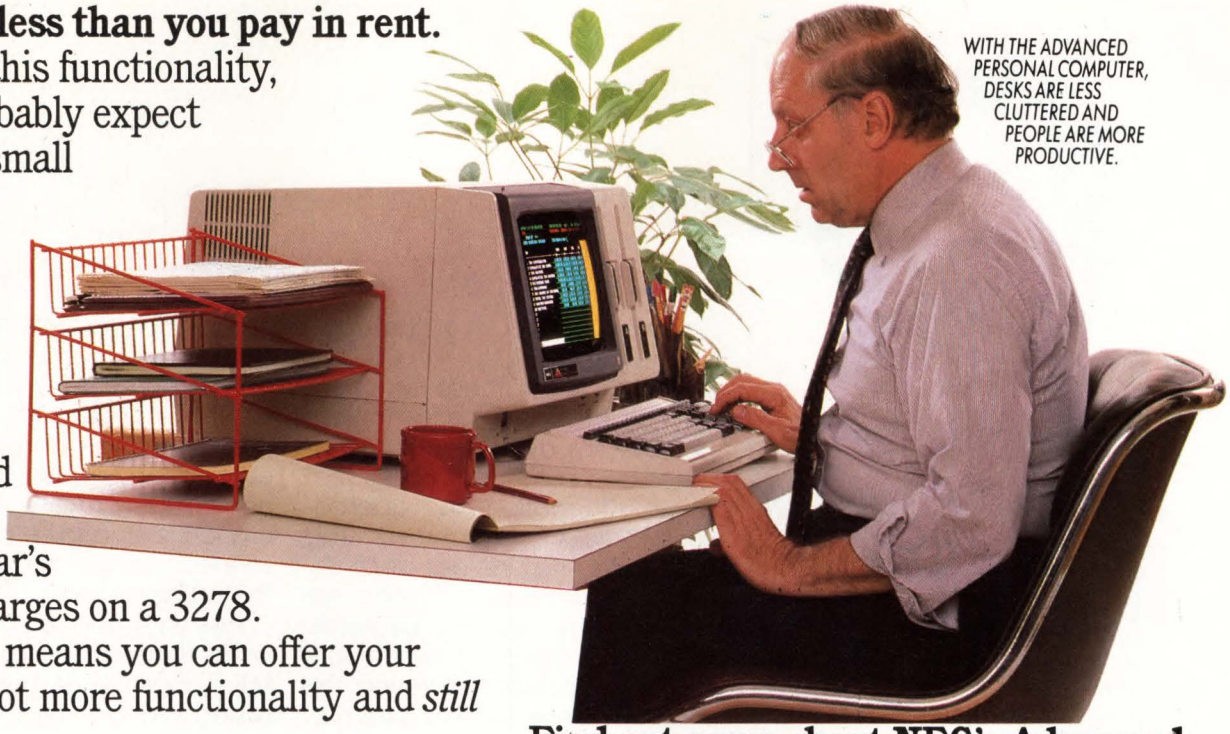
And it offers a full range of communications protocols, including SNA/SDLC, asynchronous and bisynchronous.



A MAJOR INSURANCE COMPANY IS USING THE ADVANCED PERSONAL COMPUTER TO GREATLY INCREASE WORKER PRODUCTIVITY.

Own for less than you pay in rent.
With all this functionality, you'd probably expect to pay a small fortune for the APC. Surprise! The APC can be purchased for less than 1 year's rental charges on a 3278.

Which means you can offer your people a lot more functionality and *still* pay less.

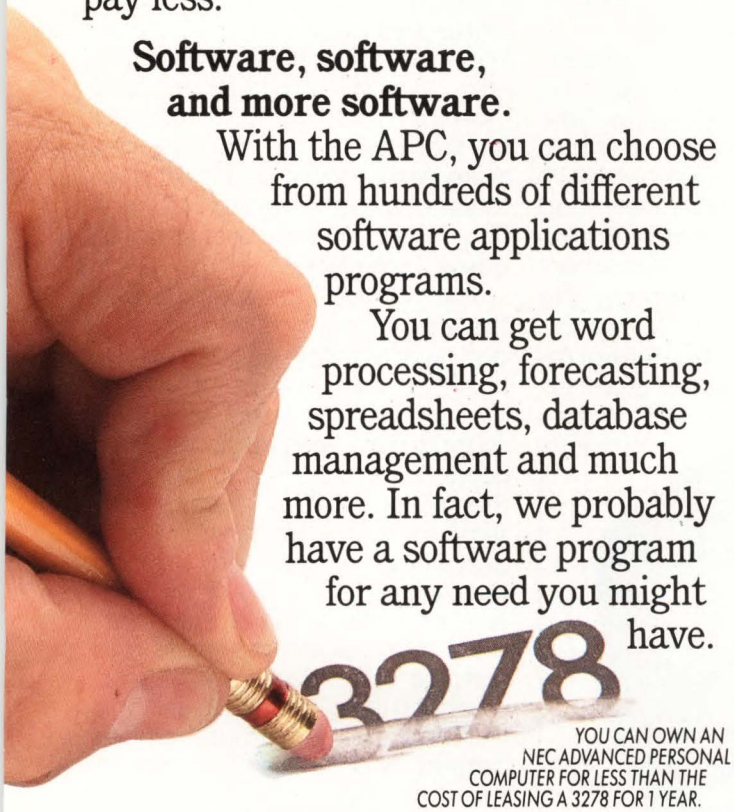


WITH THE ADVANCED PERSONAL COMPUTER, DESKS ARE LESS CLUTTERED AND PEOPLE ARE MORE PRODUCTIVE.

Software, software, and more software.

With the APC, you can choose from hundreds of different software applications programs.

You can get word processing, forecasting, spreadsheets, database management and much more. In fact, we probably have a software program for any need you might have.



YOU CAN OWN AN NEC ADVANCED PERSONAL COMPUTER FOR LESS THAN THE COST OF LEASING A 3278 FOR 1 YEAR.

The APC also offers you the best color graphics in the industry, and a wide range of graphics software. The most storage capacity of any computer in its class. And the kind of reliability that NEC is famous for.

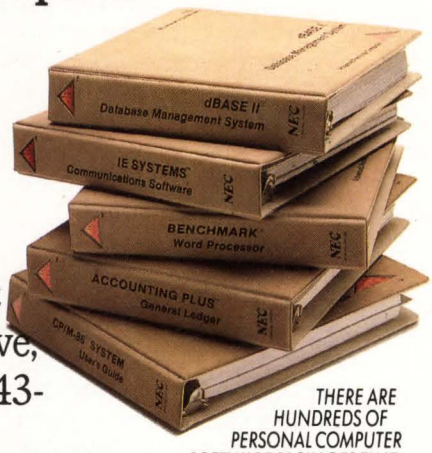
All for less than you're paying now.

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

CIRCLE 42

Find out more about NEC's Advanced Personal Computer.

For more information about the APC, or for the location of your nearest NEC representative, call 1-800-343-4419.

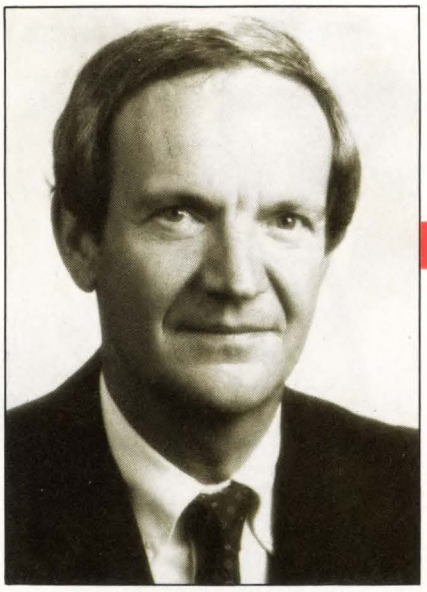


THERE ARE HUNDREDS OF PERSONAL COMPUTER SOFTWARE PACKAGES THAT RUN ON NEC'S ADVANCED PERSONAL COMPUTER.

And find out why so many 3278 users are saying "NEC and me".

NEC AND ME

NEC Information Systems, Inc.
1414 Massachusetts Avenue,
Boxborough, MA 01719



Information technology promises to help executives overcome their weaknesses and build on their strengths, says author Robert H. Waterman.

FIVE-YEAR FORECAST

(Continued from page 125)

Telephones will also be included in the workstations of the future in much the same way that AT&T, DEC, Wang, Northern Telecom, Cygnet Technologies, Texas Instruments, and Tymnet have already introduced them (or are planning introductions).

Cygnet's Co-System, announced only recently, has its own microprocessor, memory, and programming capabilities. Hooked to an IBM Personal Computer, the device lets a user talk on the phone and transmit data at the same time. For instance, during a phone discussion with a branch-office colleague, an executive can transmit a spreadsheet to illuminate the conversation. The colleague can change the assumptions and return the spreadsheet. Such capabilities will be standard on the workstations of the future.

Although Co-System and systems like it cannot transmit pictures, video conferencing is expected to become much more widely available in five years. It may be a feature of special executive workstations. "We're already seeing video and teleconferencing centers in corporations," says Jack Karp. "Right now, you have to go to a place similar to a little television studio, but in two to five years that capability will be part of the common office."

Tying all of these functions together will be a nervous system of corporate databases and program libraries that allows information and applications to flow freely and securely to where they're needed. Already information managers are moving in this direction by installing systems designed to distribute computer power. However, the scope of these systems is far narrower than that of the systems envisioned for 1989.

Building these networks will be a difficult and expensive task. The big question, of course, is how workstations, mainframes, minis, and even portable computers will talk to each other freely and securely in this electronic wonderland. The public telephone network probably will remain the best bet for remote access to data from outside the central facilities for all but a few giant organizations. But within the corporation, a variety of internal systems will have to be built, depending on the number of workstations needed, the nature of the data to be transmitted, and other considerations. Local-area networks, private automatic branch exchanges, and limited-scope multi-user networks will be the building blocks.

"Right now, you go to a place similar to a television studio for teleconferencing, but in five years that capability will be part of the office." Karp, Gartner Group

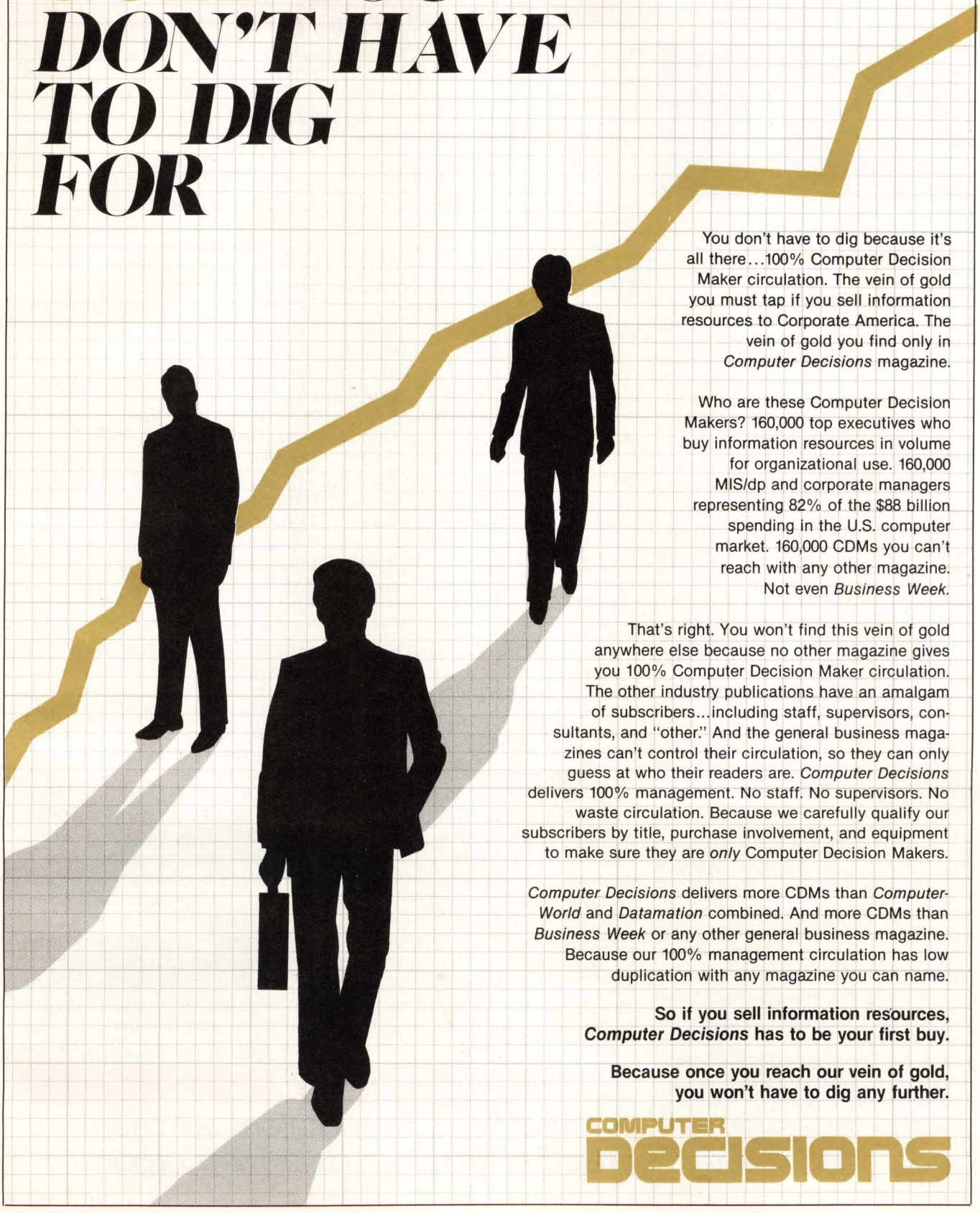
The emergence of these networks is inevitable, asserts Victor Millar, partner in the Chicago-based management-information consulting service of Arthur Andersen and Co., the New York-based Big Eight accounting firm. "Today, executives and managers are buying computers for themselves, but, as they get more comfortable and stretch for more applications and information, they look for access to databases," says Millar.

The top MIS/dp executive—the chief information officer—and his or her staff will oversee the transition from the central information centers used by many organizations to a distributed approach. Richard Nolan believes the MIS/dp staff will gradually assume a "utility function" in corporations. "MIS/dp will provide the central repository of information and the value-added network that delivers programs and data to users. We have to start restructuring databases and building the communications centers and networks of the future," he says.

How will all of these resources be distributed? Today's in-house computer stores and information centers will spawn new user-service organizations. Information centers are an effective, economical way to introduce personal computing, says Neil DiGeronimo, market analyst with Predicast, a Cleveland-based consultancy, but they're only a means to an end. "Once

160,000 COMPUTER DECISION MAKERS

THE VEIN OF GOLD YOU DON'T HAVE TO DIG FOR



You don't have to dig because it's all there...100% Computer Decision Maker circulation. The vein of gold you must tap if you sell information resources to Corporate America. The vein of gold you find only in *Computer Decisions* magazine.

Who are these Computer Decision Makers? 160,000 top executives who buy information resources in volume for organizational use. 160,000 MIS/dp and corporate managers representing 82% of the $88 billion spending in the U.S. computer market. 160,000 CDMs you can't reach with any other magazine. Not even *Business Week.*

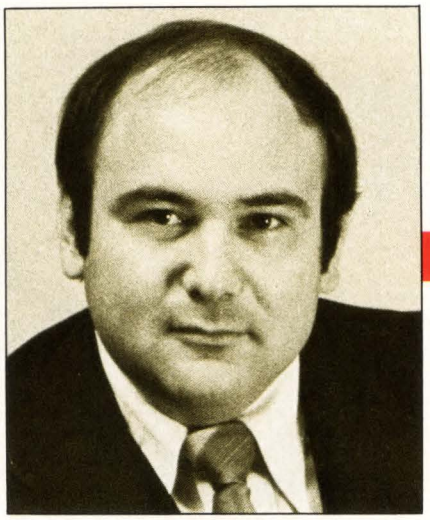
That's right. You won't find this vein of gold anywhere else because no other magazine gives you 100% Computer Decision Maker circulation. The other industry publications have an amalgam of subscribers...including staff, supervisors, consultants, and "other." And the general business magazines can't control their circulation, so they can only guess at who their readers are. *Computer Decisions* delivers 100% management. No staff. No supervisors. No waste circulation. Because we carefully qualify our subscribers by title, purchase involvement, and equipment to make sure they are *only* Computer Decision Makers.

Computer Decisions delivers more CDMs than *Computer-World* and *Datamation* combined. And more CDMs than *Business Week* or any other general business magazine. Because our 100% management circulation has low duplication with any magazine you can name.

So if you sell information resources, *Computer Decisions* has to be your first buy.

Because once you reach our vein of gold, you won't have to dig any further.

COMPUTER DECISIONS



"Personal-computing machines will find permanent homes on the desks of users in the form of workstations."
DiGeronimo, Predicast

users have reached a certain level of expertise, the center should be dispersed," he says. "Personal-computing machines will find permanent homes on the desks of individual users."

The new central organization, led by the chief information officer, will oversee purchasing and distribution of machines and software, internal billing, maintenance, and improvements for the near and long term, says Michael Stone, senior consultant for Future Computing Inc., a Fort Worth, TX-based consultancy.

The central organization will implement universal workstations, but its mandate won't end there. It will also oversee personal-computing machines used outside of the corporate premises. "The portable computer will be a subset of permanent workstations," says Poppel of Booz, Allen, Hamilton.

Depending on whom you talk to, these will include either general-purpose portables or smaller "task-specific" computers. Gartner Group's Jack Karp, for instance, believes the portable computers of five years hence will be more limited than office workstations. Portables will be no larger than a notebook and be used for specific tasks, he says. Convergent Technologies' Workslate, a low-cost machine designed for limited functions, can be viewed as the forerunner of these machines. "I doubt users will be doing six spreadsheet consolidations in a hotel room," says Karp. "It's more likely that the portable will be used as a notebook to jot down information to be plugged into a spreadsheet later. Most of the consolidation and work with large databases will be done in the office."

FIVE-YEAR FORECAST

Poppel and Richard Nolan have a different vision of the future of portable computing. They believe the key asset of portables will be the ability to access databases and remotely stored applications programs. "During the initial stage of use, you do spreadsheet analysis and word processing," says Nolan. "Plugging into a network is the second stage, and the last stage is having access to programs for special functions."

Karp disagrees with this thesis. The portables of 1989 will have as their chief attribute true portability, he says. "If a computer doesn't fit into a briefcase, no one will use it much," he asserts. "I don't think network compatibility will be an issue."

Although the in-house computing-services facility will play a vital management role, the mainframe-based data center won't disappear. In any discussion of the future, the question of whether big systems will be supplanted by computers the size of today's micros inevitably arises. Certainly, DEC's VAX minicomputer-on-a-chip (scheduled for release later this year) and products like it will dramatically reduce the size and cost of computers with the power of today's large-scale systems.

Although scientists or engineers will be able to run many smaller projects on these computers, truly big number-crunching tasks and operations with a heavy load of transactions will still require the power of mainframes and superminis, most experts agree. The reason is structural. Even though some of today's personal computers have processing power equal to that of small minis, the two machines are intrinsically different. The Fortune personal computer, for instance, has as much or more power than the DEC PDP-11/44 minicomputer, but don't try to replace the mini with the micro. "A PDP-11 is a general-purpose computer that can be expanded by adding different input/output cards," says Martin Healey, a professor of microcomputer engineering at University College in Cardiff, Wales, and founder of Future Technology Systems. "You can't do the same with a Fortune or an IBM Personal Computer."

The universal workstation, its super software, and the network that supports it promise to change the jobs of corporate employees from top executives to mail-room clerks. Information technology may even help to change many of the jobs themselves by giving executives and managers the tools to be better innovators and decision makers. "American business is searching for *leaders*, not *managers*," says Hank Koehn, vice president of futures research at Security Pacific National Bank, Los Angeles. "Managers maintain someone else's invention, and their role will diminish. But the role

"Workers and transactions will seem to breathe together as a living organism."

of the executive—the person who leads the organization—will expand."

Technology will help this trend along, in part by reducing the time required to complete mundane tasks. "Executives will spend more time analyzing assumptions and outcomes, not trying to get the numbers right," says Robert Waterman Jr., coauthor of *In Search of Excellence* (Harper & Row, $19.95).

Information technology of five years hence promises executives help in overcoming weaknesses and building on strengths, says Waterman. This phenomenon is evident today. "Many executives who normally wouldn't do a good job at financial planning are now very good because of the computer," he says. "Word processing and spreadsheets tend to make you work smarter."

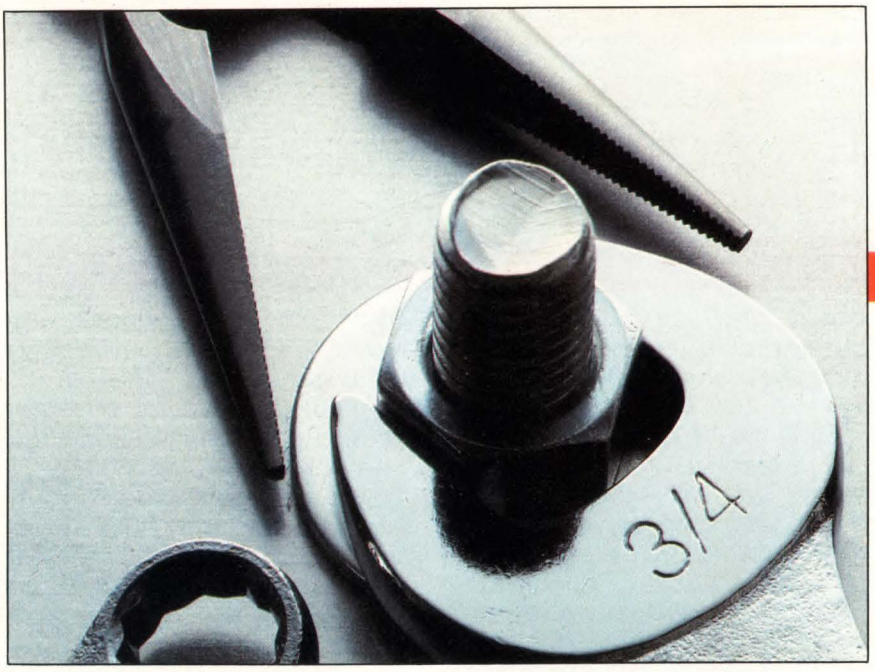
The only possible flaw in this snapshot of the corporate executive of the future is the executive. Will executives and managers take advantage of the benefits proffered by the technology?

Computer and software vendors may brag about achieving quantum leaps, but executives, managers, and professionals accept technology in steps, not leaps. Despite all of the advances of the past five years, many executives still complain that keyboards are clumsy (many can't or refuse to type) and that learning to use a personal computer is more trouble than it's worth. Many executives whose employers have given them personal computers have "delegated" them to subordinates or secretaries, a phenomenon known as "chauffeur-driven technology."

Improved no-keyboard input/output devices may help executives accept sitting at a terminal, and links to powerful facilities will also certainly help.

In addition, the number of managers and executives who "grew up" professionally with personal computers is increasing. They, after all, hold the key to the personal computer's destiny. □

Robert Carr is a California-based free-lance writer who frequently covers subjects relating to technology.



MICRO USES

(Continued from page 51)

lem into a complicated one. Also, compatibility among devices becomes harder to maintain as the technology rapidly evolves.

Nevertheless, Agin argues that corporations must take the long view when setting the product mix for microcomputers and microcomputer software. "To be assured of compatibility a few years down the line," Agin says, "we have to focus on the broader picture. We use IBM PCs and some of the compatibles, and we'll buy others for special purposes. But if you want to use an Apple Lisa, we'll discourage it."

In addition to controlling the product mix, the corporation has to restrain users who attempt to match the advance of technology step for step, says Thomas Ottman, second vice president of data processing for Travelers. Something new and better comes out every day, but if you get something new every day, you lose control, he says. "You may not have the best word-processing package, but you're better off if you can move data from office to office."

Compatibility, however, is not the only requirement for the orderly development of personal computing. The corporation also has an interest in preserving data integrity and security, for instance, through the establishment of standards and, when necessary, of restrictions.

What Hannah Blank of Chase Manhattan calls "data contamination" can be perpetrated quite innocently within a corporation that fails to standardize its software and, when possible, its data files. If similar tasks are performed with different data or software, there is a strong likelihood that the results will be different, too. Over time, significant conflicts and irreconcilable contradictions may emerge, followed swiftly by ugly confusion.

Howard Frank maintains that duplications of functions and data, though not always avoidable, always involve some additional risk of error and inconsistency. In any event, they reduce efficiency. He cites as an example the ill-conceived decision by one bank, which went unnamed, to dedicate each personal computer to a single application and to give each department as many computers as it needed to run all of its applications. So if a particular department were divided into two separate sections, for instance, one new computer would have to be purchased for every application still performed by both.

At the heart of this strategy for distributed information processing, Frank says, lies the idea that the proliferation of devices can be tolerated because the cost of equipment is relatively insignificant. But Frank believes that, apart from the cost of hardware, the bank has written a prescription for the chaos that comes with inconsistency and error.

Jack Ewers, manager of systems planning and integration for Minneapolis-based Honeywell Inc., strongly advocates centralizing important data files and applications on host computers, and allowing personal-computer users to download data as they need them. This sort of arrangement not only tends to standardize data, it also reduces the incidence of encryption and entry errors, Ewers says, and promotes efficiency by eliminating the need to reenter data again and again.

That solution makes many executives in charge of personal computing nervous, however. "Information-systems managers recognize the importance of providing access to the corporate database," Quillard says, "but it takes a lot of hardware and software to do it . . . and they're also worried about data security."

The impact of microcomputers on data security has become a fairly hot public issue recently because of intrusions by so-called systems hackers into corporate and governmental computer systems. Of course, it doesn't really matter whether the damage is done by an outsider or an authorized employee whose curiosity has led him or her out of bounds. Given the persistence and proficiency of many hackers, corporations may have to reevaluate the balance between security and user-friendliness.

The organization that substitutes user-friendliness for training, for instance, is probably making a mistake, says Robert McKenzie, senior consultant with

ONLY THE WORLD'S BEST WORD PROCESSOR COULD GENERATE WORDS LIKE THESE.

"PIE:Writer, outscored every other word processing program for microcomputers...(It) crams an incredible amount of power into a small and inexpensive package...PIE:Writer beat four out of six dedicated word processors."

Arthur Naiman
"Word Processing Buyer's Guide"
McGraw Hill Book Company

"PIE:Writer is hard to beat...There is little I can't do with it...Do not fail to check out this program if you are a first time purchaser."

James Martellaro
Peelings II

"All in all, PIE:Writer is one of the most thorough word processing packages available...it can perform many functions in addition to word processing... PIE:Writer just may be the best buy."

Peter Olivieri
"Softalk"
March 1983

Why are some of the most respected authorities in the field of software saying all these nice things about PIE:Writer™? The answer is easy.

Easy to Learn. Easy to Use.

Part of the reason that PIE:Writer is the top ranked word processor is that it's just plain simple to run. In fact, you can use it as soon as you get it home. To write a letter, for instance, just (a) load the program, (b) type the letter 'E', and (c) write your letter. Then, (d) type 'F' to enter the print mode for either screen or paper and you're ready to print. You'll get a perfectly typed, spaced and formatted letter. Now what could be easier than that?

Powerful Features.

Don't confuse our use of the word simple with unsophisticated. PIE:Writer offers features and capabilities far beyond any other word processing programs for microcomputers. And that goes for most of the dedicated word processors as well. Here are just a few:

- A tutorial section that easily acquaints you with the features of the program in step-by-step transactions.
- You can customize the design of your letters and reports with integrated centering, bold facing, special tab features, mail merge capabilities, automatic page numbering, line lengths and much more.
- PIE: Writer runs on the Apple II, II+, IIe, the IBM Personal Computer and other popular compatibles.

	Operating system(s) and/or machine(s)	Price	Overall Score
CPT 8100	dedicated word processor*	$15,000	94¾
Dictaphone Dual Disp.	dedicated word processor*	$13,500	85¼
PIE:Writer:	**Apple II, IBM PC**	**$149.95 $199.95**	**84¼**
WordStar	CP/M†, Apple II, IBM PC	$500	80
Easywriter	IBM PC**	$175	35

*Includes word processing hardware & multistation support. †Requires additional CP/M Hardware for your personal computer ($200-600 extra). CP/M is a registered trademark of Digital Research. *VisiCalc © is a registered trademark of VISIcorp. **Very similar program called Easywriter Professional, available for the Apple II.

The Hayden Advantage.

With thousands already in use, PIE: Writer integrates with other popular professional software products. This includes The Speller, from Hayden, a 20,000+ word dictionary spelling checker with the ability to add user-specific dictionaries. And naturally, you'll get full technical support from the company that has built its reputation on quality and service.

But don't take our word for it. Or the expert's either, for that matter. Try PIE: Writer for yourself and enjoy the ease and excitement of writing with the world's best word processor.

Available at your local retailer or call 1-800-343-1218 (In MA 617-937-0200). Hayden Software, 600 Suffolk St., Lowell, MA 01853.

PIE:Writer

HAYDEN SOFTWARE

CIRCLE 44

If running a task on a microcomputer requires using more than one floppy disk, Judy O'Connor of Travelers Corp. believes the task should be moved to a host computer.

MICRO USES

Advanced Information Management Inc., Woodbridge, VA. Some systems present a "help" menu before a user logs on, he says, and then walk the authorized user and hacker alike to wherever they want to go. For the hacker, the raid on the corporate computer becomes a cakewalk. "Just moving your 'help' menu to after log-on will make the system more secure," says McKenzie.

Assessing your organization's vulnerability to fraud and abuse from within is somewhat more complicated. For instance, Donn Parker, a computer-security consultant with SRI International (Menlo Park, CA), a not-for-profit research house and consultancy, believes that the discipline employees acquire from using micros may, in the long run, have a decidely positive influence on data security.

"A lot of office crime will now involve computers," Parker says, "but that's not saying there will be an increase in crime." What has increased, Parker says, is the *potential* for serious loss, because the microcomputer can enhance the manipulative powers of an employee engaged in a criminal act. McKenzie offers, as an example, the fact that the microcomputer can be programmed to perform password searches—and other functions harmful to data security—with tremendous speed.

The microcomputer's strengths, moreover, are more dangerous because of its limitations. It has tremendous processing power, but not enough to readily accommodate the built-in safeguards found on mainframes and minicomputers. For instance, because running a microcomputer tends to be a one-employee operation, the separation of duties, a traditional accounting precaution, may be abandoned. At the same time, relatively unsophisticated microcomputer software and a casual corporate stance may result in inadequate audit trails and processing controls.

Where the potential for serious loss is great, of course, the use of microcomputers should be avoided or, at the very least, closely monitored and controlled. Money transactions provide the obvious example. "The use of micros really should be confined to management information analysis, as opposed to billing or accounts receivable," says Hannah Blank.

The corporation's liability doesn't end with financial information, either. Trade secrets and other proprietary information, customer lists, and sensitive personal information all need to be protected. When a corporation gathers information about individuals that may be in some way damaging to them, it has an ethical and, probably, a legal obligation to prevent disclosure, says John H. Chapman, executive director of the program in telecommunications and information policy at Columbia University's Graduate School of Business. A lawyer and an engineer, Chapman says the law is still unclear as to whether a corporation would be legally liable for harm caused by the unauthorized release of personal information, but believes it is evolving in that direction.

"We must make sure managers aren't doing the work of their secretaries."
—Higinbotham, 3M

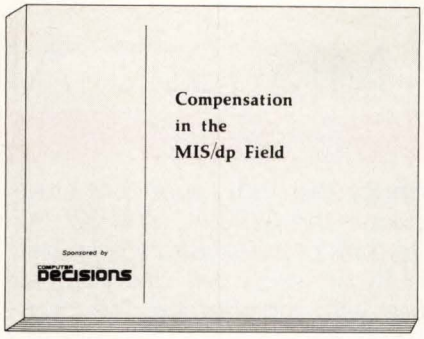
Most experts seem to agree that, as a rule, sensitive data should not be processed on personal computers and access to corporate data files from microcomputers should be strictly controlled. Price Waterhouse, for instance, offers the following recommendations to organizations that have microcomputers tied into their databases:

- Designate a person or group to authorize personal-computer access.
- Establish a password system to limit access.
- Provide read-only access to prevent improper modification of files.
- Install an electronic recording system to keep track of who extracts which data.
- Monitor the log regularly and follow up quickly on deviations from established procedures.

McKenzie, Parker, and Chapman all emphasize that the power of the mainframe computer must be enlisted in the cause of data security. Data files should be compartmentalized and access to each section controlled through user profiles. The computer should be programmed to detect and report deviations and

New—Just Released! The Most Valuable MIS/dp Salary Study You Can Buy

Compensation in the MIS/dp Field



Sponsored by *Computer Decisions*, this tightly-packed, 346-page report provides the most intensive study of salaries, salary ranges, and bonuses ever attempted in the MIS/dp field. For 35 job functions, ranging from Junior Key Entry Operator to Top MIS/dp Officer, it reports all compensation data:

- By 16 levels of supervisory responsibility
- By geographical location—total U.S., U.S. by seven regions (including & excluding major metropolitan areas), and 25 metropolitan areas & states
- By 25 types of employer
- By total MIS/dp budget
- By number of employees
- By annual sales of manufacturing/extractive and non-manufacturing organizations and utilities
- By total assets of financial organizations
- By insurance policies in force
- By education, experience, & sex

An invaluable tool for determining the "right" salaries in the MIS/dp field. $195.00

Complete & mail today for your 15-day FREE Trial Copy—No Obligation!

Abbott, Langer & Associates • Computer Decisions • 10 Mulholland Drive • Hasbrouck Heights, NJ 07604

Yes! I certainly can use *Compensation in the MIS/dp Field* in my work. Please rush my copy to me immediately! (If I'm not satisfied, I'll return it within 15 days and not be charged for it.)

☐ Check No. _____ for $195.00 is enclosed.
(Ill. residents add 6¼% sales tax.)

☐ Bill my employer, adding a small charge for shipping and handling.

Signature: _____ Name (type or print): _____

Title: _____ Employer: _____

Street Address of Employer: * _____

City: _____ State: _____ Zip: _____

*U.P.S. will not deliver to a P.O. Box number. Please give street address.

CIRCLE 45

the master file of passwords encrypted. Stategies for foiling automated searches should be employed.

Nearly as important as securing the database, and probably more difficult, is the protection of information stored on floppy disks. Data on a floppy disk, especially, are vulnerable to destruction and theft.

At the Wehr Corp., Milwaukee, personal computers are tolerated "on an exception-only basis," largely due to concern about floppy disks. Peter W. Puestow, manager of data processing at Wehr, says the company has already suffered one loss—an employee left and took with him programs and data developed on an Apple computer—and is determined to prevent others. Wehr also restricts access to printers connected to its online computer system, but Puestow says the risk of having data stolen on hard copy is less severe, anyway, because of the paper's bulk.

Brian Nahey, president and chief executive office of Wehr, is equally convinced of the danger. "The ability to transfer information and leave no tracks makes the personal computer a tremendous security risk," Nahey says. "A sales rep could transfer data to one or two floppy disks, put them in his or her pocket or attache case, and walk out of here with enough information to tear this company apart."

Nahey says he is especially disappointed that when IBM introduced the 3270 PC and 370/XT versions of its Personal Computer, both of which are designed for use with mainframes, the company overlooked the security problems posed by the floppy disk. Both new models allow users to transfer data to disks.

But IBM isn't alone, he says, by any means. "I think the manufacturers are in such a rush to come up with new developments, that they overlooked something that's going to come back to haunt them to a degree no one's anticipated," says Nahey.

Of course, not everyone believes the problem is as serious as Puestow and Nahey do. And some, like Norman Agin of Martin Marietta, argue that if it were, the technology exists to operate micro systems without floppy disks. But certainly most users and experts recognize that there is a problem. Ritch Gaiti of Merrill Lynch says the proprietary software packages that his group develops for personal computers all have "time bombs" built into them, and will self-destruct after a certain date. (Instructions embedded in the software change the code, rendering the packages useless, after a certain date.)

Theft represents only part of the total vulnerability of floppies, points out McKenzie of Advanced Information Management. Data can be destroyed as well as stolen. The dissatisfied employee who has quit or been fired should never be given access to computer facilities. Don't give notices of dismissal to employees who work around computers, he says; give them severance pay and turn them out.

Ultimately, the security of a corporation's data resources will probably depend on the corporation's willingness to confront the problem and take action. This means sizing up the risks, mapping out a strategy, and then setting and enforcing corporate policy. The sooner, the better. Under ideal conditions, the corporation would have its strategy and policies worked out before the computer system goes into service, McKenzie says.

Some observers, Norman Agin of Martin Marietta among them, suggest that some micro misuses and mistakes can be traced directly to the inability or unwillingness of the information-systems or data-processing departments to make alternatives available at a reasonable cost and in a reasonable amount of time. "Putting a job on a micro that takes four or five hours to run overnight isn't a good use," Agin says. "But it happens because the professionals responsible for putting it on the mainframe say, 'It'll cost $50,000 and take five years.'"

Having fed the fever over personal computing, information-systems pros should now help users by giving them enough flexibility to creatively exploit their machines and enough guidance to prevent their doing harm to themselves or others. In the end, proper support may mean the difference between success and continued fumbling. "Some people feel they've been totally liberated from data processing," says Contel's Howard Frank, "but that's not really true." □

"Often, the scale of the task makes the difference in determining whether it belongs on a microcomputer."

—Deal, consultant

SOURCES OF SUPPLY

MAJOR PERSONAL-COMPUTER VENDORS

Single-user systems

Alspa Computers
(408) 370-3000
Circle 689

Anderson Jacobson
(408) 263-8520
Circle 690

Apple
(408) 996-1010
Circle 691

Billings Computer
(816) 373-0000
Circle 692

Burroughs
(816) 972-7000
Circle 460

California Computer Syst.
(408) 734-5811
Circle 693

Columbia Data Products
(301) 992-3400
Circle 694

Compal
(213) 652-2263
Circle 695

Compupro
(415) 786-0909
Circle 696

Corvus Syst.
(408) 946-7700
Circle 698

Cromemco
(415) 964-7400
Circle 697

Data General
(617) 366-8911
Circle 475

Data Tech.
(415) 638-1206
Circle 699

DEC
(617) 897-5111
Circle 700

Digital Microsyst.
(415) 532-3686
Circle 702

Direct
(408) 980-1414
Circle 701

Eagle Computer
(408) 395-5005
Circle 704

Epson America
(213) 373-9511
Circle 705

Franklin Computer
(609) 482-5900
Circle 706

Fujitsu Microelectronics
(408) 727-1700
Circle 707

Hewlett-Packard
Contact local sales office
Circle 708

Honeywell
(617) 923-7500
Circle 709

IBM
Contact local sales office
Circle 710

Intecolor
(404) 449-5961
Circle 711

ITT
(602) 894-7298
Circle 712

Leading Edge
(617) 828-8150
Circle 713

Lee Data
(612) 828-0300
Circle 714

Micro-Link
(317) 846-1721
Circle 715

Micro Tech.
(919) 833-1458
Circle 716

Monroe Syst. for Business
(201) 993-2000
Circle 717

Morrow Designs
(415) 430-1970
Circle 718

NCR
(513) 445-5000
Circle 719

NEC
(617) 264-8000
Circle 720

North Star
(415) 357-8500
Circle 721

Olympia USA
(201) 722-7000
Circle 722

Ontel
(516) 364-2121
Circle 723

Onyx
(408) 946-6330
Circle 724

Perkin-Elmer
(201) 870-4500
Circle 725

Plessey Peripheral Syst.
(714) 540-9945
Circle 726

Polymorphic Syst.
(805) 967-0468
Circle 727

Pro-Comp
(212) 246-0074
Circle 728

QDP Computer Syst.
(216) 526-0838
Circle 729

Quay
(201) 542-7340
Circle 730

Sanyo
(201) 440-9300
Circle 731

SKS Computers
(614) 876-8668
Circle 732

Sony
(201) 930-1000
Circle 733

Tab Products
(415) 852-2500
Circle 734

Tandy/Radio Shack
(817) 390-3011
Circle 735

Tarbell Electronics
(213) 538-4251
Circle 736

Tektronix
(503) 627-7111
Circle 737

Televideo Syst.
(408) 745-7760
Circle 738

Texas Instruments
(214) 995-2011
Circle 739

Toshiba
(714) 730-5000
Circle 740

Vector Graphic
(805) 499-5831
Circle 741

Victor Tech.
(408) 438-7000
Circle 742

Xerox
(716) 423-5078
Circle 743

Zenith Data Syst.
(312) 391-8860
Circle 744

Multi-user systems

Alpha Microsyst.
(714) 957-8500
Circle 745

Altos Computer Syst.
(408) 946-6700
Circle 746

Billings Computer
(816) 373-0000
Circle 692

Burroughs
(816) 972-7000
Circle 460

CADO Syst.
(213) 323-8170
Circle 747

California Computer Syst.
(408) 734-5811
Circle 693

Century Computer
(214) 233-3238
Circle 748

Codex/Motorola
(617) 364-2000
Circle 749

Compupro
(415) 786-0909
Circle 696

Control Data
(612) 853-8100
Circle 750

Corvus Syst.
(408) 946-7700
Circle 751

Cromemco
(415) 964-7400
Circle 697

Data General
(617) 366-8911
Circle 475

Datapoint
(512) 699-7059
Circle 752

Datavue
(404) 449-5961
Circle 753

DEC
(617) 897-5111
Circle 700

Digilog Business Syst.
(215) 628-4810
Circle 754

Dynabyte Business Computers
(408) 263-1221
Circle 755

Fortune Syst.
(415) 593-9000
Circle 756

Four-Phase Syst.
(408) 255-0900
Circle 757

Hewlett-Packard
Contact local sales office
Circle 708

Honeywell
(617) 923-7500
Circle 709

IMS Int'l.
(702) 883-7611
Circle 758

MAI/Basic Four
(714) 731-5100
Circle 759

Micro Craft
(214) 630-2562
Circle 760

Micromation
(415) 398-0289
Circle 761

Molecular Computer
(408) 262-2122
Circle 762

Monroe Syst. for Business
(201) 993-2000
Circle 717

Morrow Designs
(415) 430-1970
Circle 718

NCR
(513) 445-5000
Circle 719

NNC Electronics
(714) 895-8000
Circle 763

North Star
(415) 357-8500
Circle 721

Ontel
(516) 364-2121
Circle 723

Perkin-Elmer
(201) 870-4500
Circle 725

Plexus Computers
(408) 988-1755
Circle 764

Polymorphic Syst.
(805) 967-0468
Circle 727

Pro-Comp
(212) 246-0074
Circle 728

Product Assoc.
(415) 364-3121
Circle 765

QDP Computer Syst.
(216) 526-0838
Circle 729

Quay
(201) 542-7340
Circle 730

Sage Computer
(702) 322-6868
Circle 766

SDS
(213) 390-8673
Circle 767

SKS Computers
(614) 876-8668
Circle 732

Smoke Signal
(213) 889-9340
Circle 768

Stearns Computer Syst.
(612) 936-2000
Circle 769

Tandy/Radio Shack
(817) 390-3011
Circle 735

Tarbell Electronics
(213) 538-4251
Circle 736

Vector Graphic
(805) 499-5831
Circle 741

Victory Computer Syst.
(408) 259-7370
Circle 770

Wang Labs.
(617) 459-5000
Circle 771

Zenith Data Syst.
(312) 391-8860
Circle 744

MAJOR PERSONAL-COMPUTER VENDORS

Transportables

Actrix
(408) 263-3660
Circle 484

Anderson Jacobson
(408) 286-7960
Circle 485

Colby Computer
(415) 493-7788
Circle 486

Columbia Data Products
(301) 992-3400
Circle 487

Compaq Computer
(713) 370-7040
Circle 488

Computer Devices
(617) 273-1550
Circle 489

Computer Shop
(617) 661-2670
Circle 490

Computer Transceiver
(201) 261-6800
Circle 491

Corona Data Syst.
(213) 991-1144
Circle 492

Digital Microsyst.
(415) 532-3686
Circle 493

Dynalogic
(613) 226-7013
Circle 494

High Tech.
(801) 262-6495
Circle 495

Jonos
(714) 999-6661
Circle 496

Kaypro
(619) 481-3424
Circle 497

Micro Source
(513) 687-1395
Circle 498

Modular Computer
(305) 974-1380
Circle 499

Osborne Computer
Contact local dealer
Circle 500

Otrona
(303) 444-2274
Circle 501

Peripheral Syst.
(609) 983-7300
Circle 502

Seequa Computer
(301) 268-6650
Circle 503

SKS Computers
(614) 876-8668
Circle 504

Strategic Tech.
(404) 446-0521
Circle 505

Televideo Syst.
(408) 745-7760
Circle 506

Texas Instruments
(214) 995-2011
Circle 507

Toshiba
(714) 730-5000
Circle 508

Briefcase portables

Athena Computer Syst.
(714) 661-2276
Circle 509

Canon USA
(516) 488-6700
Circle 510

Gavilan Computer
(408) 379-8000
Circle 511

Grid Syst.
(415) 961-4800
Circle 512

Informer Computer
(714) 855-3112
Circle 513

Personal Microcomputers
(415) 962-0220
Circle 514

Sharp Electronics
(201) 265-5600
Circle 515

STM Microelectronics
(415) 326-6226
Circle 516

Teleram Communications
(914) 694-9270
Circle 517

Universal Data
(313) 625-0158
Circle 518

Notebook portables

Compal
(213) 652-2263
Circle 519

Convergent Tech.
(408) 732-2310
Circle 520

Datec
(303) 579-0166
Circle 521

Epson America
(213) 539-9140
Circle 522

Micro Office Syst. Tech.
(203) 366-1850
Circle 523

Panasonic
(201) 348-7000
Circle 524

Tandy/Radio Shack
(817) 390-3011
Circle 525

Texas Instruments
(214) 995-2011
Circle 507

Xerox
(203) 329-8700
Circle 526

PRINTERS

Daisywheel printers

BMC USA
(213) 515-6005
Circle 841

Computers Int'l.
(213) 386-3111
Circle 826

Dataproducts
(formerly Integral Data Syst.)
(213) 887-3924
Circle 827

Data Terminals and Communications
(408) 378-1112
Circle 828

Diablo Syst.
(415) 498-7000
Circle 829

Digital Assoc.
(203) 327-9210
Circle 830

Dynax
(213) 260-7121
Circle 831

Facit Data Products
(603) 883-4157
Circle 832

Fujitsu America
(408) 988-8100
Circle 833

Qume
(408) 942-4000
Circle 834

Smith-Corona
(203) 972-1471
Circle 835

Telex Communications
(415) 341-1300
Circle 836

Transtar
(206) 454-9250
Circle 837

Dot-matrix printers

Anacom General
(714) 992-0223
Circle 838

Anadex
(805) 987-9660
Circle 839

Anderson Jacobson
(408) 263-8520
Circle 840

BMC USA
(213) 515-6005
Circle 841

Centronics
(603) 883-0111
Circle 842

Dataproducts
(213) 887-3924
Circle 827

Datasouth
(704) 523-8500
Circle 843

Diablo Syst.
(415) 498-7000
Circle 829

Digital Matrix
(formerly Hi-G)
(203) 242-3048
Circle 844

Eaton Printer Products
(414) 261-4070
Circle 845

Envision
(408) 946-9755
Circle 846

Epson America
(213) 373-9511
Circle 847

Facit Data Products
(603) 883-4157
Circle 832

Fujitsu America
(408) 988-8100
Circle 833

Genicom
(703) 949-1188
Circle 848

Infoscribe
(714) 641-8595
Circle 849

Lear Siegler
(714) 774-1010
Circle 850

Mannesmann Tally
(206) 251-5524
Circle 851

MPI
(801) 263-3081
Circle 852

NCR
Contact local sales office
Circle 854

NEC
(617) 264-8000
Circle 853

Okidata
(609) 235-2600
Circle 855

Panasonic
(201) 348-5337
Circle 856

Practical Automation
(203) 929-5381
Circle 857

Printacolor
(404) 448-2675
Circle 858

Printek
(616) 925-3200
Circle 859

Printronix
(714) 863-1900
Circle 860

Qantex
(516) 582-6060
Circle 861

Siemens
(714) 991-9700
Circle 862

Smith-Corona
(203) 972-1471
Circle 835

Star Micronics
(214) 456-0052
Circle 529

Teletype
(312) 982-2000
Circle 528

Transtar
(206) 454-9250
Circle 837

Belt, thimble, ink-jet, other printers

Diablo Syst.
(415) 498-7000
Circle 829

NCR
Contact local sales office
Circle 854

NEC
(617) 264-8000
Circle 853

Teletype
(312) 982-2000
Circle 528

SOURCES OF SUPPLY

PLOTTERS FOR PERSONAL COMPUTERS

Alpha Merics
(213) 709-1155
Circle 200

Amdek
(312) 364-1180
Circle 201

BMC USA
(213) 515-6005
Circle 202

Calcomp
(714) 821-2011
Circle 203

Envision
(408) 946-9755
Circle 204

Houston Instrument
(512) 835-0900
Circle 205

Hewlett-Packard
Contact local sales office
Circle 206

IBM
Contact local sales office
Circle 207

Mannesmann Tally
(206) 251-5524
Circle 208

Nicolet Zeta
(415) 671-0600
Circle 209

Panasonic
(201) 348-5337
Circle 210

Strobe
(415) 969-5130
Circle 211

Tektronix
(503) 627-7111
Circle 212

Western Graphtec (formerly Watanabe Instruments)
(714) 770-6010
Circle 214

Yokowaga
(404) 253-7000
Circle 215

CRTS FOR PERSONAL COMPUTERS

Amdek
(312) 364-1180
Circle 245

BMC USA
(213) 515-6005
Circle 246

CIE Terminals
(714) 660-1421
Circle 247

DEC
(617) 897-5111
Circle 248

Electrohome Electronics
(519) 744-7111
Circle 249

IBM
Contact local sales office
Circle 250

Ithaca Intersyst.
(607) 273-2500
Circle 251

Panasonic
(201) 348-5337
Circle 252

Princeton Graphics
(609) 683-1660
Circle 253

Qume
(408) 942-4000
Circle 254

Sakata USA
(312) 593-3211
Circle 255

USI
(415) 468-4900
Circle 256

Zenith Data Syst.
(312) 391-8860
Circle 257

INDEPENDENT SOURCES OF DISK DRIVES

Canon USA
(516) 488-6700
Circle 258

CMC Int'l.
(206) 885-1600
Circle 259

Comrex Int'l.
(213) 373-0280
Circle 260

Corvus Syst.
(408) 946-7700
Circle 261

Data Tech.
(408) 496-0434
Circle 262

Davong Syst
(408) 734-4900
Circle 263

Floppy Disk Svcs.
(609) 799-4440
Circle 264

Mountain Computer
(408) 438-6650
Circle 265

Pegasus
(312) 884-7272
Circle 266

Sysgen
(415) 490-6770
Circle 267

Tallgrass Tech.
(913) 492-6002
Circle 268

Tandon
(213) 993-6644
Circle 269

Xidex
(415) 964-4652
Circle 270

PERSONAL-COMPUTER ACCESSORIES

Anti-static protection

ACL
(312) 981-9212
Circle 311

Bemis
(612) 340-6307
Circle 312

Computer Coverup
(312) 520-3350
Circle 313

EPD
(617) 890-2518
Circle 314

Hollander Office Products
(805) 525-2158
Circle 315

Ludlow Composites
(419) 332-5531
Circle 316

Omnium
(612) 430-2060
Circle 317

3M/Static Control Syst.
(612) 733-1110
Circle 354

United Tech. Products
(617) 326-7611
Circle 355

Hardware security

Anchor Pad Int'l.
(213) 306-3881
Circle 356

Aztec Electronics
(714) 554-1730
Circle 357

Computerized Mfg. Consultants
(312) 940-0010
Circle 358

Continental Engineering Group
(213) 350-8371
Circle 359

Corde Locking Syst.
(212) 782-8001
Circle 360

Data-Mate
(603) 882-5142
Circle 361

Enigma
(416) 259-5401
Circle 362

Fire King Int'l.
(812) 948-8400
Circle 363

IBM/SSD
(201) 329-3978
Circle 364

MPPi
(312) 998-8402
Circle 365

National Product Mktg.
(404) 351-2902
Circle 366

Omni Tech
(414) 784-4178
Circle 367

Trace Syst.
(415) 964-3115
Circle 459

Software security

Advanced Computer Security Concepts
(703) 354-0985
Circle 460

Computer Tech.
(619) 453-0303
Circle 461

Cryptext
(206) 364-8585
Circle 462

Enigma
(416) 259-5401
Circle 362

Fire King Int'l.
(812) 948-8400
Circle 363

Int'l. Anasazi
(714) 771-7250
Circle 463

Merritt Software
(501) 442-0914
Circle 464

MPPi
(312) 998-8402
Circle 465

Okiok Data Ltd.
(514) 681-1681
Circle 466

Picotronics
(602) 624-8771
Circle 467

Sophco
(303) 444-1542
Circle 468

Ven-Tel
(408) 727-5721
Circle 469

SUPERCHARGERS

Buffers

Interactive Structures
(215) 667-1713
Circle 782

Microtek
(619) 569-0900
Circle 783

MPC Peripherals
(619) 578-9222
Circle 784

Orange Micro
(714) 779-2772
Circle 785

Practical Peripherals
(213) 991-8200
Circle 786

Quadram
(404) 923-6666
Circle 787

Memory boards

Compupro Syst.
(415) 786-0909
Circle 788

Data Tech.
(415) 638-1206
Circle 789

Gimix
(312) 927-5510
Circle 790

Microsoft
(206) 828-8080
Circle 791

Microtek
(619) 569-0900
Circle 783

Mountain Computer
(408) 438-6650
Circle 792

MPC Peripherals
(619) 578-9222
Circle 784

Quadram
(404) 923-6666
Circle 787

R.H. Electronics
(805) 688-2047
Circle 793

Seattle Computer Products
(206) 575-1830
Circle 794

Smoke Signal
(213) 889-9340
Circle 795

SSM Microcomputer
(408) 946-7400
Circle 796

Tecmar
(216) 349-0600
Circle 797

Vista
(714) 953-0523
Circle 798

Miscellaneous

Advanced Logic Syst.
(415) 964-5670
Circle 799

Data Tech.
(415) 638-1206
Circle 800

Davong Syst.
(408) 734-4900
Circle 213

Decmation
(408) 980-1678
Circle 703

Hercules Tech.
(415) 540-6000
Circle 304

Ide Assoc.
(617) 275-4430
Circle 305

Interphase
(214) 350-9000
Circle 307

Microsoft
(206) 828-3080
Circle 791

PC Plus Products
(408) 945-8711
Circle 309

Persyst Products
(714) 859-8871
Circle 310

Quadram
(404) 923-6666
Circle 787

Tecmar
(216) 349-0600
Circle 797

Vista
(714) 953-0523
Circle 798

NETWORKS FOR PERSONAL COMPUTERS

Apple Computer
(408) 996-1010
Circle 271

Bridge Communications
(408) 446-2981
Circle 686

Corvus Syst.
(408) 946-7700
Circle 272

Datapoint
(512) 699-7000
Circle 273

Digital Microsyst.
(415) 532-3686
Circle 274

Fox Research
(513) 433-2238
Circle 275

GE Intersil
(408) 743-4300
Circle 687

Metapath
(415) 345-7700
Circle 276

Mohawk Data Sciences
(201) 540-9080
Circle 277

Nestar Syst.
(415) 493-2223
Circle 278

Novell
(801) 226-8202
Circle 279

Orchid Tech.
(415) 490-8586
Circle 280

Percom Data
(214) 340-5800
Circle 281

Santa Clara Syst.
(408) 287-4640
Circle 282

Stearns Computer Syst.
(612) 936-2000
Circle 283

Systech
(619) 695-3420
Circle 284

Sytek
(415) 966-7330
Circle 306

Televideo Syst.
(408) 745-7760
Circle 286

3Com
(415) 961-9602
Circle 285

Ungermann-Bass
(408) 496-0111
Circle 688

Western Digital Industries
(707) 795-8574
Circle 287

Xerox
Contact local sales office
Circle 288

MODEMS FOR PERSONAL COMPUTERS

Anchor Automation
(213) 997-6493
Circle 289

Bizcomp
(408) 745-1616
Circle 290

Cermetek
(408) 734-8150
Circle 291

Emtrol
(717) 291-1116
Circle 292

Datec
(919) 929-2135
Circle 293

DEC
(617) 897-5111
Circle 294

Hayes Microcomputer Products
(404) 449-8791
Circle 295

Lexicon
(305) 792-4400
Circle 296

MFJ Enterprises
(601) 323-5869
Circle 297

Multi-Tech Syst.
(612) 631-3550
Circle 298

NEC Home Electronics (USA)
(312) 228-5900
Circle 299

Prentice
(408) 734-9810
Circle 320

Sharp Electronics
(201) 265-5600
Circle 300

Racal-Vadic
(408) 744-0810
Circle 684

Rixon
(301) 622-2121
Circle 301

Universal Data Syst.
(205) 837-8100
Circle 302

U.S. Robotics
(312) 733-0497
Circle 303

Ven-Tel
(408) 727-5721
Circle 685

SOURCES OF SUPPLY

POWER PROTECTION

UPS

BITS Power Syst.
(214) 340-1208
Circle 863

Computer Power
(201) 735-8000
Circle 864

Cuesta Syst.
(805) 541-4160
Circle 865

Dorlen Products
(414) 282-4840
Circle 216

EPD
(617) 890-2518
Circle 217

General Power Syst.
(714) 956-9321
Circle 218

Gould
(619) 291-4211
Circle 219

Innovations in Control
(408) 298-7218
Circle 220

Sola Electric
(312) 439-2000
Circle 866

Sun Research
(603) 859-7110
Circle 867

Topaz
(619) 279-0831
Circle 221

Transwestern Products
(408) 279-2544
Circle 222

Power-line protection

ADC/Magnetic Controls
(612) 835-6800
Circle 223

Amtek Syst.
(214) 238-5300
Circle 868

Brooks Mktg.
(215) 244-1264
Circle 224

Computer Accessories
(619) 695-3773
Circle 225

Computer Mate
(214) 669-9370
Circle 226

Computer Power
(213) 515-6566
Circle 227

Computer Power Solutions
(813) 544-8801
Circle 869

Dymarc Industries
(301) 298-9626
Circle 228

Electrolert
(513) 667-2461
Circle 229

Electronic Specialists
(617) 655-1532
Circle 230

EPD
(617) 890-2518
Circle 217

Exlin
(619) 571-3134
Circle 870

Gould
(619) 291-4211
Circle 219

Inmac
(408) 727-1970
Circle 871

Kensington Microware
(212) 486-7707
Circle 231

Misco
(201) 780-9299
Circle 232

Networx
(212) 821-7555
Circle 233

Oneac
(312) 295-2800
Circle 234

Panamax
(415) 472-5547
Circle 235

Perma Power Electronics
(312) 763-0763
Circle 236

PMC Industries
(619) 695-3520
Circle 237

Power Unity Electronics
(714) 566-3893
Circle 872

PTI Industries
(408) 429-6881
Circle 238

RKS Industries
(408) 438-5700
Circle 239

Ron Berns & Assoc.
(312) 527-2800
Circle 873

Saft America
(602) 279-0831
Circle 244

Sutton Designs
(607) 277-4301
Circle 874

Topaz
(619) 279-0831
Circle 221

Transtector Syst.
(208) 773-1521
Circle 875

Ultima Electronics
(516) 752-0144
Circle 240

Winders & Geist
(402) 474-3400
Circle 241

Power-line monitors

BMI
(415) 570-5355
Circle 242

EPD
(617) 890-2518
Circle 217

Replacement power supplies

Alliance Research
(818) 701-5848
Circle 243

Standby power

General Power Syst.
(714) 956-9321
Circle 218

Kalgo Electronics
(215) 837-0700
Circle 876

Misco
(201) 780-9299
Circle 232

Panamax
(415) 472-5547
Circle 235

PTI Industries
(408) 429-6881
Circle 238

Saft America
(602) 279-0831
Circle 244

Sun Research
(603) 859-7110
Circle 876

Topaz
(619) 279-0831
Circle 221

ALTERNATIVES TO MICROS

Large-system personal computing

Basic Computer Svcs.
(312) 748-7290
Circle 771

Chicago-Soft
(312) 528-0841
Circle 772

Computer Concepts
(913) 541-0900
Circle 773

Data General
(617) 366-8911
Circle 774

Data Retrieval
(414) 355-5900
Circle 775

Hourglass Syst.
(312) 690-1855
Circle 776

Logicraft
(603) 888-4448
Circle 777

Mega Group
(714) 474-0800
Circle 778

Plessey Peripherals
(714) 540-9945
Circle 779

Raytheon Data Syst.
(617) 762-6700
Circle 780

Virtual Microsyst.
(415) 841-9594
Circle 781

Word-processor/ terminal enhancements

Advanced Software
(305) 276-5080
Circle 579

Braegen
(408) 945-1900
Circle 580

Burroughs
(313) 972-7000
Circle 581

Carterfone Communications
(214) 630-9700
Circle 582

CPT
(612) 937-8000
Circle 583

Data Tech. Syst.
(415) 638-1206
Circle 584

DEC
(617) 879-5111
Circle 585

Exxon Office Syst.
(203) 329-5000
Circle 586

IBM
Contact local sales office
Circle 587

Lanier Business Products
(404) 329-8000
Circle 588

Lee Data
(612) 828-0300
Circle 589

Memorex
(408) 996-9000
Circle 590

Mohawk Data Sciences
(201) 540-9080
Circle 591

NBI
(404) 444-5710
Circle 592

Olympia USA
(201) 722-7000
Circle 593

Personal Micro Computers
(415) 962-0224
Circle 594

Phaze Information Machines
(602) 991-6855
Circle 595

Philips Information Syst.
(214) 386-5580
Circle 596

Solaris Computer
(408) 244-6214
Circle 597

Sony
(201) 930-1000
Circle 598

Sperry
(215) 542-4011
Circle 599

Systar
(408) 280-7066
Circle 600

Systel Computers
(408) 262-3999
Circle 601

Teleface
(212) 477-6802
Circle 602

Telex Computer
(918) 627-1111
Circle 603

SOURCES OF SUPPLY

ALTERNATIVES TO MICROS

Word-processor/ terminal enhancements

3R Computers
(617) 435-6872
Circle 604

Veritas Tech.
(408) 263-0646
Circle 605

Wang Labs.
(617) 459-5000
Circle 606

Wordtronix
(612) 941-0400
Circle 607

COMPUTER-SUPPORT FURNITURE

Adjustable furniture

Atlantic Data
(813) 879-3504
Circle 318

Biotec Syst.
(513) 874-9498
Circle 319

Dennison Monarch
(914) 562-3100
Circle 321

Devoke
(408) 980-1366
Circle 322

Eagle Computer Furniture Syst.
(215) 252-2220
Circle 323

Haworth
(616) 392-5961
Circle 324

JB Engineering
(213) 442-3444
Circle 325

Krueger
(414) 468-8100
Circle 326

LSI/Burroughs
(616) 342-0161
Circle 327

Maine Mfg.
(603) 882-5142
Circle 328

Steelcase
(616) 247-2710
Circle 329

Structural Concepts
(616) 846-3300
Circle 330

Tab Products
(415) 852-2400
Circle 331

Tiffany Stand and Furniture
(314) 991-1700
Circle 332

Versatec
(813) 251-2431
Circle 333

Westinghouse
(616) 949-1050
Circle 334

Fixed furniture

Atlantic Data
(813) 879-3504
Circle 318

Biotec Syst.
(513) 874-9498
Circle 319

Constellation Furniture
(616) 983-7740
Circle 337

Decar
(608) 836-1911
Circle 338

Delco Assoc.
(203) 661-5101
Circle 339

Hamilton Sorter
(513) 874-9498
Circle 340

Haworth
(616) 392-5961
Circle 324

SOURCES OF SUPPLY

COMPUTER-SUPPORT FURNITURE

Luxor
(312) 244-1800
Circle 341

M&M Industries
(312) 766-8306
Circle 342

Stantron
(213) 875-0800
Circle 343

Stor-wel Syst.
(213) 846-1464
Circle 344

Tiffany Stand and Furniture
(314) 991-1700
Circle 332

Trimm Industries
(213) 875-2830
Circle 345

Westinghouse
(616) 949-1050
Circle 334

Williams & Foltz
(415) 644-2022
Circle 350

Turntables and conversion units

Biotec Syst.
(513) 874-9498
Circle 319

Business Efficiency Aids
(312) 673-0520
Circle 346

Hamilton Sorter
(513) 874-9498
Circle 347

Mead-Hatcher
(716) 877-1185
Circle 348

Pentek Products
(717) 724-2554
Circle 349

Tiffany Stand and Furniture
(314) 991-1700
Circle 332

Chairs

All-Steel
(312) 859-2600
Circle 351

Decar
(608) 836-1911
Circle 338

Delco Assoc.
(203) 661-5101
Circle 339

Group 12
(612) 890-9163
Circle 352

Haworth
(616) 392-5961
Circle 324

Krueger
(414) 468-8100
Circle 326

Litton Business Furniture
(404) 939-4115
Circle 353

Westinghouse
(616) 949-1050
Circle 334

TRAINING

Classes

American Training Int'l.
(213) 546-4725
Circle 470

Compubiz
(213) 430-7226
Circle 471

Computers Simplified
(415) 339-3392
Circle 472

Computer Syst. Research
(203) 678-1212
Circle 473

Institute for Professional Education
(703) 527-8700
Circle 474

Know How
(415) 986-8600
Circle 477

NTS
(213) 394-7685
Circle 478

SoftwareBanc
(617) 641-1241
Circle 479

Software

Advanced Syst.
(312) 981-4260
Circle 532

Cdex
(415) 964-7600
Circle 533

CMA Micro Computer
(619) 365-9718
Circle 534

Computer Syst. Research
(203) 678-1212
Circle 473

Comshare
(313) 987-4000
Circle 535

Control Data
(212) 371-2200
Circle 536

Datascan
(213) 452-9114
Circle 537

Micro Courseware
(415) 751-5223
Circle 538

Softech Microsyst.
(619) 451-1230
Circle 539

Video disks

Computer Tech. Group
(312) 987-4000
Circle 480

Deltak Microsyst.
(312) 369-3000
Circle 481

Educational Dimensions
(203) 327-4612
Circle 482

JAM
(716) 232-5500
Circle 476

Understanding Personal Computers
(415) 494-3737
Circle 483

Video and audio tapes

Fliptrack Learning Syst.
(312) 790-1117
Circle 527

Micro Learning Concepts
(212) 687-0066
Circle 530

McGraw-Hill Education Center
(202) 244-1600
Circle 531

BUSINESS SOFTWARE

Spreadsheets

Artsci
(213) 985-2922
Circle 540

Chang Labs.
(408) 246-8020
Circle 541

Computer Mktg.
(609) 795-9480
Circle 542

Comshare Target
(313) 994-4800
Circle 801

Context Mgt. Syst.
(213) 378-8277
Circle 802

Digital Mktg.
(415) 938-2880
Circle 803

Executec/Starsoft
(415) 965-8000
Circle 804

Horizon Software Syst.
(415) 543-1199
Circle 805

Hourglass Syst.
(312) 690-1855
Circle 806

Information Unltd.
(415) 331-6700
Circle 807

I.S.A. Software
(214) 960-6696
Circle 808

Lifeboat Assoc.
(212) 860-0300
Circle 809

Logic Extension Resources
(714) 980-0046
Circle 810

Micropro Int'l.
(415) 499-1200
Circle 811

Microsoft
(206) 828-8080
Circle 812

Peachtree Software
(404) 239-3000
Circle 813

Perfect Software
(415) 644-3001
Circle 814

Phase One Syst.
(415) 562-8085
Circle 815

Software Arts
(617) 237-4000
Circle 816

Software Product
(619) 450-1526
Circle 817

Software Toolworks
(213) 986-4885
Circle 818

Sorcim
(408) 942-1727
Circle 819

Supersoft
(217) 359-2112
Circle 820

T/Maker
(415) 326-6103
Circle 821

University Computing
(214) 353-7100
Circle 822

Videx
(503) 758-0521
Circle 823

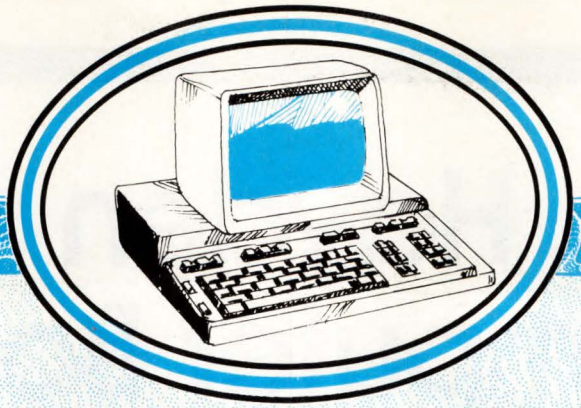
Visicorp
(408) 946-9000
Circle 824

Westico
(203) 853-6880
Circle 825

DBMSs

ABW
(313) 971-9364
Circle 368

American Planning
(703) 751-0451
Circle 369



Need Extra Copies
of the
Corporate Executives' Guide To Personal Computing

Do you need additional copies of this Guide for your organization?

Here's how to order . . .

Fill out the coupon below and enclose check or money order for the correct amount. 1 to 10 copies $4 each plus $1 each for postage and handling $5 each

More than 10 copies $4 each plus $.50 each for postage and handling.

Send to: Box G, Computer Decisions,
10 Mulholland Dr.,
Hasbrouck Heights, NJ 07604

Please pass this extra coupon along to a colleague.

Please send me ____ copies of the Corporate Executives' Guide to Personal Computing. I'm enclosing $ _____ to cover costs.

Name _____

Title _____

Company _____

Street _____

City _____ State _____ Zip _____

Please send me ____ copies of the Corporate Executives' Guide to Personal Computing. I'm enclosing $ _____ to cover costs.

Name _____

Title _____

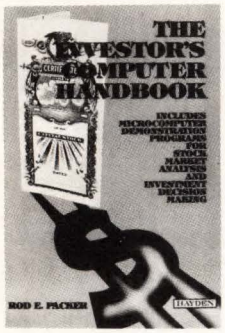
Company _____

Street _____

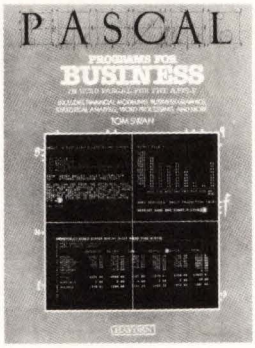
City _____ State _____ Zip _____

Data Base Management for the Apple™ (Wadsworth)
Explains the basics of storing and organizing information on your Apple II Plus or Apple IIe home computer. Using DATA BASE as an example, the book shows how these techniques can simplify household chores such as checkbook balancing, organizing appointments, tracking investment portfolios, and more.
#6282, $12.95

Business Program Portfolio: An Integrated Office System for the Osborne 1 and Executive Computer (Hildebrand)
A valuable library of 62 work-saving programs for the professional. These programs help keep office records in shape while eliminating much of the drudgery and paperwork of the daily routine. The interactive disk-based programs cover interest calculation, financial analysis, depreciation, property management, real estate, cash receipts and disbursements, job cost, payroll, and much more.
#6301, $15.95



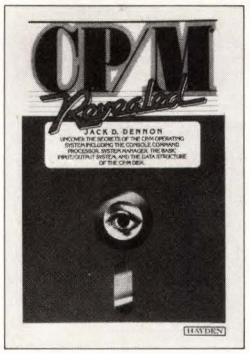
The Investor's Computer Handbook (Packer)
A valuable guide to help you manage your investments better using your micro. NO PREVIOUS MICROCOMPUTER EXPERIENCE IS NEEDED. Offers advice on choosing the system best suited to your particular investment applications, including a list of required and recommended components and information on hardware, software, peripherals. The programs and principles transfer easily to other dynamic markets and portfolios, such as commodity futures and options, bonds, and treasury bills. **#5203, $12.95**



Pascal Programs for Business (Swan)
Contains an excellent library of Pascal programs, including word-processing programs that sort, merge, edit, tabulate, encode, and print out letters and reports. Also includes an electronic spreadsheet that is easily updated and greatly simplifies financial planning and forecasting. **#6270, $16.95**

Business Programs for the IBM® PC (Hildebrand)
Presents 62 time-saving business programs for your IBM PC. Programs include interest calculation, financial analysis, job cost, payroll, and depreciation. All are thoroughly documented for easy use. Also shows you how to set up your computer to take advantage of standard forms, create a menu to keep track of your program access, and more. **#6351, $15.95**

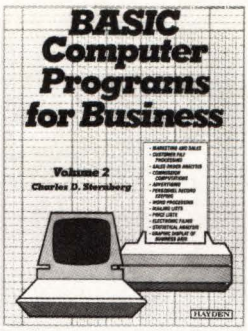
Pascal Programs for Data Base Management (Swan)
One of the most practical, comprehensive treatments of data base management on microcomputers available. Contains *pdbs* (Pascal Data Base System), a suite of more than 35 short, UCSD-compatible Apple Pascal programs for creating, reformatting, updating, storing, searching, sorting, and reporting a relational data base. **#6272, $16.95**



CP/M® Revealed (Dennon)
Explore and master the full potential of CP/M, the most popular operating system for microcomputers. The author breaks down the technical aspects of CP/M into step-by-step explanations. He clearly describes the data structure of the CP/M disk. Booting up, logging in, changing memory size, mapping disk space, calling programs, and interfacing are explained to help you use CP/M more effectively.
#5204, $15.95

Getting Started with CP/M® (Patten and Calandrino)
Introduces you to CP/M-80. Explains how it operates and describes the structure and function of its commands. Answers questions on handling diskettes, storing and transferring information, creating and naming files, reacting to error messages, and using specific command structures and options. With manufacturers now offering CP/M as a standard software component, this is a vital timely guide.
#5208, $12.95

BASIC Computer Programs for Business, Vols. 1 and 2 (Sternberg)
Get your micro up and running as soon as it enters your office. These two volumes contain over 100 programs essential to the success of your business. There are programs to simplify bookkeeping, maintain accurate financial records, produce instant marketing/sales analysis, organize your daily office routine, and much more. Each program is documented with a description of its function and operation.
Volume 1 #5162, $14.95
Volume 2 #5178, $15.95



ORDER BY PHONE
1-800-631-0856
In NJ call
(201) 393-6315

MAIL TO:
Hayden Book Company
Dept. CBM4
10 Mulholland Drive
Hasbrouck Heights, NJ 07604

Please send me the book(s) indicated below by code number. If I am not completely satisfied, I may return the book(s) undamaged within 10 days for a complete refund.

I am enclosing $2.00 to cover postage and handling.
☐ Enclosed is my check or money order.
Bill my ☐ Visa ☐ MasterCard

NAME

ADDRESS

CITY

STATE/ZIP

VISA/MASTERCARD #

EXPIRES

SIGNATURE

Residents of NJ and CA must add sales tax. Prices subject to change.

SOURCES OF SUPPLY

BUSINESS SOFTWARE

DBMSs

Applied Software Tech.
(408) 370-2660
Circle 370

Ashton-Tate
(213) 204-5570
Circle 371

Avant-Garde Creations
(503) 345-3043
Circle 372

B&B Software
(313) 668-8152
Circle 373

Chang Labs.
(408) 246-8020
Circle 374

Compumax
(415) 854-6700
Circle 375

Condor Computer
(313) 769-3988
Circle 376

CRS Assoc.
(215) 629-5756
Circle 377

DJR Assoc.
(914) 631-6766
Circle 378

Dravac Ltd.
(201) 337-8350
Circle 379

Excalibur Tech.
(505) 842-5421
Circle 380

Friends Software
(415) 540-7280
Circle 381

GMS Syst.
(212) 947-3590
Circle 382

High Tech.
(405) 478-2105
Circle 383

Information Builders
(212) 736-4433
Circle 384

Information Unltd.
(415) 331-6700
Circle 385

Innovative Software
(913) 383-1089
Circle 386

Insoft
(503) 244-4181
Circle 387

ISE
(312) 981-9200
Circle 388

LJK Enterprises
(314) 846-6124
Circle 389

Micro-Ap
(415) 828-6697
Circle 390

Micro Applications Group
(213) 700-1426
Circle 391

Micro Architect
(617) 643-4713
Circle 392

Micro Data Base
(317) 448-1616
Circle 393

Micro Decisionware
(303) 443-2706
Circle 394

Micropro Int'l.
(415) 499-1200
Circle 395

Microrim
(206) 453-6017
Circle 396

O'Hanlon Computer
(206) 454-2261
Circle 397

Pacific Software Mfg.
(415) 540-0616
Circle 398

Pascal Syst.
(415) 321-0761
Circle 399

Pearlsoft
(503) 363-8929
Circle 400

Phase One Syst.
(415) 562-8085
Circle 401

Programming Tech.
(415) 331-5600
Circle 402

Quanteckna Research
(206) 364-6940
Circle 403

Readers Digest
(914) 769-7000
Circle 404

Science Mgt.
(201) 685-9000
Circle 405

Sensor-based Syst.
(507) 867-4440
Circle 406

Sierra On-Line
(209) 683-6858
Circle 407

Silicon Valley Syst.
(415) 593-4344
Circle 408

Small Computer
(201) 445-5643
Circle 409

Software Automation
(214) 392-2802
Circle 410

Software Publishing
(415) 962-8910
Circle 411

Software Tech. for Computers
(617) 923-4334
Circle 412

Stoneware
(415) 454-6500
Circle 413

Structured Syst. Group
(415) 547-1567
Circle 414

Super Soft Assoc.
(217) 359-2112
Circle 415

Tamarack Software
(406) 821-4596
Circle 416

Threshold Software
(916) 920-8189
Circle 417

Tominy
(513) 984-6605
Circle 418

Westware
(503) 881-1477
Circle 419

Xor
(612) 938-3005
Circle 420

Communications

ABT Microcomputer Software
(617) 492-7100
Circle 608

Alpha Software
(617) 229-2924
Circle 609

American Datacom
(714) 863-3000
Circle 610

Cygnet Tech.
(408) 734-9946
Circle 611

Compuserve
(614) 457-8650
Circle 612

Dow Jones
(609) 452-1511
Circle 613

Genasys
(301) 770-4000
Circle 614

Informatics General
(818) 716-1616
Circle 615

Intelligent Tech.
(415) 328-2411
Circle 616

Lifeboat Assoc.
(212) 860-0300
Circle 617

Link Syst.
(213) 453-1851
Circle 618

MFJ Enterprises
(601) 323-5869
Circle 619

Microcom
(617) 762-9310
Circle 620

Microstuf
(404) 952-0267
Circle 621

Microsyst. Software
(305) 983-3390
Circle 683

Mountain Computer
(408) 438-6650
Circle 623

Peachtree Software
(404) 239-3000
Circle 624

Perfect Software
(415) 974-6661
Circle 625

Software Connections
(408) 988-3704
Circle 626

Southeastern Software
(504) 246-7937
Circle 627

Southwestern Data Syst.
(714) 562-3670
Circle 628

SSM Microcomputer Products
(408) 946-7400
Circle 629

Supersoft Assoc.
(217) 359-2112
Circle 630

TNW
(619) 296-2115
Circle 631

U.S. Robotics
(312) 346-5650
Circle 632

Visicorp
(408) 946-9000
Circle 633

Westico
(203) 853-6880
Circle 634

Word processing

AB Computers
(215) 822-7727
Circle 635

Advanced Operating Syst.
(317) 298-5400
Circle 636

Applied Microcomputer Syst.
(603) 367-8004
Circle 637

Applied Research & Consulting
(303) 667-7936
Circle 638

Artsci
(213) 985-2922
Circle 639

Batteries Included
(416) 596-1405
Circle 640

Beaman Porter
(914) 967-3504
Circle 641

Broderbund Software
(415) 456-6424
Circle 642

Bruce & James
(617) 766-0110
Circle 643

Charles Mann & Assoc.
(714) 365-9718
Circle 644

Computer Mktg. Svcs.
(609) 795-9480
Circle 645

Compuview Products
(313) 996-1299
Circle 646

Datamost
(213) 709-1202
Circle 647

Designer Software
(713) 520-8221
Circle 648

Friendly Soft
(817) 277-9378
Circle 649

Hayden Software
(617) 937-0200
Circle 650

Human Engineered Software
(415) 468-4110
Circle 651

I.J.G.
(714) 946-5805
Circle 652

BUSINESS SOFTWARE

Information Unltd.
(415) 331-6700
Circle 653

Kensington Microware
(212) 486-7707
Circle 654

Lexisoft
(916) 758-3630
Circle 655

Lifetree Software
(408) 659-3221
Circle 656

LJK Enterprises
(314) 846-6124
Circle 657

Mark of the Unicorn
(617) 489-1387
Circle 658

Mark Software
(415) 326-1971
Circle 659

Metasoft
(602) 836-0268
Circle 660

Micropro Int'l.
(415) 499-1200
Circle 661

Miller Microcomputer Svcs.
(617) 653-6136
Circle 662

Muse Software
(301) 659-7212
Circle 663

Nemco
(201) 933-4933
Circle 664

Norell Data Syst.
(213) 257-2026
Circle 665

Peachtree Software
(404) 239-3000
Circle 666

Perfect Software
(415) 644-3001
Circle 667

Pro Software
(617) 444-5224
Circle 668

Prosoft
(213) 764-3131
Circle 669

Quark
(303) 399-1096
Circle 670

Quick Brown Fox
(212) 925-8290
Circle 671

Racet Computers
(714) 997-4950
Circle 672

Satellite Software Int'l.
(801) 224-8554
Circle 673

Select Information Syst.
(415) 459-4003
Circle 674

Sierra On-Line
(209) 683-6858
Circle 675

Sof/Sys
(612) 929-7104
Circle 676

Software Publishing
(415) 962-8910
Circle 677

Software Toolworks
(213) 986-4885
Circle 678

Sorcim
(408) 942-1727
Circle 679

Structured Syst. Group
(415) 547-1567
Circle 680

Threshold Software
(916) 920-8189
Circle 681

Visicorp
(408) 946-9000
Circle 682

Graphics

Avant Garde
(503) 345-3043
Circle 543

BMC Syst.
(713) 850-0005
Circle 544

Business Planning Syst.
(302) 674-5500
Circle 545

Computer Station
(314) 432-7019
Circle 546

Comshare Target
(313) 994-4800
Circle 547

Creative Software Concepts
(607) 729-5558
Circle 548

Datasoft
(818) 701-5161
Circle 549

Decision Resources
(203) 222-1974
Circle 550

Dickens Data Syst.
(404) 448-6177
Circle 551

Digigraphic Syst.
(612) 935-9111
Circle 552

Digital Research
(408) 649-3896
Circle 553

Eagle Software Publishing
(215) 946-8660
Circle 554

Enercomp
(303) 988-1648
Circle 555

Ferox Microsyst.
(703) 841-0800
Circle 556

Fox & Geller
(201) 794-8883
Circle 557

Funk Software
(617) 497-6339
Circle 558

Graphic Communications
(617) 890-8778
Circle 559

Graphic Software Syst.
(503) 682-1606
Circle 560

Graphware
(513) 424-6733
Circle 561

Hypergraphics
(214) 783-9900
Circle 562

Innovative Software
(913) 383-1089
Circle 563

Intelligent Syst.
(404) 449-5961
Circle 564

Interactive Microware
(814) 238-8294
Circle 565

Kern Publications
(617) 934-0445
Circle 566

Lifeboat Assoc.
(212) 860-0300
Circle 567

Micro Control Syst.
(203) 877-0602
Circle 568

Micro Lab
(312) 433-7550
Circle 569

Peachtree Software
(404) 239-3000
Circle 570

Penguin
(312) 232-1984
Circle 571

Sensible Software
(313) 399-8877
Circle 572

Software Publishing
(415) 962-8910
Circle 573

Starware
(202) 331-8833
Circle 574

Strobe
(415) 969-5130
Circle 575

Supersoft
(217) 359-2112
Circle 576

Visicorp
(408) 946-9000
Circle 577

Wadsworth Publishing
(617) 423-0420
Circle 578

Integrated packages

Alpha Software
(617) 229-2924
Circle 421

Arktronics
(313) 769-7253
Circle 422

Business Solutions
(516) 269-1120
Circle 423

Computer Mktg. Svcs.
(609) 795-9480
Circle 424

Concentric Data
(617) 366-1122
Circle 425

Context Mgt. Syst.
(213) 378-8277
Circle 426

Corvus Syst.
(408) 946-7700
Circle 427

Datamension
(312) 564-5060
Circle 428

Desktop Computer
(404) 448-6177
Circle 429

Executec
(214) 239-8080
Circle 430

Haba Syst.
(213) 901-8828
Circle 431

Human Edge Software
(415) 493-1593
Circle 432

Innovative Software
(913) 383-1089
Circle 433

Lotus Development
(617) 494-1192
Circle 434

Martin Marietta Data
(301) 982-6500
Circle 435

Micro Data Base Syst.
(317) 463-2581
Circle 436

Micro Software Int'l.
(605) 335-7676
Circle 438

Micropro Int'l.
(415) 499-1200
Circle 437

Mosaic Software
(617) 491-2434
Circle 439

Muse Software
(301) 659-7212
Circle 440

North American Business
(314) 432-6106
Circle 441

Ovation Tech.
(617) 821-1420
Circle 442

Peachtree Software
(404) 239-3000
Circle 443

Perfect Software
(415) 527-2626
Circle 444

Prentice-Hall
(201) 592-2000
Circle 445

Quarterdeck Office Syst.
(213) 392-9851
Circle 446

Schuchardt Software
(415) 492-9330
Circle 447

Sensor-based Syst.
(507) 867-4440
Circle 448

Softrend
(603) 898-1777
Circle 449

Software Prod. Int'l.
(619) 450-1526
Circle 450

Software Publishing
(415) 962-8910
Circle 451

Sorcim
(408) 942-1727
Circle 452

Strategic Software Syst.
(714) 476-2842
Circle 453

T/Maker
(415) 962-0195
Circle 454

United Software
(918) 622-4800
Circle 455

Visicorp
(408) 946-9000
Circle 456

WB Syst.
(401) 596-1811
Circle 457

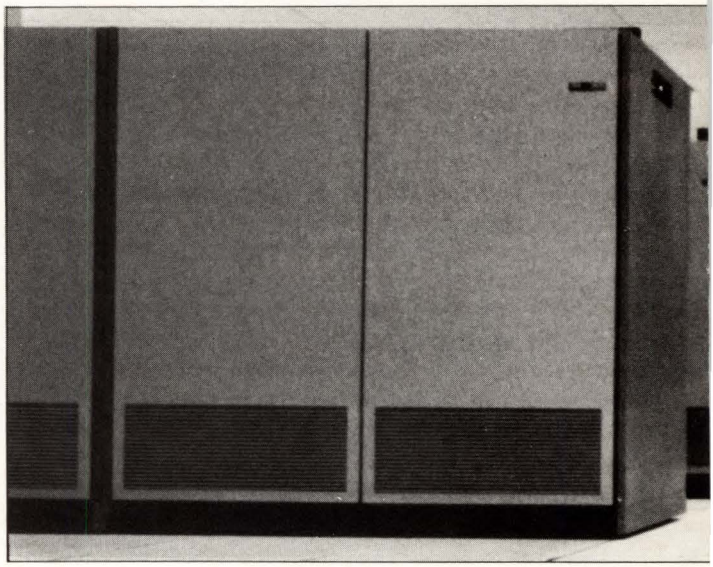
Zetec
(714) 836-3560
Circle 458

Here's how you can:

Identify key prospects

Improve direct mail response

Lower your cost per sale



Take Advantage of Mailing Lists from Hayden

Hayden Direct Marketing Services offers you the most specialized, high quality, flexible lists you can buy in the computer industry—and they are proven responsive!

Now You Can Target Prospects By Manufacturer/Model# On Site

For a little more than 1¢ per name, you can have the option of selecting individual labels by manufacturer and model number. Zero in on only those you want to reach. For example . . . select labels for managers with IBM & Plug Compatibles such as . . .
IBM 3081/303X/4341/4331 • Amdahl 580/470
Or . . . with medium/large mainframes like these . . .
DEC VAX/10/20 series • H-P 3000 • Data General C/350-M/600/MV 8000
And these minicomputers . . . Data General Eclipse/Nova • DEC PDP 8/11 • H-P 250/300/1000 • IBM series 1/3/7/32/34/38
Or micro/personal computers like . . .
Apple II/III • Commodore • Radio Shack
PLUS . . . dozens of others.

Give Your Direct Mail High Impact At Low Cost

Hayden gives you 100% management lists from Computer Decisions subscribers. That means you reach the industry's prime decision makers . . . and the base cost is an amazingly low $55.00/M.

Select These Options Tailored To Your Needs

Job title/function	$5/M
Business/industry	$5/M
5-digit zip, SCF, or state	$5/M
Manufacturer/model number	$20/M
4-up Cheshire labels	no extra charge
Pressure-sensitive labels	$8/M
Total list	160,000 managers
Minimum order	$225.00

HAYDEN DIRECT MARKETING SERVICES

You can test these lists for as little as $225.00. All you have to do is call Hayden Direct Marketing today at (201) 393-6384 or fill out coupon. We'll tell you how you can

Zero in

on your best prospects.

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____

CD-4

Mail today to:
Hayden Direct Marketing Services
10 Mulholland Drive
Hasbrouck Heights, N.J. 07604

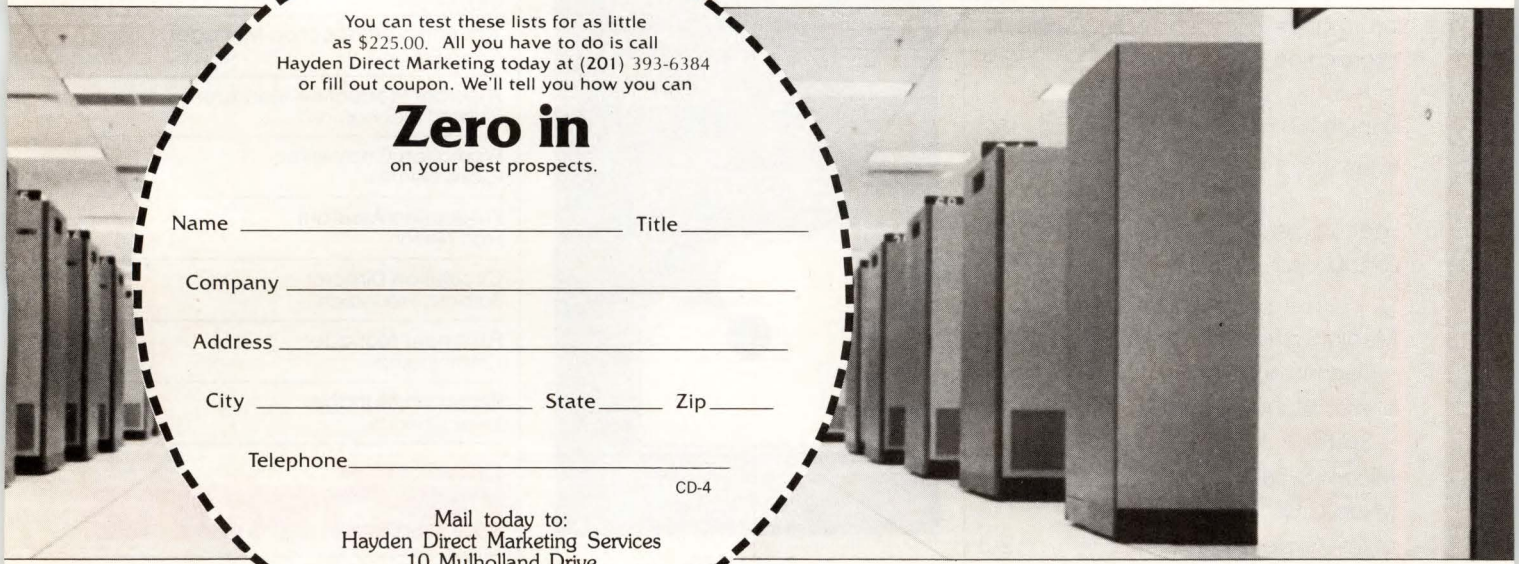


Photo courtesy of McDonnell Douglas Corp.

ADVERTISER INDEX

ADVERTISING OFFICES

Sales Representatives

National Sales Manager
Nick Bubany, 10 Mulholland Drive
Hasbrouck Hts., NJ 07604, (201) 393-6012

Eastern
Joan DeSaulniers, (203) 869-1530
Lori Lippin, (201) 393-6025, (212) 369-6601
Cindy Peyton (914) 368-0148,
(201) 393-6024

Texas/Southwest
Deborah Goldsmith, (214) 239-3457

New England
Chris Dobbrow
231 Boston Post Rd., Suite 2
Wayland, MA 01778, (617) 358-4147

Midwest
Richard Julius, Regional Sales Manager
Hayden Publishing Co., 200 East Ontario
Chicago, IL 60611, (312) 337-0588

Mark Hickey
615 Woodland Lane
Northfield, IL 60093
(312) 337-0588, (312) 446-6893

Orange County/Southwest
Kathleen Kosanovich,
8939 S. Sepulveda Blvd.
Los Angeles, CA 90045 (213) 433-3545
(213) 641-6544-45-47, (201) 393-6021
Jay Leech (714) 492-1641, (201) 393-6021

Los Angeles/Northwest
Denise Sinnott, (213) 289-5425
8939 S. Sepulveda Blvd., Suite 260
Los Angeles, CA 90045
LA Office, (213) 641-6544-45-47

San Francisco
Virginia Pohlman, (415) 332-3075
Heidi Spencer, (415) 788-5119
Cherie LaFrance, (201) 393-6021
Sunnyvale Office, (408) 736-6667

Tokyo
Haruki Hirayama, EMS, Inc.
Cable: EMSINCPERIOD, Tokyo

Recruiting, Supermarket
(201) 393-6027, (201) 393-6028

Publication Staff

Promotion Director
Rayna Gillman

Advertising Production Manager
Craig Balick

Assistant Production Manager
Richard Macnamara

Promotion Copywriter
Claire Nemes

Production Assistant
Fran Nelson

Circulation Director
Barbara Freundlich

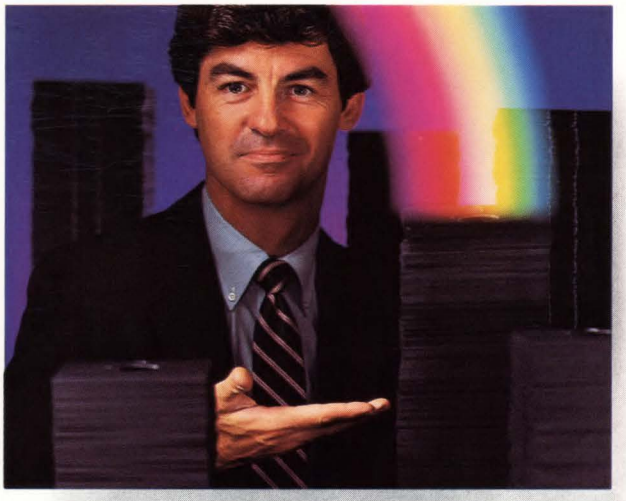
Fulfillment Manager
Cindy Stump

Research Manager
Irene Chervin

COMPUTER DECISIONS

INTRODUCING A NEW CONCEPT IN SOFTWARE DUPLICATION:

FREEDOM OF CHOICE.



Media Systems Technology offers you Freedom of Choice ...If you need to duplicate and distribute software—MST is the company to support you. Hardware systems to automate your production or total software publishing services. MST's systems and services now support all facets of your software manufacturing.

MST, the leading manufacturer of automatic diskette duplication equipment, supplies and supports systems for IBM, DEC, 3M, Apple, Hewlett Packard, Peachtree...

HIGH QUALITY DUPLICATION SYSTEMS

MST manufactures systems for 8", 5.25", and 3.5" media that support every major format. We provide technical expertise in developing formats—under complete non-disclosure. MST's mini computer-based systems automatically duplicate 1000's of diskettes a day with 100% verification. For lower volume requirements, our automatic desktop copiers can duplicate and verify a wide range of formats including Apple, IBM, DEC, HP, to name a few. Designed-in test parameters insure the highest quality for your software product.

TOTAL SOFTWARE MANUFACTURING SUPPORT

MST recognizes many companies prefer to have a third party handle software production. We can provide complete software manufacturing services on the East and West Coast. Duplication, serialization, copy protection, format development, packaging design, documentation printing and product assembly all under complete confidentiality. By MST providing these services, you reduce fixed costs, control distribution, lower inventory, and most importantly, realize rapid turnaround time of a high quality finished software product.

Again, whether your needs are hardware or software publishing services—MST is the company to offer you Freedom of Choice.

Corporate Headquarters
16950 Armstrong Ave., Irvine, CA 92714, (714) 863-1201

East Coast
100 South Street
Hopkinton, MA 01748
(617) 435-5381

MST™
Media Systems Technology, Inc.

CIRCLE 49

Now there are remedies for local networking headaches.

Headache	Remedy
It's too early to make a long-term commitment to baseband or broadband.	Don't make one.
We don't want to get involved with more layers of protocol and more incompatibilities.	You don't have to.
Fiber optic cable and coax are expensive and messy to install.	Use your existing telephone wiring instead.
We're not ready to put in a whole network now.	Install a piece at a time as you're ready.
We already own a good deal of datacomm gear.	Good. Connect it to the new network.
Division/Group DP Managers want control of their own local datacomm.	Give it to them.
We need Gateways:	
• To the switched phone network	• Use dial-in and dial-out. No big deal.
• To Packet Data Networks	• Opt for X.25 compatibility.
• To other local networks.	• Good thought. Use networks that are easy to interconnect.
WE NEED IT FAST!	Put in MICOM's INSTANET™—the *instant* local network.
We don't want to spend an arm and a leg.	That's the best part! Call or send today for literature and a price list.

MICOM®

MICOM SYSTEMS, Inc. • 20151 Nordhoff Street • Chatsworth, CA 91311 • Telephone (213) 998-8844 • TWX 910/494-4910
Regional Sales/Service • Atlanta, GA • (404) 435-2999 • Boston, MA • (617) 527-4010 • Chicago, IL • (312) 789-2430
Dallas, TX • (214) 258-0774 • St. Louis, MO • (314) 576-7626 • Teaneck, NJ • (201) 836-4000
MICOM-BORER Ltd. • Bel Court • 15 Cradock Road • Reading, Berkshire RG20JT, England • (0734) 866801 • Telex 847135

For literature please call: (800) "MICOM U.S."

CIRCLE 50