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MARCH 1984

THE MANAGEMENT MAGAZINE OF COMPUTING

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MARCH 1984

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FEATURES

- 72 PABX: Working with analog, wishing for digital/ John Seaman *Digital PABXs offer snazzy features and benefits, but there's no reason to rush to implement them.*
- 90 Salary-status survey, part II—Benefits: Your hidden pay/ David Whieldon *If you're looking for an easy second income, you may be overlooking the one you're getting now.*
- 98 Meeting the pay-equity challenge/ Mary Miles *Organizations that tip their pay scales in favor of male employees may have to face the larger, more equitable scales of justice.*
- 110 Building up your personal computers, part II—Input devices/ David R. Roman *Micros will now accept pictures and pen marks as input, and spoken words and finger pokes as commands.*
- 132 Shielding computers from power mishaps Part I—Mainframes and minis/ Jennifer E. Beaver *It's your responsibility to ensure against power fluctuations and outages.* Part II—Personal computers/ Martin Lasden *How much should you pay to defend your organization's personal computers against power demons?*
- 164 To raise productivity . . . Work smarter, not harder/ David Kull *New software-development tools are helping companies save dollars by saving effort.*

98



132



164



COLUMNS / DEPARTMENTS

- | | | |
|----------------------------|-------------------------------------|---------------------------------------|
| 10 INSIGHT | 55 DATA COMMUNICATIONS | 68 YOUR CAREER |
| 12 NEWS & COMMENT | <i>Modems</i> | <i>Managing undesirable employees</i> |
| 38 PERSONAL COMPUTING | 63 FOLLOWING THE LEADERS | 192 NEW PRODUCTS |
| <i>Hiring a consultant</i> | <i>Outlook for software vendors</i> | 200 SUPERMARKET |
| 44 SNYDERS ON SOFTWARE | 66 OFFICE AUTOMATION | 200 ADVERTISER INDEX |
| <i>Conversions</i> | <i>Reading OA advertising</i> | COVER PHOTO: Bill Oliwa |

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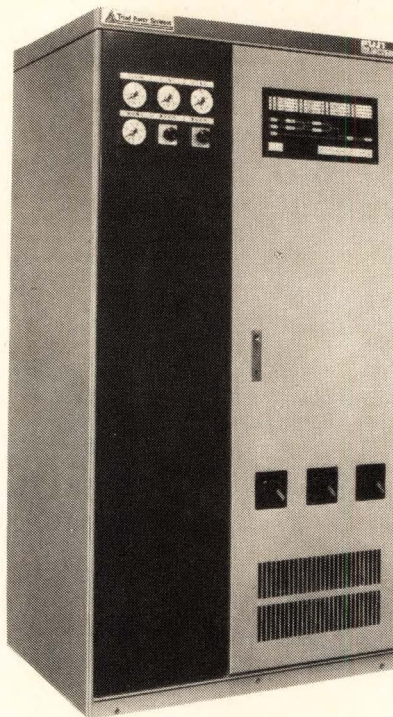
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Headquarters Office
10 Mulholland Dr., Hasbrouck Hts., NJ
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Publisher/Vice President: Don Huber

Editor: Mel Mandell

Managing Editor: Donne Florence

Senior Editor: David Whieldon

Art Director: Bonnie Meyer

Midwestern Editor: Jan Snyders
(815) 838-5280

Microsystems Editor: Susan Foster Bryant
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

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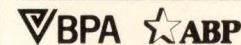
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Orange County/Southwest

Kathleen Kosanovich, Jay Leech
8939 S. Sepulveda Blvd.
Los Angeles, CA 90045
(213) 641-6544-45-47, (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

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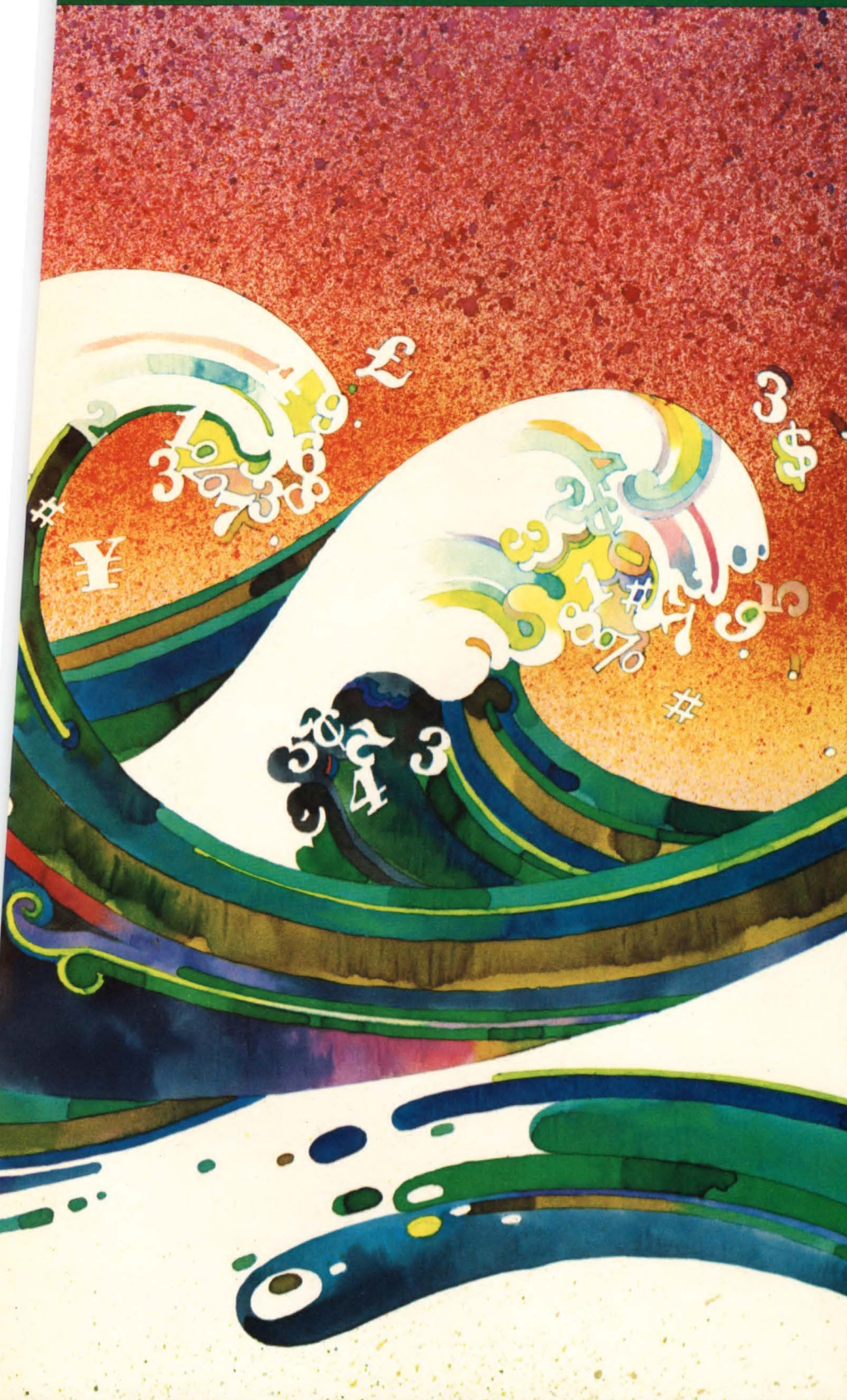
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INSIGHT

Extremes in competition

The Pentagon and the computer industry stand at opposite poles of the continuum of free enterprise. This stance was highlighted by two recent news items.

The first story was the settlement between Apple Computer and clone-maker Franklin Computer. The second news item was the resignation under fire of Deputy Secretary of Defense Paul Thayer for reportedly revealing inside information to very close associates on upcoming acquisitions by the multi-billion dollar, Dallas-based conglomerate he formerly headed, LTV Corp. These alleged improprieties took place prior to his joining the administration. (Thayer, himself, was not accused of benefiting from any illegal insider trading.)

Thayer was well-known around Capitol Hill for questioning the procurement practices of the Defense Department. One practice that raised Thayer's hackles, and which received well-deserved publicity, was the exclusive buying of spare parts for major weapons systems from the original contractor. The most extreme abuses of this practice were the claw hammer priced at \$430 and the small plastic caps that attach to the ends of stool legs costing \$1,086.17 each! Both items are commercially available at standard low competitive prices.

Consider what those amounts could buy on the computer market.



Photo by Bob Ward

Four-hundred thirty dollars would bring in some powerful software, such as one of the new integrated packages that perform word processing, financial projection, and graphics without switching disks.

For \$1,086, one could purchase one of the new book-size portable computers from Casio, Convergent Technologies, Epson, Hewlett-Packard, NEC, Sharp, Tandy, or Texas Instruments, and still have money left over to buy a fancy leather briefcase in which to carry it. (For more details on these useful little devices, see "Go-anywhere computing," in the November 1983 issue of this magazine.)

The \$2.5 million settlement between Apple and Franklin coupled with IBM's current aggressive pursuit of those who reportedly steal its secrets may somewhat dampen com-

petition in the computer industry, but not much. In spite of its agreement to stop using Apple's proprietary operating system in its machine, we have little doubt that Franklin will remain a vigorous competitor.

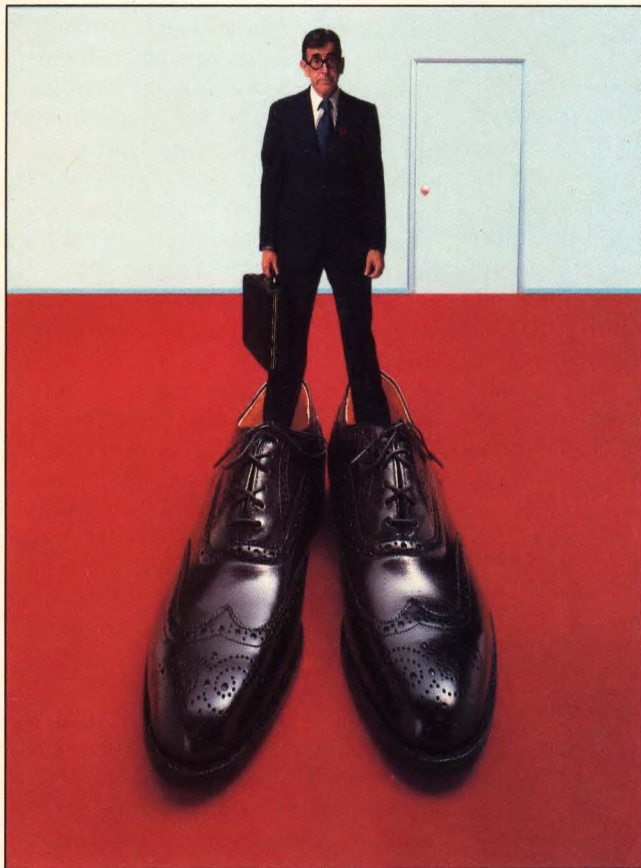
Competitive second sourcing is unknown in weapons systems contracted by the defense department. Having won the bid (sometimes by deliberately underbidding in hopes of recouping losses later), the manufacturer becomes the only source of the system and its spare parts. The Pentagon is considering ending a prime contractor's

right to supply spare parts exclusively after five years. Five years! In the computer industry, the originator of a truly innovative product is lucky if it can hold on to a competitive advantage for five months.

The system for procurement of weapons is past due for a vigorous injection of old-fashioned competition. Everyone would benefit. The defense forces might get systems that really work, especially in wartime conditions. The public could conceivably be taxed less. The administration could certainly chip away at our presently horrendous budget deficit. Remember the comment of the late Senator Everett Dirksen? He said: "Save a billion here and a billion there and after a while it adds up to real money."

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CIRCLE 8

news & comment

The push to standardize Unix

Unix operating systems will be running on everything but the kitchen sink," predicts Jack Scanlon, vice president of computer systems for AT&T Technologies, which sells the original Unix. Scanlon was the keynote speaker at Uniform, the international conference of Unix users attended by more than 3,000 managers in Washington from January 17 to 19.

As Unix spreads, it is giving users more choices. Unlike proprietary software that "locks in" customers, Unix is easily "transported" from one

manufacturer's hardware to another's. The buyer need not be restricted by his original selection of hardware and software. Unix frees users to partake of all technological advances.

CP/M and MS-DOS, the most popular personal-computer operating systems, do not offer the same degree of transportability. Using Unix, a software application written for a desk-top will also run on a mini-computer or mainframe. Another benefit to the end user is that Unix can operate on several generations of hardware.

Unix is a multi-user operating system that enables personal computers to handle a multitude of applications concurrently. Unix machines can be networked, and that's far more cost-efficient than providing each with a full set of peripherals.

Unix was developed by AT&T's Bell Labs in 1969. For its first 15 years, the operating system was taken lightly, almost as a joke, by computer professionals. No one's laughing now. More and more software houses are writing programs for Unix-based systems. The result is a "Unix revolution" that has shaken up hardware manufacturers. More than 100 companies have entered into "Right to Copy" agreements with AT&T Technologies. According to Scanlon, "About 700,000 computers of approximately 70 different types are running Unix."

One of the ironies of Unix's success is that it has taken hold in the midst of a rage over user friendliness. Unix is programmer-friendly, but there has been some question about Unix's user friendliness.

Unix's different versions have caused much confusion. AT&T has committed itself to Unix System V. System V incorporates many of the features of earlier Unix versions, such as a hierarchical file system and a shell (a command-language interpreter that also acts as a programming language). New features are a directory and file security system, enhanced networking capabilities, and communications between functions.

To speed the making of Unix System V into the industry standard AT&T has combined forces with Digital Research, developer of CP/M. Together they are developing a Unix System V applications library for personal computers. Both companies will be selling packages from this library by the end of this year.

Password protection for personals



Concerned that sensitive data stored in your personal computer may be stolen by competitors or fouled up by hackers? Then you may want The Barrier, a gadget that prevents unauthorized access to personal computers over 300- or 1,200-baud dialup asynchronous lines.

Incoming calls will be connected only after The Barrier accepts a user-programmable password of up to 63 characters. After three unsuccessful attempts to access a computer, the connection is automatically broken. The user can also program 63-character-greeting and access-granting messages. List price is \$369. For more information, call International Anasazi Inc. at (714) 771-7250.

Among some of the other announcements made at Uniforum:

- The Wollongong Group, a company that calls itself the Unix authority, has developed a "MetaPort" concept that supports both the native operating system and the Unix system simultaneously on a single host system. Their product, Pegasus, gives VAX users the ability to merge DEC's VMS operating system with Unix.

- Data General increased its UNX/VS with enhancements derived from AT&T's Unix System.

- Access Technology is starting up the Independent Software Information Standard (ISIS). This represents a new standard for exchanging information between Unix applications and is designed to provide Unix users with a superior level of integration.

- Charles River Data Systems announced that its proprietary Unos operating system is compatible with AT&T's Unix. Called UN/System V, it is designed for real-time and run-time applications. The company claims its version runs more rapidly than Unix.

- IBM is offering a Unix operating system on the Personal Computer in cooperation with Interactive Systems. Computer buyers are going to find at least three versions of Unix running on the IBM PC. For instance, VenturCom is offering its package, the Office Unix System, that turns an IBM PC into a Unix-based system, using Venix/86. The Venix/86 includes four editors, a C compiler, Basic, an assembler, and other Unix tools. Unisource is the sole distributor of Venix/86 on the IBM PC.

- UniQ Digital Technologies is offering a Unix system instructional series for administrators, programmers, or anyone else interested in discovering the versatility, productivity, and pow-

er of the Unix operating system. The first session will familiarize the administrator with commands and procedures for managing a Unix system. The second class is designed for the experienced programming professional and will introduce the widely used C language. The first session is scheduled for March 5 through 9; the second, March 12 through 16. Both will meet at UniQ's headquarters in Batavia, IL. The price of a one-week session is \$750. For more information call (312) 879-1566.

Mouse + software for IBM PC



Users of the IBM Personal Computer or compatibles can get a mouse plus word-processing software in a single package. The digital optical mouse is called Optomouse, and the software is appropriately called Blue. Together they cost \$375. From USI Computer Products, they let the user move the cursor without touching the keyboard. Blue can create and manipulate up to eight windows simultaneously. Each window can look into a different document or at a separate portion of the same document. Text can also be moved from

one window to another. The same vendor also combines the mouse with Autocad, a software system for drafting and design. Together they cost \$1,200. The mouse, which has four command buttons, can be purchased separately for \$299. For more information call (415) 468-4900.

One in-house store serves many

Users in far-flung branches of your organization can shop at a single in-house computer store, claims consultant Michael Blum. They can access an electronic bulletin board to purchase hardware and software, learn about new products, and receive education and assistance in personal computing.

Blum has implemented the bulletin-board concept at Peat Marwick Mitchell & Co., the New York-based consultancy from which he operates. Speaking at the company's recent seminar on personal computing, Blum claimed that a few clients are also trying out the concept.

Blum went on to describe newsletters as an effective way to inform employees of offerings at computer stores. He advocates a strong tie between the computer store and the corporate information center—he considers the store merely an extension of the center. Blum also believes that local "gurus," computer-savvy employees equipped to train non-technical users, can aid in promoting personal computing.

Members of the audience, too, revealed interesting approaches to implementing effective personal computing. For example, Ivan Brass, a vice president with Manufacturers Hanover Bank, New York, told how his organization loans machines to employees who want to try personal

news & comment

computing. The bank also provides Compaq portables to those who want to take work to their own office or home.

At the Melville, NY, data center of National Westminster Bank, sharing of personal computers is quite common, according to vice president John R. Layton. In some of the center's departments, as many as 20 employees share the same machine.

Ilse W. Martin, manager of information systems for General Electric Trading Co., New York, was faced with the challenge of providing custom programs for personal computers. She met the demand by assigning the jobs on a free-lance basis to college students adept at Basic. This approach allowed her staff programmers, few of whom know Basic, to concentrate on mainframe tasks.

Speakers at the seminar also addressed the problems of personal computing. They discussed such fa-

miliar practices as sneaking "disguised" machines into offices and "creative bookkeeping." They raised a concern about unauthorized machines: When users lose or misplace their warranties, they can't bring defective or inoperable machines back to the source for service. Another new problem is caused by users who take parts from other computers to keep their own machines running.

Idle software is a problem particularly among upper-level executives with insufficient training. Consultant Roger Rubinstein claims they sometimes buy special package deals offered by retailers to move products, and don't bother to learn to use the new programs.

Finally, because users tend to accept data on computer printouts as authoritative, when in fact they might not be, one speaker urged that all reports produced on personal computers be labeled.

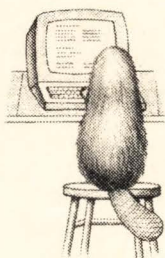
Peat Marwick offers many seminars on various aspects of personal computing. For more information, call (212) 758-9700.

Unix paired with Ethernet

Organizations deploying personal computers with Bell Labs' Unix operating system have a new option to network them. Plexus Computers (Santa Clara, CA) has unveiled a new scheme that integrates Unix microcomputers, IBM Personal Computers, and storage-access devices using the Ethernet local-area network.

Other Unix networks employ batch-oriented file-copy programs, but the Plexus network is interactive. The network provides easy access to files and peripherals, and integrates a relational database management

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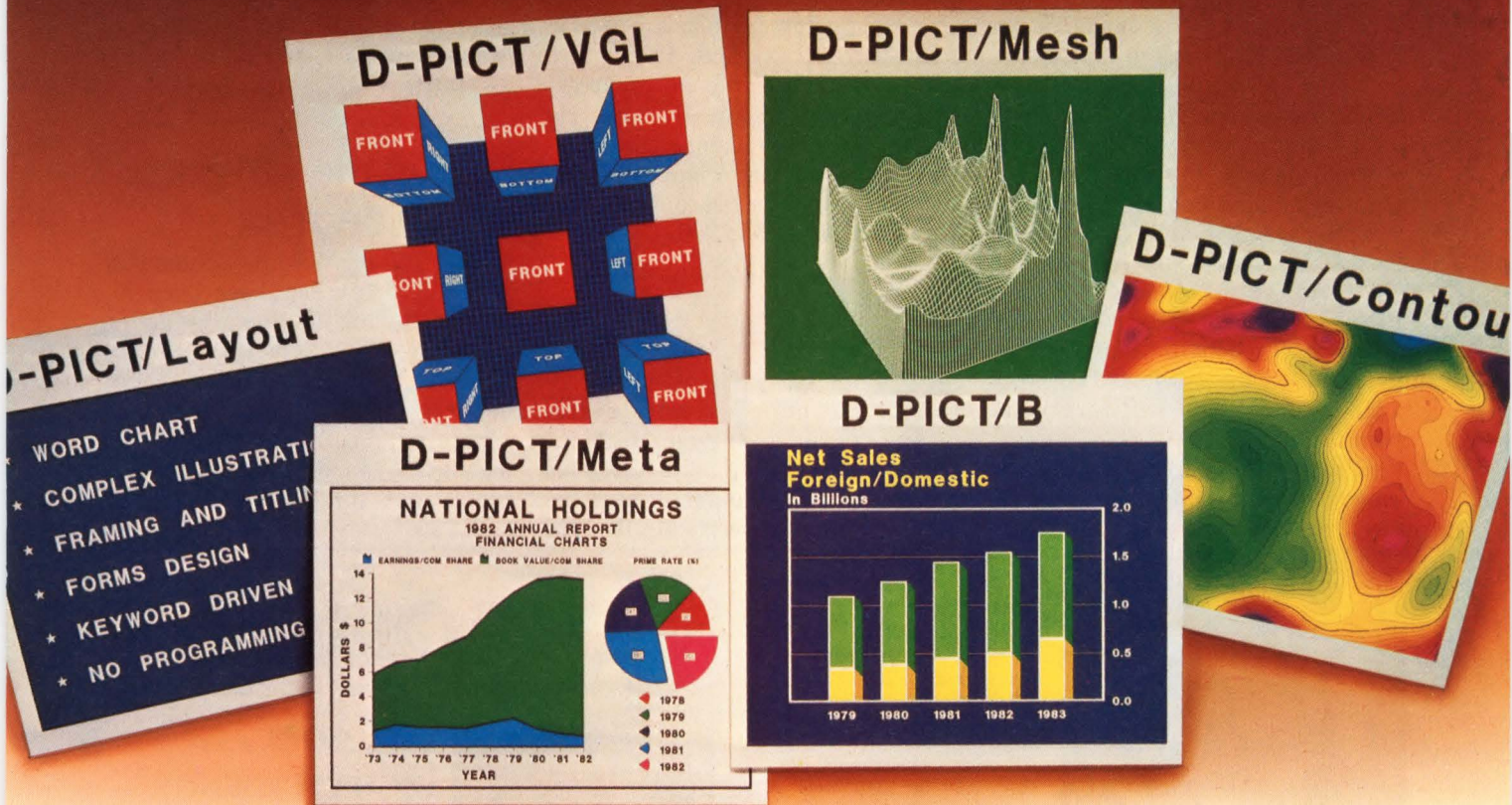
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NEWS & COMMENT

system. It can be built using existing stand-alone Plexus "super micro-computers" as foundation stones and three other components as building blocks. The components include:

- The P/65 network file server, a Unix-based network data manager. It controls the database management capabilities and access to shared data by users. It also provides up to 1.1 billion bytes of storage. An entry-level P/65 is priced at \$49,950.
- Unix-workstation software that integrates stand-alone IBM Personal Computers into network operations. Robert Marsh, Plexus' founder and chairman, claims this is a "first." Previously, he says, IBM PCs could not work with Unix-based micros in a network or more limited shared-access setup. The software component costs \$250.
- A distributed relational database management system called Unify. It enables users anywhere on the net-

work to access local and remote databases. Unify is priced at \$3,000 (development system) or \$1,500 per installed node for a run-time system.

Plexus uses a proprietary distributed, multi-processor design for its microcomputers. The vendor claims this architecture performs better in multi-user applications. Plexus also claims to be the first company to deliver the Unix System III operating system on a microcomputer. Plexus 16- and 32-bit microcomputers support up to 40 users and range in price from \$14,950 to \$85,000.

Correction

The Theft Guard personal-computer security device pictured on page 16 of the January issue is manufactured by Computerized Manufacturing Consultants Inc. of Deerfield, IL. The

\$30 anti-theft unit consists of a special adhesive-backed plate that adheres to personal computers or other office equipment with up to 2,000 pounds of gripping strength and a five-foot aircraft-style security cable with a built-in locking loop. The correct phone number for Computerized Manufacturing Consultants is (312) 940-0010.

Secretaries thankful for office aids

All those word processors that corporations have been installing in offices during the last few years are a big hit with "the desk set," according to a recent survey.

Eighty-three percent of 600 female secretaries in North American organizations surveyed last October said they love their word processors



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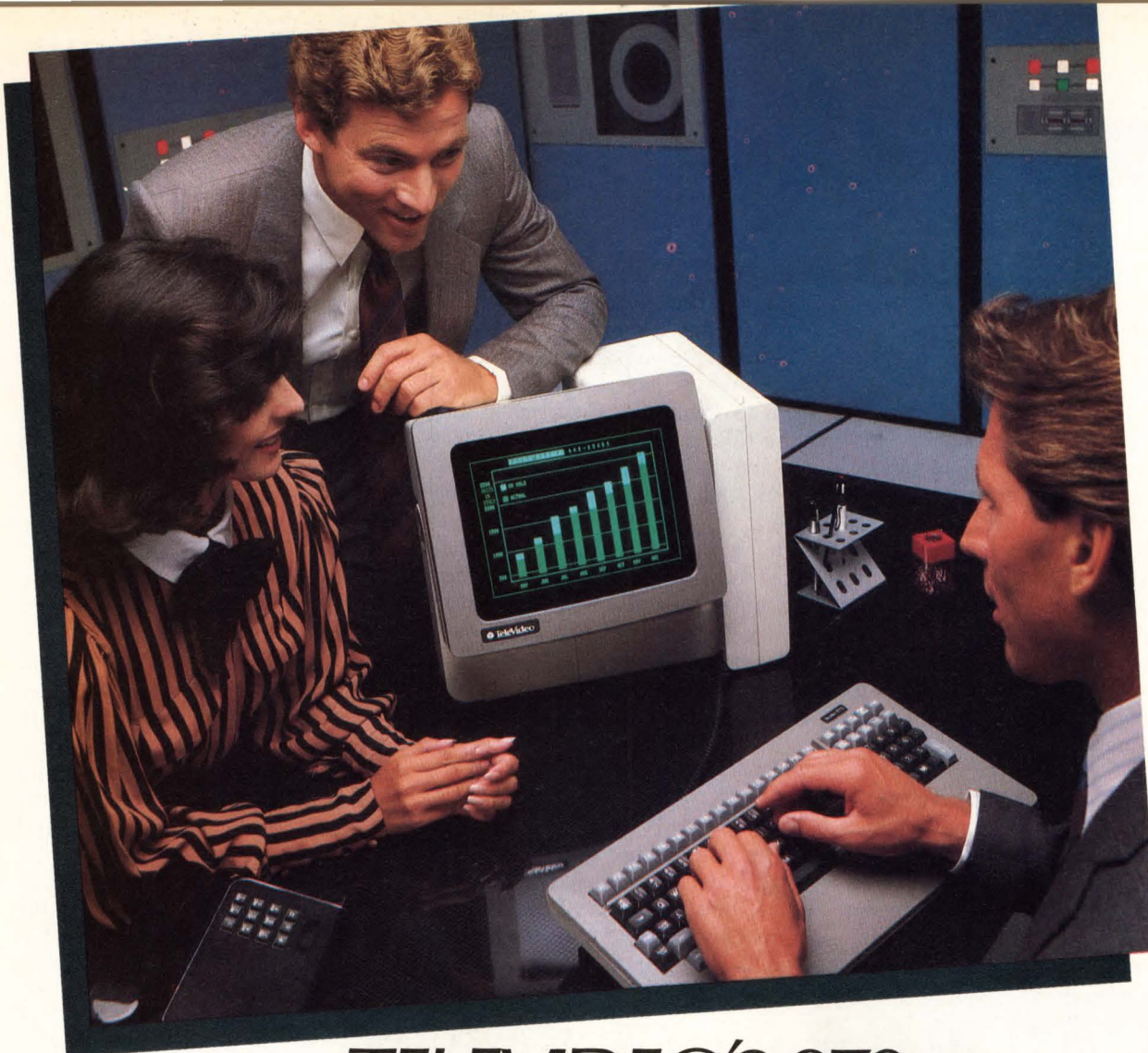
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CIRCLE 10

NEWS & COMMENT

and other automated equipment, only 16 percent had mixed feelings, and not a single secretary hated her machine.

In the survey, commissioned by Kelly Services Inc., the Troy, MI-based temporary office-help service, the younger secretaries were generally more enthusiastic about electronic equipment than the older respondents.

Far from being alienated by the computer revolution, 82 percent of the respondents said they are not afraid their jobs will be eliminated by automation and 63 percent said office automation makes their jobs less stressful.

Further, 43 percent said their skills with the new office tools have helped improve their relationships with their bosses, and 49 percent believe secretaries with such skills have higher status in their companies. Moreover, the responses suggest that secretaries

believe office automation creates opportunities for expanded responsibilities. Three-quarters of the secretaries said the new equipment allows them to spend less time typing and more time doing work that involves decision-making, such as supervising others and researching and writing reports.

But a section of the survey that asked secretaries to list the tasks they perform in the office indicates that in reality word-processing equipment simply allows secretaries to do more of the traditional secretarial tasks—such as typing letters and invoices.

No-flop floppies

Picture this dreaded event: You have just compiled a day's revision of a long program requiring many disk accesses, memory swapping, and read-after-

write verification. The primary drive overheats and the compilation aborts, with all revisions lost. It looks like you have only two alternatives: One, you can quit your job and move to Tahiti; or, two, you can look into Omni Resources' new line of Intelligent Disks. Unless you're independently wealthy, it might be a good idea to go for the disks.

Disks are damaged and data lost, often permanently, to heat and humidity every day. And that is no joke. What makes Omni's 5¼-inch Intelligent Disks different from other disks is that they come equipped with sensors that warn users when a disk has been exposed to high temperature or excessive humidity. The sensors change colors when environmental conditions become dangerous to data. According to Paul Johnson, president of Omni Resources, "These are the first disks that can actually warn

(News continued on page 22)

**"Before,
I couldn't get
a memo from my
CRT to my
secretary's
word processor."**



"Before Soft-Switch,™ that is."

"It used to be difficult to share information at our company because our office equipment comes from different vendors. Consequently, when we needed a finished document, all of the information had to be re-keyed for the word processors.

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"Soft-Switch is a Document Control System from ITI, and it runs on our IBM mainframe. It permits documents created on one type of equipment to be used by other devices, regardless of the vendor (word processors, personal computers, printers, etc.).

"Soft-Switch gives us extensive edit level translation capabilities. It stores documents in libraries on the mainframe—no more hunting for diskettes for last year's reports. And routing is simple and efficient. Whether the document goes

to storage at the mainframe, or to a device across the hall, or to 25 branch offices around the country, Soft-Switch requires just one command. Conveniently, the recipient gets the document directly from the mainframe. This is especially useful when you route across time zones.

"It's simple to install and doesn't need much maintenance. The staff likes it because it's easy to use, requires very little training, and just about eliminates document back-up.

"Soft-Switch supports both MVS and VM/CMS operating systems, and it's the first Document Control System that's fully compatible with IBM's DIA/DCA.

"Soft-Switch is available for most major OA equipment. And if you don't have a mainframe, you can still use Soft-Switch by time-sharing through CIsinetwork Corporation.



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really can integrate what you want, when you want—with Soft-Switch. Check it out. Call ITI."



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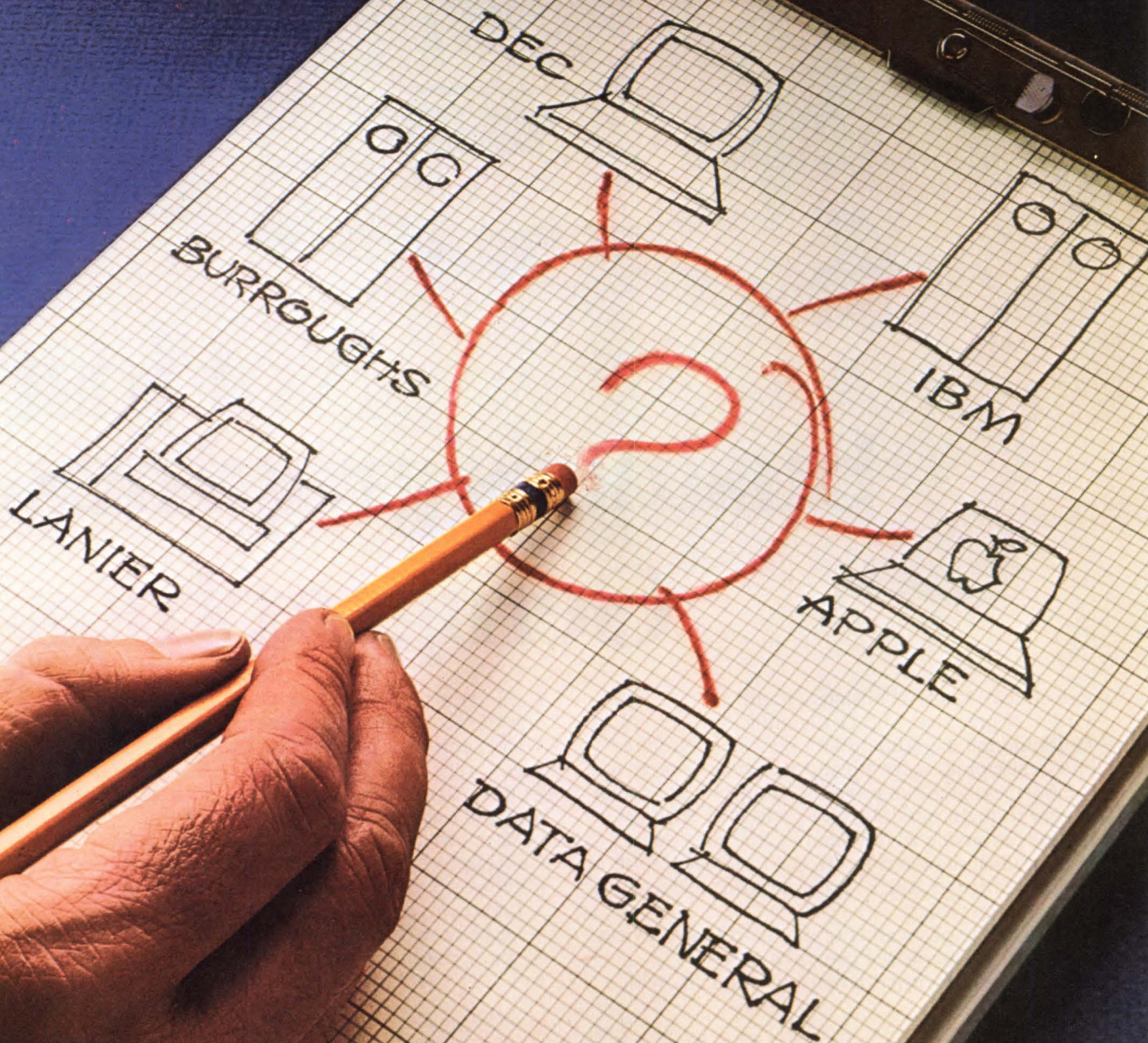
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(Continued from page 18)

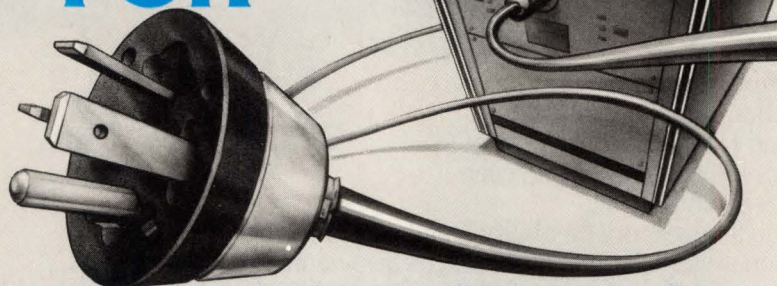
users that data loss is impending due to environmental conditions. They are really early warning signals that it is time to duplicate a disk, or at least not to record on it until environmental factors have been corrected.

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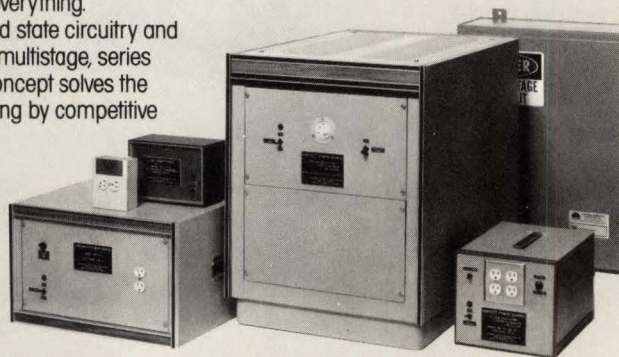
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Data-comm networks subject of seminars

Supporting and maintaining the data-communications network is the subject of a series of two-day workshops sponsored by the Data-Tech Institute. Among the subjects to be covered will be comparing features of network-control centers. The workshops will be held in St. Louis at the Sheraton Plaza March 5 to 6; in Orlando, FL, at the Harley Hotel March 12 to 13; in Princeton, NJ, at the Hyatt Regency March 19 to 20; in Stamford, CT, at the Marriott March 26 to 27; and in Washington at the Bellevue April 2 to 3. The charge is \$595. For more information, call (201) 661-2300.

Building your data center

A handbook to help organizations plan new computer centers, and save thousands of dollars while doing so, has been published by BEK Press.

The *Computer Center Construction Guide*, by Bruce Cook and Ted Farrell, outlines the steps for planning, designing, and furnishing a data center. It puts you in touch with experts—engineers, designers, and construction project managers—manufacturers across the country, equipment, and prices.

The guide also provides advice on such important aspects of design as

(News continued on page 26)



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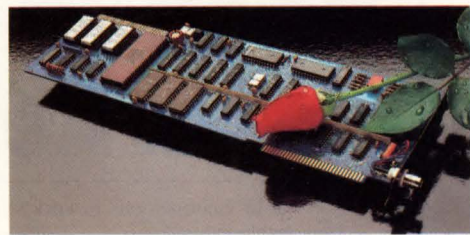
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NEWS & COMMENT

(Continued from page 22)

power supply, temperature and humidity control, floor plan, noise suppression, and security.

A glossary explains terms from "silver migration" to "sound soak," and the source list provides toll-free numbers for manufacturers. The handbook also lends assistance in pricing a computer-center project. The book costs \$79.50 and is available through BEK Press, 40 Clubhouse Dr., Woodbury, CT 06798.

Interlink: IBM meets DEC

Accessing databases under IBM's MVS through Digital Equipment Corp.'s DECnet communications facility has long been a complicated and potentially expensive proposition. However, System 3711, an integrated soft-

ware/hardware package, merges IBM's MVS systems with DECnet, eliminating the need for special programming and user training.

The system, made by Interlink Computer Sciences, combines a Network Controller and DECnet software with special software that's installed on the IBM host. The Network Controller is an intelligent front-end processor linked to the host by a high-speed communications channel. Interlink's special software, called Master Control and Translator, allows DEC users to quickly and easily retrieve information from IBM-resident databases.

The system's software permits easier file access—there's no need to use job-control language—and provides error messages. Cambridge Systems Group's ACF2 or IBM's RACF protocols are deployed to provide data security. A user must enter

a password to get onto the system. System 3711 is flexible and can be expanded without being redesigned.

The system costs \$98,500. For more information, call (415) 792-6212.

Bell breakup subject of seminar

Coping with AT&T and the new regional operating companies and the inevitable deregulation of long-distance calling are two of the subjects to be covered at upcoming seminars in San Francisco and New York. Sponsored by the Eastern Management Group, "Divestiture, AT&T, and the RBOCs: An Assessment of Future Opportunities," will be held April 24 and 25 at San Francisco's Mark Hopkins and May 1 and 2 at the Essex House in New York. The fee is \$695 for those who preregister, and \$750 at the door. For more details, call Andrew Bastian at (201) 267-3700.

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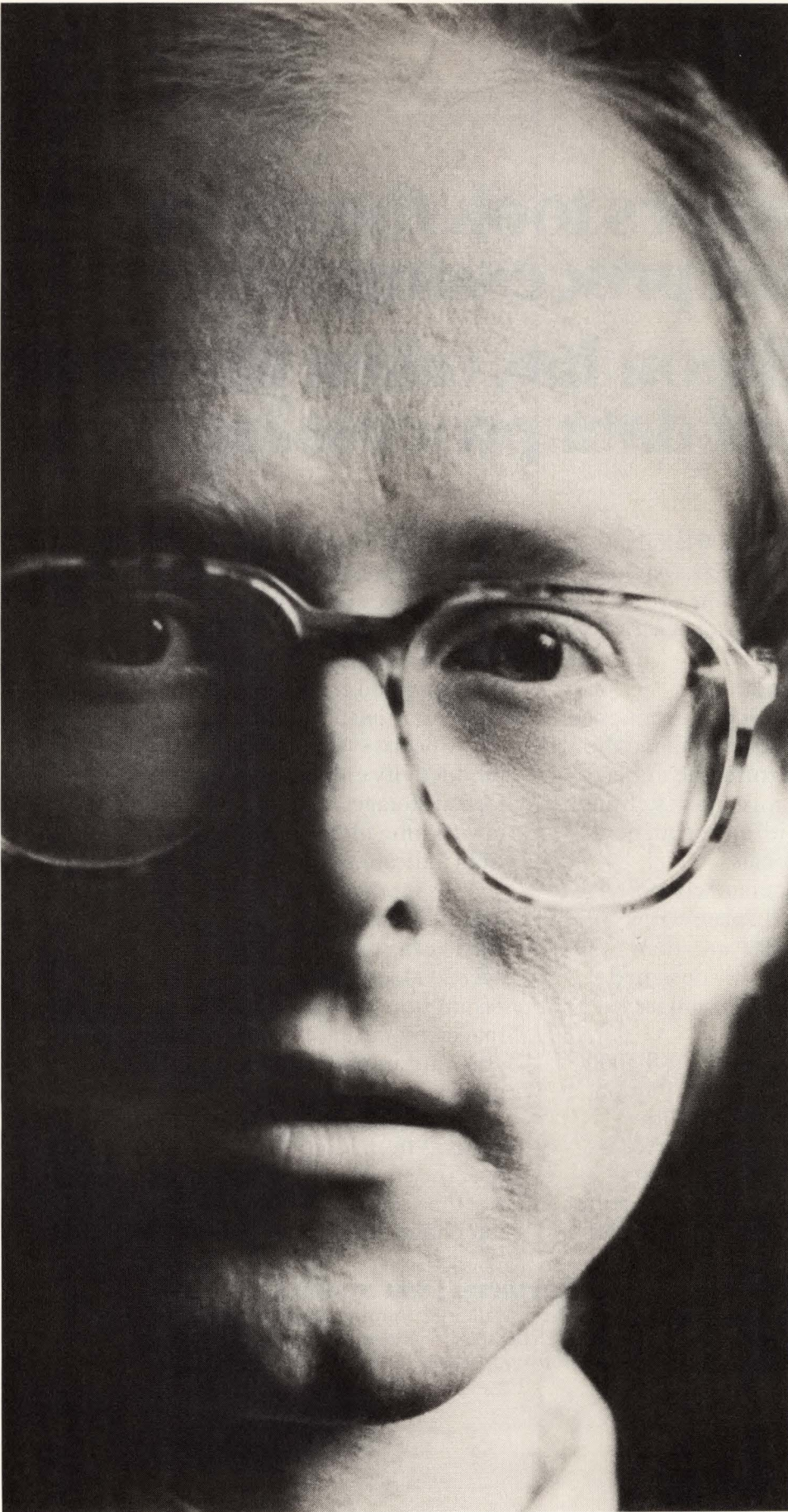
Recruiting—no time to waste

Looking for a new key employee? That drawn-out process of contacting professional recruiters, writing advertisements, and then reading resumes, and arranging and conducting interviews costs time and money.

Career System is one alternative to traditional recruitment methods. It is an electronic information utility that allows employers to rapidly match job criteria to millions of resumes. Developed by General Database Technology Inc., this system permits an employer to scan a database of profiles and identify qualified candidates in about 30 minutes, at a cost of about \$400. The search can be nationwide or limited to a specific area.

General Database Technology expects to have a library of 175,000 re-

(News continued on page 30)



**"You can't just plunk
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How can we promise all that?

After more than a decade of experience in 3270 emulation, Raytheon designed the PTS-1000/4000 family to offer the utmost in flexibility, so you can mix and match any of our new controllers with any of our new display and printer terminals.

When it comes to operator comfort, no one offers interactive displays with more built-in ergonomic features than Raytheon. Features especially designed to ease the strain on one's neck and back, hand and wrist, and eyes.

The microprocessor-based PTS-1000/4000 family enables efficient distribution of your data processing workload with flexible configuration options and extensive self-diagnostic capabilities. Binary synchronous, systems network architecture (local and remote), and airline link control

communication protocols are supported. Large and small control units, multiple screen sizes, and a wide variety of peripheral input/output devices and printers can be mixed and matched with varying star, multidropped cabling, or multiplexed configurations.

Special system features include productivity enhancements like local format storage, response time monitors, row/column indicators, and unprotected field indicators.

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ACCOUNT NO.....9283A.....
CONTACT NAME.....P. Jones.....
P.O. NO.....RJ293844.....
BILL TO ADDRESS.....29 Marylebone..... SHIP TO ADDRESS...(Same).....
.....London NW15JX.....
.....England.....

QUANTITY	ITEM	ORDER REF. NO.	PRICE	DATE SHIPPED
26	4C1	238512	43.11	1/86
12	7F2	932910	27.42	1/18
30	3C5	327922	52.38	1/17
41	2X8	729384	81.16	1/23
75	6K7	298342	36.50	1/27
53	8J3	394820	74.99	1/28

ENTER to confirm -- PF3 to cancel -- PF5 to continue

532

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NEWS & COMMENT

(Continued from page 26)

sumes by the end of the year. The initial focus will be on professional, managerial, and technical jobs. Career System can handle 937,000 resumes and can be expanded to 256 nodes. As many as 1,630 employers can search the database simultaneously. For more information contact William Berry, president, Career System, (305) 689-3337.

Benefits of carbonless forms

How much money can a company save by banishing carbon paper from its offices? The question may seem whimsical, but Joe Hume, vice president of the National Business Forms Association in Alexandria, VA, has given it a lot of thought. "There is a trend toward phasing out carbon paper," he says,

"especially now that cost-conscious managers are turning to minicomputers and carbonless paper." The savings associated with such a move could be substantial, Hume asserts.

"The easiest way to estimate the annual savings in forms conversion is to tally up all the costs of carbon forms," explains Hume. In the past, too many operations considered forms a minor, necessary business expense. Now, he says, when every penny in a budget is scrutinized, the cost of forms is seen as "a painful reality."

Hume has analyzed the costs of carbon forms. "De-collating is a big expense. If employees are de-collating forms manually, they're wasting valuable time. Even a small de-collator needs an employee to run it, and costs about \$500. Converting to carbonless forms and eliminating the de-collating function entirely can mean big savings," Hume says.

For heavy mailings, carbonless forms reduce postage bills. They weigh less than carbon forms and, according to Hume, "with their lower shipping costs, carbonless forms may save you money before they even arrive at your door." He points out that 10 cartons of carbonless weigh as much as nine cartons of carbon forms.

Printing costs are also lowered by eliminating multipart carbon forms. "It takes time to correct printer misfeeds, and it costs to have a person correct them. Moreover, you pay for those forms that are ruined. That all translates into dollars," says Hume.

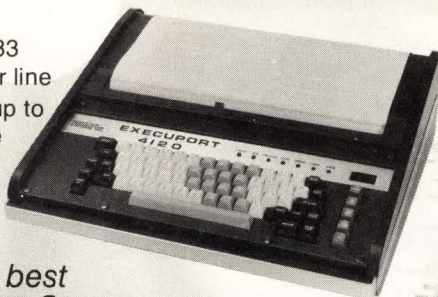
The security of carbonless forms is another consideration. "Some companies go through great pains to destroy their carbon interleaves," Hume says. "They are worried about confidential information slipping into their competitors' hands. If you pay for this extra service, you can imag-

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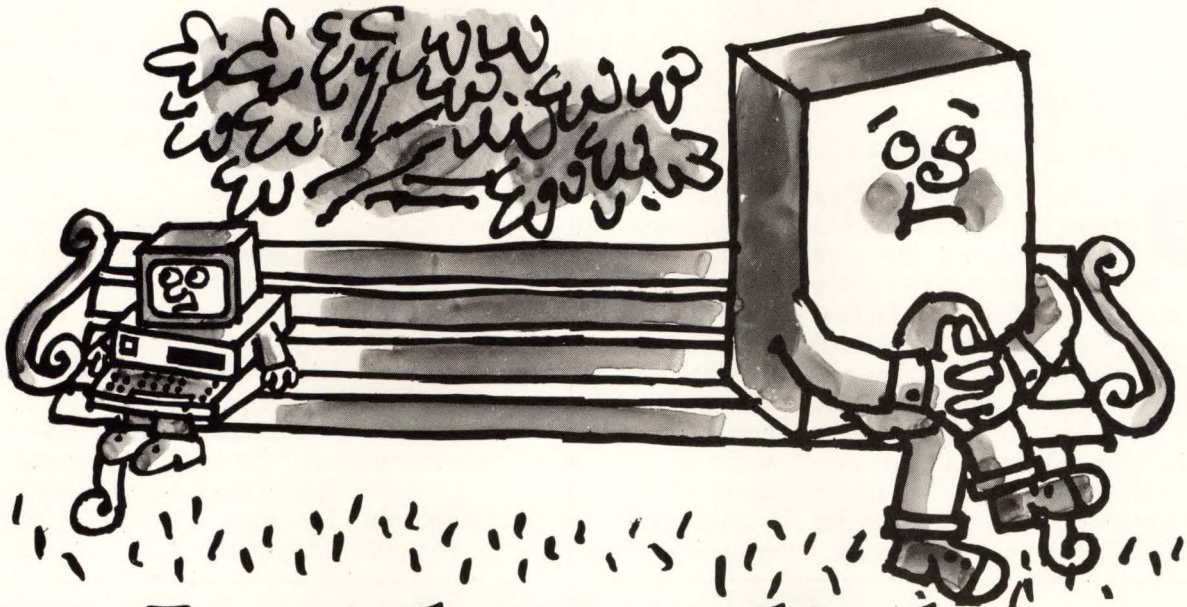
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CIRCLE 46

NEWS & COMMENT

ine the savings of carbonless forms."

Hume believes that carbonless paper is "synonymous with bottom-line savings and improved office efficiency. Its use is an effective way to trim the fat from an already tight budget."

Optical disks replace mag tape

Optical disk, on which data can be recorded locally, will replace magnetic tape and microfilm within the next five years, predicts Frost & Sullivan. "Optical disk is more compact, accessible, and durable than magnetic tape," asserts Joseph Savino, an editor with the New York-based market-research house. "The disks store digital information as well as images, and are far more practical than microfilm for live and frequently accessed storage."

Frost & Sullivan's new study of storage media projects that more than \$135 million worth of locally writable optical media will be sold in 1988, mostly in the form of 12- to 14-inch disks, priced at about \$65 apiece (in 1983 dollars). Airlines, banks, credit-card companies, government agencies, and other organizations with heavy data storage will require more than 4,500 optical-disk drives and more than 26,000 disks in 1988, the survey indicates.

Major applications include transaction recording, drafting, telecommunication store-and-forward systems, geologic-data storage, and mapping. Optical-disk systems will also be used in large computer systems. As replacements for or adjuncts to mass-storage systems, sales should rise from only 10 this year to nearly 1,000 in 1988.

Most of these computer-peripheral systems will be based on erasable

optical storage. Another form of optical-disk recording, designed for read-only applications, is "... likely to create a whole new business based on distribution of large digital databases."

The report also compares optical-disk technology to high-density storage technologies in terms of read-write rates, media cost and sensitivity, erasability restrictions, density of storage, error rate, and media stability. Special attention is given to other new media, such as vertical magnetic recording using thin-film media, isotropic magnetic recording using fine particulate media, and magnetic-bubble technology. The last has proven disappointing, after early high hopes.

The report, which profiles 26 leading U.S. and foreign developers of optical-storage media, costs \$1,375. For more information, call (212) 233-1080. *(News continued on page 34)*

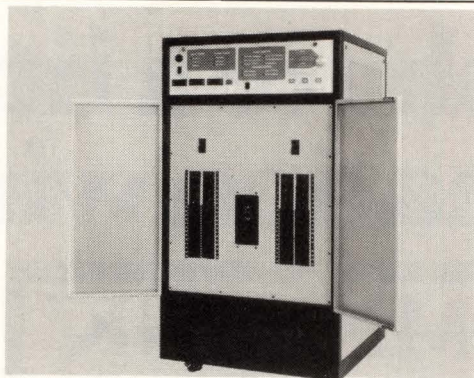
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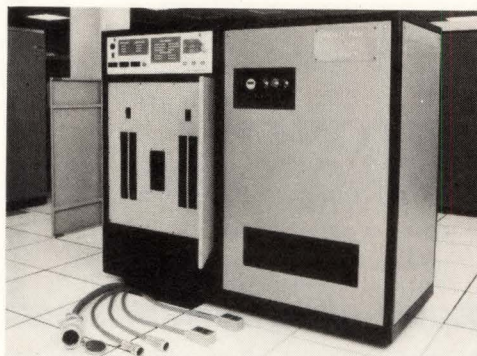
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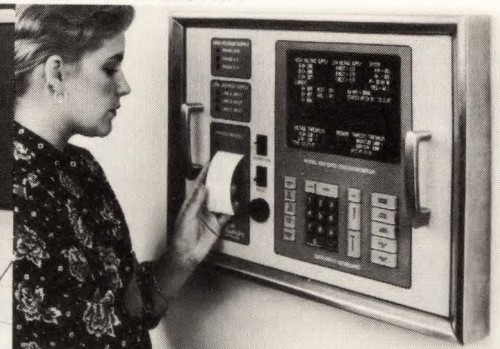
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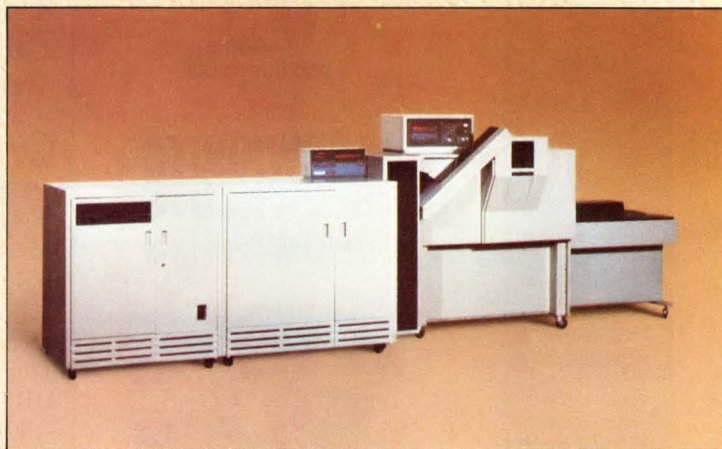
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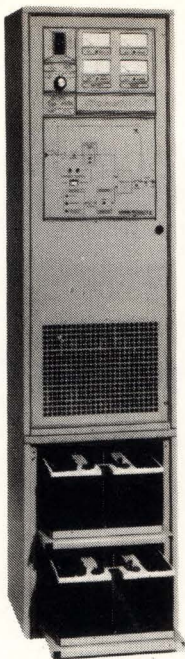
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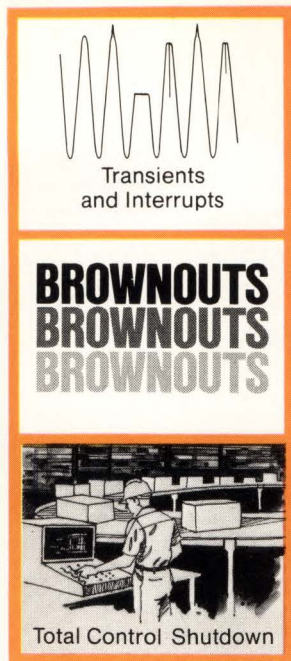
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CIRCLE 18

NEWS & COMMENT

(Continued from page 32)

Online consultants

Stuck on who to bring in to assess your personal-computing needs? Human Resources Selection (HRS) Network, a proprietary database of HRS:Net Inc., Boston, may have the answer for you.

Network users pay an annual fee that is 30 percent to 45 percent less than that of an agency fee, according to Tom Joseph, president. Subscriber companies dial the HRS:Net mainframe and request a search for specific talent. The search can include such factors as availability of the consultant, specific skills, rates, resumes, and prior work sites and references. When querying the database, you provide it with information on your micro-to-mainframe integration; the micros, mainframes, and telecommunications devices you have; and the type of company you are.

Consultants listed with HRS:Net must have a minimum of five years' experience and must provide three references.

Further information can be obtained from HRS:Net, 20 Park Plaza, Boston, MA 02116, or call (617) 338-6313.

Corporate sins: lying and loafing

The employee vices that bug bosses the most are dishonesty and goofing off.

This is the finding of a recent survey of 100 vice presidents and personnel directors in Fortune 1,000 corporations. They were asked: "What employee behavior disturbs you the most?"

"Dishonesty and lack of integrity topped the list, with goofing off and irresponsibility a very close second," says Marc Silbert, vice president of Accountemps, the New York-based temporary-personnel service that commissioned the survey.

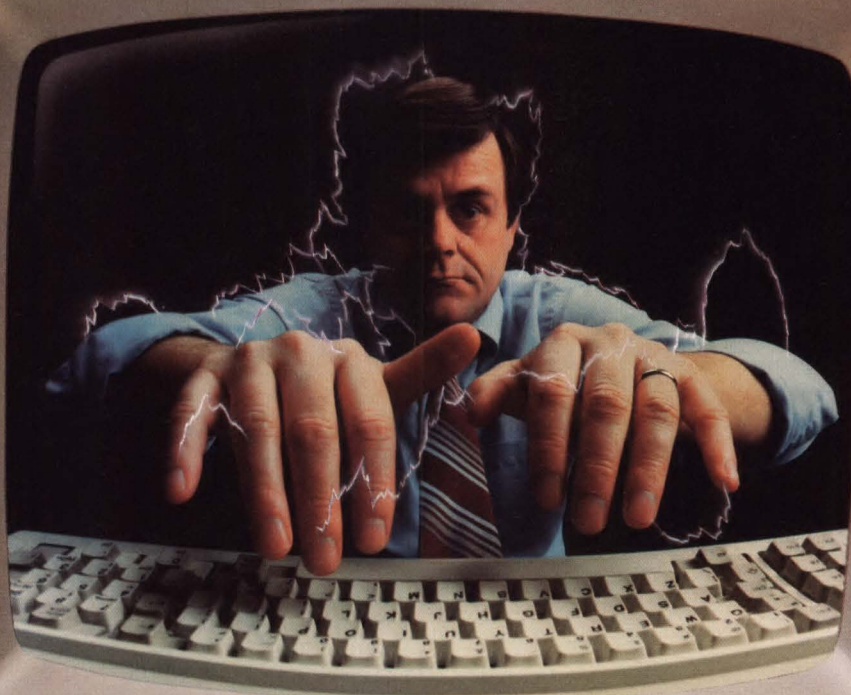
Dishonesty not only includes employees who pilfer the petty cash, but also those who are intellectually dishonest, Silbert says. "That group would include an employee who told his boss he would have a project ready on December 13 when in reality he was going to be on vacation on that day," he says.

In order of unpopularity, the survey listed the following employee behavioral traits.

- Dishonesty (14 percent)
- Irresponsibility (12 percent)
- Arrogance and egotism (10 percent)
- Absenteeism and lateness (9 percent)
- Ignoring of policies (8 percent)
- Constant complaining (7 percent)
- Lack of dedication (6 percent)
- Laziness and lack of motivation (5 percent)

The survey was conducted by Burke Marketing Research Inc., and is not available to the public. Accountemps is headquartered at 522 Fifth Ave., New York, NY 10036. The phone number is (212) 221-6500.

The last thing your computer will see before it goes crazy



You or someone else charged with static electricity can drive your personal computer crazy. Garbled data, memory loss, video interference and mechanical malfunctions are among the symptoms of a PC that's "a little touched."

And a little touch is all it takes. Your PC is more sensitive than you when it comes to static. A charge in your finger so small that you can't see or feel it can do the damage.

Static is ever-present. Even when the humidity is up, you can generate a charge by walking on a carpet or vinyl floor. The resulting glitches or downtime could be enough to make you even a little mad.

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The First Touch pad is an evolution of a 3M technology created

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Proven effective in industry, easily installed by you in home or office, the First Touch pad is available in 24" x 26" and 9½" x 23½". Look for our packages.

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news & comment

Are you paying your staff enough?

What you pay your project leaders, systems analysts, programmers, and other subordinates depends on several factors, some of which are the kind of your organization, your location, and, of course, the size of your budget. Salaries vary considerably as shown by the data collected in *Computer Decisions* fifth annual Salary-Status Survey. See box for median salaries for data-processing staff members.

Median salaries of dp staffers

Title	Median salary
Project/team leader	\$35,000
Lead systems analyst/programmer.....	32,000
Senior systems analyst/programmer	27,773
Lead systems analyst.....	\$32,500
Senior systems analyst	29,735
Lead systems programmer.....	29,965
Senior systems programmer	\$29,780
Lead applications programmer	26,000
Senior applications programmer.....	23,875
Communications operator.....	\$20,500
Lead computer operator	19,006
Senior computer operator.....	16,217
Tape librarian.....	\$14,900
Lead key-entry operator	14,414
Senior key-entry operator.....	12,480

Retailers shop around

Retailing cannot ignore the computer age if it wants to stay in business. This warning rang clear at the National Retail Merchants Association (NRMA) convention and exhibition recently in New York City.

Walter Loeb, vice president of the investment banking firm of Morgan Stanley, in his speech at the opening session, cautioned executives to stay abreast of the latest computer developments. "For retailing executives to remain competitive and on the leading edge in business, they must allow high technology to permeate their plans," he said.

Retailers were told that the days of the old-fashioned cash register are gone forever. Giving a look into the future were the many exhibits of sophisticated computer and telecommunications systems at the show.

However, seminars also stressed that technology is not a panacea. In one seminar entitled "A Safe and Sane Approach to Automation," three warnings were given to executives implementing new computer systems: No system will work if the manual system doesn't, require-

ments for a system based on current operations should be carefully defined, and software decisions should shape hardware purchases.

To help with software selections, NRMA announced a new retail software directory for retailers. Compiled by Coopers & Lybrand, the New York-based Big Eight accounting firm, the book lists almost 400 packages from 130 suppliers. The directory is available to NRMA members for \$29 and to nonmembers for \$49 through NRMA Book Department, 100 W. 31st St., New York, NY 10001.

Computer directory for New York area

A directory that lists 16,000 computer users throughout the New York metropolitan area has been published by Computer Management Research. Entitled "New York Metropolitan Directory of Computer Installations," it offers a comprehensive profile of the hardware and software installed, applications found, consultants used, future plans, and a phone number and contact for each listing. The book also includes cross-referenced indexes by hardware, software, and industry.

The \$240 directory can be ordered from Computer Management Research Inc., (212) 683-0606.

Rival to dedicated word processors?

Dedicated word processors will soon be replaced," predicts Deborah Fain, vice president of marketing at Samna Corp. It's not surprising that Fain expects Samna's word-processing package, Samna Word II, to be successor to the word processor.

Samna Word II offers many features found on high-priced dedicated systems, including mail/merge and free-form line drawing. It also offers standard editing and formatting features comparable to those of dedicated word processors.

Digital Equipment Corp. has given Samna Word II its stamp of approval by selecting it as the second-generation word-processing package for the DEC Rainbow 100 and 100 Plus personal computers. "The big difference between Samna Word II on a DEC personal computer, and a dedicated word processor is the price," says Fain.

A word processor with comparable features costs about \$10,000, she says. Samna Word II costs \$450, placing the total cost of the package and a Rainbow considerably lower than that of a word processor.

Samna Word II is also available on the IBM Personal Computer, PC XT and compatibles, and the Texas Instruments Professional Computer. Samna is headquartered in Atlanta. Call (404) 321-5006.

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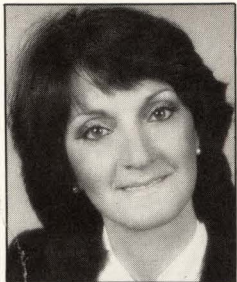
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by Susan Foster Bryant, Microsystems Editor

PERSONAL COMPUTING

Is a consultant in your cards?

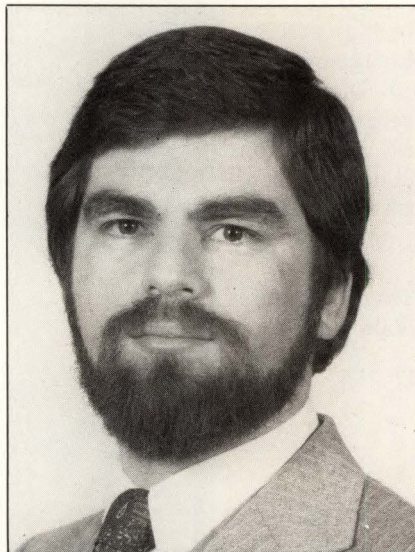
More managers are realizing that in order to make the most of the increased efficiency offered by personal computers, they need to know more. Present capabilities of personal computers and future possibilities, overall strategy for information resource in their corporations, and each department's needs for today and tomorrow is a lot of ground for a manager already working full time to cover. Enter the microcomputer consultant.

The computer consultant is frequently called in when an organization finds it needs more resources than its data-processing department can provide. "You may be short on staff and just can't cover the territory in your own department, or you may want an independent view on what micros and software to purchase. Training personnel may call for special talent, or turning those desk-top decorations into usable tools may require a consultant for hand holding," says Steven Epner, founder of Independent Computer Consultants Association (ICCA) of St. Louis.

What should you look for in a consultant to help establish successful personal computing within your organization?

- *Someone who is not tied with any manufacturer.* Stay away from those who call themselves "purchasing guides" or some other nomenclature to conceal their actual representation of specific hardware or software vendors. They will hawk those products, regardless of your needs.
- *Someone who studies the personal-computing market.* Most consultants I spoke to estimate that they spend at least 20 percent of their time

keeping up with developments in their field. This study includes all major players and is not tied in with any one manufacturer.



To avoid representing unemployed computer programmers turned consultants, the Independent Computer Consultants Association (ICCA) requires that a consultant have worked one year before joining, says Steven Epner, founder.

- *Someone who understands the equipment already installed.* Your consultant should be able to plan for your needs today and tomorrow while protecting your present investment.
- *Someone who is a team player.* Because your consultant will be part of your organization for a time, he or she should be able to work in accordance with your organization's policies and procedures.

According to Shirley Dyer, a Philadelphia-based consultant and founder of the PC Consultation Program, a hot line for personal-

computing problems, "the most important characteristic of the consultant you choose is that he or she have no stake in what he or she recommends. You want unbiased answers to your problems and needs."

Although many large corporations go to large consulting firms, Dyer maintains that small independent concerns can serve large corporate needs as well. This view is shared by ICCA's Epner, who claims that consultants have gotten a bad name of late because so many unemployed programmers have transformed themselves into consultants. Epner's organization represents over 1,000 consulting firms and 3,000 individuals throughout the nation. Members must have been full-time consultants for at least one year and must subscribe to a strict code of ethics.

Some managers simply *prefer* dealing with larger consultancies, such as Arthur D. Little Inc. (Cambridge, MA), Booz, Allen and Hamilton (New York), Computer Sciences Corp. (El Segundo, CA), and Electronic Data Systems Corp. (Dallas). Other firms that generally offer personal-computer consulting are the Big Eight accounting firms.

Whether you're looking at large or small organizations, don't discount the value of referrals from colleagues. They may be able to put you onto the right expert for your job.

Once you have checked the references of several consultants, you can start working on the price of your personal-computing project. According to Epner, most independent consultants charge between \$25 and \$200 per hour (higher on the east and west coasts). You will pay a high price but not as much as for a full-time microcomputer manager. If you

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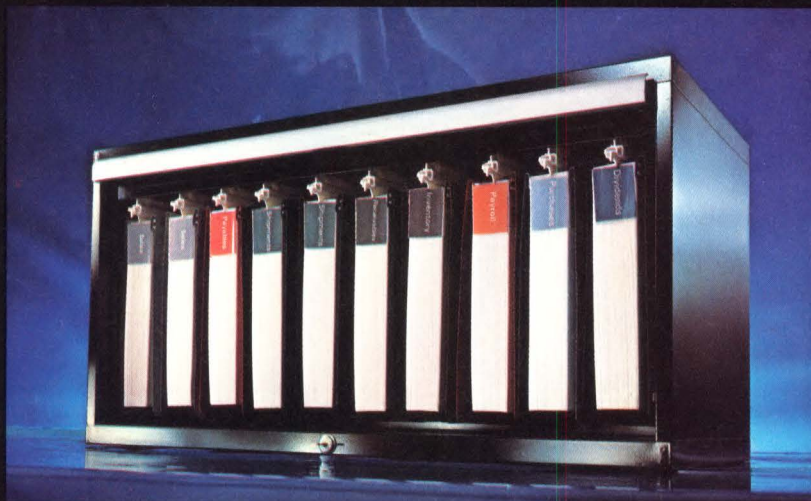
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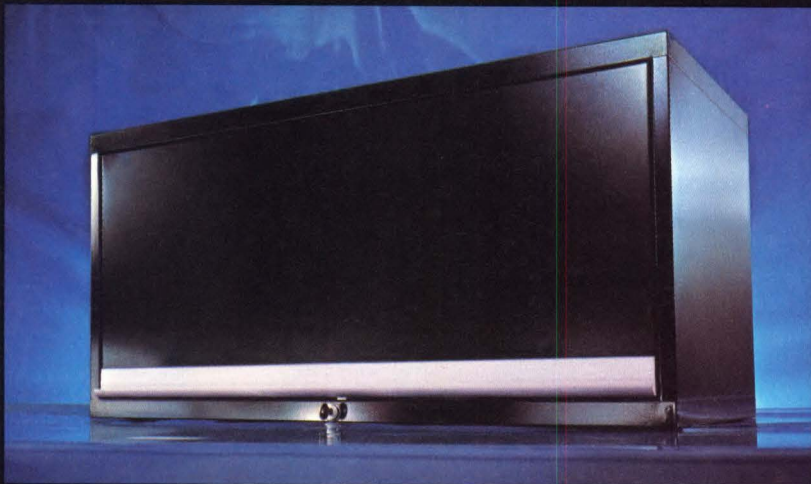
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DataCabinets are strong. Sturdy. Made of heavy-gauge steel formed into double-wall construction. They're welded, with no exposed rivets. They're attractive in black, putty or two-tone tan.

The doors open like an overhead door on a garage. Smoothly. Nylon guides see to that. This makes printouts easier to get to, too.

And each cabinet holds over 10,000 printouts, up to 14 $\frac{7}{8}$ x 11", or smaller, in ten or more binders neatly suspended from the top of the unit.

You can put them side-by-side. You can stack them to make a data library. Or let them stand alone. Wood-grain tops are available for added work space.



There's one more reason to buy DataCabinets. The reputation of the company that makes them.

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PERSONAL COMPUTING

(Continued from page 38)

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One last, but most important, consideration is whether your company imposes any limitations on the use of outside consultants. You may find that your organization has a consultant whom it prefers you use, that it has an ongoing contract with a consultant you could be using, that your department doesn't have the budget to hire a consultant, that your organization never uses consultants, or that you have an initial purchase agreement with the hardware or software vendor that includes consulting.

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by Jan Snyders, Midwest Editor

SNYDERS ON SOFTWARE

Conversions—a necessary evil?

For years experts have been predicting the coming of "portable" software, that is, software that can be moved from one hardware system to another. Such software would eliminate the need to rewrite old programs when, for instance, a user decides to convert from another hardware manufacturer's mainframe to IBM. Even if that prediction had come true (and it hasn't) all pre-1984 software would still require conversions if the users later changed hardware.

Conversions to IBM are frequently made because of the greater amount and availability of software for Big

Blue's systems. Even upgrading to a larger-scale system within the IBM line often requires software conversion. It's a job no one looks forward to doing. But as long as it has to be done—and it *will* have to be done even after truly portable software arrives—you might as well tap the special packages that can help you through your conversion.

Strange as it may seem, there are still some IBM 1401 Autocoder programs in use. The E.I. Du Pont de Nemours facility in Rochester, NY, had over 100 of them to be converted to Cobol. Du Pont, headquartered in Wilmington, DE, had

sales of \$33 billion in 1983. The corporation is divided into eight administrative departments and 10 operating departments, which include textile fibers, and biochemical, biomedical, and photographic products. The latter unit, based in Rochester, has annual sales of \$1.5 billion. Major accounting applications and finished-product and raw-material inventories are handled on the 2-Mbyte IBM 4331, which is linked to 28 IBM 3178 terminals.

Mario Fabi, special studies/project administrator at Du Pont, explains, "The problem was that we had a number of systems written in 1401 Autocoder that needed to be upgraded so they could be maintained

A sampling of conversion software

Vendor	Package	Price	Circle
Arkey Computer (617) 964-1894	Focus DOS to OS	\$15,000 to \$40,000, depending on size	794
California Software (714) 973-0440	IBM S/34 RPG II to IBM PC	\$2,500	795
Comp Act Data Syst. (818) 992-4361	CAMS DOS to OS/MVS	\$30,000	796
Conversions (919) 848-9801	Transit-Sperry, Honeywell, Burroughs, CDC, and DEC to IBM	\$40,000 to \$70,000	797
C-S Computer Syst. (201) 526-9000	CS-Tran	\$55,000	798
DASD (414) 355-3405	IBM DOS ALC to OS ALC Any Cobol to Cobol IBM Cobol using ISAM to IBM Cobol DEC Dibol to any Cobol Any Fortran to Fortran Any JCL to JCL NCR Neat/3 to Cobol Any RPG to any Cobol IBM S/3 RPG CCP to IBM Cobol CICS	\$11,500 \$5,800 to \$22,500 \$5,800 \$12,500 \$19,800 \$4,400 to \$7,000 \$17,400 \$19,800 \$24,800	799

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SNYDERS ON SOFTWARE

by the present staff members who are trained in Cobol. We just couldn't keep the Autocoder programs and expect to move forward."

About five years ago, C-S Computer Systems Inc. was contacted to convert some of the programs for Du Pont and, several years later, a few more. The complete conversion was finally started in April 1983 and completed in December.

According to Fabi, Du Pont saved time by having the programs converted by an outside source. "It would have taken two programmers anywhere from six to 10 years to convert the Autocoder programs," says Fabi. C-S Computer Systems finished the conversion in under 10 months.

One of the major reasons users

convert from one system to another is the availability of more packaged software. Because IBM dominates the mainframe market, most independent software vendors develop systems for IBM. As Van Johnson, director of systems development at P.Y.A./Monarch, in Greenville, SC, recalls, "We wanted a system that could be expanded from the application-software standpoint, so we switched to IBM mainframes. There is just more software available for IBM."

P.Y.A./Monarch, a division of Consolidated Foods, which is headquartered in Chicago, is a food-service company whose customers are institutions. Its annual sales are over \$1 billion.

The distributor is using a 24-Mbyte IBM 3033 linked to IBM Series/1 minis in each of its 22 distribution warehouses, as well as 150 IBM 3278 terminals for online applications. The primary application is distribution, including inventory control and purchasing; however, it also runs a full range of financial systems.

Discussing the conversion from two Burroughs 6800s to the IBM, Johnson says, "In addition to wanting to purchase more application software, we were faced with recruiting a large staff to support the effort. It is easier to recruit for an IBM system than it is for the Burroughs." To help in the conversion, the Transit-Sperry conversion system from Conversions Inc. was installed. (Continued on page 48)

A sampling of conversion software

Vendor	Package	Price	Circle
Dataware (716) 876-8722	Cobol to Cobol	\$5,300 to \$10,000	800
	RPG/RPG II to Cobol	\$20,600	
	RPG/RPG II to PL/1	\$20,600	
	PL/1, Assembler, 1400/ SPS Autocoder, and Easycoder to Cobol	\$20,600	
	Fileconvt	\$10,000	
	File cmp	\$1,200 to \$3,000	
	Algol to Fortran	\$39,800	
	DASDcmp	\$2,200	
	Universal File Translator	\$22,500 and up	
The King's Co. (618) 234-6569	King/Tran	\$4,250	801
Lincoln Land Software Syst. (217) 522-1747	DOS to OS Assembler	\$5,800	802
MHT Services (201) 342-1321	MHTran-1 (DOS to MVS BAL)	\$2,400 to \$9,900	803
	DOS to MVS service	Depends on job	
Rand Information Syst. (415) 392-2500	Conversion service	20 cents to \$1 a line	804
	Conversion support tools	\$225 to \$1,000 a month	
SDI (201) 569-7212	Universal Disk Compatibility (Instant-FBA)	\$10,200	805
Software Dynamics (713) 650-1607	Changer II	\$59,000	806
Sterling Software Mktg. (916) 441-7234	JCL	\$50,000 VSI	807
		\$60,000 MVS	
Unilogic Ltd. (412) 621-2277	IBM to VAX	\$1 per source-code line	808
University Computing (214) 353-7100	UCC-2	\$42,000	809

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SNYDERS ON SOFTWARE

(Continued from page 46)

Planning for the conversion of 400 programs began in August 1982. The actual conversion started November 1 of that year and took seven months to complete.

Another company that converted from Burroughs to IBM mainframes for the ease of buying software is Argonaut Insurance Co. in Menlo Park, CA.

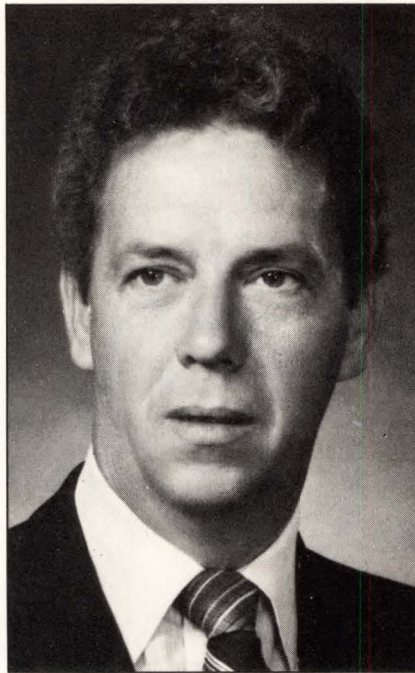
Part of the Teledyne Financial Corp. Insurance Group, Argonaut is a casualty insurance carrier with 1983 premium income of \$321 million. The carrier converted from a Burroughs 2930 to a 16-Mbyte IBM 3033. For online applications Argonaut has 30 Lee Data Systems terminals.

The greatest benefit of the conversion, according to Paul Williams, vice president of information systems, is that "we are now consistent with the industry in general and with the other insurance companies in Teledyne." Many of the large applications systems available for the insurance industry are written for IBM hardware. "Right now our data center has a lot of options available that it didn't have before the conversion," Williams continues.

Argonaut had about 400 programs that had to be converted from Burroughs Cobol to IBM Cobol. Rand Information Systems Inc. was contacted to do the conversion.

Explaining Argonaut's decision to use a specializing company for the conversion, Williams says, "We were dealing with a one-time-only situation. We felt it was better to get some assistance and use conversion specialists, rather than try to deal with all the unknowns ourselves."

At Service Systems Corp. in Buffalo, NY, many of Williams' reasons for conversion are echoed by W. Eugene Breeden, vice president of information services. Service Systems Corp. is a subsidiary of Del Monte Corp., an affiliate of R.J. Reynolds Industries Inc. Eighty-five percent of Service Systems' 1983 sales of \$300 million came from its contract food service. The other 15 percent was



"We converted to IBM because we are one operating unit of a large conglomerate that has IBM equipment." *Breeden, Service Systems*

from management services, such as janitorial and security. Its IBM 4341 is used for all major financial applications, such as accounts payable, accounts receivable, and payroll, and for tracking distribution of products.

"The reason we went from Burroughs to IBM," says Breeden, "is that we are one operating unit of a large conglomerate that has IBM equipment. If I want assistance in evaluating software, I can get it."

With 479 programs to be converted from Burroughs Cobol to IBM Cobol, Service Systems called on Dataware Inc., which took five months to do the conversion. "We could never have done the conversion in the time allotted if we had to do it ourselves—not even with the addition of outside programmers," says Breeden. He estimates it would have taken twice as much time to do the conversion in-house.

Any conversion is difficult, but a conversion that takes place in California from the packages of a service bureau in Texas for use in computers in New Jersey is hair-raising. Still,

Richard Harbina, programming analyst at Prudential Property and Casualty Insurance Co. in Holmdel, NJ, thinks the conversion will save \$500,000 over the next three years.

Last year Prudential Property and Casualty Insurance Co., which has 3,200 employees, wrote \$700 million in premiums. The corporate office in Holmdel uses an IBM 4341 and 97 IBM 3278 terminals connected to two IBM 3033s in the processing center in Ft. Washington, PA. Major applications are writing and billing policies.

Prudential is required, as is every insurance carrier, to write a share of assigned-risk business insurance, which is for policy holders who don't otherwise meet insurance carriers' requirements. Prudential managed this one line of insurance manually until it learned, in 1977, that Business Computer Systems in Garland, TX, had a computerized system that could write and bill assigned-risk policies. BCS was given a contract, which ran from March 1977 to March 1981, to run this application for Prudential. By 1980 Prudential had developed its computer system to such an extent that it realized it would be better off doing its own processing. Prudential needed to convert the DOS version of the application purchased from the service bureau to its own OS system. Comp Act Data Systems Inc. was contracted to perform the conversion.

This would have been a normal conversion but for the geography. As Harbina explains, "We are located in Holmdel, but the processing department was in Lynwood, NJ; the actual computer processing was done in Garland, TX, and the conversion was to be performed in Sherman Oaks, CA. What's more, the in-house processing for the corporate office was done in Roseland, NJ, but our part of the processing was being moved to Ft. Washington, PA." In September 1981, the final plans for conversion of 37 programs from DOS to OS were formulated with Comp Act Data Systems. (Continued on page 50)

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**David Litwack is Cullinet's Vice President of Product Development. Mr. Litwack has contributed significantly to the many technical advances Cullinet has achieved in database software products, including IDMS/R. Mr. Litwack joined Cullinet in 1976. He is a Cum Laude graduate of Brandeis University and holds a Masters in Computer Science from Boston University.*

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IDMS/R is not only a relational database management system, but a particularly powerful one. IDMS was made relational by removing all pointers and allowing the user to define data as tables and providing the traditional relational operators such as selects, projects and joins. The major benefit of a relational DBMS is the capacity to develop applications faster because the developer does not have to be concerned with the database design. IDMS/R provides this and much more.

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SNYDERS

(Continued from page 48)

According to Harbina, to do the conversion in-house, Prudential would have had to either train its staff in DOS or hire some new programmers. "If we had had to do this on our own, it would have taken our staff of six programmers 10 months," he says. Comp Act Data Systems completed the conversion in 45 days.

At the R.P. Scherer Corp., Richard Thifault, manager of information services in St. Petersburg, FL, found he had to convert his NCR Neat/3 programs when the corporate office requested some of his software packages. The corporate software is written in Cobol.

R.P. Scherer Corp., with world headquarters in Troy, MI, has 17 subsidiaries in 11 countries, annual sales of \$170 million, and 2,250 employees. The pharmaceutical manufacturer is, according to Thifault, the world's largest manufacturer of soft-shell gelatin capsules. The company uses a 3-Mbyte NCR 8500 with 35 NCR 7900 terminals for online applications. Major applications are manufacturing and accounting.

To convert the packages, Thifault brought in The King Co.'s King/Tran conversion package. Three packages—corporate financial statements, assets, and accounts payable—have been converted in three months.

Without King/Tran this conversion would have taken three times longer, according to Thifault. The conversion package saved more than just programmers' time, it also saved paying for time on an outside computer to convert the system and do all of the testing and debugging. "Using the package, we converted it on our mainframe, copied it onto a disk that was compatible between the two systems, and did only the testing outside," says Thifault.

At Milbank Mutual Insurance Co. in Milbank, SD, a regional subsidiary of Royal Insurance Co. Inc., Gary Mohs, manager of data administration, knew that one conversion at a time is difficult enough. When

management decided—in the middle of the one conversion—to upgrade the system from DOS to OS, he called on Lincoln Land Software Systems Inc. for help.

Milbank Mutual Insurance has an annual premium volume of \$65 million on fire and casualty insurance for homes and autos. The carrier has 80 IBM 3278 terminals in branch offices linked to an 8-Mbyte IBM 3031. Major applications include automated claim systems, direct billing, and accounting functions.

Explaining the problem, Mohs says, "About 95 percent of our programs were written in Assembler when we decided to convert them to Cobol. In fact, we had already started writing programs in Cobol when management decided to upgrade our system to MVS. At that point, we knew we needed help with the Assembler conversion." The carrier had 1,000 Assembler programs to convert.

"We had 100 programs written in Autocoder and a programming staff trained only in Cobol."

Fabi, Du Pont

Ethicon Inc., a division of Johnson & Johnson Inc., specializes in the production of wound-closure devices, such as staples and sutures. The 5,000 employees are located in plants in Cornelia, GA, Albuquerque, NM, San Angelo, TX, and Somerville, NJ. The company has an IBM 3083 and an IBM 4341 with 16 Mbytes each. About 400 IBM 3270 terminals access the computers. Major applications include standard manufacturing types, such as shop-floor control, and financial applications, such as payroll and accounts receivable and payable.

Ethicon had been using two IBM 4341s. As applications grew, more memory was needed. One 4341 running under DOS was replaced with

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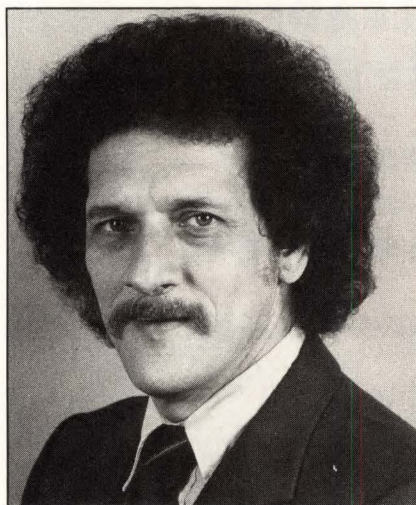
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SNYDERS ON SOFTWARE

the 3083 and an OS system. Richard Lack, manager of systems engineering at Ethicon in Somerville, NJ, brought in the Focus DOS-to-OS conversion system from Arkay Computer Inc. The conversion of 4,000 programs was started in February 1982 and completed one year later. One of the major benefits, according to Lack, was in the JCL (job-control-language) conversion. He says, "We saw about a 75-percent increase in accuracy and consistency in JCL usage switching from DOS to OS." To sit down and create OS JCL based on a DOS JCL listing would have taken about four months alone.

Leaving IBM behind

Not everyone converts to IBM. At RCA Solid State Division in Somerville, NJ, Hank Miller, manager of semicustom design system engineering, converted from an IBM system to a DEC VAX.



"We had to convert from DOS to OS when we moved a system from a service bureau to in-house. It will probably save us a half-million dollars over three years." *Harbina, Prudential*

The RCA Solid State Division is a supplier of digital MOS integrated circuits and semiconductors with cus-

tomers throughout the United States and Europe. Explaining the operation, Miller says, "If your company wishes to make a new engine controller, you can use our software tools to do your logic designs, and then we can use those tooling designs to manufacture prototypes for your evaluation. It would normally take up to nine months for a semiconductor company to do a handcrafted design; we can now do it in about 12 weeks."

RCA Solid State had been using IBM with packages written in PL/1 for designing the internal circuitry of its products. However, when it decided to provide Tymshare Inc.'s Tymnet service, it converted to an 8-Mbyte VAX-11/782 computer. Miller contracted with Unilogic Inc. to assist in the conversion.

The conversion from IBM PL/1 to the VAX system was completed in 45 days. If this conversion service had not been available, Miller says,

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SNYDERS ON SOFTWARE

the system would have had to be rewritten.

In recent years conversions from older disks to the new, smaller disks have also been taking place. At Burgoyne Inc., in Cincinnati, Charles Whitford, vice president of data processing, is converting from IBM 2314 disk drives to 3375s. With SDI's conversion tool, files need not be rewritten.

Burgoyne Inc., with 204 employees in offices in Cincinnati, San Francisco, and New York, is a private research organization with two divisions, consumer research and sales research. The company uses a 2-Mbyte IBM 4341 for research reporting, as well as typical accounting functions.

Burgoyne's old system was an IBM 360 Model 50 with two strings of 2314 disk drives with 100 ISAM files; it converted to an IBM 4341 with model 3375 disk drives and

VSAM files. "When we converted," says Whitford, "we needed a quick way to bring the ISAM files over to the 3375; so we installed SDI's Universal Disk Compatibility."

"We found that using the conversion package increased accuracy and consistency in JCL."

Lack, Ethicon

The conversion project was started in May of last year. Whitford estimates that he is now halfway through the VSAM conversion. However, he can already discuss benefits. Converting to the 3375s has meant eliminating the \$2,000-a-month maintenance bill for the 2314s. The 2314s also required a 20-by-12-foot room that is now free for new printers.

"Not only are we saving money and freeing up space," says Whitford, "but we're also gaining time with the faster 3375s."

A few pointers

Though conversion software can be an enormous help, some users with experience offer these guidelines.

- Have a written plan before you start the conversion.
- If the conversion is going to be performed by an outside company, provide that company with a written plan, and make sure you communicate at all stages.
- Do a complete conversion with the smallest program before attempting other programs.
- If your current system is not big enough to handle the conversion, arrange for outside computer time well in advance.
- Use your most experienced staff to do the conversion. □

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by John Seaman, Data Communications Editor

DATA COMMUNICATIONS

The advantages of micro modems

Modems aren't the only option for personal-computer communications, but they are the most widely used. At the end of last year, 15 percent of the personal computers used in corporations

and smaller businesses had modems, says Ken Bosomworth, president of International Resource Development, a Norwalk, CT-based consultancy. By the end of 1986, the percentage of micros equipped with

modems will more than double, he predicts.

Modems are popular for several reasons. First, prices have been falling for some time, notes Gordon Stitt,

(Continued on page 58)

A sampler of micro modems

At least 40 vendors offer modems for personal computers. Perhaps a dozen sell integral cards that can be slipped into the machines; the others make separate

boxes. A sampling of five important vendors follows. (C) signifies a plug-in modem card, all others are stand-alone modems. All speeds are baud rates.

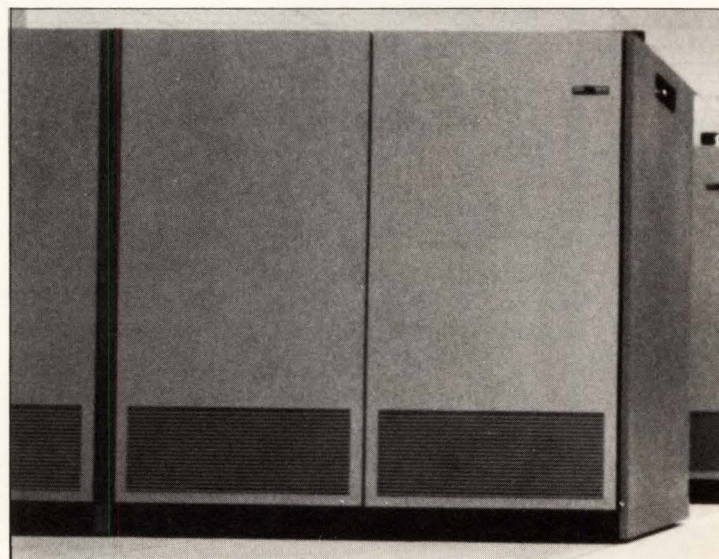
Vendor	Product	Speed	Requirements	Price	Circle
Hayes Microcomputer Products (404) 449-8971	Smartmodem 300	300	Any micro with RS-232C port	\$289	445
	Smartmodem 1200	300 & 1,200	Any micro with RS-232C port	\$699	
	Smartmodem 1200B (C)	300 & 1,200	IBM PC, XT and compatibles	\$539	
Novation (213) 996-5060	Apple-Cat II (C)	300 & 1,200	Any Apple model	\$389 (incl. software)	446
	Smart-Cat 103/212	300 & 1,200	Any micro with RS-232C port	\$595	
	212 Auto-Cat	300 & 1,200	Any micro with RS-232C port	\$249	
	PC-Cat (C)	300 & 1,200	IBM PC	\$595	
Racal-Vadic (408) 946-2227	VA212PA	300 & 1,200	Any micro with RS-232C port	\$695	447
	IBM PC Modem (C)	300 & 1,200	IBM PC	\$599 (incl. software)	
Rixon (301) 622-2121	PC212A (C)	300 & 1,200	IBM PC	\$499 (incl. software)	448
	R212 Intelligent Modem	300 & 1,200	Any micro with RS-232C port	\$499	
	Executive 212	300 & 1,200	Any micro with RS-232C port	\$599	
Ven-Tel (408) 727-5721	PC Modem Half Card (C)	300 & 1,200	IBM PC, XT and compatibles	\$549 (incl. software)	449
	PC Modem 1200 (C)	300 & 1,200	IBM PC, XT and compatibles	\$499 (incl. software)	
	HP 150 Internal Modem (C)	300 & 1,200	HP 150	\$425	
	1200 Plus	300 & 1,200	Any micro with RS-232C port	\$499	

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Photo courtesy of McDonnell Douglas Corp.

DATA COMMUNICATIONS

(Continued from page 55)

personal-computer-products director for Ven-Tel, a modem vendor. A top-of-the-line micro modem that cost \$700 at the end of last year will cost about \$500 by the end of 1984. Modems on slip-in circuit cards will cost even less, he says. Second, a personal computer equipped with a modem can communicate with machines in the same building or on the same campus, *and* work with outside databases and personal computers via the public phone network.

By installing modems on personal computers, an organization can build what Stitt calls "a dialup micro network." Obviously, a network that uses existing phone wiring is a lot easier and cheaper to install than one that requires new cable. "Instead of running 50 individual lines to 50 micros, you can use modems and four or so telephone lines," he says. "If information isn't being transferred continually, why pay for fixed wiring?"

In comparison, most local-area networks (LANs) require new wiring, hiking the cost per personal-computer connection as high as \$1,000, including software. Adding dedicated phone lines for cross-country communications can cost up to \$1,000 more each month.

Flexibility was the reason modems were chosen as the nervous system of a network of 89 high schools and 12 colleges set up by the Educational Testing Service (ETS), Princeton, NJ. Students in the program are learning how to use personal computers. Each of the colleges monitors the programs run by clusters of the high schools.

Each educational institution has 15 IBM Personal Computers, one of which is equipped with a Smart-modem from Hayes Microcomputer Products. The 101 modems in the network link students in all of the schools in the program, and also give them access to The Source, an online database, and Bitnet, an educational network. The public phone network and Tymnet carry interschool communications. "Even though our users are only high-school students, they're



"Instead of running 50 individual lines to 50 micros, modems let you use four or so telephone lines for communications." *Stitt, Ven-Tel*

able to use a fully professional system," says Roger Kershaw, director of research technology for ETS. "We're especially happy with the automatic-dialing feature of the modems."

Kershaw ran into a technical problem when setting up the network. The modems weren't compatible with some of the private automatic branch exchanges (PABXs) in the member schools, preventing some schools from gaining access to the outside databases. The schools themselves overcame this problem by installing direct lines to the modem-equipped micros or bypassing their PABXs.

Modem-PABX incompatibility is just one of the things that can go wrong in a dialup network of personal computers. Communications can be compromised if your PABX doesn't have enough capacity to handle the increased traffic generated by micros. Stitt cautions: "Data calls tie up the lines longer than voice calls, and you'll have to be careful not to overload your PABX."

Stitt also acknowledges a potential security problem. The public network is, after all, public. "You'll need passwords or some form of encryption for sensitive information," he says. If secrecy is vital for your organization, modems probably aren't the best way for you to link your personal computers. Other network systems are more

secure than those based on modems, he says.

There are four ways to orchestrate corporate personal computers, says Bosomworth. First, personal computers can be made to emulate IBM 3270-type terminals. In this instance, micros require synchronous modems, which cost from \$1,200 to \$4,000. In most instances, however, the modems can be shared by several users. An IBM 3274 or 3276 controller equipped with one of these modems, for example, allows 32 terminal-emulating personal computers to communicate.

The second option is to use a digital PABX for communications between personal computers. However, if the PABX is also handling voice communications, you risk choking it off. Many of the new digital PABXs attempt to solve this problem by squeezing many data channels onto a single voice channel. For example, the new Rolm CBX II puts 32 data channels onto a single voice path.

However, PABXs don't offer a per-connection cost advantage over modems, says Bosomworth. Each micro hooked to the switch needs an interface box, which costs about the same as a modem.

An LAN is the third alternative. LANs can handle micro-to-main-frame communications and file transfers at much higher speeds than standard micro modems. LANs eliminate the need for modems but still require a network interface, and once again, the interface costs about the same as or more than a modem without giving you the same flexibility.

The fourth alternative to micro modems is a data-only PABX. This device leaves voice communications to be switched by a separate PABX. It moves traffic more quickly than modem-equipped personal computers, but it offers no per-connection cost advantages, says Bosomworth.

The first consideration when planning a network of personal computers using modems is compatibility. "What will your users be doing?"

(Continued on page 62)

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Intelligent line data display	Yes	No	No
User-programmable automatic alarms trap	Yes	No	No
Protocol discrepancy alarms	Yes	No	No
Line utilization analysis	12 real time and 30 databased components	3 real time components	2 real time components
Network configuration recognition	Automatically generated and verified	Manual entry required	Manual entry required
Entire database available to host	Yes	No	No
Local (non-host) database	Yes	Yes	Yes
Low maintenance design	Yes	No	No
Special A.C. power	None required	Required	None Required

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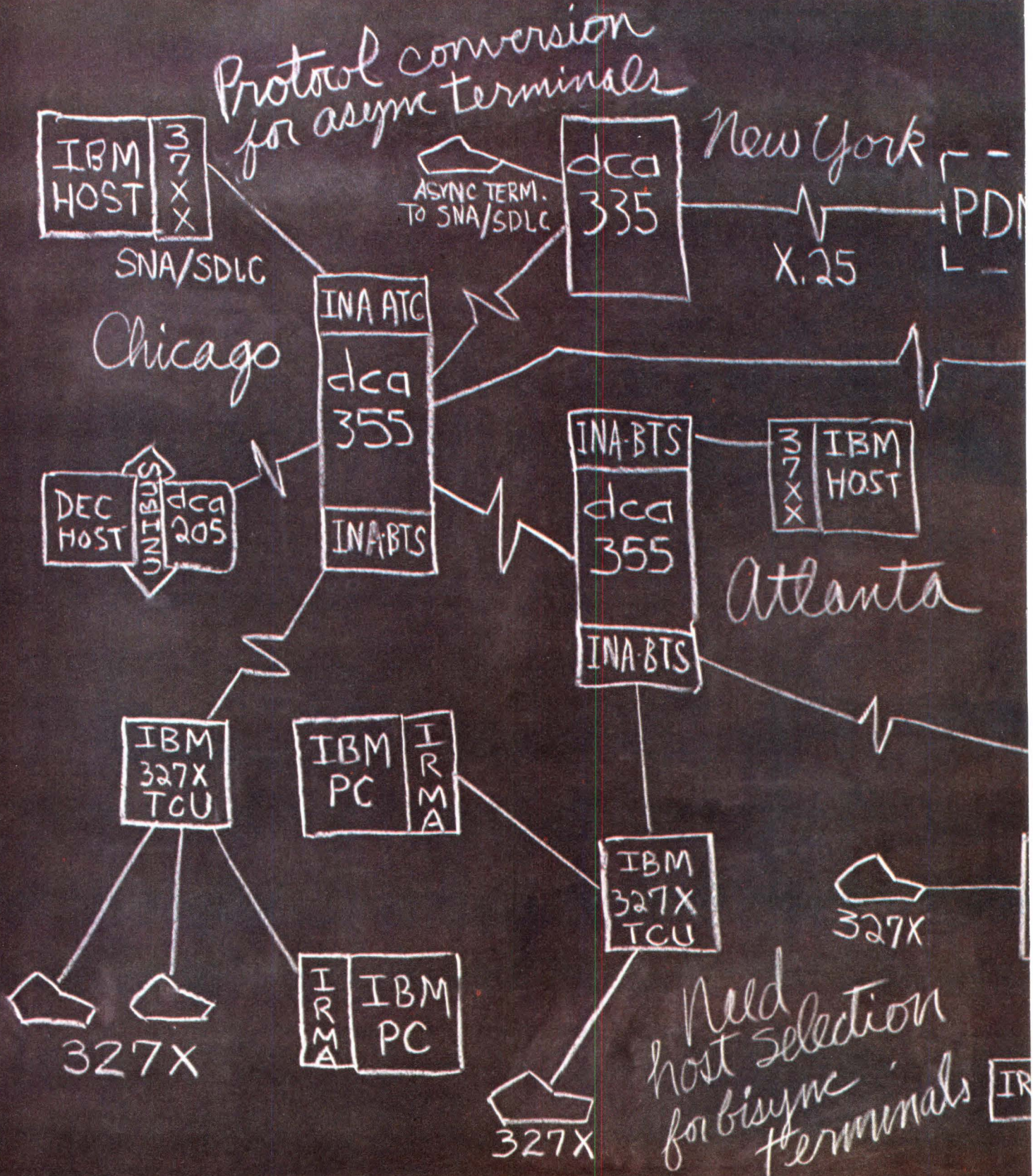
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DATA COMMUNICATIONS

(Continued from page 58)

asks Pat Bishop, marketing analyst for Hayes Microcomputer Products. "Whatever they are doing, compatibility with the modem at the other end of the line is imperative."

Compatibility, in this case, applies not only to equipment, but also to tasks. Personal computers that will use modems to access mainframes probably will require a synchronous rather than asynchronous protocol. Other protocols are fine for communications between personal computers and outside.

You'll also have to choose between acoustic-coupler and direct-connect modems. Acoustic couplers cradle a telephone handset, "speaking" into the mouthpiece and "listening" to the earpiece. These devices are susceptible to outside noise and may introduce more errors into transmissions than you can tolerate. Direct-connect modems generally have lower error rates.

Some direct-connect modems are available as cards that are slipped into special slots in the chassis of the computer. They offer two advantages. They're less expensive than stand-alone modems, and they don't take up valuable desk space. However, they can be used only with the personal computers for which they are designed.

On the other hand, stand-alone modems are more versatile because they are hooked to a personal computer's RS-232C port. They handle the communications of different brands of micros, and if you have to rearrange an office, they're easy to move.

The choice between the two common transmission speeds offered on micro modems is simple. Nearly all personal-computer modems transmit data at either 300 bits per second or 1,200 bits per second. The faster speed is best for business users be-

cause it cuts online time for long transmissions.

When choosing micro modems, software is a fundamental consideration. "Software helps maintain the necessary protocols and parameters," says Bishop. The software that comes with the Hayes Smartcom II, for example, makes the modem compatible with the IBM Personal Computer and the Rainbow 100 by Digital Equipment Corp. Many modems are sold with "bundled," or built-in, software.

Smartcom II and other modems also include extra capabilities, like automatic dialing from a special directory, passwords, terminal codes, and features that make it easier to access outside databases. Students in the ETS educational network, for example, use "macros," special codes that simplify database access.

Federal Communications Commission regulations shape the modem-maintenance options available to your organization. The FCC discourages maintenance by dealers, distributors, or third-party companies by specifying that modem maintenance is the vendor's responsibility. With FCC approval, a vendor can authorize a third party to repair its modems.

The standard procedure is repair by vendors at service centers. That could mean long delays for shipping, but many dealers supply replacement units while the defective unit is out for repair. Limited warranties are also fairly standard. For instance, Ven-Tel replaces defective modems in the first 30 days of use. Modems that break down during the first two years are repaired free, but must be returned to Ven-Tel.

For faster maintenance, Ven-Tel offers a fast-action policy that costs a little more. Ven-Tel guarantees 24-hour service under the policy, but your organization pays a fee equal to 15 percent of the cost of the defective component for the service. Ven-Tel and other vendors also have toll-free phone numbers to help dealers and users resolve service problems. □

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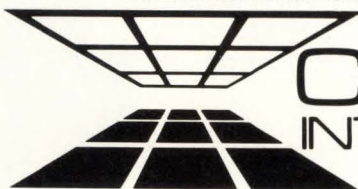
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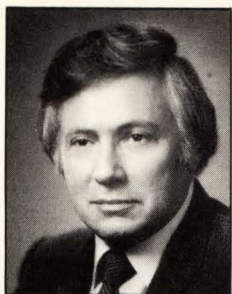
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by Robert T. Fertig

FOLLOWING THE LEADERS

On top today, toppled tomorrow

Software for personal computers is highly vulnerable to obsolescence and replacement. This is a matter of concern to information-handling managers because they may have selected (or be supporting) a product that is likely to be toppled in the next market shakeout.

Consider CP/M. It was the dominant operating system for personal computers until IBM made a deal with Microsoft and adopted PC-DOS (its own version of Microsoft's MS-DOS) as the standard operating system for the IBM Personal Computer. There is plenty of evidence that IBM was also negotiating with Digital Research for rights to CP/M,

but made a deal with Microsoft instead. In any case, the IBM-Microsoft agreement has made MS-DOS the current market leader in operating systems.

However, a new leader—perhaps Bell Laboratories' Unix—may appear by next year. The industry is moving toward more advanced, true 16-bit and 32-bit microprocessors, with the need for multi-tasking, multi-workstation software support. (The table, "Operating systems," sums up some key product variables for major microcomputer operating systems.)

Ashton-Tate, the current leader in database management systems (DBMSs) for micros, is also vulner-

able, but for different reasons. Ashton-Tate's dBase II has an estimated 150,000 installations—plus, perhaps, another 30,000 illegal copies—worldwide. That represents probably 65 percent to 70 percent of *yesterday's* personal-computer market. (Only about 8 percent of all *professional* personal computers installed last year had *any* DBMS.)

Yet dBase II is not the best DBMS available today. The Ashton-Tate offering is not a *true* relational DBMS. It offers neither vendor-supplied data-security features nor automatic file backup and recovery. In addition, the December 1983 *PC World* reported that the dBase II code contains many bugs and that, under certain conditions, the software will destroy files. *PC World* also noted

Operating systems

Comparison of leading operating systems for personal computers on a scale of 1 (poorest) to 5 (best).

Vendor	AT&T	Microsoft	Microsoft	Digital Research
Operating System	Unix	MS-DOS	Xenix	CP/M
Product differentiation	4	4	4	3
Retail-price positioning	4	2	4	2
Feature richness	4	3	4	2
Ease-of-use/learning	2	4	3	4
Documentation	3	4	4	4
Performance	2	4	2	3
Reliability	5	5	5	5
Technical extensibility	5	4	5	3
Current product-growth path	4	5	4	4
User lock-in potential	4	4	4	5
Portability to major micros	4	5	4	5
Compatibility with IBM mainframes	3	2	2	2
Compatibility with other software	4	5	4	5

Source: "Personal Computer/Microcomputer Software—Strategies for Success," EIS Inc.

FOLLOWING THE LEADERS

that dBase II can only handle two files and a restrictive number of records. Even with these serious limitations, the Ashton-Tate package dominates the micro DBMS market. What's more, Ashton-Tate expects to penetrate the Fortune 1,000 personal-computer sites this year. How come?

The dBase II vendor must be doing something right. Ashton-Tate happened to be first into the market delivering a product (created by others) that filled an obvious need. It also promoted that product cleverly with lots of advertising dollars. In addition, it achieved product leverage by using third-party software houses, original-equipment manufacturers (OEMs), independent sales organizations, retailers, and other distribution channels and methods.

In the early stages of a new mar-

ket, less-than-standard or even inferior products can be successful—temporarily. Ultimately, however, the best product wins—if it also has good marketing, brand recognition, and support. (Even the best product will rarely succeed without those.) Have any competitors emerged to challenge dBase II's lead in the micro DBMS market?

In fact, several excellent DBMS products have recently moved down from the mainframe and minicomputer level to the personal-computer level—and at affordable prices (less than \$1,000). Examples include Oracle Corp.'s Oracle, Information Builders' Focus, Mathematica's IT Series, Applied Data Research's Datacomm/DB, Condor's System:20, MDBS's namesake package, and DJR's FMS-80, among others.

These products are built on a more

solid architectural and design foundation than dBase II. They are true relational DBMSs; their code is more stable; backup and recovery, as well as data-security features, are built into them; excellent query languages are supported; and the suppliers and products have a substantial track record (on mainframes and minis).

These vendors have many Fortune 1,000 reference accounts, too. That is significant because those Fortune 1,000 MIS departments are staffed by trained, experienced data-processing professionals who are qualified to advise management on the technical advantages and weaknesses of DBMS products.

The non-computer-literate managers and professionals in corporate departments and smaller companies are rarely as well qualified as these

Database management systems

Comparison of leading database management systems for personal computers on a scale of 1 (poorest) to 5 (best).

Vendor	Ashton-Tate	Condor	DJR	MDBS	Oracle
DBMS	dBase II	System:20	FMS-80	MDBS	Oracle
Product differentiation	4	3	4	4	5
Retail-price positioning	4	4	2	5	3
Feature richness	4	4	5	5	5
Ease-of-use/learning	3	4	5	1	4
Documentation	3	4	5	4	3
Performance	3	4	4	3	3
Reliability	5	5	5	5	4
Technical extensibility	4	4	5	5	5
Current product-growth path	4	5	5	5	3
User lock-in potential	5	5	5	5	5
Portability to major operating systems	5	4	5	5	2
Portability to major micros	5	4	5	5	3
Compatibility with IBM mainframes	2	2	2	3	5
Compatibility with other software	5	3	4	3	2
Integrated productivity-tool sets	2	1	2	2	1

Source: "Personal Computer/Microcomputer Software—Strategies for Success," EIS Inc.

dp professionals to make judgments about the merits of any DBMS. Though they may be given the responsibility for buying personal computers, they generally don't know the right questions to ask about specialized software like DBMSs, and they haven't the time or interest to study or compare the technical details of these systems.

While Ashton-Tate does plan to invest part of the money it obtained from a recent public stock offering in improving dBase II, that may not be enough to make the product attractive to the knowledgeable MIS execs in Fortune 1,000 companies. Truth is, it's a lot easier for more advanced, time-tested DBMS products to move down to the personal-computing level than for a less advanced product to move up to serve the requirements of the Fortune 1,000. (The table, "Database management systems," compares some of the key variables for leading micro DBMSs.)

Productivity-tool sets, also known as integrated software and window software (because they have multiple, overlapping screens that provide a more simplified user-command interface), are another important category of personal-computer software. The three best-known personal-computing packages of this type are Lotus 1-2-3, Microsoft's MS-Windows, and Visicorp's VisiOn. Other very innovative products have recently been introduced, including Mathematica's IT Series, MDBS' Knowledgeman, Quarterdeck's DESQ, and Context's MBA.

The current market leader in this arena is Lotus 1-2-3. However, its position is being seriously challenged by all the competitors mentioned above. In terms of technical merits, Lotus 1-2-3 lacks both icons/symbols and touch-screen capability; more important, it doesn't have any DBMS foundation. And it is not as feature-rich as DESQ, MS-Windows, or

VisiOn. On top of all that, IBM is now supporting VisiOn. (The table, "Productivity-tool sets," analyzes some of the major packages' features.)

In all three of these personal-computing software segments, market shares are shifting, and today's leaders in operating systems, DBMSs, and productivity-tool sets are vulnerable. They are threatened by new competitive offerings from innovative and well financed challengers who could leapfrog over them in a dynamically growing personal-computing marketplace. □

Robert T. Fertig is founder and president of Enterprise Information Systems Inc. This article is based, in part, on a new EIS Inc. research report: Personal Computer/Microcomputer Software—Strategies for Success. For more information on this report, write to EIS Inc. at P.O. Box 1154, Greenwich, CT 06836.

Productivity-tool sets

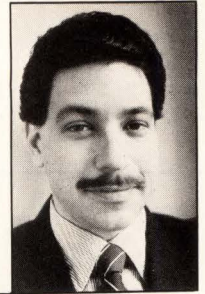
Comparison of leading productivity-tool sets on a scale of 1 (poorest) to 5 (best).

Vendor	Lotus	Context	Mathematica	MDBS
Product	1-2-3	MBA	IT Series	Knowledgeman
Product differentiation	5	5	5	5
Retail-price positioning	2	3	3	3
Feature richness	4	4	5	5
Ease-of-use/learning	5	4	5	2
Documentation	5	5		4
Performance	5	3	4	3
Reliability	5	4	4	5
Technical extensibility	5	4	5	5
Current product-growth path	2	3	5	5
User lock-in potential	3	3	5	5
Portability to major operating systems	5	5	3	4
Portability to major micros	5	4	3	2
Compatibility with IBM mainframes	3	2	5	4
Compatibility with other software	5	4	5	4
Scope of components	3	4	5	2

Source: "Personal Computer/Microcomputer Software—Strategies for Success," EIS Inc.



by Randy J. Goldfield and Dan Burstein



OFFICE AUTOMATION

How to read OA advertising

We live in an age and a country of hype and superhype. Our dependency on technology and desire for immediate gratification have created an environment where we are buffeted and pecked at every turn with information we never knew we needed. Most of the information is superfluous and some of it only marginally accurate; much is actually misleading or patently untrue. In this wasteland of publicity, computer and office-automation advertising is especially prone to misrepresentation and hyperbole.

Through the labyrinth of advertisers' half-truths, wishful thinking, and last resorts, there is a thread to follow for those who look sharp. To help you on your way, here is an outline of the six deadly sins of office-automation advertising.

- The first deadly sin: *introducing a product you ain't got*.

Even the industry giants have been known to offer products months before they can be delivered. In desperation, smaller companies have countered by offering products whose working prototypes have yet to be developed. This particular snake in the grass requires skepticism because it may not be apparent from an ad that the product is merely a figment in some technician's brain. Promises are hard to bank on but harder still to run a spreadsheet on.

- The second deadly sin: *the "totally new" concept in computer technology*.

This sin beckons with an exhortation to stand out from the crowd. "Don't go with the herd." "Don't be a sheep." This translates, "Pick up our

gear, even though it is incompatible with everything else on the market." It frequently means too that the product can't be integrated with other systems, or its applications are few, or its software limited. Although the implication of such an ad is that the user will move ahead of the crowd, it may, in fact, end up dining on the dust.

- The third deadly sin: *the name in lights*.

Another popular ploy in OA advertising is getting the famous face to plug the product. These faces sell everything—brokerage services, automobiles, pudding mixes—so why not computers? What the celebrity's got—and lots of it—is personality. So what he or she usually sells is the personal, identity-related product, such as pantyhose, toothpaste, fad foods, shampoo, clothes, and diet aids. When you get down to it, how many movie stars made their names with technological savvy? They may know how to wear their hair, but what do they know about maintaining a database? The public is not so naive as to choose the personal computer recommended by a sit-com star, is it?

- The fourth deadly sin: *ergonomics*.

Ergonomics, the study of relating man and machine, is not as profound as it sounds. How hard is it, after all, to raise or lower a keyboard or tilt a screen? While these amenities are helpful, it has yet to be proved that such minute attention to the human body, which is itself a highly adjustable instrument, is required to produce any long-term measurable increases in productivity. The bottom line, in this less than perfect world, is pro-

ductivity and profit, not the spring in the operator's step. Those who do the buying rarely do the sitting. When the ad emphasizes the ergonomic virtues of its product, you should ask yourself why the more significant characteristics are ignored.

- The fifth deadly sin: *succumbing to cute*.

Another advertising tactic whose validity approaches that of confederate currency is trying to make machinery look lovable. This strategy is designed to appeal to those customers who should not be in the market in the first place. The smart OA buyer knows that computers are not for curling up with at night; hence, they need be no cuter or fuzzier than a rake or a vacuum cleaner.

- The sixth deadly sin: *stressing the rudimentary*.

Buzzwords, such as "cost-effective," "productivity tool," "upgradable," "expandable," and the vaunted "user-friendly," are the spoor of this hobgoblin. These are qualities you shouldn't be reading about in an ad because the equipment that *can't* promise them is worthless. Sophisticated buyers want to know what sets one machine apart from the others.

Adequately armored against the slings and arrows of outrageous advertising, you should be able to find the newest, best, and most realistically represented in computer technology if you read carefully—especially between the lines. □

Randy J. Goldfield is president and Dan Burstein is senior media consultant of the Omni Group Ltd., an office-automation consulting organization based in New York City.

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by Mary Miles, New England Editor

YOUR CAREER

Managing employees you could do without

Ask any manager which subordinates bug him or her most, and chances are you'll hear about the office pest, the goldbrick, the excuse maker, and—this one may surprise you—the workaholic. The first three clearly spell lower productivity; the last, the workaholic, may produce more and better work but may engender such resentment and even sagging morale among other workers that the overall effect is decreased productivity. Yet the workaholic is usually loved by the boss.

The workaholic

Take Terry Feverish, who comes in voluntarily on weekends, stays late to complete assignments or start new ones, and always does the job well. Terry's boss loves having him on the staff.

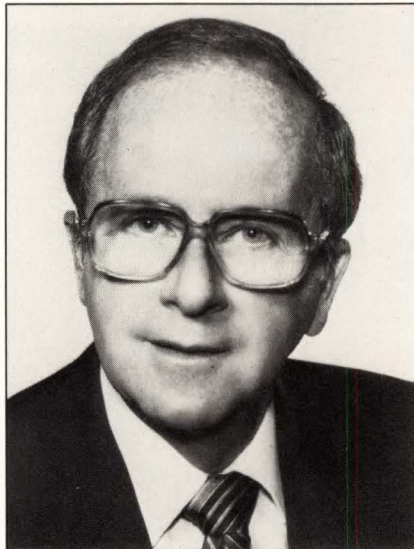
But how do Terry's co-workers feel? Though most are trying to do their jobs well, here's this Feverish person working twice as hard and making everyone else look like slouches!

One dp-department employee reported that she was so anxious to learn her new job and make a good impression that she routinely came in early, worked through lunch, and stayed late. "I do tend to be a perfectionist," she says, "but I really love my work, and I intend to go far!"

She was surprised that her boss and co-workers had opposite reactions to her. "At the end of my first month," she explains, "a group of colleagues invited me to lunch. They told me that I really shouldn't be putting in so much extra time, that management didn't approve of it. One individual actually said, 'It could make you look bad—as if you can't

get your work done in the scheduled time.' But what I heard was, 'It makes the rest of us look bad, you turkey!'" To confuse matters, the boss called her in shortly afterward and commended her on her devotion to the job, as well as the high level of her accomplishments. "Now I feel like a blasted teacher's pet!" she exclaims.

Doubtless, if the boss had been in closer touch with subordinates, he would have sensed the hostility and foreseen the potential problems of having an addictive worker on board. A manager should be aware that such



Robert Half, of Robert Half International, acknowledges that "everyone goofs off a bit now and then," but asserts, "deliberate and continual time theft poses a serious threat to companies."

employees aren't necessarily positive additions to the staff, and that, sometimes, they can be disruptive influences. Knowing why an individual is an obsessive worker might help in handling this employee.

Marilyn Machlowitz, a New York-based management consultant and author of *Workaholics* (Addison-Wesley, 1980), says that many workaholics use their time productively, have high standards, and do well in the organization. They do not draw lines between business and pleasure; they cannot tolerate inactivity; they enjoy pressure, deadlines, challenges; and they hate the thought of failing.

Machlowitz believes that workaholics have gotten unnecessary bad press. First, she says, the word *workaholic* comes from the negative label *alcoholic*. Second, some psychiatrists and psychologists have advertised a biased notion that all those who adore hard work may have secret, serious problems spurring them on. Third, the families of workaholics are often angry and vocal about being short-changed.

The proportion in the workaholic's life and activities will tell a manager whether his or her devotion to the job is based on a constructive and healthy attitude. Is the idea of failure terrifying or merely irksome? Are the standards of accomplishment unrealistic or within attainable limits? Are friends, families, fellow workers affected negatively by the workaholic's behavior, or does she or he serve as a model, a cheerleader, a positive influence? Is work a way of hiding from serious problems or a joyous and energizing part of life? (Remember the saying that nothing is work unless you'd rather be doing something else?) And is this person obsessed by the need to be regarded as a super-performer?

Is it the boss' job to sort all this out? In a November 21 article in the *Wall Street Journal*, Machlowitz observed that "The manager who has

taken one too many supervisory counseling courses or sat through one too many training videotapes may come to blur the distinction between being a coach, which is all right, and being a counselor, which is inconsistent and incompatible with being a boss." Knowing the difference between a troubled and a troublesome employee is one matter, trying to play therapist is another, says Machlowitz.

What's a boss to do with an employee who is a bona fide workaholic? Machlowitz says that the important issue is one of placement. In what jobs would being a workaholic be an advantage? In what jobs, a disadvantage? A manager must think of ways to praise the workaholic without creating resentment among other employees. He or she must also commend the lesser achievements of other workers without giving the addictive hard worker the feeling that the extra effort was for naught.

The goldbrick

Another difficult employee that demands careful management because of the high cost to the business is the goldbrick. Recruiter Robert Half, of Robert Half International (NY), says that "time theft" is both an overlooked and overwhelming problem in U.S. businesses. He defines time theft as "the deliberate waste, abuse, and misappropriation of on-the-job time."

According to Half, who has been researching time theft since 1970, the signs of a goldbrick are:

- being habitually late for work and/or leaving early
- making excessive personal phone calls, attending to personal business on company time
- deliberately neglecting work
- reducing productivity to create overtime opportunities



Marilyn Machlowitz, management counselor and author of the book *Workaholics*, says workaholics have gotten unnecessary bad press.

- constantly socializing with others.

"We all goof off a bit now and then," says Half, "but deliberate and continual time theft poses a serious threat to individual companies." A study by Accountemps, a large temporary-personnel service and a division of Robert Half International, shows that the average worker spends 32 percent of the workday not working—almost 16 working weeks a year!

Related to the goldbrick, but often less of an intentional work shirker, is the office pest. There is probably more hope of salvaging this person, but what a pain! Like lint in pockets and ants at picnics, the office pest is part of the package in all too many offices.

"Hi," says the pest as he perches atop the stack of unanswered letters on the corner of the victim's desk. "Seen any good movies lately?" (Yes, that's "he" because most of them are men, according to psychologists.) Customarily impervious to polite sug-

gestion ("I am terribly busy"), rudeness, or even total inattention, this person gets on co-workers' nerves—and for good reason. At the very least, the pest causes disruption, anxiety in those awaiting the inevitable daily (or hourly?) visit, and resentment; at worst he creates hostility, serious upset, even requests for transfer. Co-workers may even find themselves sinking to such desperate, unadmirable acts as guilt-producing snubs or unsigned notes to the boss.

Roy W. Walters, chairman of the board of Roy W. Walters & Associates, a personnel agency in Mahwah, NJ, believes that "the underlying reason for office pests' behavior is they either haven't got enough to do or hate like hell what they're doing." The boss, says Walters, must make it perfectly clear that such a person has a job to do and that he will be held accountable for it. "Then, if he's still got time, you know he's either not doing the job or he's got so much talent that he did in 15 minutes what you thought would take eight hours!"

It's important to realize, says Walters, that this situation must be approached as a problem of management, not as a personality or psychological problem. "If a person has an emotional problem, leave its solution to the experts. The employee is there; he or she is getting paid to work; the manager's job is to make his or her time at work productive. If the job is getting done and you still have employees with unused time, you have a staffing problem."

The excuse maker

The excuse maker (or excusaholic) always has a reason, often valid, for not getting the job done. "My spouse is in the hospital, and the transmission just fell out of the car. The job will be a little late. . . . I hope you

YOUR CAREER

understand." If excuses are chronic, you have a tough problem. Chances are you get the assignment eventually and done acceptably, too, but you also get production backups.

A report entitled "Cultivating Ex-

ecutive Stature," published by the Research Institute of America (NY), suggests that excuse makers "may see themselves as victims of forces that prevent them from doing what they really intended to do. Since

these outside events are valid, and not their fault, they feel excused from their failure to measure up." The report recommends several actions the manager can take.

- *Focus on objectives.* Get your facts together, and document each case of procrastination.

- *Don't get trapped into debating the merits of the excuses.* Be firm in asserting that although each excuse existed, the poor performance cannot continue, for the good of the organization.

- *Emphasize that success is possible.* The employee may eventually remind you of the jobs he or she has done right. You can capitalize on this by pointing out, "We need to have that happen more often."

- *Demand that the employee take responsibility.* Impress upon the person that good intentions are no substitute for good performance and that he or she is responsible for fulfilling his or her job.

To deal with those difficult subordinates at work means you have to be, not a psychotherapist, but a good manager. You must be observant, fair-minded, and communicative; you must know the job, your employees, and their behavior patterns. Sometimes the manager must prune his or her work force of ineffective or unsatisfactory workers. But for many problem subordinates, there is a solution. Often a potentially serious problem can be avoided by placing people in jobs that suit their personalities, needs, and abilities. Would the office pest be less of a bother if he had a more responsible, stimulating job? Might the goldbrick be doing work that is so unchallenging that he or she believes his or her services aren't really valuable to the company?

The manager must administrate, assign, and direct job responsibilities in such a way that employees' skills are used most constructively. There will always be difficult people at work, but they don't have to be endured or dumped. Usually, the problems can be solved by good management. That's why you are there. □

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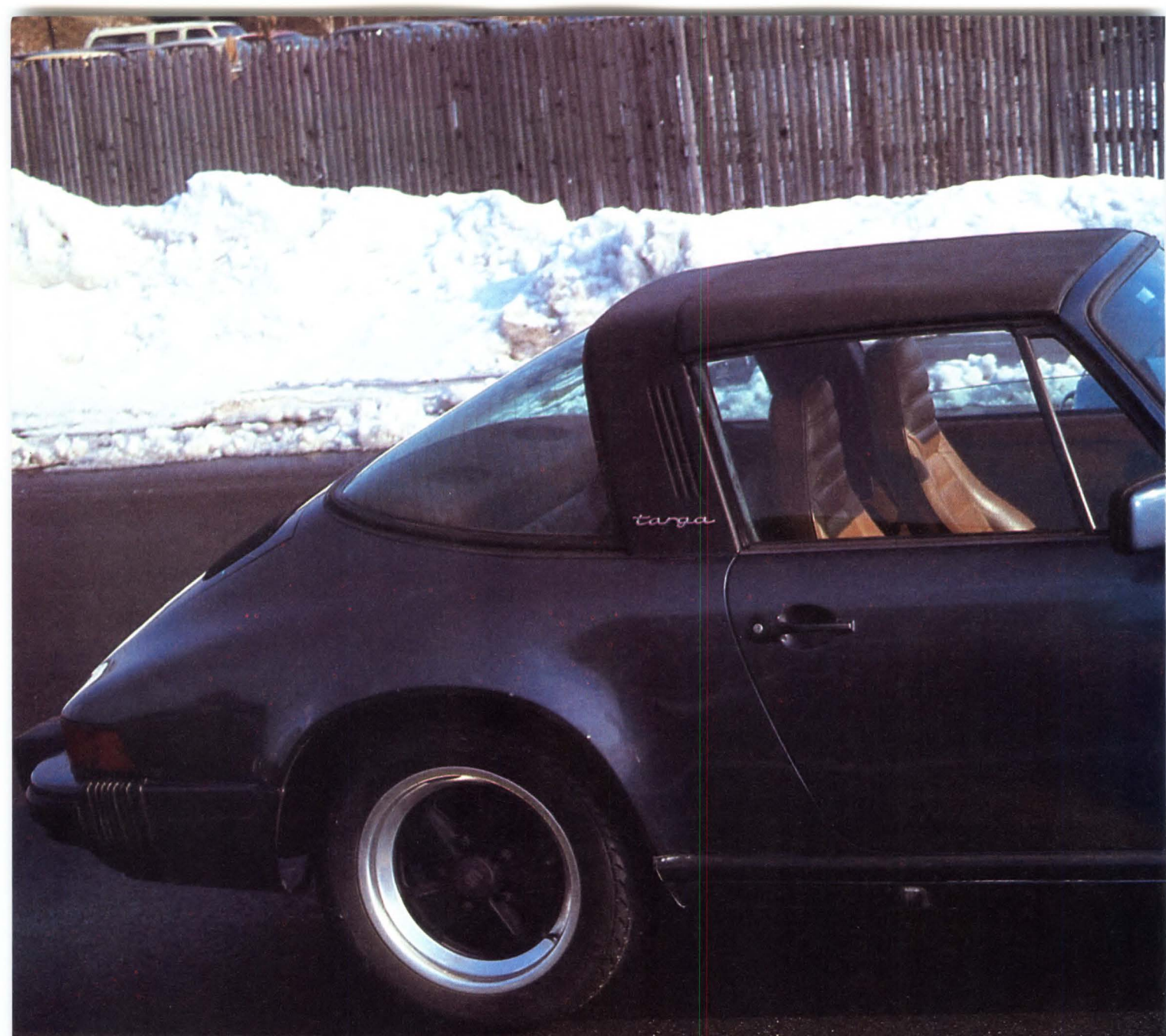
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CIRCLE 47



PABX

WORKING WITH ANALOG, WISHING FOR DIGITAL

Snazzy digital PABXs offer many benefits, but it's prudent to implement them gradually.

By John Seaman, Data Communications Editor



As an acknowledged wave of the future, digital private automatic branch exchanges (PABXs) are causing discomfiture among managers. It's the old "keeping up with the Joneses" syndrome, and many managers are feeling pressured to get with it or be left behind the crowd. Some consultants go so far as to assert that organizations without digital technology are poor relations in the corporate community.

A quick, unconsidered response to this pressure is not

a prudent managerial strategy. Even though you will need to install a digital PABX at some point in the not-too-distant future, rushing to install one may be a disservice to your organization. Certainly, you'll want to install a digital PABX before the whole communications world, local loops and all, goes digital. But that won't happen for about a decade, and in the meantime, your analog PABX will serve you well as you prepare for an orderly, cost-effective move into the digital realm.

Depending on the nature of

your business, the time may not be right to implement a digital switch. "Digital PABX isn't right for every user or every application, at least not immediately," says Kevin Krebs, telecommunications manager for American Motors Corp., Detroit. "Even if digital is right for your organization, you still can't get into it all at once. You may have older equipment to amortize, and you're going to have to budget potentially tremendous new expenses over a period of years."

John King of James Martin Associates, a consultancy in Carmel, CA, suggests that

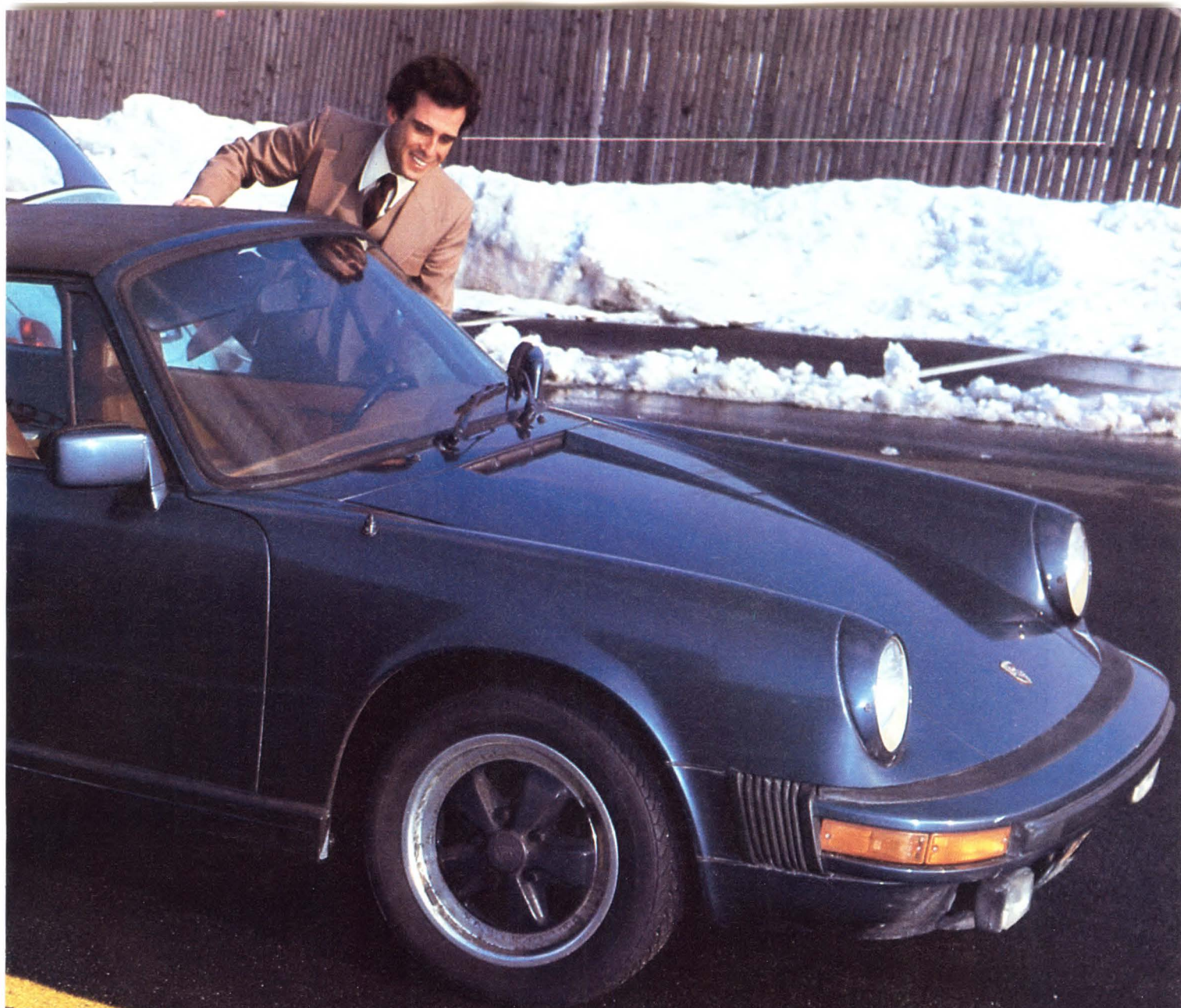


PABXs

before you move you ask yourself one question: "What am I going to do on a digital switch in the next 12 to 24 months that I can't do on my analog switch?" If the answer is "Nothing," you may feel safe to implement a digital PABX gradually, he says.

Digital PABXs do offer more sophisticated phone-management features that can save money, such as advanced station-message-detail recording (SMDR) and least-cost routing (LCR). But analog PABXs offer simple versions of many of the same features. If you view your analog PABX as a stopgap solution with a lot of life left in it, you will have the time to carefully prepare your organization's conversion to all-digital communications.

Even banks, which have been pioneers in digital communications, exercise caution when considering digital PABXs. "We take a very careful look, and if we don't have a foreseeable need for digital PABX, we'll stay with analog," says Rod Coward, telecommunications manager of the First Union National Bank (Charlotte, NC). "The new digital PABX features aren't

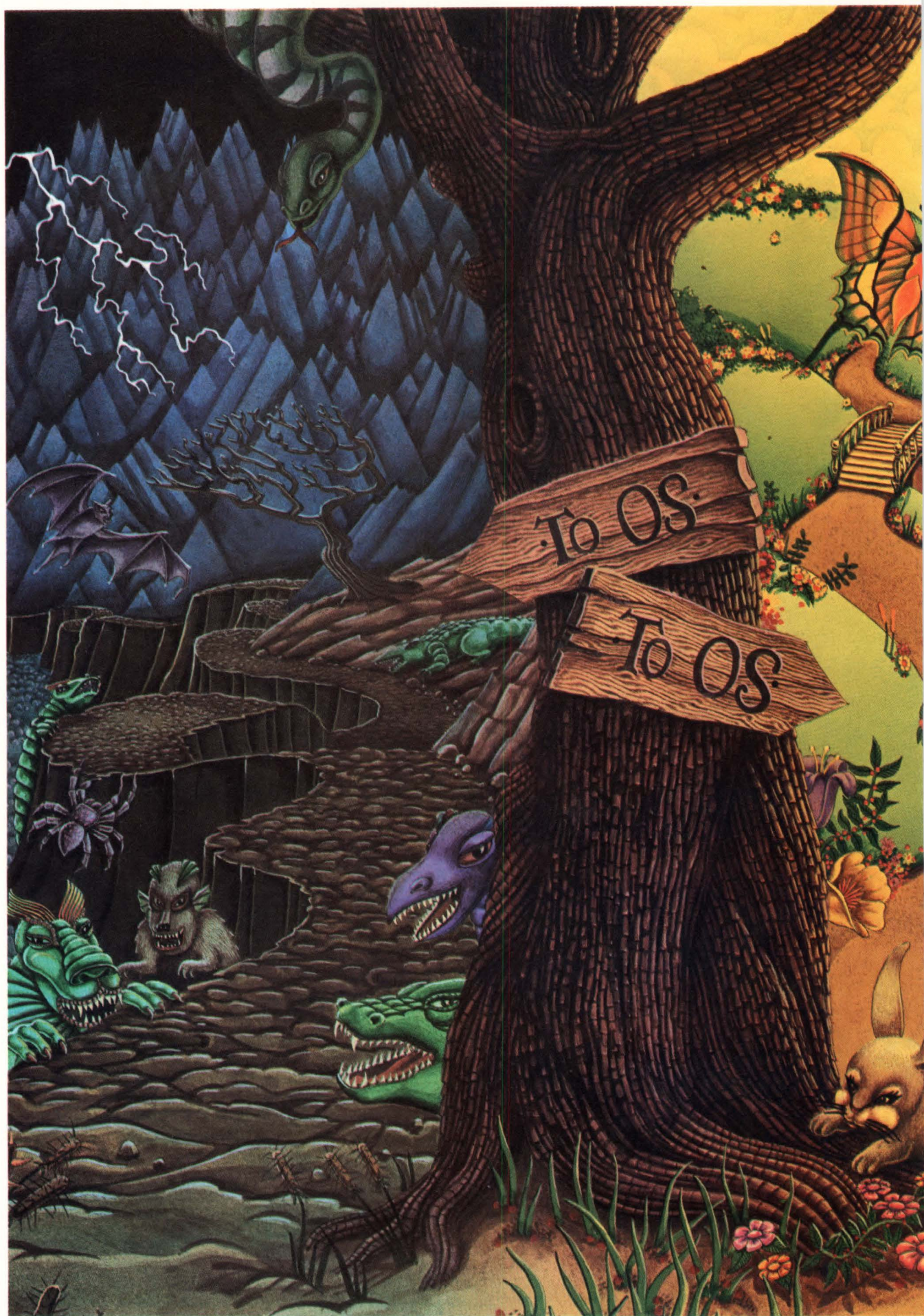


worth a nickel if you don't need them or if they aren't used. If we have a requirement for just one digital circuit, it costs a whole lot less to go analog and use modems for the data link."

Another good reason to plan a phased entrance into digital PABXs is that in the aftermath of the AT&T divestiture, costs have become a mystery. "Nobody knows for sure what's going to happen in the new communications order, and that complicates the digital PABX decision," says Thomas Vicknair, a vice president of Texas Commerce Bank.

Unpredictable costs reduce to guesswork an analysis of the cost of installing a digital PABX. You can probably figure that installation and its attendant employee disruption will exact a certain toll. Beyond that, the cost of equipment and ongoing operations are big question marks. "So many tariffs are being filed, and then are being countermanded by later filings," says AMC's Krebs. "It's difficult to plan."

When the reshuffling is complete, local phone rates will probably have risen, as the various state regulatory bodies hike them to be closer to the true cost of transmission. Although competition is expected to drive long-distance costs down, nothing is certain. Transmission-cost increases





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PABXs

(Continued from page 75)

will be piled on top of the normally higher cost of digital communications. At today's rates, digital costs more than analog, and that isn't expected to change for some time—probably not until the local loops are converted to digital.

The uncertainty about costs extends to whether a digital PABX is more cost-efficient than an analog machine. North Carolina Union Bank determined that digital PABXs cost at least 20 percent more than comparably sized analog switches, says Coward. The size of a PABX determines its price, and the cost difference between digital and analog PABXs narrows as the size of the unit grows. The prices are comparable for installations of more than 100 lines, but for smaller organizations, analog remains the most economical choice.

All of this may change any which way during the next year. "PABX costs may rise after divestiture gets into full swing," says Vicknair. "Some managers will certainly want to start to buy or lease from independent vendors, rather than the local phone companies, and who knows what effect that will have on overall costs?"

If you begin counting down to a launch into digital PABX now, how



can you determine when the lift-off should occur? Look for guidance to the mix of voice and data in your organization's communications traffic. Most of the traffic managed by PABXs today is 95 percent voice. At that level, analog PABX is the most economical solution. Analog switches handle voice traffic better than digital PABXs, and, until the volume of data traffic increases to about 20 percent, the cost of converting to digital doesn't make sense.

The mix of data and voice is expected to change during the next five years, partly because so many personal computers will be going online to internal facilities and outside databases. If a micro user wants to access an outside database (such as The Source), transfer a file to a mainframe, or merely contact another micro, he or she will probably need the switching capabilities of a digital PABX (as well as modems).

There's no question that digital transmission is the future of communications. When the local loops are converted to carry all-digital voice and data communications—probably by 1992—having digital PABXs will be vital. This new world of communications will eliminate the need for modems, and may even cut the cost of communications. To be sure, some special interfaces will still be required. For example, if a digital PABX is hooked to a local-area network (LAN), each connected device will need an LAN interface of some kind. Also, links between LANs and the public digital network will require interfaces.

When all-digital local loops arrive, analog PABXs will suddenly become machines with a glorious past and no future. "Getting into digital PABX today prepares you for the digital future," says James Morgan, a Morristown, NJ-based consultant. A digital PABX can be viewed as a common denominator for corporate tele- and data communications, he says. The same is not true of analog PABXs. "Digital PABXs provide better communications," says Morgan. "Ultimately, they will also reduce the cost of communications."

Your entrance into this world, however, need not be immediate. Many organizations ease into the future by installing a digital PABX at headquarters and shipping older analog PABXs to a branch office.

"We'll probably start phasing in digital PABXs at our central sites over the next five years," says AMC's Kevin Krebs. "But we'll keep our analog equipment at branch sites until technology dictates otherwise. We'll get five more years' service out of some of our analog equipment."

AMC has Dimensions, Horizons, and Bell 770s from AT&T, and is also a Centrex user. However, the prospect of higher costs for Centrex has prompted Krebs to reevaluate AMC's systems. "Centrex probably will price itself out of the market, and I think access charges for Centrex may go through the roof," he says. "Whatever happens to Centrex



"Managers have difficulty predicting what equipment they will need in five years, and so they equip their organizations for the unknown."

Malone, Eastern Mgt. Group

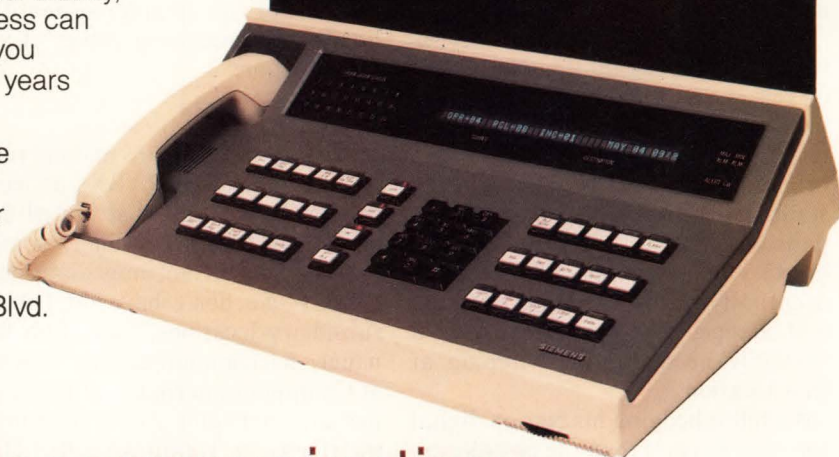
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PABXs

(Continued from page 78)

charges will affect the pace of our move into digital PABXs."

What's the appeal of digital PABX for AMC? Reduced costs, says Krebs: "We want to eliminate modems for in-house communications, and we want to prepare to connect directly with local digital loops to save money." Krebs expects the nature of AMC's communications to change by the end of the decade. "We expect to go fully digital with integrated voice and data, tie-ins with LANs, and digital phones," he says.

Tighter schedules

Some companies can't afford the wait-and-see approach of AMC. Adolph Coors Co., the brewer based in Golden, CO, will have to decide on digital PABX next May, when its lease on two AT&T analog Dimension PABXs expires. Martin Cahill, telecommunications-systems supervisor, says he expects to get into digital eventually, but May might not be the right time. In addition to the Dimensions, Coors has a data-only PABX, from Gandalf Data Inc., in its headquarters.

Cahill is studying Coors' needs. "Will we be doing mostly voice transmissions or will we have a lot of data to be switched?" he asks. "In our smaller subsidiaries, at least at this time, there's no data switching at all." Even if he concludes that data traffic at headquarters is on the rise, says Cahill, he doesn't think of the digital PABX as a "panacea."

Cahill believes Coors will eventually install a digital PABX at headquarters. But in May, he might install an *analog* PABX at headquarters and small analog switches in the branch offices. His decision is being stalled by the company's plans for expansion. "If we build an eastern brewery in Virginia, as the company eventually plans to do, everything will change," he says, "because we'd probably need digital switching at that location."

Cahill is hedging his bets on digital for more reasons than the possible expansion, however. Digital PABXs have bothersome operating con-



Even organizations with digital PABXs don't convert their communications to digital all at once. In the picture, an analyst at First Union National Bank in Charlotte, NC, checks over the bank's SD 192 analog PABX from Siemens Corp. The bank has both kinds of PABXs.

straints, he says. "Most of them have approximately a 4,000-foot operating limit for digitized voice communications without repeaters, and the repeaters are expensive," says Cahill. "Digital signals weaken as they travel, but there's almost no limit for distance with analog transmissions. With that in mind, we may go to a distributed digital or hybrid (part digital and part analog) system that breaks the processing power at various locations."

Preparing for ddp

Some companies are making plans to install digital PABXs to complement moves into distributed data processing (ddp). For many companies, ddp is not an immediate need. "Today, we don't have ddp at our subsidiary locations," says Bob Bernauer, telecommunications engineer at Champion International Inc., a paper and packaging corporation headquartered in Hamilton, OH. "Our traffic through these locations is mostly voice, and we're able to func-

tion quite well with analog PABXs."

Champion is planning to install a digital PABX sometime in the near future. "We want a direct connection between our mainframe and the PABX. We want to distribute data processing, and we want features like state-of-the-art electronic mail."

The corporation is negotiating with four digital PABX vendors, all of which promote their products as the nerve center for a ddp network. "We're projecting faster operating speeds in our ddp circuits—up to 19,200 bits per second. We're also hoping to save money by eliminating modems, cutting the error rates of our transmissions, and reducing paper flow as we implement electronic mail."

However, Bernauer says caution is his watchword. "We're moving carefully," he says. "It will be many months before our all-digital installation is up and running. Until that time, our analog equipment will continue to give us cost-effective service."

"Digital PABX is a buzzword," Bernauer cautions. "You shouldn't overreact. Your analog setup may be fine for the present."

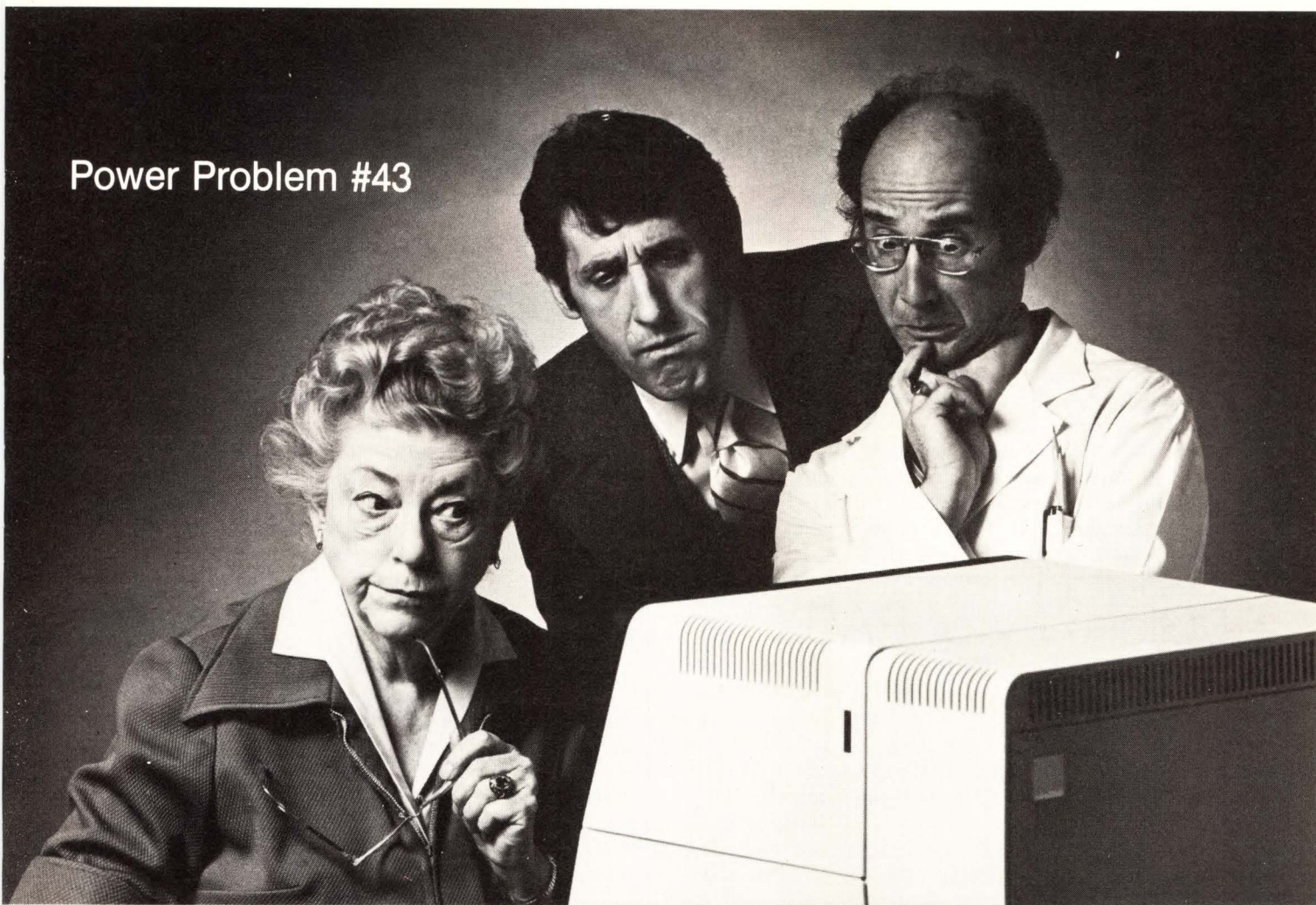
There's a lot of pressure to go digital immediately to take advantage of benefits that can be substantial for some organizations. A minority of corporations need digital PABXs now, says John Malone, president of the Eastern Management Group, a Parsippany, NJ-based consultancy.

One of the most popular "convenience" features of digital PABXs is remote system access (RSA). RSA lets a bank-branch manager, for instance, access the PABX from an outside phone by dialing a special code. Another feature, the hot line, automatically dials a preset telephone number, such as the local police station.

Digital PABXs also offer speed calling, automatic recall/hold, and management reporting. They allow organizations to set up electronic message-taking centers, and, of course, they switch data more efficiently than do analog PABXs.

Other features help hold the line on

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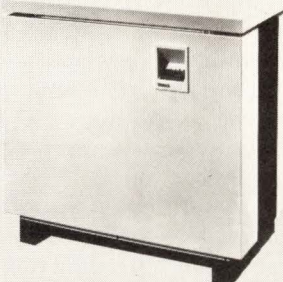
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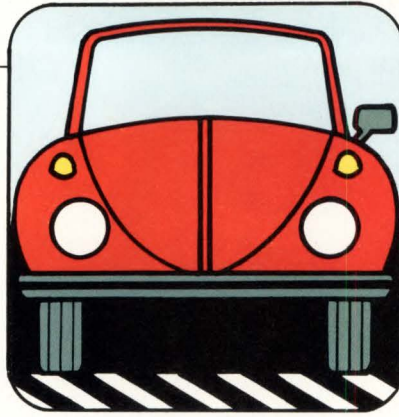
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PABXs

(Continued from page 80)

communications costs. Least-cost routing (LCR) switches calls to the cheapest routes available. Digital PABXs also switch data without having to convert it to analog signals. Automatic call distribution (ACD), a feature first developed for airlines, automatically routes incoming calls, in sequence, to the next available operator or respondent.

However, the promise of these benefits may outstrip your organization's ability to take advantage of them. "In many companies, the PABX selection process is haphazard," says Mal-



one. "Telecommunications managers have difficulty predicting what equipment they will need in five years. So they equip their organizations for the unknown."

Hype is the reason some managers

move before they must, says Malone. The digital PABX is promoted and applauded at industry shows and user-group meetings, he says, "creating an aura about digital switching that overplays the real applications for small user organizations and for medium-sized and large corporations with branch offices."

Coward at North Carolina Union Bank agrees. "Consider the T-1 interface," he says. "A T-1 circuit, at 1.544 million bits per second, can be multiplexed into 24 voice circuits, each operating at 64,000 bits per sec-

Glossary of PABX terms

The terms—particularly the acronyms—used to describe the functions performed by private automatic branch exchanges (PABXs) can be difficult to understand. Here's a list of the most confusing terms.

Account code: A five-to-seven-digit number inserted by the user during dialing either to gain access to special facilities (such as foreign exchange) or to identify function, client, department, product, and so on.

ACD, or automatic call distribution: The ability of a PABX to evenly distribute a large volume of incoming calls among specific departments or business functions, as in an airline-reservations office. ACD usually requires a supervisor, special telephones, and a recording system to warn callers about delays.

ARS, or automatic route selection: This function is similar to, but not as sophisticated as, least-cost routing because it doesn't consider the time of day when routing calls. ARS eliminates the need to dial access codes for services like MCI and Sprint.

Customer-controlled changes: Lets a user at a terminal change a PABX's system software to alter functions like least-cost routing, hunt groups, and activation and deactivation of station numbers.

Hot-line capability: Lets a user originate a call to another station

accessible to the PABX without involving a common carrier by hitting a button or lifting the handset off the hook. When used in conjunction with speed dialing, this feature can be valuable in emergencies.

Integral LAN: A PABX with an integrated local-area network (LAN). Such systems handle both voice and data communications efficiently. The PABX is best at voice, and the LAN is best at high-speed data, video, and facsimile transmissions.

LCR, or least-cost routing: This function enables a PABX to route each outgoing call along the most economical path, taking into account the destination, time of call, and available connections.

Nonblocking system: A PABX that provides a path for each user all the time. Few machines are truly nonblocking, and few users need unconditional access to a line.

RSA, or remote system access: Gives employees access to a PABX from remote locations. It lets a user, for instance, gain access to long-distance services from home.

Set relocation: Allows a user to retain his or her number despite changes in location.

SMDR, or station-message-detail recording: Also known as *call-detail recording*, this function provides reports for each outgoing call on the type of line used, the time of

call and its duration, the calling station number, and so on. Reverse detail is available to provide information on incoming calls.

Station speed dialing: One of two types of speed calling. Users maintain their own lists of speed-dialing codes for frequently called numbers. Codes can be activated either by hitting a single button or by dialing special codes on a handset.

System-wide speed calling: This is the other type of speed calling. All users use the same list of special codes to call frequently dialed numbers.

T-1 compatibility: A PABX with this feature can be directly connected to high-speed (typically 1.544 million bits per second) lines. T-1 is valuable in systems that have "slave" PABXs in remote locations connected to a central PABX. This feature will increase in value as local telephone companies begin offering discounts to users of high-speed digital PABXs for bulk access to the switched phone network.

UCD, or uniform call distribution: This feature is similar to ACD, but doesn't require special telephones or a supervisor. UCD is less costly and less sophisticated than ACD.

X.25 capability: A PABX with this function integrates a protocol that lets it transfer data to outside networks for packet-switching communications.

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PABXs

(Continued from page 82)

ond. For a small branch, that rate of speed is overkill."

Converting to digital switching entails substantial capital costs, notes James Morgan, but many companies overlook the organizational implications. Many users are baffled by sophisticated phone functions. Indeed, if users haven't been prepared, the functions may be ignored. "It's all too complex for them," says Morgan. If you buy a machine for its special features, and they are underused, you can't justify the cost of the machine. You may be able to prepare users ahead of time by introducing them to more sophisticated phone functions on your analog machine.

Even organizations that can make

digital PABXs pay dividends today are putting off full conversion in the hopes that better products will soon be available. In the meantime, they're using analog PABXs. The older equipment may not be the ideal way to manage communications, but it is proven. Digital PABXs, on the other hand, are still surrounded by uncertainty. The combining of voice and data on the same lines, for instance, is still less than perfect, but it is one of the big selling points of digital PABXs.

Texas Commerce Bank is one of these users. The bank has installed a digital PABX, but is holding off on a full commitment to digital communications. "We're waiting for more ap-

propriate digital PABX products to find their way to market," says Tom Vicknair. "There isn't enough competition among the vendors today."

Vicknair wants to see PABXs that are easier to use, better interfaces between PABXs and host mainframes, and improvement in the ability of digital PABXs to transmit voice and data over the same line. "Almost every organization is running voice communications on one line and data transmissions on another," he says. "This is not as it should be."

Until problems like awkward combined voice-data communications are addressed, many users won't commit their organizations to digital PABX. Moreover, many companies will even

PABX selection guide

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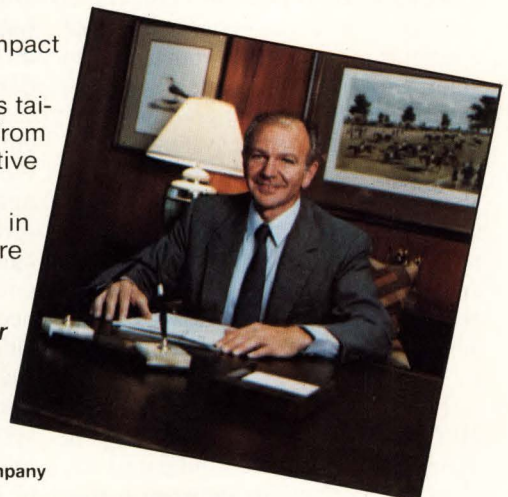
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PABXs

(Continued from page 84)

move slowly on a more nearly perfect digital PABX, Vicknair predicts. The situation is analogous to the introduction of IBM's System Network Architecture 10 years ago. "MIS/dp managers didn't rush to convert to SNA right away," he says. "It took years for many of them to fully convert, and many still have not done so."

Advanced analog

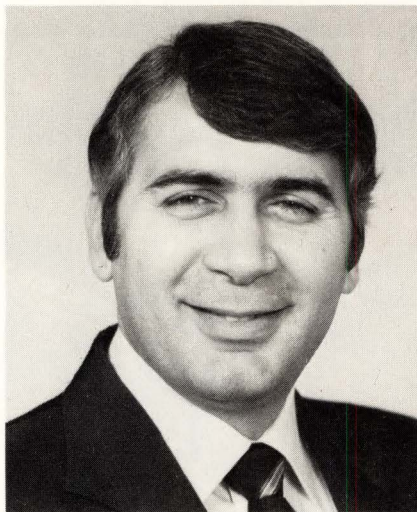
In Vicknair's analogy, digital PABX is in a state of development. It has demonstrated usefulness as a cost-effective tool for communications management, but only for a minority of businesses. Until the technology really takes off, as IBM's SNA has, managers will be given many options for advanced communications management in what might be called "advanced analog" devices.

For example, you can hook an analog PABX to a local-area network, an arrangement that will handle high-speed data, facsimile, and even video transmissions. Tie-ins with integral LANs are common with digital PABXs, but are somewhat unusual with the analog machines. Still, they can be accomplished, often at a lower cost.

Prolink Corp. (Boulder, CO) offers a combined LAN/analog PABX-based system that integrates data processing, data and voice communications, and word processing. The system is modular, allowing a user to start with a single capability, like word processing, and gradually expand the scope of the system.

The network, which supports simultaneous interactive data and digitized voice on a single coaxial cable, is a shared-resource system. It has no central network controller and all processors on the network are equals. The sharing of resources is managed by the operating system.

The LAN part of the system is a 10-Mbps baseband ring or loop in which packets of voice and data travel in both directions between nodes. This design provides a measure of redundancy in the event of node or cable failure. The Prolink LAN sup-



"Nobody knows for sure what's going to happen in the new communications order, and that complicates the digital PABX decision."

Vicknair, Texas Commerce Bank

ports up to 62 active nodes; it assigns 16 channels of the baseband capacity to voice.

The other component of the system is the Prolink Computerized Branch Exchange. This PABX is analog and is available in increments of five trunks and 16 lines, up to a maximum capacity of 40 trunks and 128 lines. The combination of the PABX, shared system storage, and the system's universal-processing capabilities endow the Prolink system with features often reserved for larger, more expensive systems. Prolink includes a crt-based attendant, directory of services for the attendant, and a form of SMDR.

Hofgard & Co. (Boulder, CO), an employee-benefits consultancy, uses the Prolink system to process a large number of personal claims and other information. Hofgard, which manages more than 130 corporate plans covering 12,000 employees, also needs to maintain and modify individual plans. The integrated files and security features on the Prolink system are vital to Hofgard. The system automatically formats information retrieved from the databases of insurance carriers.

Still another alternative allows users of voice-only analog PABXs to upgrade their systems to carry more

data on *analog* circuits. If you're trying to buy time to sort out your options as the era of digital communications approaches, this option may be just right. You can make a simple adaptation to your analog PABX that will enable it to carry data at transmission speeds of up to 9,600 bps, and you won't have to install modems or expensive cabling.

The DCS-2 data-carrier system from Teltone Corp., Kirkland, WA, uses high-frequency techniques to piggyback data on voice transmissions carried on PABX twisted-pair wiring. The system treats twisted-pair wiring as if it were baseband cable, taking advantage of the considerable amount of capacity left free by telephone transmissions and signaling. Voice-band audio and signaling use only 4 Kilohertz of twisted-pair's bandwidth. DCS-2 uses the balance of the bandwidth to transmit data at up to 9,600 bps. The result is simultaneous voice and data traffic.

Combining voice and data using this method allows organizations to route data to virtually any telephone set without installing new cable. The system works on any PABX or local Centrex installation with analog twisted-pair wiring connected to the transmitting telephone. DCS-2 costs from \$450 to \$500 per data link, considerably less than the cost of cabling and taps for a data local-area network, for example.

ENI Corp., an oil-lease broker and exploration company based in Bellevue, WA, installed a DCS-2 system when it moved into a new building. The company needed all of its communications equipment up and running within two days of the move (existing and new data equipment were to be included in the new system). Using an augmented DCS-2 system, ENI's computer-services staff was able to get 120 terminals and an analog PABX installed and online only six hours after the move. Moreover, ENI saved over \$150,000 in cabling and installation expenses.

If your leasing or amortization schedules don't give you time to ponder your move into digital communi-

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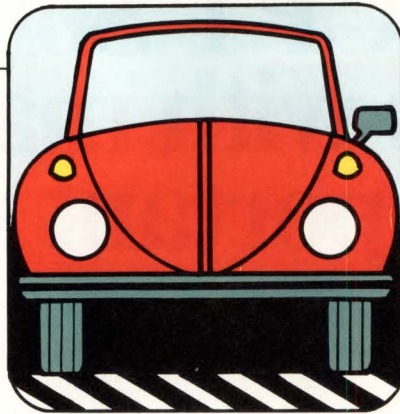
(Continued from page 86)

cations—like Adolph Coors Co.—there is another option that can buy you time to plan. Depending on the sophistication of your equipment, you may be able to buy a used, or “reconditioned,” analog PABX. (If your central systems employ state-of-the-art technology, this option may not be open to your organization.)

The used-PABX option is particularly attractive to organizations facing purchasing decisions for branch offices. A site with fewer than 100 lines really can’t make a digital PABX pay off. But if a branch needs switching, a used switch may be the most economical way to provide it.

Reconditioned PABXs cost as little as 40 percent of wholesale prices for new switches if the products are still in the manufacturer’s catalog, says Stan Blau, president of Consolidated Communications Inc., a Harrison, NY, dealer. Consolidated and Source Inc. of Dallas are dealers of used PABXs and other telecommunications equipment. Used PABXs can also be obtained from manufacturers. Prospective users should give careful consideration to the purchase of a used PABX. They can help you realize big capital-cost savings, especially in remote branches.

Another option for branch operations is to rent space in a “smart” building. In these buildings, which are becoming more widely available



in cities across the country, all telecommunications, PABX, energy, security, heating, air-conditioning, and other needs are handled as utilities. The landlord provides the facilities, and tenants pay fees to use them. These arrangements eliminate the need to tie up scarce capital for equipment purchases in remote locations, and are cost-effective for smaller branch offices when compared to the purchase or lease of even a small analog PABX and associated equipment.

The last question to consider is maintenance, and, in the post-divestiture era, it has become a big question. “The chief problem with our PABX is service,” says Sandra Tracy, corporate secretary for Citizens National Bank, Evans City, PA. “There is constant squabbling between the interconnect company that supplied our Tele/Resources analog PABX and the local phone company (United Telephone).”

Tracy believes the bank would have had less finger-pointing if it had

purchased a PABX from the local phone company. “Except for this caveat, the equipment has been wonderful,” she says. However, that’s a big exception.

Whatever type of PABX you have, keeping it up and running is a major concern. In the wake of the Bell breakup, responsibilities for service have been scattered among a variety of equipment and service vendors. As Tracy discovered, the demise of Ma Bell’s end-to-end service has introduced a new facet to PABX service. Managers now have to pin responsibility for breakdowns and maintenance chores on one of several vendors.

Until the various vendors of equipment and services sort themselves out, companies that buy from someone other than the local telephone company may have to work harder to ensure they get proper maintenance.

Organizations with many branch offices face even larger maintenance challenges. And, if you decide to ship old analog equipment from headquarters to a branch, who will service it? If the equipment transferred was made by AT&T, and its new home is within a region serviced by a former local Bell company, you probably will be able to count on reliable service. However, if neither of those conditions applies, you may have to make other arrangements, either with your equipment vendor or with a third party. You may be able to get the new local telephone company to pick up maintenance responsibilities. In either case, maintenance becomes a lot more complicated than it was before, and you’ll have to work harder to ensure that your organization is covered if the PABX fails.

Doubts about maintenance have prompted some users to delay purchasing decisions. They figure that by “sitting on the fence,” they’ll avoid headaches while observing how the maintenance issues sort themselves out. Rod Coward of Charlotte’s First Union National Bank has adopted such a posture. He’s not sure what he will do, but for now, he’s holding



The Tele/Resources console is interchangeable among the T/R 150 Series family of analog PABXs. An operator at Citizens National Bank, Evans City, PA, fields a call routed through a T/R 150.

back. "Before divestiture, we dealt with 15 different local telephone companies here in North Carolina, many of which were non-Bell. Our options for service now are to contract with a local interconnect vendor or with one of the local phone companies. We're waiting to see how it all falls into place."

When American Motors makes its move into digital communications, it will try to standardize on a single vendor's equipment to simplify maintenance, says Kevin Krebs. "We'll consider leasing or buying from the local telephone company," he says. "But our choice will depend on the cost benefits and interest rates at the time, as well as the projected life of the new switches."

At the moment, sticking with the local phone company may be the best way to avoid chaotic maintenance problems. The local companies probably will fill the maintenance void left when Ma Bell retired. They can now sell or lease PABXs and other telecommunications equipment made by independent manufacturers, and they have long experience providing Bell-quality maintenance. You probably won't sacrifice much by working with a local phone company—most of the locals offer a wide variety of equipment. Both digital and analog PABXs are available.

The local phone companies haven't revealed a great deal about their post-divestiture plans, but then the divestiture is still recent history. The independent operating companies—those in which AT&T held no interest or only a minority interest before the breakup—may provide clues about the direction the local companies will take.

Unlike their Bell brethren, the independents haven't been restrained from selling and servicing independently produced equipment. Southern New England Telephone, New Haven, CT, is one such company. Last fall, it began to sell and lease NEAX 2400 digital PABXs and a variety of auxiliary equipment. The NEAX 2400 is made in the United States by NEC America, the Jap-

anese vendor. Southern New England Telephone also sells or leases PABX equipment from AT&T, including digital System 85s and analog Dimensions. It offers a full program of end-to-end maintenance. Southern New England Telephone's

approach just might be the way of the future for other local telephone companies. However, the uncertainty about maintenance may also be another good reason to delay your move into digital communications until the most advantageous moment. □

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The basic five

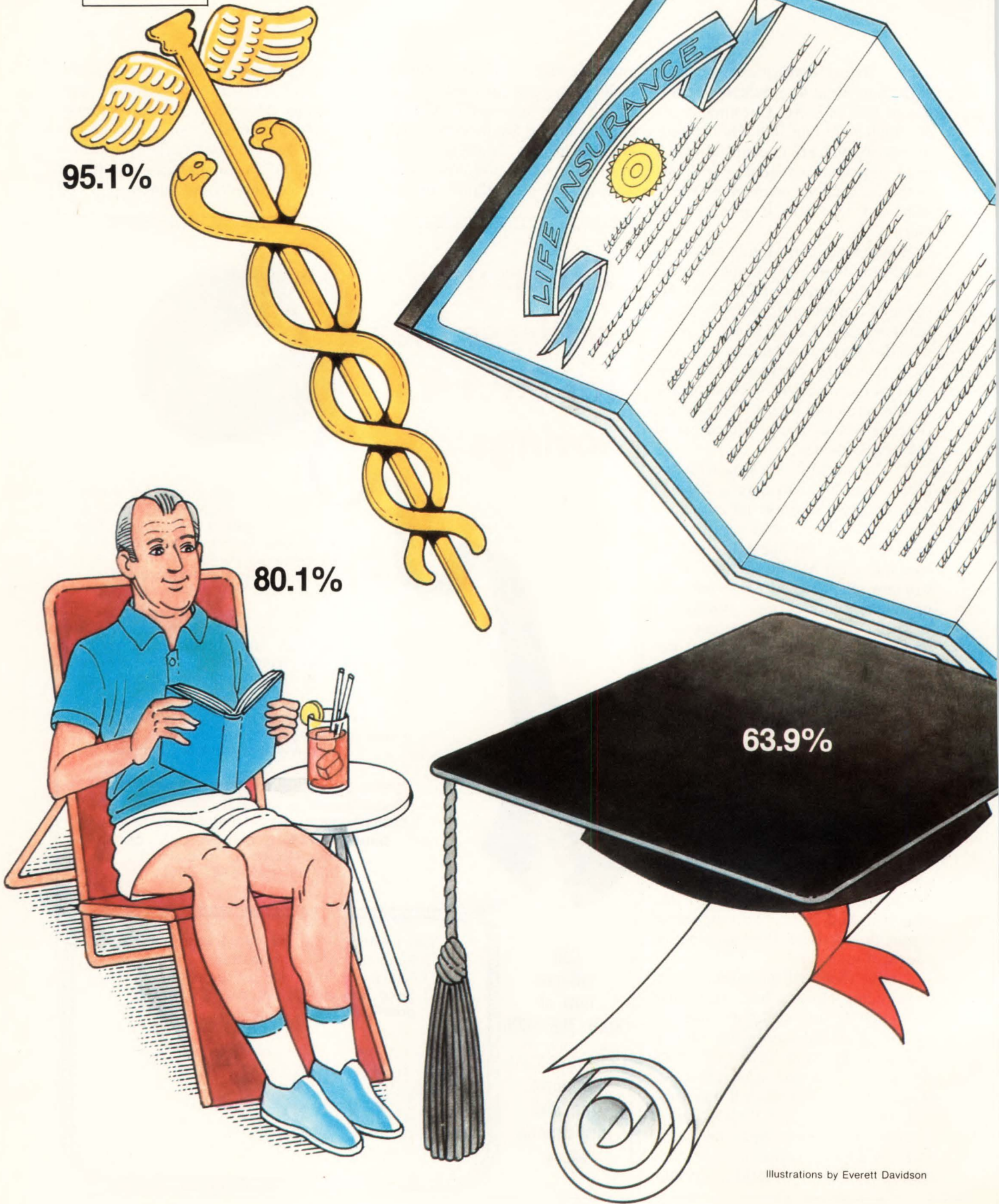
% of
respondents

88.8%

95.1%

80.1%

63.9%



Illustrations by Everett Davidson

SALARY-STATUS SURVEY, PART II

BENEFIT\$: YOUR HIDDEN PAY

If you're looking for an easy second income, you may be overlooking the one you're getting right now.

by David Whieldon, Senior Editor

You don't have to be moonlighting to say that you're picking up a few extra dollars every week. You're probably receiving extra "pay" in a package of benefits and perquisites (perks) that your organization provides in addition to your salary. (Perquisites are privileges that go with managerial rank, and that often translate into genuine financial assets.) The value of these benefits can be substantial: According to compensation experts, it may equal up to 40 percent of the dollar figure you call your income.

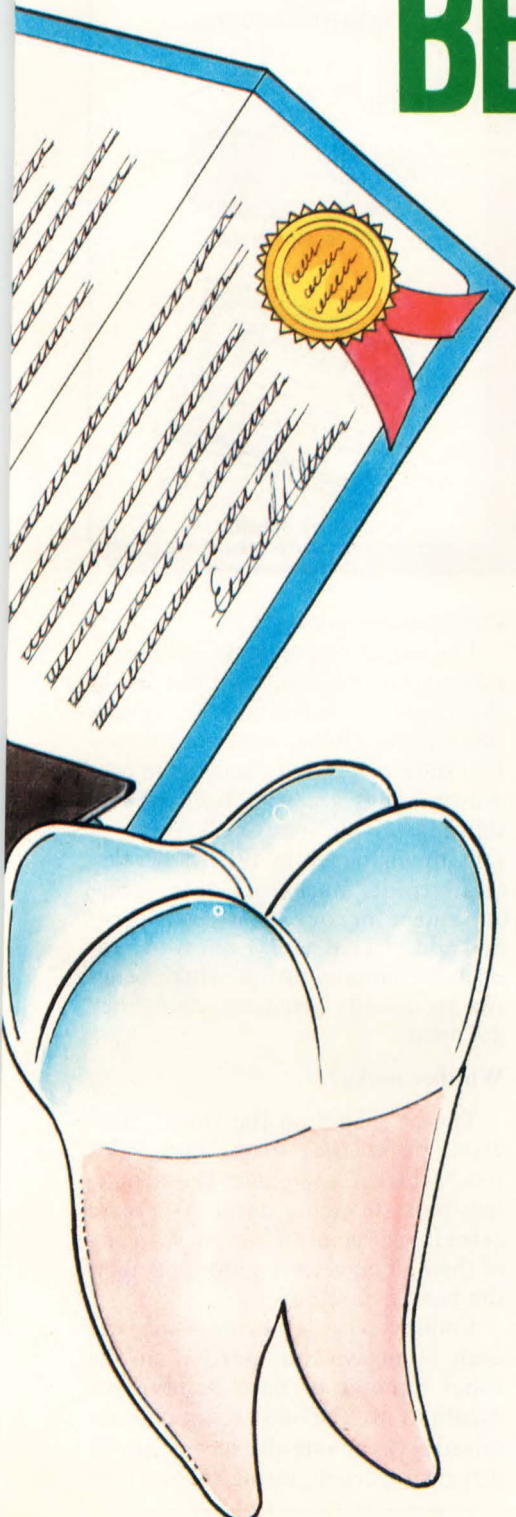
Figures from *Computer Decisions'* fifth annual salary-status survey indicate that benefits and perks for top executives are much the same as they were a year ago. They're very good, but a lack of marked growth indicates the continuing effects of the last recession. For instance, as of mid-August, 95.1 percent of managers and executives had medical-insurance plans, as compared to 94.1 percent a year earlier. And 2.8 percent of respondents enjoyed the privilege of organization-subsidized legal services, a tally that diverges only slight-

ly from the 3.2 percent of last year.

Using medical insurance as a starting point, you can quickly compare your benefits to those that most of the 1,529 survey respondents receive. Second-ranking was life insurance: Nearly nine out of 10 have that benefit. Close behind came pension plans, a benefit for four out of five. A bit lower on the scale were education assistance, which nearly two-thirds of respondents receive, and dental insurance, a benefit for three-fifths.

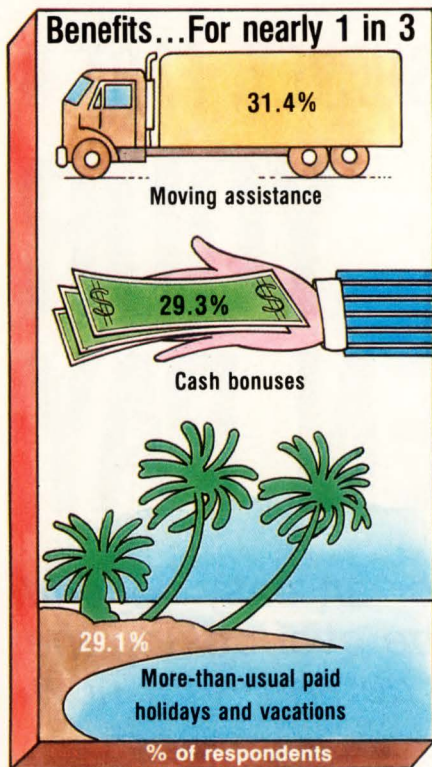
The implication is clear: Those doing well when it comes to benefits are getting at least these basic five, and probably some others. Over the past three years, the majority of survey respondents have consistently indicated that these core benefits are a part of their packages. And the proportion of respondents receiving each has hardly changed, showing that managements generally have not been extending pension, insurance, and education benefits to those who didn't have them before.

Your chances of getting more of the foremost five increase, of course,



Benefits Survey

(Continued from page 91)



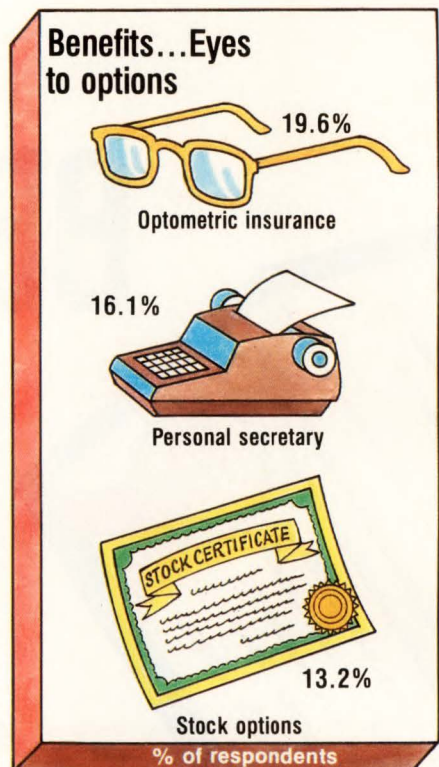
when your salary increases. With medical and life insurance, pension plans, and education assistance, the likelihood of getting more goes up only modestly. But dental insurance is an exception: Of MIS/dp managers with salaries of \$25,001 to \$30,000, 46.1 percent have dental plans, whereas 67.7 percent of those earning \$50,001 to \$60,000 have them. There are also marked increases in six other benefit categories when salaries go up.

Some organizations have started trimming the basic benefits because they are costly. One trend, according to Hay Group, a compensation-research organization in Philadelphia, is to raise deductibles on health insurance from \$100 to \$150 or \$200, transferring a larger share of the cost to employees. Nearly 40 percent of the companies that Hay surveyed reported taking such action.

W. David Wessinger, vice president of compensation services at Organization Resources Counselors Inc., New York, also sees many companies cutting health-care costs and explains ways some go about it.

"One way some companies cut costs," he says, "is by freezing the amount they pay for health care, and having employees contribute above that level. Another way is by arranging with providers to reduce costs. For example, a corporation makes a volume-discount agreement with a hospital, and tells employees that if they use that hospital, the company will pay 80 percent of costs. If you use a different hospital, the company pays only 70 percent. A third way," Wessinger continues, "is by paying 100 percent of the cost for elective surgery done outside the hospital, and only 80 percent if an employee is admitted. By providing these alternatives, companies are telling employees to be aware of costs."

The relatively fixed status of benefits over the last couple of years should come as no surprise. "Benefits don't change nearly as rapidly as do salaries," comments Steven Langer, who heads Abbott, Langer & Associates, a management-consulting and compensation-research company in Crete, IL. (Langer and his staff conducted *Computer Decisions'* latest



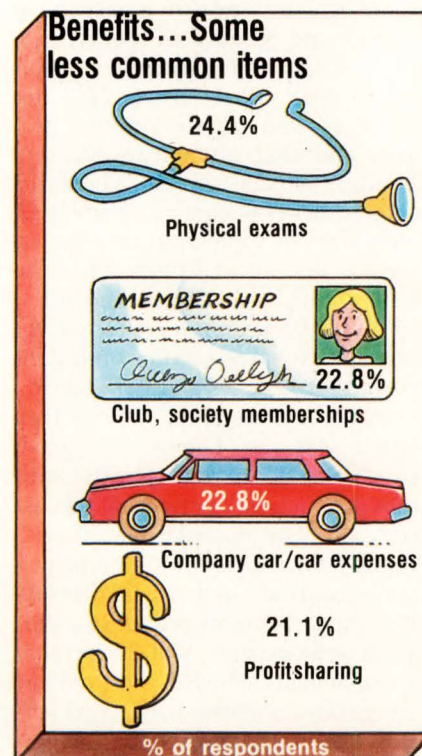
salary-status survey.)

For some respondents—those in certain economic sectors and areas of the country—benefits have always been sparse. One manager in a mountain state writes that "benefits in government jobs are poor compared to those in private industry." An assistant dp manager in the wholesale/retail trade marks off only reimbursement for car expenses as a perk, and adds, "That's it!" Even two managers in manufacturing, where benefits are usually generous, claim they get none.

Whither perks?

The privileges on the chart "Benefits, perks that grow with salaries," which accompanies this article, may indicate higher status. You score extra career points if you share in any of them. You get even more points if the benefits are generous.

Employer-paid moving expenses, cash bonuses, and more than the usual number of paid holidays or vacations are the most commonly received perks among all execs; about 30 percent reported getting them. (One



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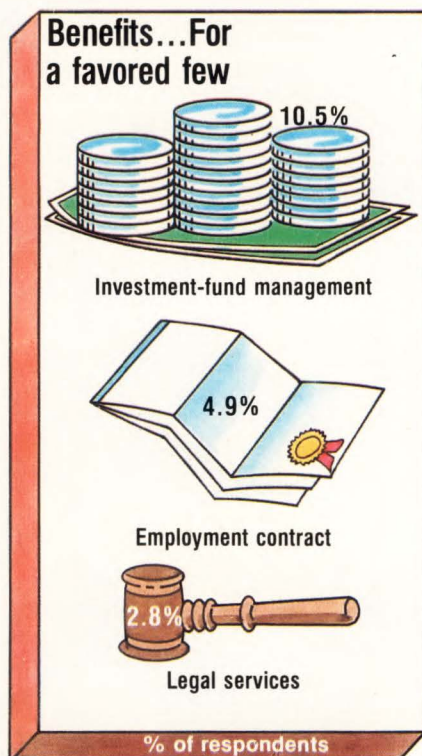
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Benefits Survey

(Continued from page 92)

MIS manager with an insurance carrier says he works a four-day week.) About one manager or executive in four gets free physical exams, club or society memberships, or a company car or car-expense reimbursement. Profit sharing and optometric insurance go to approximately 20 percent.

Profit sharing holds a lot of appeal for one MIS/dp director, James B. Savitz, of Howard Publications in Carlsbad, CA. (Howard's newspaper and TV operations produce more than \$100 million annually in sales.) Savitz's dp center, which is treated as a regulated utility, produces profits in which Savitz shares—and that's an arrangement he relishes. "An employee in management is motivated in a different way than others in the organization," he writes. "That person could make a million-dollar difference in the bottom line. I'm compensated according to how much responsibility I can handle and how efficient my operation is. Not how big, but how efficient. With this kind of profit sharing, I should come out way ahead of my peers who have run-of-the-mill benefits."



What's happening with salaries?

Part I of "Salary-status survey," published in February, showed modest but steady increases in direct compensation. Here are a few highlights from that report:

- The median salary for a top MIS/dp officer was \$40,000; pay for a typical dp manager was \$33,280.
- Nearly four-fifths of respondents received pay increases between Aug. 15, 1982 and Aug. 15, 1983, the majority without changing jobs.
- Increases typically amounted to 7.8 percent of salary. More than three-fourths of respondents received raises of 10.9 percent.
- Salaries for top MIS/dp officers in banking and finance were the highest (the median was \$46,620); followed by manufacturing, processing, and extracting; health services; merchandising; government; and education.
- Top MIS/dp officers in the Pacific states earn the most (the median was \$42,426), and those in the mountain states the least (\$36,310), when salaries of respondents working in urban areas are included.
- Altogether, MIS/dp managers consider their salaries slightly below par when comparing them to salaries of other managers with comparable responsibilities.
- In the final analysis, respondents say, they're more satisfied than dissatisfied with their jobs.

Only one MIS/dp manager in six has a personal secretary. Even fewer get stock options, investment-fund management, employment contracts, or free legal services.

As with the basic five, the percentage of managers enjoying these perks has changed little from the previous year. "Perks are very important," says W. David Wessinger. "But there's not much of a trend toward expanding them."

What about cash bonuses? As indicated in the salary portion of the survey, cash bonuses amounted to relatively little. For the top MIS/dp officer, a bonus and other cash benefits typically added just under \$1,000 to direct income; for the dp manager, \$720. (These are the median, or middle, figures reported by respondents.)

Cash bonuses are also listed with perks and benefits in the accompanying charts. Generally, 29.3 percent of respondents received them this past year; 22 percent of those making between \$25,001 and \$30,000 received them, and 47.7 percent making be-

tween \$50,001 and \$60,000 received them. These percentages have varied very little over the past few years.

Most of the benefits and perks listed are familiar. But some respondents enjoy a few very special and not-so-commonplace items.

- "Unlimited free air travel"—Dp manager at a municipal airport in Maryland
- "Terminal installed in my house at company expense"—South Dakotan in charge of dp
- "Free lunches"—MIS manager in Iowa
- "Matching, tax-deferred savings"—MIS manager for New England manufacturer
- "Forty percent discount on clothing"—Dp manager for California merchandiser
- "Tax-return preparation"—Dp manager for Colorado financial institution
- And what many managers and executives yearn for, at least in bad moments: "Very low pressure"—Dp manager in a nonprofit organization in Philadelphia (Continued on page 96)



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Benefits Survey

(Continued from page 94)

How the survey was done

Readers of *Computer Decisions* returned 1,529 personal questionnaires out of 20,007 that were mailed in August 1983. That's the largest batch of questionnaires sent out in five years of surveying, as well as the largest response. Data from the returns have been incorporated into parts I and II of this article. (Part I appeared in last month's issue.)

The survey was made more comprehensive due to a collaboration between *Computer Decisions* and Abbott, Langer & Associates, a personnel, compensation, and psychological consulting company in Crete, IL. "The survey is the most exhaustive in MIS/dp," says Steven Langer, who heads the organization. "In the statistical field, the size of the sample is important, because the number of responses affects reliability and validity."

A personal questionnaire and survey data sheet on salaries and demographics went to each MIS/dp manager randomly selected from *Computer Decisions*' circulation list. (These managers made up 45 percent of *Computer Decisions*' circulation, which was 120,000 at the time.) Recipients hailed from all 50 states and Puerto Rico. Not all who returned the questionnaires answered all the questions, but most did.

Findings for both parts of the survey indicate medians—the middle figure in a lowest-to-highest array. Statisticians generally regard the median as the most accurate indicator of "central tendency"—and a better measure than average or mean, which can be more easily distorted by a few very low or very high figures.

Only a portion of the salary data was published last month in Part I. The complete report, which includes salaries for 35 different jobs, from top MIS/dp officer to junior key-entry operator, over seven regions and 25 metropolitan areas, is available for \$195. The 346-page document, entitled "Compensation in the MIS/dp field," can be ordered from Abbott, Langer & Associates, 548 First St., Crete, IL 60417. The company's phone number is (312) 672-4200.

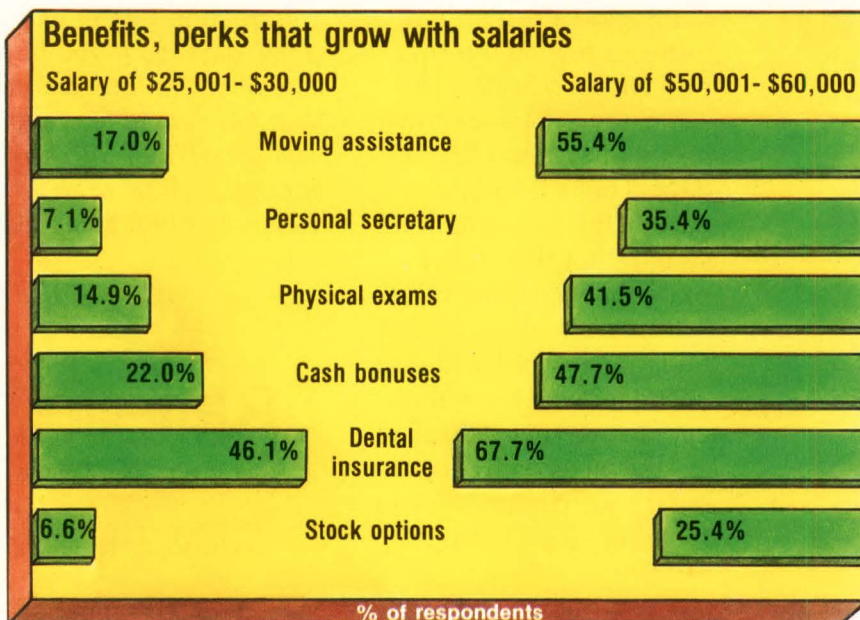
Nine out of 10 respondents say they'd move to another organization if the incentives were good enough. A higher salary would do the trick for 83.5 percent; bonuses for 43.3 percent; profit sharing for 42.4 percent. Working conditions count for something, too—three out of five say they're looking for greater challenges.

About one-third of the managers say that company cars or car allowances might entice them to move. One-third also checked off improved retirement plans, and one-fourth, increased medical-dental benefits. Finally, 22.2 percent say that reimbursement for moving expenses would influence them.

Though education assistance is a common benefit, and 63.9 percent of managers report having it, several others write it in as something they want and for which they'd move. "An employment contract and additional vacation days and holidays" are the desires, along with nine other items, of an assistant dp manager in Houston who earns between \$60,000 and \$70,000 a year. Perhaps the most unusual motivator—and it's a benefit in her eyes—is added by an MIS manager who makes well over \$30,000 yearly. "Being a female under 30," she writes, "I'd look for an organization with more women in an established management network."

How do respondents see their own benefits, perquisites, and incentives in comparison to those of others with similar responsibilities? The typical response is that their benefits are about the same as other managers'. And when asked if they're content with their jobs, 54.7 percent indicate that they're either somewhat content or quite content.

It's obvious that for almost all MIS/dp managers, benefits and perks are important elements in the compensation picture. So it's to your advantage to figure out exactly what you have, and to negotiate for more when the opportunity arises. Sometimes, you can improve your earning power without actually getting a boost in salary. □



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MEETING THE PAY-EQUITY CHALLENGE

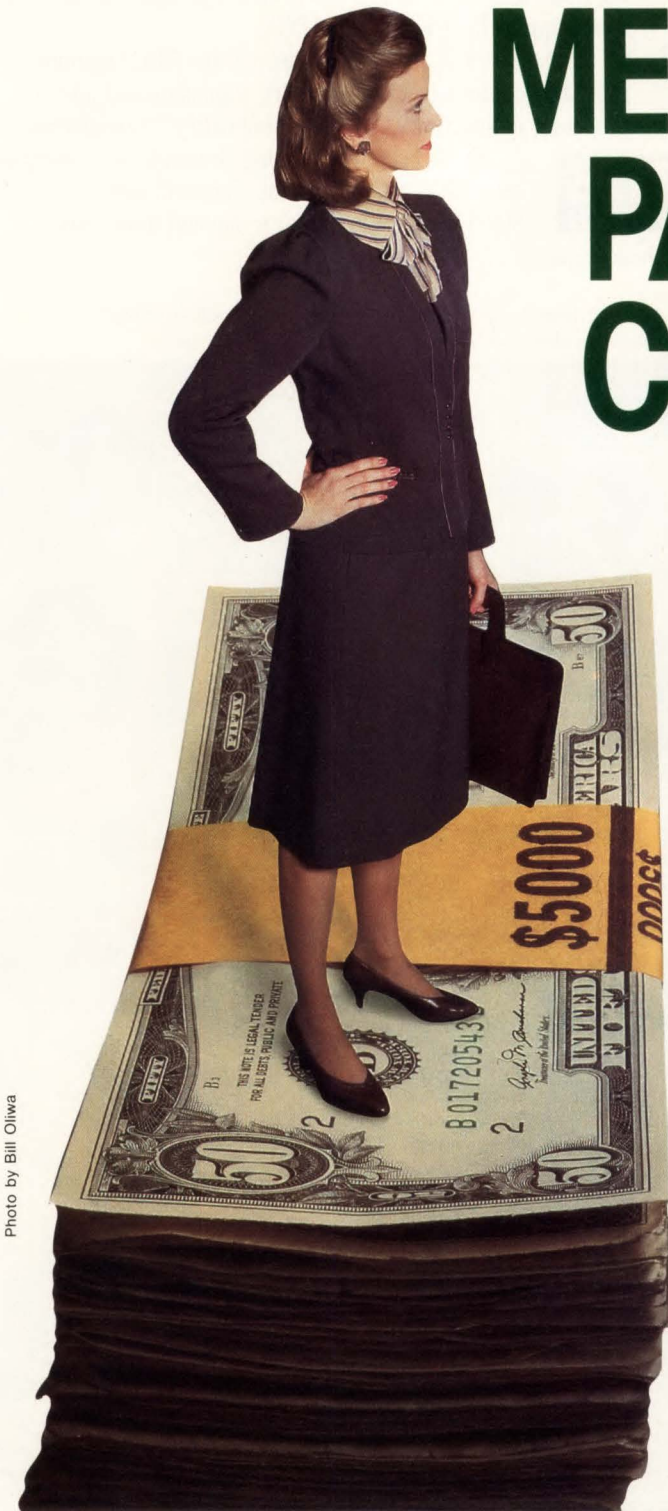
by Mary Miles, New England Editor

Are your organization's pay scales tipped in favor of male employees? If so, you may have to face the larger, more equitable scales of justice.

- A department vice president confides to a subordinate—who also happens to be a fellow Yale man—that the company is planning to open a London branch, and will need a coordinator. A woman who is also qualified to fill the spot isn't advised of the opportunity until months later.
- A department manager interviews a Hispanic job candidate for five minutes and an equally qualified white applicant for 30 minutes. He hires the latter.
- A boss routinely leaves his secretary in charge during his frequent business trips, but fails to raise her salary—or her title—to a level commensurate with the responsibilities she has to assume.

Do these scenarios represent little more than a few bad breaks in the

Photo by Bill Oliwa



make-it-or-break-it world of business, or are they clear-cut examples of discrimination? Managers who shrug them off with a jaded "That's business" should keep one point in mind: These and similar practices are inextricably tied to the issue of pay equity, and managers who engage in them may be breaking the law.

What is pay equity? According to Anne Ladky, associate director of Women Employed (Chicago), "When we say 'pay equity' we're talking about removing the gender-based pay system, in which jobs traditionally held by women are automatically paid less than jobs traditionally held by men, regardless of what the jobs entail. The issue is a fair salary system . . . in which it is recognized that salary ought to be based on the content of the work."

"Setting and administering corporate wage policies doesn't really concern me—I don't have to get too worked up about pay equity," some managers might assume. But that's not so. In one company, an entire supervisory level was fired outright when implications of discrimination surfaced. June Baldino, senior program director of the American Management Association, believes that, in this increasingly litigious society, people at every level of an organization must "take the issue seriously or learn the hard way."

If you practice discrimination, you may be putting both yourself and your company at risk. According to pay-equity advocates, living up to the letter of the law involves more than just fair wage practices, it requires paying the same salaries for the same type of work and paying comparable wages for jobs of comparable worth. It also means seeing to it that all of your subordinates have equal chances to succeed, to advance their careers, and to do their jobs well.

"He started out as a computer specialist while I began as a data-entry clerk," complains a woman employed by a Fortune 1,000 company. "We did exactly the same work, and started at the same salary. Six months later, I got a raise; he got a bigger one and a promotion. Determined to climb the career ladder, I started joining the guys for their lunch sessions, even though I wasn't invited. After they began to accept me, I learned about loads of company-funded opportunities I hadn't known about before—including self-improvement and managerial courses. I approached my boss and asked to go to the courses, and even-

Organizations with large pools of clerical workers will be the first to be steamrolled by the pay-equity issue.

tually I got my promotion. But it was clear he'd expected me to stay in that one slot."

"That doesn't happen in my department," claim many of the biggest offenders—who often are simply unaware of the intricacies of equitable pay structures and comparable-worth concepts. These managers don't realize that not all forms of discrimination are conscious. "Companies aren't always deliberately discriminating against women [and minorities], but they've set up pay ladders and promotion schemes that structurally discriminate," claims Teresa Amott, assistant professor of economics at Wellesley (MA) College.

A study conducted by Women Employed supports this viewpoint. It says: "The pervasiveness of oc-

cupational segregation and wage discrimination after a decade of concerted action to promote economic equality for working women demonstrates how deeply ingrained these patterns are in the economy as a whole and in individual employers' policies." Daniel E. Leach, former chairman of the Equal Employment Opportunity Commission (EEOC), agrees: "These things were sort of built into the system, and they really haven't been flushed out yet."

However, many political groups and labor organizations are making impressive headway in their efforts to eradicate these practices, especially within the public sector. In the 1981 case, *County of Washington [Oregon] v. Gunther*, the Supreme Court sidestepped the pay-equity controversy, but supported its proponents by ruling that allegations of discrimination can be brought under Title VII, even though equal work is not involved. Under this ruling, clerical workers are already protesting a salary lower than that of dockloaders, nurses are demanding pay equal to tree-trimmers, and data-entry clerks are fighting to receive the same earnings as beginning programmers. The pay-equity issue has been compared to a steamroller; it may be moving slowly now, but it's picking up speed, and corporations that don't keep out of its way may get flattened.

Driving this steamroller is a number of forces. A growing awareness of the issue, strong union involvement, and the increased clout of women's groups—all are fueled by the increasing power of women in government. The Reagan administration's foot-dragging in matters of civil rights has only served to lend new focus and resolve to those who seek to strengthen the positions of women and minorities in the workplace.

Massachusetts Governor Michael

Pay Equity

(Continued from page 99)

Dukakis (D), for one, on the 10th anniversary of 9 to 5, a union of female office workers, asserted that "state government should be a model for employers." He has put his money where his mouth is, fulfilling his campaign promise to appoint 50 percent women and 20 percent minorities to management positions on his staff. Senators John Glenn (D) of Ohio and Walter Mondale (D) of Minnesota are also supporting the pay-equity issue.

The American Federation of State, County, and Municipal Employees (AFSCME) has recently won an important case against Washington State. A federal judge ordered some \$800 million in back pay and raises for women found to have been paid less than men for jobs of comparable worth. Even though the Reagan administration is preparing to challenge the decision, it still represents a victory for pay-equity supporters.

AFSCME is bargaining with a lot of employers, trying to bypass litigation by persuading organizations to set up equitable pay structures, says Martha Buck, a labor economist for AFSCME. "If companies would start to work on solutions now—before they get into adversary situations—they could begin on a rational step-by-step approach to fair pay policies."

For now, the question haunting corporations is: If such progress is being made in the public sector, can the private sector remain immune for long?

Not according to most heads of women's labor groups. Janice Bruns, who chairs the Boston chapter of 9 to 5, says companies with large pools of clerical workers will be among the first to be steamrolled by the pay-equity issue. And information-processing departments where data-entry clerks work for low pay, with little opportunity for advancement, are prime targets for discrimination suits.

In some ways, the data-processing departments are the most progressive in corporations. "The computer can be a great equalizer," says Janice

Miller, international president of Women in Information Processing (Washington, DC). She points out that minorities may enter and succeed in data processing more easily than in traditional fields. Those with the education and skills required for computer technology can get a jump on the job market.

But other minorities and women believe computers lower their value in the job market. "Although the increased number of women in the labor force has put more women in high-paying jobs, their concentration in low-paying jobs is still extremely high," says Miller. Many women fear that computers will lock them into menial positions.

In one company, an entire supervisory level was fired when implications of discrimination arose.

Amy Dru Stanley, a doctoral candidate in American social history at Yale, agrees. For most women, she writes in a recent Op-Ed piece in *The New York Times*, "technological innovation means diminished requirements for skills and reduced opportunities for mobility." High-tech can well "buttress the economic barriers women face, constricting their access to jobs outside the ghetto of women's work," she adds.

Women who desperately need entry-level jobs may find themselves trapped in a sort of "typewriter bondage," according to Daniel Mackey, employee-relations consultant, attorney, and former director of the New York office of EEOC. "They may be expected to quickly transfer their skills at the typewriter to more modern machinery. Some can't make the transition, and they are losing jobs; younger women may be brought in and given the opportunity, without receiving any real increase in wages. This is the type of thing that will keep women from really achieving true

equal pay for comparable worth."

Of course, not everyone agrees on the definition of "fair pay." In fact, the concept of pay equity has been hooted as economically unsound, unconstitutional, and even medieval. The source of this controversy lies with opposing interpretations of existing law.

The case for pay equity is based on two constitutional acts that address the issues of sex and race discrimination: Title VII of the Civil Rights Act of 1964, which prohibits discrimination based on sex, race, color, religion, or national origin in any employment practice, and the Equal Pay Act (EPA) of 1963, which rules that equal wages must be paid for work that is substantially equal with regard to skill, effort, responsibility, and working conditions. The Bennett Amendment to Title VII holds that legally acceptable reasons for pay differentials cited in the EPA—such as seniority, merit, and per-unit production—also hold true under Title VII.

Speakers for women and minorities have consistently argued that Title VII requires not only equal pay for equal work, but also equal pay for work of comparable worth. Their theory is that if two people have equivalent skills and responsibilities—even though their jobs may be dissimilar—they ought to be paid the same—and any discrimination shown in their pay is grounds for litigation under Title VII.

Those who dispute the pay-equity principle believe the contradiction between job value and market worth will cause serious imbalances in business. As Carl Hoffmann and John Shelton Reed wrote in "Sex Discrimination?—The XYZ Affair" (*The Public Interest*, Winter 1981), proponents "are eager to tamper with a complex, competitive system, and their search for simple solutions may upset the engine of our prosperity." Citing individual initiative and competition for rewards as the basis of that prosperity, the authors ask, "What is a company's obligation to its female employees?" and answer,

"It is obliged to offer them the same opportunities as men, and to reward them in proportion to their productivity. No more."

The belief that comparable worth is a faulty, even dangerous, policy is expressed by Judith Finn, a public-policy specialist and labor economist. Coordinator of Phyllis Schlafly's (the well-known opponent of the Equal Rights Amendment) Eagle Forum Conference on Comparable Worth last October, Finn suggests that the fact that the wage gap hasn't narrowed very much since the civil-rights legislation of the 1960s is evidence that there is no significant discrimination in employment practices. She argues that the wage gap persists because most female workers are concentrated in jobs that happen to pay less than those typically occupied by men, rather than because of deeply entrenched sex bias and discrimination in the American economy.

Finn and other opponents of pay equity assert that women seek and remain in traditionally female jobs because of a combination of biological differences, early sex-role socialization patterns, and traditional family roles, all of which cause men and women to approach work with different capabilities and aspirations.

The embracing of traditional values, a general distrust of many of the current job-evaluation procedures, and the belief that supply and demand should determine the worth of individual jobs form the argument against pay equity. In a *Wall Street Journal* article (Jan. 24, 1984), June O'Neill, director of the Urban Institute's Program of Policy Research on Women and Families, cited a job-evaluation program conducted in 1970 for the State of Washington. A committee rated the importance of various jobs, on the basis of knowledge and skills required, mental demands, accountability, and working conditions.

The highest rated job, O'Neill wrote, was that of registered nurse, which won 573 points. Computer-systems analysts, who typically earn

56% more than registered nurses, received only 426 points. According to O'Neill, "If a private firm employing both registered nurses and computer-systems analysts were required to accept the rankings from the Washington state study, it would have to make significant pay adjustments. It could either lower the salaries of systems analysts or raise the pay of nurses. If it lowered the pay of systems analysts, it would find it difficult to retain or recruit them. If it raised the pay of nurses, it also would have to raise its prices and likely would end up reducing the number of registered nurses it employed as consumer demand for the service fell. Some women would benefit, but other women would lose."

Daniel Mackey disagrees with the idea that pay equity is economically unsound. Pay-equity adversaries'

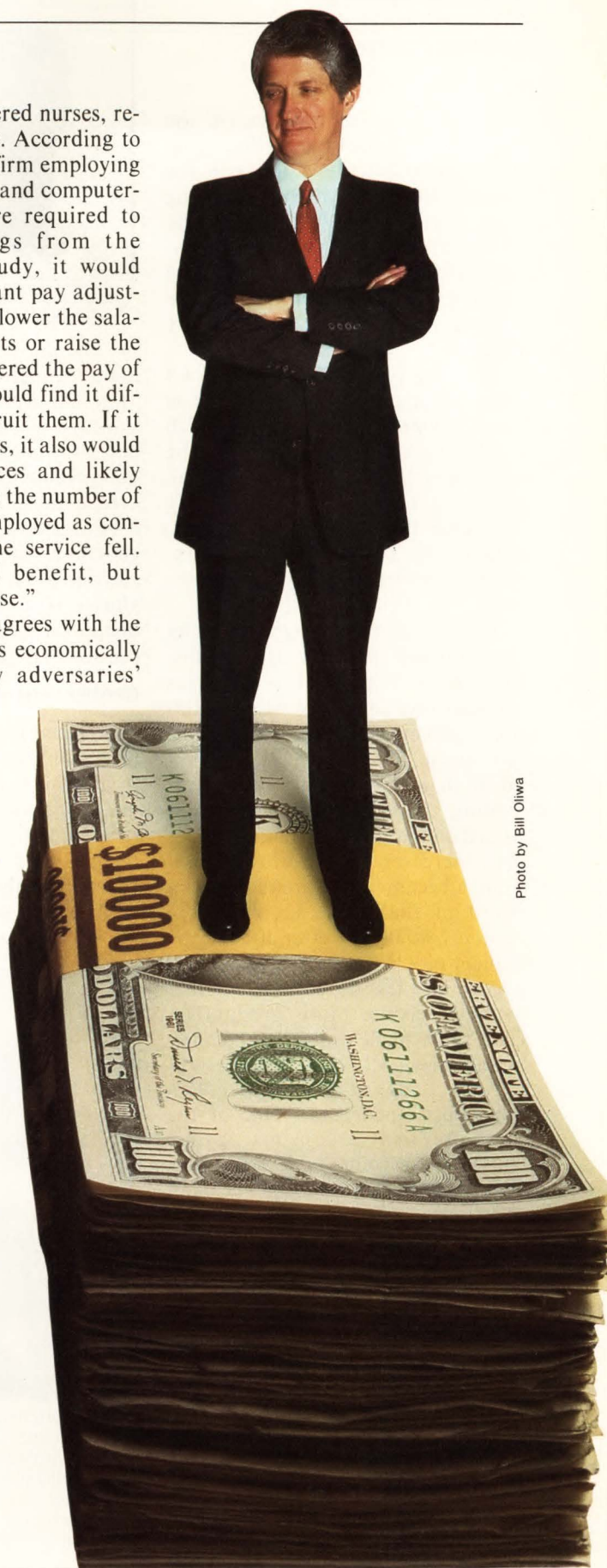


Photo by Bill Oliwa

Pay Equity

(Continued from page 101)

view, he says, seems to be, in the extreme, "that if you adopt this principle requiring equal pay for comparable worth, it won't be long before an organization like the EEOC will be setting wages throughout the United States; employees and employers, opponents say, should be free to negotiate matters of pay together."

But that type of negotiation isn't about to happen, says Mackey. "You have to remember that only one-fifth of the workforce is organized. The power is still on the side of management in these issues. Giving employees power to negotiate for equitable wages is a great idea, but is it realistic in today's economy? No!"

Teresa Amott contests the belief that equitable pay structures will disrupt the economy. "Raising wages through comparable-worth legislation—assuming it were done in one fell swoop, which is certainly not about to happen—could be seen as leading to inflation, if companies passed on that increase in the form of price increases. On the other hand, if women became more productive as a result of that wage increase, the economy would be better off. The argument of whether or not pay equity is good business depends on whether women become more productive. Give them higher salaries and their output goes up."

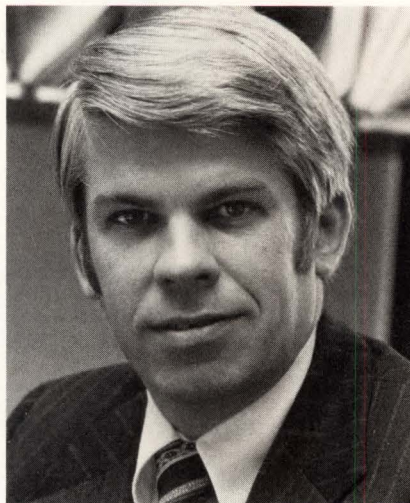
Anne Ladky also disagrees with pay-equity opponents. "One of the most prevalent arguments against equal pay for comparable worth says that the law of supply and demand sets salary, and so if women's jobs are traditionally paid less, it is undoubtedly because there is an oversupply of workers for these jobs and an under-supply for more traditionally male jobs. In fact, the market does not set salaries. Women Employed studied this issue during the secretarial shortage, which lasted about three years. If the law of supply and demand worked, shouldn't that shortage have fueled a significant increase in secretarial salaries to attract more people into the field? That didn't happen.



"The law does, however, work for male occupations," Ladky continues. "For example, when there was a shortage of engineers and computer operators (when these were primarily male occupations), you did see an increase in salaries. In the clerical classifications, even when there is a shortage, there isn't really much spreading out of the salaries—not a sharp rise, as occurs in male-dominated fields. And what's the reason for that? Discrimination."

Getting started

Some corporations, whether out of fear of litigation or a genuine desire to uncover biased methods of determining job worth and salary structures, are already reevaluating existing systems. These organizations have found the process to be loaded with snags, which many managers are still trying to resolve.



Chuck Cumming, managing principal of Sibson and Co., fears that "the costs of artificially raising the pay for traditionally female jobs will be used as an excuse for reducing efforts to advance qualified women into more challenging jobs."

A manager at a major Boston bank that has recently undertaken an ambitious job-reevaluation gives the bank's reason for doing so. "When you have a decentralized, geographically dispersed business, you have to have a uniform pay structure. A lot of inequities can develop among the different regions. If each unit develops its own pay practices over the years, problems can arise when you start transferring employees. And that certainly can drive a corporation into a search for updated evaluation procedures."

The human-resources vp at the same bank avers that "the best way to avoid one of these pay-equity controversies is to have a good, objective job-evaluation program. Over the years, we have developed different salary scales for the geographically dispersed units," he goes on. "Because we have 5,000 employees, that system hasn't posed too many problems. But we've had some concerns about it; a fairly anxious labor-relations attorney might feel we were defining a bargaining unit with different salary scales. We worry about any inequity that could be perceived as being sex- or race-oriented."

The bank employed a well-known compensation consultancy "to develop a color-blind, sex-blind procedure that's systematic and credible, and will result in fair pay for employees," says the vp.

Still, the first manager points out that sticky areas develop around internally determined evaluations of job worth. "There are, for example, jobs in dp that require a four-year degree, and their value may be rated the same as jobs in, say, corporate services. . . . But when you go out and price those two comparably evaluated jobs, you find that right now it's tough to find dp people—so you have to attract them with a higher pay level."

It can happen the other way around, too, he says. "In cities like Boston, there happen to be a lot of women available for secretarial positions—and because you can fill those slots more easily than, say, dp

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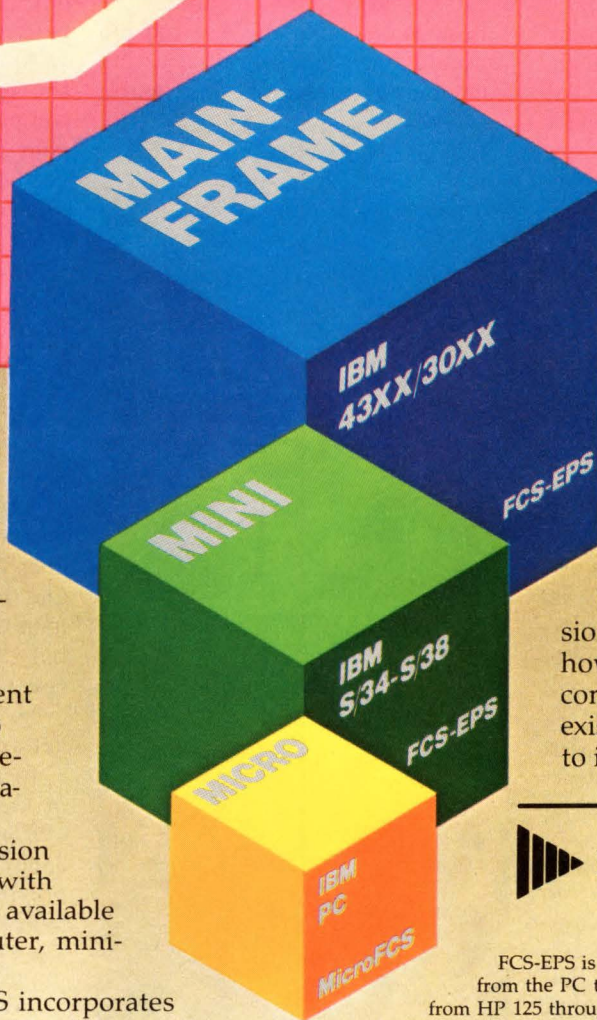
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Pay Equity

(Continued from page 102)

jobs, you may find yourself paying less than the company's internal job-evaluation system has indicated."

This is precisely where many companies have worked themselves into a corner, believes Chuck Cumming, managing principal of Sibson & Co. (Princeton, NJ), a consultancy specializing in compensation management. "The organization may say, 'Our jobs are worth so much, based on our internal assessment, but we're not paying for workers exactly the way we value them because we can get them for less.' An organization can conduct an internal job evaluation, and then find that the pay levels in the marketplace don't line up with it. Typically, such discrepancies occur in jobs that have traditionally been populated by women." Such companies, Cumming says, put themselves in legal jeopardy, considering current pay-equity legislation.

Organizations most deeply involved in the use of high-technology tools and techniques may be especially prone to this problem, asserts Cumming. "Many are competing externally for the same limited pool of people, and thus have a more difficult time ignoring the marketplace. To claim that you're paying wages that are both internally suitable and externally competitive is, in many cases, contradictory."

In formulating pay plans based on elaborate internal job-evaluation systems, Cumming believes companies may hurt rather than help employees. Systems may emerge that are so esoteric and complex that they can scarcely be understood by those who administer them, let alone by employees. "If no companies were using job-evaluation systems," he says, "we would see rates of pay move more rapidly with changes in supply and demand. Once job values get locked in through the job-evaluation process, the responsiveness of the market tends to slow down."

Daniel Mackey agrees that many current job-evaluation systems are indeed lacking in objectivity and validity. But he claims corporate

management is responsible for inaccuracies. Typically, he says, once an internal wage rate is proposed by some panel, task force, or consultant, companies "can't resist fooling around with the conclusions. The result is to lift the value of one type of job and lower that of another. And eventually legal problems arise."

Besides changing the pay and job structures of organizations, treating women and minorities like white

males demands consideration and revision of fundamental management policies and techniques. Accomplishing such an overhaul involves looking closely at the opinions and attitudes of your employees.

In early 1983, 9 to 5 distributed thousands of questionnaires throughout Boston, asking people to rate particular aspects of their companies. In April, on National Secretary's Day the results were announced. The company that scored highest for its policy of encouraging and receiving good employee input concerning the implementation of technology and its tools was the National Bureau of Economic Research (Cambridge, MA). "The employees were involved in almost every step of implementation; they helped to design their jobs," says Brunts.

Liberty Mutual Life Insurance Co. got the booby prize. Women complained that they were never apprised of job openings, never learned of opportunities or programs that might open the way for career advancement and higher-paying jobs. They saw men being trained for advancement, but they themselves didn't have access to the training programs. Moreover, they said they were unable to get any input to management.

In *The Black Manager: Making It in the Corporate World* (Amacom, 1982), authors Floyd Dickens Jr. and Jacqueline B. Dickens offer some practical ways to manage minorities and women fairly and effectively, using a method they call "multicultural management." They write:

"With an increased number of minorities and women joining the work force, there is a need to manage different people differently and appropriately. Minorities and women cannot produce to their maximum potential as long as they are managed with the standard techniques that were designed for white males. . . . Therefore, we need additional management techniques to include those different needs and motivations to reach members of minority cultures and capitalize on their potential." (Continued on page 106)



Janice Miller of Women in Information Processing points out that women and minorities may enter and succeed in data processing more easily than in traditional fields.

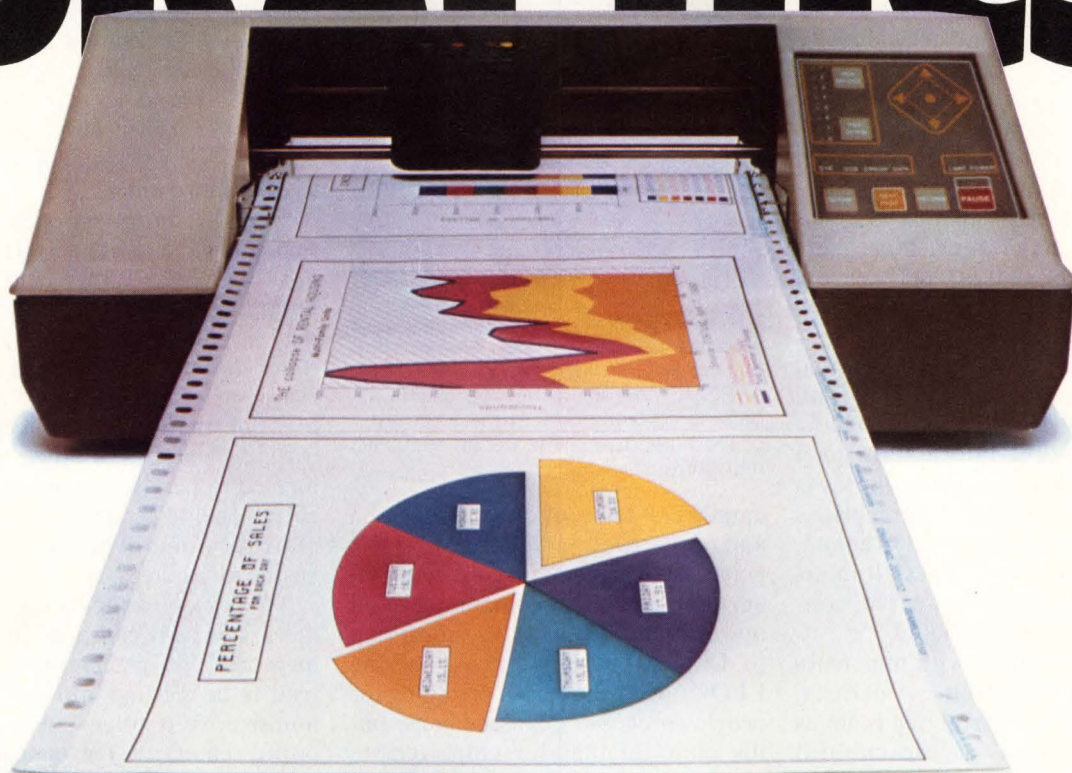


"What we are talking about when we say 'pay equity' is removing the gender-based pay system in which jobs traditionally held by women pay less than jobs held by men."

Ladky, *Women Employed*

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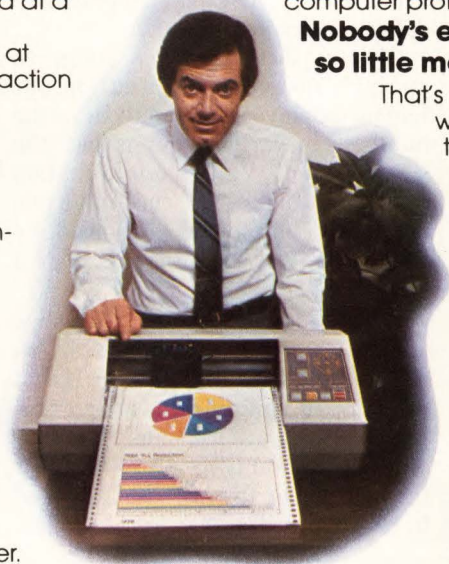
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Pay Equity

(Continued from page 104)

Here are some of the key aspects of multicultural management:

- **Feedback:** "Supervisors must probe both negative and positive feedback from others on minority subordinates. . . . Testing the feedback for validity is a way of removing racism and sexism from the input."
- **Inclusion of minorities and women in decision-making:** This step is particularly important in matters that will have a major impact on these workers. Such input is vital to ensure that barriers are not set up between races and sexes.
- **Sensitivity to the perceptions and assumptions of minorities and women:** "Before transmitting organizational-skill information to a minority, a white supervisor must explore that individual's perceptions and assumptions about the situation. Otherwise, the use of the skill information may have negative consequences for the individual."
- **Direct interactions with minorities and women:** "The white, American, corporate style of interaction is not as open and up-front as the cultural style of minorities. . . ." The fact may generate suspicion among employees.
- **Appropriate management of race and sex issues:** "White supervisors must be sensitive to racism and manage it in the boss-subordinate relationship." This allows minorities and women to handle the natural anger and resentment they may feel in reaction to the racism/sexism of others.
- **Programming of entry-level jobs for minorities and women:** "A hostile environment can program [an individual] for failure. . . . The first job should be one in which [the person] can realize early success while also being challenged."
- **Awareness of "differential consequences":** "A white supervisor must be attuned to the differential consequences a given behavior can have for a minority versus a white individual operating in a similar manner."

One of the biggest gripes of comparable-worth advocates isn't the pay system per se; it is the practice some



Martha Buck, a labor economist with AFSCME, the union that represents a half-million women, is at the forefront of the move to get the public sector to recognize pay equity.

employers have of putting women and minorities in jobs that aren't going anywhere, or in jobs with inadequate training components and upward-mobility features, according to Daniel Leach (formerly of the EEOC). He believes it's one thing for people to choose dead-end jobs, but it's quite another for employers to channel employees into them. Though extremely hard to prove, that practice is actionable under Title VII, says Leach.

What kind of job-evaluation studies and programs do supporters of pay equity recommend? The following is from a presentation by Day Piercy, executive director of Women Employed, to the Equal Employment Advisory Council in 1980:

"First, corporations need to analyze the current situation for female employees. An analysis of the numbers in various jobs is just the starting point. Valuable information can be obtained by ascertaining the aggregate employees, followed by breakdowns by seniority and education.

"Examining the causes of the wage gap will pinpoint problem areas. If, for example, one of the causes is that women are concentrated in clerical jobs, an exploration of salary-administration programs may well uncover the fact that many of these jobs need to be upgraded, either into technical

or professional job codes or by expanding the salary ranges for these positions. Additionally, career paths from clerical into technical and professional jobs need to be instituted. Employee turnover in clerical jobs is a high labor cost: Yet one of the reasons for this turnover is that clericals change jobs frequently in order to earn more money.

"Another problem area may be that men and women start at comparable wage levels, but women progress more slowly. . . . The reason may be a job-evaluation system that relies heavily on individual supervisors, many of whom are male and many of whom are prejudiced against working women. In other instances, men in supervisory jobs have difficulty convincing their bosses to promote a woman because of their bosses' prejudices.

"Women's wages may increase more slowly because of job assignment and job placement. If women tend to be tracked into staff and administrative positions away from the profit centers of the business, their salaries will reflect that placement. While the numbers of women in professional or managerial jobs may increase, the salaries earned by women may not be commensurate with those of male co-workers with comparable skills, seniority, and experience. . . ."

Lion at the door

Such analysis of wage-administration procedures within a corporation, says Piercy, "provides a mechanism for breaking out of traditional employment policies." And that is necessary for most companies, considering the direction in which the 1960s-born civil-rights legislation is pushing. "The lion is certainly at the door," is the colorful way Jean Entine of Women for Economic Justice describes the inevitability of comparable-worth legislation. "And the door is eventually going to open all the way.

"Since women are in the workforce permanently now, it would behoove employers to make the best of it," continues Entine, who is executive



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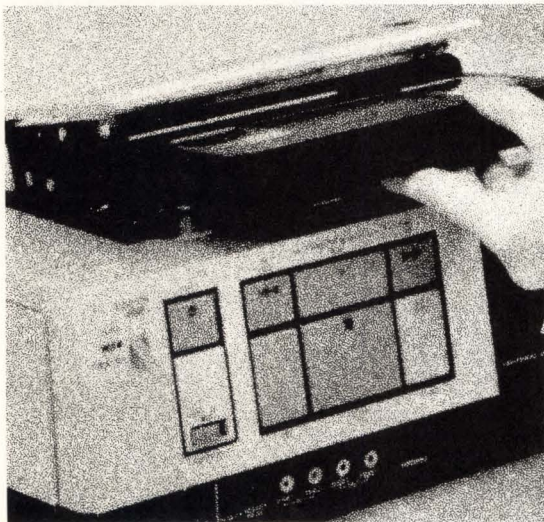
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Pay Equity

(Continued from page 106)

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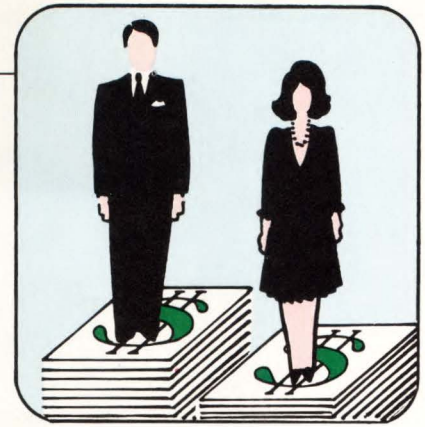
Daniel Mackey agrees: "Organizations have an opportunity to think about this idea and to make their adjustments piecemeal, gradually, intelligently. No one wants to put an organization out of business just to enforce the law," he adds. "The tendency now seems to be the enactment of 'prospective legislation'—California, in fact, has recently done this—requiring studies and adjustments made over time."

These trends are contributing to what Teresa Amott calls a "revolution in attitudes among both men and women. It's not just the women's world that's changing," says Amott. "It's the whole world." An interesting new wrinkle she brings up is that "men will not necessarily continue to condone lower wages paid to their wives." In addition to the frequent sheer financial necessity of a second income, "increasingly, in pro-

fessional and technical circles, there is also status to be gained from a wife who is also a professional," she observes. "I have talked to some men who were enraged that their wives have been denied wages or promotions they deserve."

Anne Ladky agrees that a revolution in attitudes is on the way. "The whole question of compensation is very knotty and difficult for corporations," she says, "but fair salary systems are an advantage for any business, in terms of its ability to retain talented employees, and as a means of providing clear incentives for their career advancement."

"In information management," adds Amott, "where skilled workers are in short supply, it's increasingly important to have a reputation for treating your employees well, and that includes women and minorities." It's always hard to suggest to a company that it should not continue to do things the way it has always done



them. Few companies are as interested in social justice as they are in their own profits. But corporations are coming to realize, very slowly, that it pays to be forward-looking about changes that are inevitable.

"Women's expectations, their rising level of experience in the job market, their tremendous motivation to prepare themselves to be productive, are vital factors in the changes that are taking place," Ladky concludes. "Today, women and minorities are devoting enormous energy to achieving in the working world... and the organization that isn't aware of this isn't keeping up." □

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PART II: DATA-INPUT DEVICES

Personal computers will now accept anything from pictures to pen marks as input, and spoken words and finger pokes as instructional commands.

by David R. Roman, Staff Writer

About a year ago, as he surveyed his employer's medical-supplies production line, inspection supervisor Don Keaton got fed up. Product inspection was too cumbersome. Inspectors randomly selected samples, jotting down any defects they found. At the end of the day, these reports were keyboarded into an Apple II personal computer for compilation, and reports were issued the following morning.

It was the extra step—the key-boarding—that irritated Keaton (a pseudonym), the manager of quality systems and standards for a southern California manufacturer. He wondered if there was a way to input the data directly into the computer. “We just wanted a convenient way to input

data,” says Keaton. “We explored the gamut of alternatives, and even thought about having the inspectors keypunch directly into the system, but that wasn’t feasible. I didn’t want a technology that required a slew of Ph.D.s to maintain.”

Finally, Keaton settled on OMR-2000 card readers from Chatsworth Data Systems. Now inspectors report on the quality of an item by making

Photo by Bob Ward



pencil marks on a card about the size of an old programming card. The OMR-2000 inputs the inspection data directly into the Apple without operator assistance. Says Keaton: "The cards are five times faster than keyboarding, and we save money because the system is unattended."

Keaton's input alternative fulfills three selection criteria: It is simple to use, it reduces the amount of work required to input data, and in this particular application, it is superior to a keyboard and other options. Many organizations measure alternatives against the same list of criteria. The savings are gravy.

The standard Qwerty keyboard that comes with most personal computers does not face extinction. But it is impractical for many applications. On the manufacturing floor, where a worker's hands are occupied by assembling, sorting, or some other task, the keyboard is a hindrance. At crowded supermarket checkout counters, keyboard entry of inventory data would be daft—barcode scanners add each purchase to the day's tally in one swipe. As the link between the user and the computer, keyboards leave a lot to be desired for many tasks. But personal-computer

users now have enough alternatives to match the device to the task. To restrict yourself and your organization to the keyboard is to miss opportunities to get data into personal computers more quickly, more accurately, and even more economically.

A few of the alternatives are strong in their own neighborhoods—they're used in a particular application or by a particular type of user. For example, 95 percent of all card readers,

like the ones used at the medical-supplies manufacturer, are used in educational applications, according to Frank Lefkowitz, vice president of marketing for Chatsworth Data Systems.

A card reader also has the potential to reduce the input errors that result from data-entry clerks transcribing reported data. The only problem Keaton's company had with the OMR-2000 was remedied by training. When the card readers were introduced, inspectors were improperly filling out the cards, causing a spurt in data errors.

Other methods, including voice command, cursor control via mouse, and touch screens, have more cosmopolitan appeal. They can ease the introduction of personal computers to the great body of hesitant users who haven't used computers, or even a keyboard, in their lives.

Not all of these "human interfaces" are designed for the novice. Some require a bit of sophistication. Not all of them are inexpensive, either. Roy Pursley, the speech-technology department manager for Texas Instruments Inc., could be talking about any input device when he says of his company's Speech Command voice-recognition application: "It's excellent for managers who need a personal computer, but who don't want to learn all the cryptic commands you need to know to run it." However, Pursley concedes that the device's price will be too high for many organizations to justify. Also, the Texas Instruments device is designed for managers who have technical support. Setting up the applications and a database for the computer requires a certain amount of expertise, says Pursley.

(Continued on page 112)

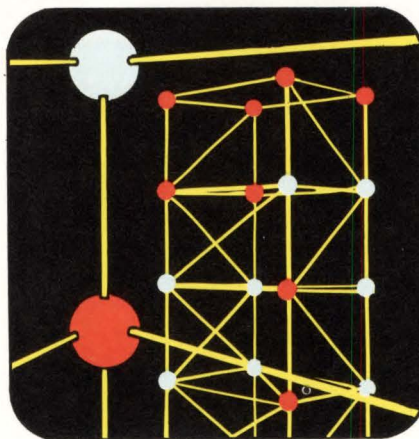


Personal-Computer Add-Ons

(Continued from page 111)

The mouse is the best-known interface alternative for personal-computer users. A three-button version first appeared on the Star networked workstation from Xerox Corp., but it was the one-button mouse that debuted with the Lisa personal computer from Apple Computer Inc. in early 1982 that first aroused user interest in simpler input devices.

Neither the mouse nor any other user interface replaces a keyboard. Lisa, for example, comes with both. Rather, the mouse assumes some of the keyboard's functions by replacing a series of typed commands with a single button. By moving the mouse on a table, users position the cursor over commands listed on the screen.



One tap on the mouse's button executes the command. "With the mouse, you don't have to remember complex commands, and you don't

have to bother keying them in," says Joel Pliskin, a product manager for Apple's Lisa. "It's not the traditional form of input, but it's a better way of using a computer."

The integrated software that was released with the Lisa, and is controlled via the mouse, has been imitated by many companies. VisiOn software from Visicorp, which adds integrated software and a mouse to the IBM Personal Computer, is one example.

As the crowd of imitators attests, the mouse has preferred status among the input alternatives. And among users? Eric Petersen, a financial analyst with the Group Health Cooperative of Puget Sound in Seattle, has been using the mouse on his Lisa computer for six months, and he is "ambivalent" about it.

Petersen was an experienced user of the Apple II Plus and IIe before he began working with Lisa, so the mouse played no role in easing his introduction to computers. He does believe the mouse is useful as an introduction to personal computers. "It provides the new user with an easy way to run the computer," he says. However, as the user develops expertise, the mouse becomes less of a convenience, says Petersen. "A savvy user could still use the mouse for some functions, but he or she would probably use it less and less frequently, given a choice."

Mouse-like movement

Petersen isn't the only user with doubts about the long-term usefulness of the mouse. Nevertheless, in terms of the number of offerings, the mouse is the rage at the moment. And this status has spurred other devices that are called "mouse-like." They don't look like mouse attachments, but they offer the same operating advantages.

These devices are offered not as keyboard alternatives, but as mouse replacements. One such device is the Penpad, billed as a combination mouse, keyboard, and graphics tablet by its manufacturer, Pencept Inc.

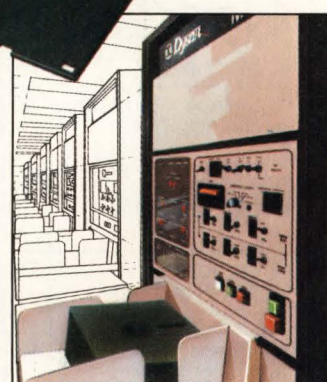
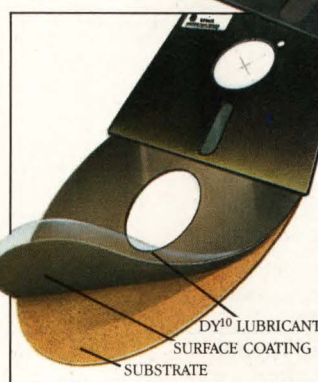
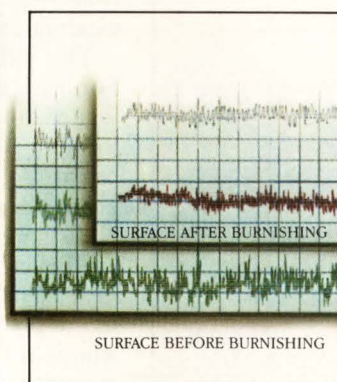
(Continued on page 114)

Need to know more?

For more information about the products mentioned in this article, contact the following companies or circle the appropriate number on the Reader-Service Card.

Vendor	Product	Price	Circle
Apple Computer (408) 996-1010	Lisa personal computer with mouse	\$7,000 (hardware) \$2,000 (software)	450
Chatsworth Data (213) 341-9200	OMR-2000 card reader	\$1,725	451
CMC Int'l. (206) 855-1600	Speak Easy telephone voice-input aid	\$795	452
Datacopy (415) 493-3420	Model 610 electronic digitizing camera	\$7,850	453
	Model 110 image-processing interface	\$795	
	Model 90 integrated imaging system	\$9,945	
Epson America (213) 539-9140	HX-20 Notebook Portable Computer	\$795	454
Heritage Software (213) 737-7252	Smart Key II custom-keyboard conversion software	\$90	455
Hewlett-Packard (415) 857-1501	HP 150 personal computer with touch screen	\$3,995	456

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Personal-Computer Add-Ons

(Continued from page 112)

Capital letters, numbers, and graphic images can be hand-drawn on the Penpad and then input into the IBM Personal Computer or a compatible machine. Because input involves familiar movements, the instruction needed to use Penpad is minimal.

Gerald Babb, Pencept's vice president of marketing, calls the Penpad "a mouse that writes. It knows what you write, as well as *where* you write it." Characters are transmitted to the computer with their positions intact. In addition, any section of the pad can be assigned function-key status, so touching that area will send a command to the computer. These

commands can be established for any application package. Indeed, Pencept has set up command areas for several packages.

Another of the mouse's unusual imitators is the Track Pen from Tech Sketch Inc. Resembling an oversized ball-point pen, it controls cursor movement. You move the cursor by "drawing" on a flat surface, and commands are executed by applying pressure to the device's spring-loaded tip.

Tech Sketch doesn't sell the Track Pen to end users, so you cannot purchase it as an add-on to your personal computer. Instead, the device is being sold through resellers that may add

something to it, alter it, or incorporate it into a specialized system. The Light Pen, Tech Sketch's other cursor-control device, is sold by resellers for educational applications. The Light Pen controls cursor movements and prompts a program by directly touching a screen's surface.

Sophisticated simplicity

Mouse and mouse-like options raise the same question about how simple a device can be without becoming a klutz in the long run. Simplicity usually implies a sacrifice of sophistication, and sometimes even functionality. The ideal user interface would combine simplicity for the first-time user and sophistication for experienced users.

The balance isn't easy to strike. For instance, although Lisa users can issue most program commands through either the mouse or the keyboard, Petersen says the choice isn't always available. He wishes it were. "I dislike having to take my hands off the keyboard to use the mouse," he says. "There's not always a good reason to do that." An experienced user who is comfortable with a keyboard may view a simple interface as an obstacle that slows operations, in the same way that a keyboard can slow the novice.

Hewlett-Packard Co. offers users another option on its new HP 150 personal computer. Users can control cursor movements and issue commands by typing codes with a keyboard or by touching specific areas on the crt screen. "We weren't sure whether experienced users would tire of using a touch screen," says Carol Mills, product marketing manager of HP's personal-office-computer division. User reactions remain to be seen—the HP 150 hasn't been available long enough for users to form opinions. HP's own research reveals that once users learn how to use touch screens, they want to stick with them, says Mills. Of course, a certain percentage of users aren't interested in even trying the technology, she adds.

The touch screen requires the user to lift his or her hand off the key-

Need to know more?

Vendor	Product	Price	Circle
Interface Solutions (901) 372-3764	IS-3000 barcode scanner	\$290	457
Key Tronic (509) 928-8000	Dvorak alternative keyboard	\$269	458
Oberon Int'l. (214) 252-8453	Omni-Reader optical-character reader	\$500	655
Pencept (617) 893-6390	Penpad Model 320 input device	\$995	467
Season Syst. (919) 967-5818	Sure Stroke custom-keyboard conversion software	\$50	459
Tech Sketch (201) 227-7724	Light Pen	\$120 to \$400	460
Texas Instruments (214) 995-2011	Speech Command voice-input system	\$2,600	461
Threshold Tech (609) 461-9200	Auricle-1 voice-input system	\$1,500	462
Visicorp (408) 946-9000	VisiOn integrated software with mouse	\$2,140	463
Voice Machine Communications (714) 541-0454	Voice Input Module	\$1,195	464
Vynet (408) 370-0555	V1000 modem and messaging system	\$7,315	465
Wang Labs. (617) 459-5000	PIC-1008 imaging and image-storage system	\$14,965	466

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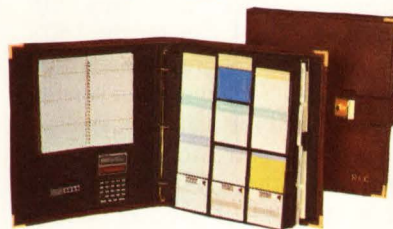
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Personal-Computer Add-Ons

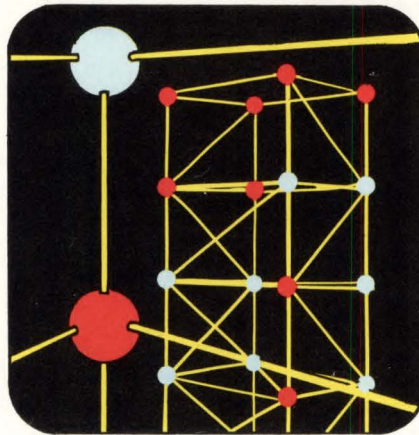
(Continued from page 114)

board, which prompts Eric Petersen to call the interface "a real loser." But Mills believes the screen will appeal to "users who don't want to remember commands or learn how to use the keyboard." It will also be valuable for executives and managers who can't type and don't care to learn how, she adds.

Dirty hands

As Don Keaton found, under the right circumstances, *any* input option can be valuable. The durability of touch screens, particularly their apparent imperviousness to dirt, may be useful in workplaces like laboratories and factories. Users don't actually have to touch the HP 150's screen to activate commands. A series of infrared beams cross in front of the screen, and the user's finger just has to break the invisible plane of light to make the screen respond. Some of the touch screens included with other personal computers operate the same way.

A major east coast pharmaceutical manufacturer, for instance, plans to use the HP 150 in research laboratories, where keyboards are awkward for technicians. "We'll find extensive applications in the toxicology labs, where technicians are handling animals, and are at the same time expected to input data into the computer," says a company spokesman. "In some labs, the workers' hands can get



kind of messy, but touch screens seem to stand up under a lot of abuse. They'll operate well even if they're dirty."

Software vendors are working with HP to develop packages for the 150's touch screen. The pharmaceutical concern uses the touch-screen version of Visicalc, and the company spokesman says it is "extremely easy to use compared to the old Visicalc." So easy, in fact, that it is being considered as a replacement for the modeling package that runs on the corporation's HP 3000 minicomputer. "There's a tradeoff between ease of use and overall power," the spokesman says, "and we're at the point where we may come down on the ease-of-use side."

The simplest way to input data is to tell it to the computer. For years, ven-

dors have been trying to develop systems that understand the human voice and accept speech as input. Such systems are becoming available for personal computers. In most systems, each word is the equivalent of a set of keystroke commands.

These systems have only a limited ability to understand voices. For instance, equipped with Speech Command software, the Texas Instruments Professional Computer can be "programmed" to recognize 450 words. However, the system only responds to one 50-word vocabulary at any given time. Nine vocabularies can be stored in memory, and if these vocabularies are interchanged quickly enough, a user has the impression he or she is using the full 450 words.

The system's major drawback is its inability to understand different voices. Even if two users set up vocabularies containing the same 50 words, the system can only understand one of them at a time. Each vocabulary is specific to one user's voice, so the computer must be set up to understand two separate vocabularies if two users want to use voice commands on the same application. Moreover, if a user has a cold, or if his or her voice is altered in some other way, Speech Command may not recognize commands. The user may have to create separate vocabularies to accommodate even slight voice changes.

Best is yet to come

Even vendors of voice-command products concede the technology hasn't been perfected. "Most applications can be accommodated with a limited vocabulary of 50 to 80 words," says Jerry Beckmann, president of Threshold Technology Inc., a developer of voice-recognition systems. But users want functionality that is out of reach at the moment. "Users want to enter data with voice," Beckmann says, "but systems can't understand continuous speech yet, and they aren't speaker independent."

Until "free speech" is available at a

(Continued on page 120)



The Dvorak keyboard layout, top, puts the most-used keys on the home row, reducing the amount of effort required to type. Standard Qwerty layouts like the one at bottom require typists to reach more often for commonly used letters.

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City: Mpls.	State: MN	City:	State:
Zip Code: 55343		Zip Code:	
Phone: (612) 983-0005	Ext.:	Phone:	
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Return Change Labels			

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Priority: 1		
People Involved:	Each group of records can be accessed through its own dictionary. When viewing any directory, just point at a record with the little arrow and press (Z) to zoom to that record.	(PgDn)
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Personal-Computer Add-Ons

(Continued from page 116)

reasonable price, the usefulness of voice-command systems will remain limited. "Voice will be one of the preferred methods of interacting with a computer during the next decade," says Roy Pursley of TI, "but touch screens, light pens, and the mouse will certainly have a place. Keyboards will always have a place. There are applications where speech should be used, and applications where keyboards should be used."

Is voice recognition useful today, or is it a technology managers should merely keep an eye on for future improvements? "Speech is very good for a hands-free application, like on the manufacturing floor," Pursley says. "If your hands are busy doing something, you don't want to have to jump over to a keyboard or take your eyes off your work."

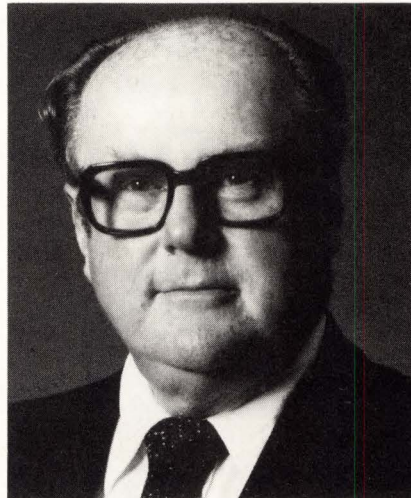
Development engineers at Eastman Kodak Co., Rochester, NY, have found hands-free data entry an advantage for testing that takes place in the dark. "Sometimes we're working with light-sensitive film in dark laboratories," says Gabe Hamidian, one of the engineers. "We used to use flashlights so we could see to enter data or control instrumentation. Now we can input through the microphone." The engineers input data into HP Series 80 personal computers using the Auricle-1 system from Threshold. The system works with any personal computer with an RS-232C or IEEE-488 standard interface, and understands up to 120 words. Hamidian and the other engineers also use the system to switch meters and power supplies on and off.

Business talk

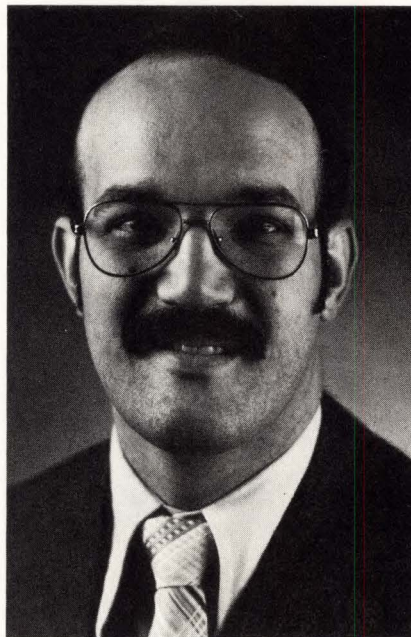
A laboratory may be a good place to use voice systems, but voice commands can be used in offices, as well. Engineers at Westinghouse Hanford Co., Richland, WA, use voice commands to control the actions of a robotic arm, and they've also simplified the Apple Writer word-processing package by adding voice commands. They run the package on the Apple II. "We prepare a lot of reports on our engineering work, and

they usually have to be edited or revised several times," says Daniel Swannack, manager of maintenance-equipment engineering for the manufacturer. "Simple voice commands let us change, correct, and modify our text."

Westinghouse Hanford uses the Voice Input Module from Voice Machine Communications Inc. The



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The Dvorak keyboard can help double a typist's speed, but Mark Tiddens of Key Tronic concedes it's not for everyone.

Module includes a microphone and a plug-in board that accommodates a 160-word vocabulary.

TI's Speech Command system can be used with any application under the MS-DOS operating system running on the Professional Computer. Most of those application packages are designed for business use, as opposed to use in laboratories or factories. In addition to its voice-recognition capabilities, Speech Command integrates telephone-management and -messaging capabilities that broaden its appeal to business users. "Telephone conversation is a major form of communication," says Roy Pursley. "The system can answer the phone and take messages, and it can be instructed to deliver messages to a particular station at a particular time."

Computers can't understand voice commands over the telephone because the quality of sound is degraded during transmission. However, several devices are available to boost the quality of telephone-transmitted voice to computer-comprehensible grade. The products are made for use with Touch-Tone telephones.

One of these devices is Speak Easy from CMC International Inc. Speak Easy, which comprises a circuit board and a software package, can deliver voice messages to phone stations, but the messages don't have to be identical. It can be added to an IBM Personal Computer.

For example, a recorded message can start with a standard introductory paragraph, and the remainder can be tailored to individual employees. The listener is asked a multiple-choice question, and his or her response, entered by pressing one or more Touch-Tone keys, instructs the computer to deliver the appropriate version of the message. The message can be set up as a series of "branches," with each successive component presented as the recipient types a code into a menu on a crt. Depending on the user's response to menu queries, the message may be

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Personal-Computer Add-Ons

(Continued from page 120)

different. As a security measure, a punched code could be required from any caller wishing to access voice messages.

A similar listener-prompted messaging system from Vynet Corp., called the V1000, doubles as a modem. It can be used to send data over regular phone lines to another computer.

Barcode applications

Direct and phone-transmitted voice-input devices have technological limitations at the moment. Until speech input devices can deliver commands to computers unhindered, the technology probably will find only limited acceptance. However, user experience may encourage acceptance: As users become more familiar with voice systems, they may find more applications for them. The history of barcode scanners—another input alternative—demonstrates that



"Voice will be one of the preferred methods of interacting with a computer during the next decade, but touch screens, light pens, and the mouse will certainly have a place."

Pursley, Texas Instruments

hand-held barcode scanners from Interface Solutions Inc. and HX-20 Notebook Computers from Epson America to heavy-volume customers. Coupled with a scale, the scanner-equipped portable becomes a meter for about two dozen heavy-volume customers.

These customers affix a preprinted label with a barcode to any package to be sent via Federal Express. A scan of the code records the date and the time the package is readied for shipment. The package is scanned again when it passes through Federal Express' Memphis nerve center and once more when it arrives at one of the carrier's hundreds of delivery stations around the country. "We can always trace a package through our system," says John Thekford, a sales analyst with delivery service.

The meter is more than a tracking device. Large-volume customers pay Federal Express in advance for shipping services, and that amount is recorded in the barcode. When an overnight package is placed on the electronic scale, its weight is automatically recorded by the Epson, and the cost of shipping that package is deducted from the customer's credit. All of this information is recorded on

the Epson's microcassette. Each day, the cassettes are collected and the data are relayed onto a larger system.

The system saves money and time at both ends of the package-delivery connection. "The meters make it unnecessary for our customers to key-stroke data into the Epson," Thekford says. "They reduce paperwork, and rather than having two or three people filling out bills all day, one employee can process several hundred packages in a couple of hours." Of course, the credit-deduction feature eliminates separate bills for packages, cutting Federal Express' paperwork.

Using images as data

One of the most exciting input devices for personal computers is the camera—so to speak. So-called imaging systems expand the kinds of data that can be fed into a personal computer. "It's a way of dealing with

The standard Qwerty keyboard does not face extinction, but it is impractical for many applications.

data that wasn't available before," says Helayne Jones, product manager for imaging systems at Wang Laboratories. "It's more than an alternative to capturing information, it's a new way to use and manipulate information."

An imaging system can scan a piece of paper, or even a three-dimensional object, and store an image of it. Handwritten notes, drawings, and photographs on a scanned page can all be stored in an image. "The average person in an organization gets a lot of information from documents that contain more than typed data," says James McNaul, vice president of marketing and planning for Datacopy Corp., a manufacturer that offers image processing, through resellers, to users of

(Continued on page 126)

"With a mouse, you don't have to remember or key in complex commands."

Pliskin, Apple

technological limitations do not necessarily constrict a device's usefulness.

Barcode scanners are one of the most widely used alternatives—despite an apparent lack of sophistication. Scanners are easy to use, but they aren't an effective way to feed volumes of information into a computer. Yet they are the basis of many sophisticated applications.

The scanners deployed in supermarkets, for instance, track sales. Indeed, barcode scanners can be used in any sort of tracking system, even one as complex as the system that makes sure millions of Federal Express packages make it to their destinations overnight.

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Personal-Computer Add-Ons

(Continued from page 122)

the IBM PC. "Journals, newspapers, and magazines have a lot of images, and we use those images to assimilate knowledge. Now they can be captured and integrated into business documents."

McNaul asserts the cost is worth the benefits. Adding Datacopy's imaging system to a personal computer costs about \$9,000, he says. "That's not expensive if you provide imaging in one station to serve a cluster of five or six word processors," he says. One of the reasons imaging systems are pricey is their need for large amounts of local storage. Wang's standard imaging system, the PIC (Professional Image Computer)-1008 comes with a 10-Mbyte Winchester disk—enough storage capacity for only about 100 images. It costs \$14,965.

Jones and McNaul say that imaging is advantageous in forms-intensive banking and insurance applications. They also stress that imag-



The Omni-Reader from Oberon International costs \$500 and can be attached to most personal computers via an RS-232 port. It reads one line of type at a time at the rate of 80 characters per second.

ing is better for producing documents used internally than those that would be distributed externally.

There's some debate about whether imaging systems meet all three criteria for alternative input systems. They certainly reduce the amount of work required to input data, and can be superior to keyboard

input in certain applications, but are they easy to use? "All users will find the Professional Image Computer easy to use," says Jones. But McNaul has doubts. "A user is going to have to be pretty comfortable with the computer before he or she can use imaging," he says. "It's a user-interactive system, and the user will have to learn how to control the machine."

Providing for adequate training is a good general rule when installing alternative input devices. Many user interfaces require no training—like Federal Express' barcode scanners and portable computers. But many do, and the company selling the product sometimes isn't the best judge of how much training your users may need. That decision is your responsibility.

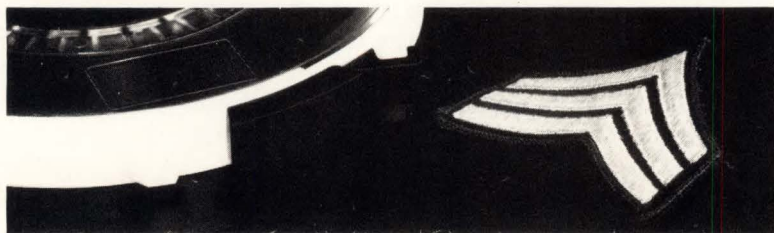
Qwerty vs. Dvorak

Card readers, barcode scanners, voice recognition, and imaging each offer opportunities for speedy, accurate input in specialized situations. But what about conventional office applications? Do the millions of employees who use keyboards every day have no alternatives to speed their work?

At least one vendor proposes a keyboard that at first looks scrambled, but is supposedly easier to use than a conventional Qwerty keyboard. The Dvorak keyboard puts the letters of the alphabet in a sequence that will be unfamiliar to Qwerty users. The Dvorak layout was designed during the 1930s, about 50 years after Qwerty, and never generated significant interest among users. However, last year the American National Standards Institute endorsed the Dvorak layout as a national standard, a status previously enjoyed only by Qwerty.

Key Tronic Corp. offers a Dvorak keyboard that can be plugged into the IBM PC. "The personal computer helped generate interest in Dvorak," says Mark Tiddens, marketing manager for Key Tronic. "Users figured that as long as they were computerizing to become more productive,

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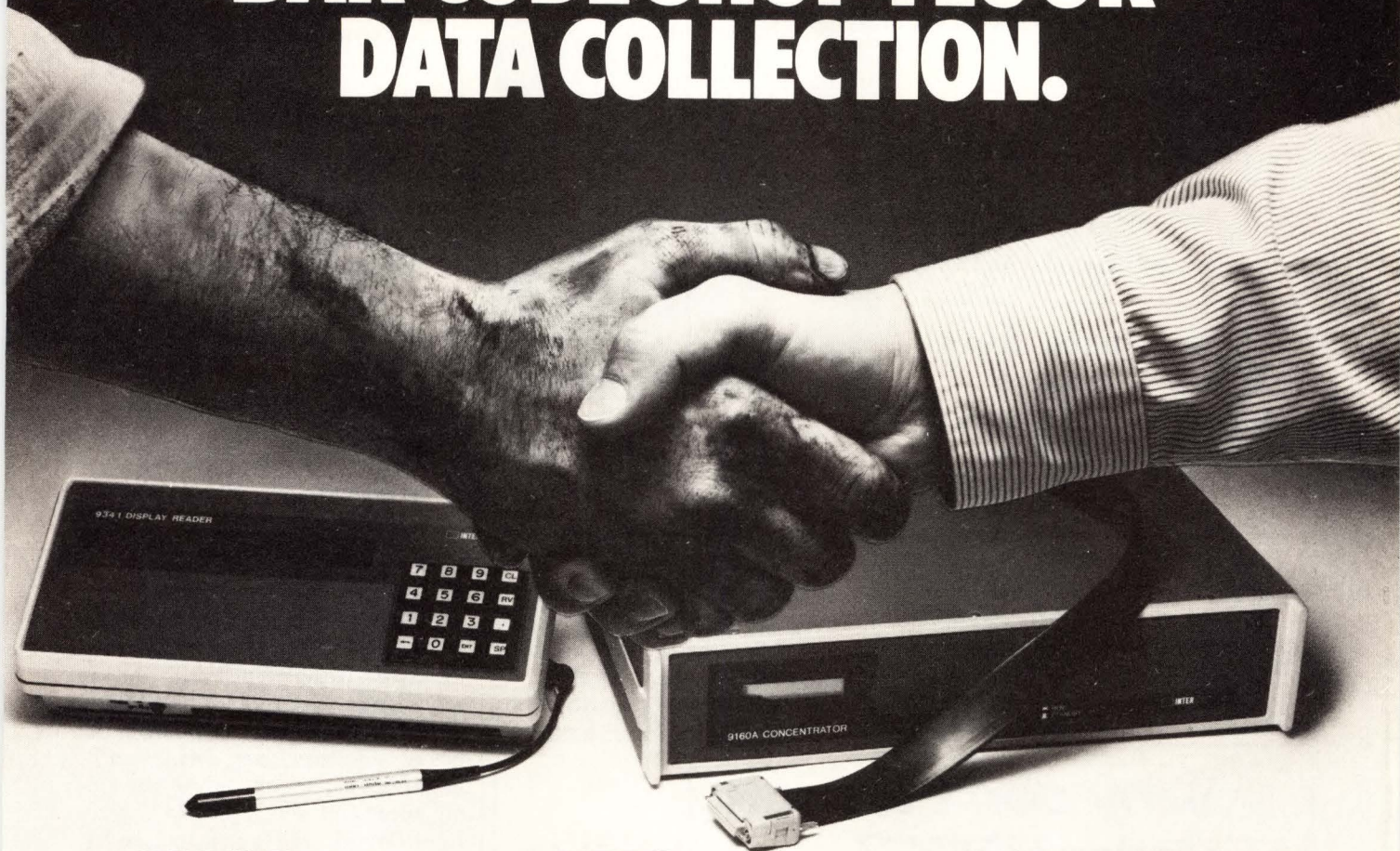
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(Continued from page 126)

they might as well try to increase that productivity with a better keyboard, as well."

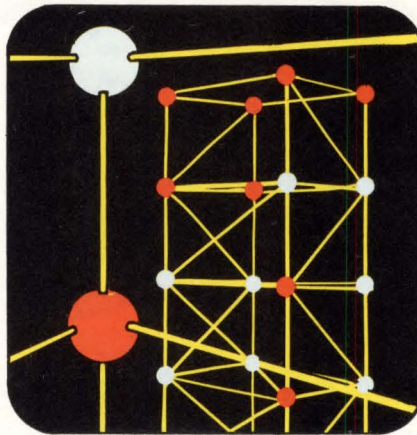
The Dvorak layout puts the most-typed characters beneath the fingers that rest on the home row of the keyboard, reducing the amount of movement required to type. After a user becomes accustomed to the keyboard, he or she can improve typing

"Imaging is more than a new way to capture data, it's a new way to use and manipulate it."

Jones, Wang Labs.

speed by 30 percent or more, says Tiddens.

Dvorak is best for users who sit at the keyboard all day, he adds. "The less-than-high-duty user won't be attracted to it," he says. Data-



entry and word-processing operators, on the other hand, could make significant productivity improvements with the Dvorak layout.

Key Tronic's product isn't the only way to install the Dvorak layout. James Miller, assistant vice president of First Interstate Bank in Salt Lake City, switched the keys on his IBM PC himself. The Sure Stroke software package from Season Systems

makes the necessary translations, instructing the PC to read *T* when what used to be the *K* key is pressed, and so on.

Miller, who works at the keyboard for about 30 hours each week, used a similar package from Heritage Software, called Smart Key II, to convert the keyboard of his Osborne portable. After an initial adjustment and train-

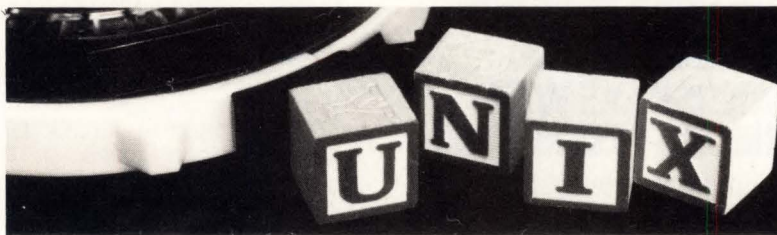
"Users want to enter data with voice, but computers can't handle continuous speech yet."

Beckmann, Threshold Tech.

ing period, Miller says he returned to his original typing speed of 60 words a minute. "I expect to go much faster," he says. Like Tiddens, Miller believes the casual typist will find no advantage—and may be slowed down—by the Dvorak layout. But the heavy keyboard user, Miller says, might double or triple his or her typing speed. "If you return to Qwerty from Dvorak, you'll be astonished at how awkward it is," he says. "Qwerty is like having a school of turtles swim in a sea of molasses. It actually was set up to slow down typists by scattering the most-used keys and levers so they wouldn't get tangled."

Not every input alternative will be as liberating for its user as the Dvorak keyboard was for Miller, but each can produce some advantage over the standard keyboard. The push to produce simpler, more powerful personal computers will spawn improvements of the alternative input devices and user interfaces, and perhaps even produce a few new ones. "Computers are powerful enough now so that you don't have to tell a user to change his or her behavior to accommodate the machine," says Gerald Babb. Demands like that prompt users to resist technology. Babb believes input alternatives are the key to making computers both easy to use and convenient. And a friendly computer is a more productive one. □

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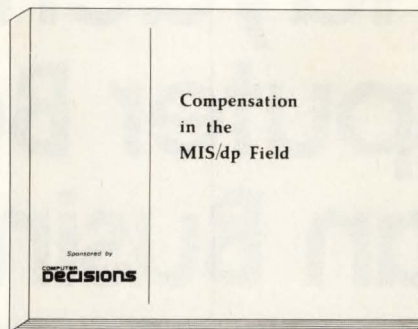
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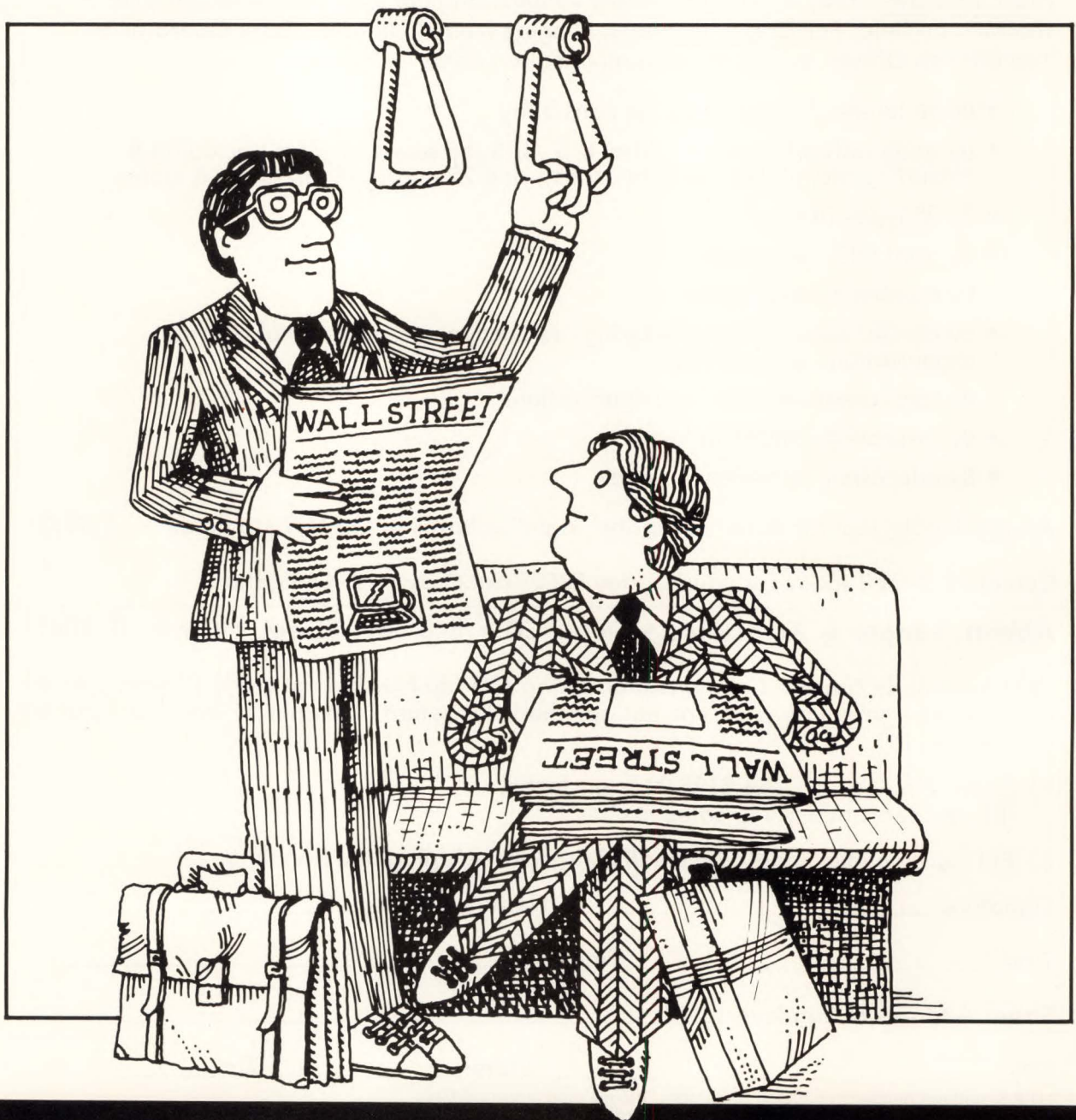
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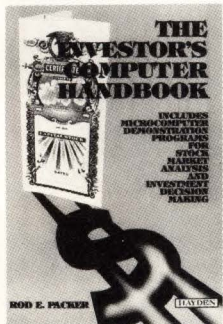
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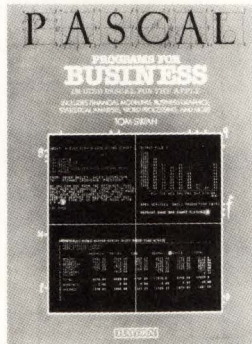
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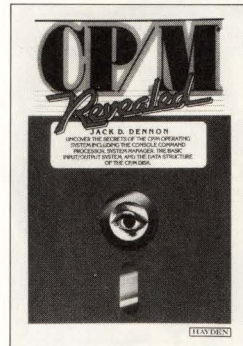
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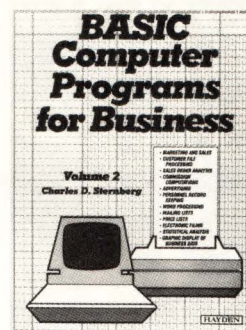
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Part I: Mainframes And Minis

Shielding Computers From Power Mishaps

If you delegate your responsibility for ensuring against costly power problems, the decision may come back to bedevil you.

by Jennifer E. Beaver, Southwestern Editor

When you plug in your coffee maker first thing in the morning, you don't give a thought to the electricity surging through it. Nor should you. Utility-generated power is reliable for appliances, lamps, and the like. When you arrive at your data center an hour or so later, however, your feeling of security about power should vanish.

In reality, utility-generated power is not steady and unflinching, and your organization's mainframes and minis are sensitive to the dips, surges, and interference it contains. Minor fluctuations that might cause a light to flicker can crash a computer, wiping out data and costing your organization millions in downtime and lost revenues.

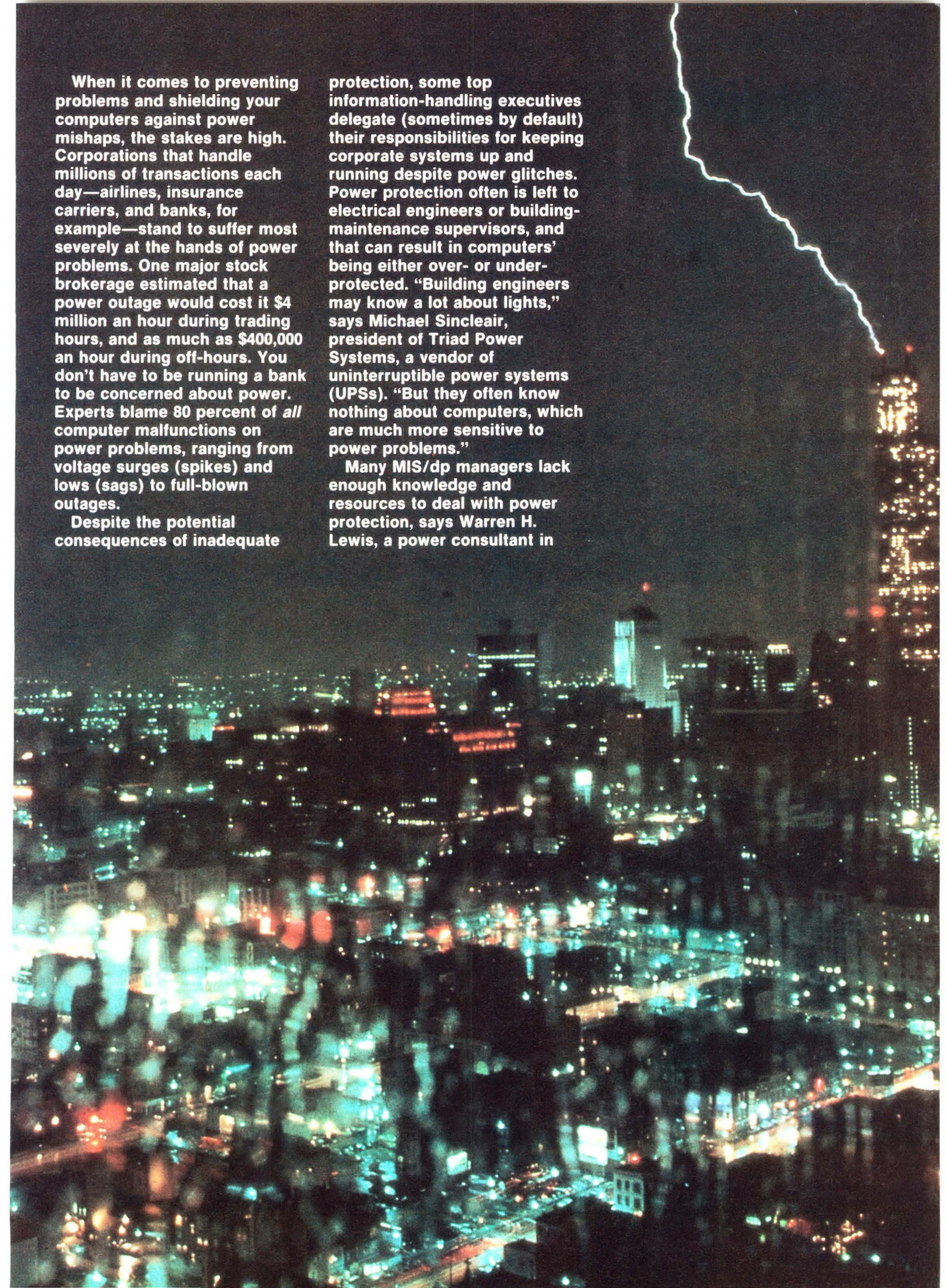
Of course, brownouts and blackouts can be even more devastating.

When it comes to preventing problems and shielding your computers against power mishaps, the stakes are high. Corporations that handle millions of transactions each day—airlines, insurance carriers, and banks, for example—stand to suffer most severely at the hands of power problems. One major stock brokerage estimated that a power outage would cost it \$4 million an hour during trading hours, and as much as \$400,000 an hour during off-hours. You don't have to be running a bank to be concerned about power. Experts blame 80 percent of *all* computer malfunctions on power problems, ranging from voltage surges (spikes) and lows (sags) to full-blown outages.

Despite the potential consequences of inadequate

protection, some top information-handling executives delegate (sometimes by default) their responsibilities for keeping corporate systems up and running despite power glitches. Power protection often is left to electrical engineers or building-maintenance supervisors, and that can result in computers' being either over- or under-protected. "Building engineers may know a lot about lights," says Michael Sinclear, president of Triad Power Systems, a vendor of uninterruptible power systems (UPSs). "But they often know nothing about computers, which are much more sensitive to power problems."

Many MIS/dp managers lack enough knowledge and resources to deal with power protection, says Warren H. Lewis, a power consultant in



Power Protection

(Continued from page 133)

Costa Mesa, CA. "Most managers have no background in building design, and no regulatory agency or clearinghouse exists to advise them on the subject," he asserts.

Passing the buck on power is bad policy. There's simply too much at stake. Moreover, even executives who've made preparations for power disasters should never allow themselves to feel secure. As the number of real-time installations increases, so does the potential for damage from



electrical mishaps. If you're installing, or planning, more sophisticated information-processing facilities, you should strengthen the power-protec-

tion stockade you've already erected around your data center.

Your data center may actually be more vulnerable than before. "The computers of 10 years ago could tolerate 10 times more noise [power-line disruption] than today's systems," says Frank R. Breletich, general manager of Oneac Corp., a power-protection vendor. "Computers will become even more sensitive in the future, making the proper power protection a major concern." (Continued)

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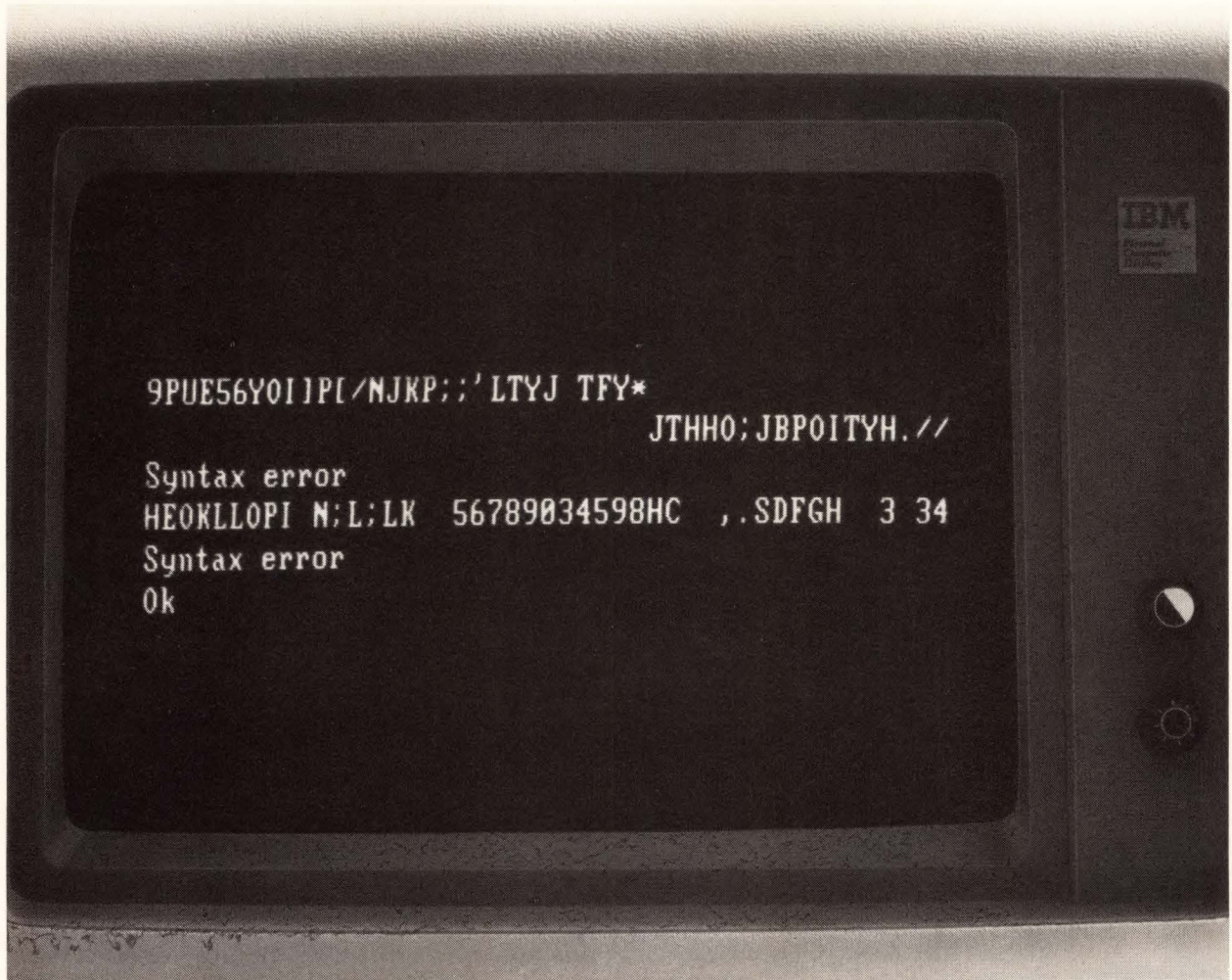
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just stand by and let your computer fend for itself.

Of course you could add a line conditioner to the standby unit, and take your chances with blackouts. But for less money, you can have a Gould Uninterruptible Power System, and a lot more peace of mind.

For the name of your local computer dealer carrying the Micro-UPS call Toll Free 800-854-2658. In California (619) 291-4211. Gould Inc., Power Conversion Division.

 **GOULD**
Electronics

See us at Booth No. 858.

 **COMDEX/Winter '84**
April 5-7, 1984
Los Angeles Convention Center
Los Angeles, California

Power Protection

(Continued from page 134)

Fewer than 10 percent of the real-time installations in the United States are shielded from problems by a solid-state UPS, the ultimate in power protection. Solid-state UPSs purify power and provide backup juice in case of an outage. "The number of installed UPSs will increase when MIS/dp managers take a more active role in controlling their own power protection," predicts Sinclair. "MIS/dp managers should take an active role in the decision-making for power protection—the same role they do in the selection of the computer hardware itself."

You might adopt the attitude of

Don Lo Cicero, vice president of the computer division of the Baltimore-based United Credit Bureau. He's got a rotary UPS protecting three

"If you can't trust your power-protection equipment, you've made a bad investment."

Lo Cicero, United Credit

minicomputers, and he tests its mettle periodically by pulling the plugs on his computers. He's performed

this stunt 30 or 40 times and never been disappointed. "If you can't trust your power-protection equipment, you've made a bad investment," he says.

If you're unfamiliar with the ins and outs of power protection, a good way to begin to educate yourself is by learning about the causes, effects, and remedies of various mishaps.

Small scale, big problems

The least severe disturbances—sags, spikes, transients, and noise—account for 99 percent of power problems. A well-known study by Bell Laboratories, Murray Hill, NJ,

Powerful ways to shield power

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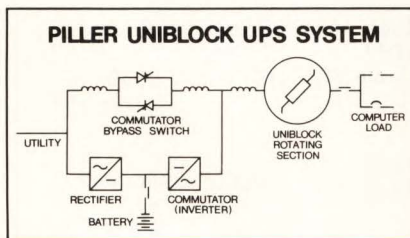
Announcing the most advanced UPS system ever designed!

Even before its formal introduction, the new Piller UNIBLOCK Uninterruptible Power System (UPS) was already being installed at major telephone, television, and telecommunications installations, banks and financial institutions, data services companies, and automated manufacturing installations worldwide!

A state-of-the-art breakthrough

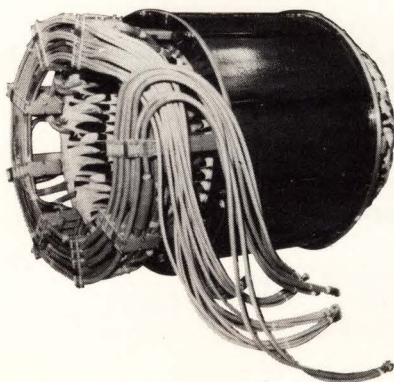
$$1 \text{ STATIC UPS} + 1 \text{ STATIC UPS} = 1 \text{ UNIBLOCK UPS}$$

The Piller UNIBLOCK is the first UPS system that offers dual power paths, each capable of supplying full rated power to the computer. That means built-in redundancy in a single module. (So a single UNIBLOCK UPS System provides the same protection as two static UPS systems!)

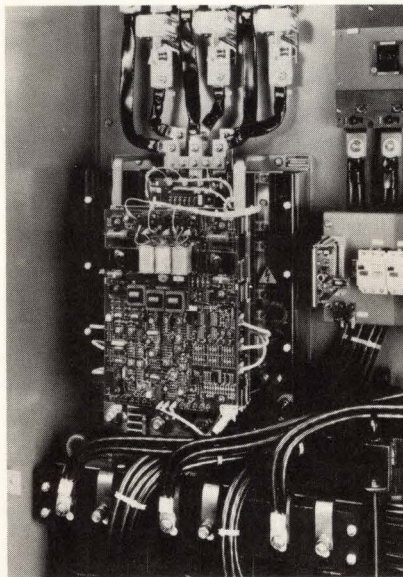


Superior efficiency

It's the first rotary UPS to offer efficiency equal to and even superior to that of static UPS



systems. (No other rotary-based UPS even comes close!) That's the result of the exclusive Piller rotating power conditioner...the first ever to combine primary (motor) and secondary (generator) windings on a single stator with a common rotor.



Superior reliability

It's the only UPS system to offer four times the reliability of a static UPS system. (The UNIBLOCK's simple commutator (inverter) is only a fraction of the size of a static UPS inverter and has only 25% the parts count!)

Total power protection/plus system flexibility

It's the only UPS system to offer up to 100ms ridethrough, plus complete isolation of the load from the utility, and protection against, voltage spikes, voltage

sags, brownouts, even without a battery.

The right system for your power requirements

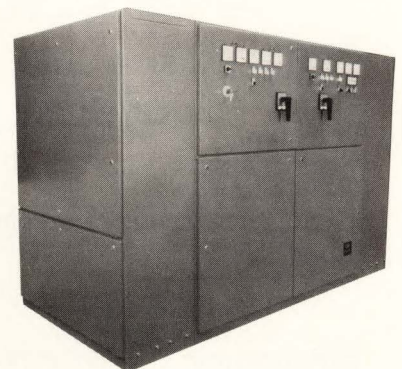
It's the only UPS system available in KVA ratings to cover the entire range of mainframe power requirements from 40 to 500 KVA...plus an off-line battery, constant-voltage battery charger, automatic bypass switching, power distribution system, and diesel-electric emergency power generation capability...all from a single source!

Nationwide maintenance and service

And it's offered with a 24-hour-a-day, 360 days-a-year nationwide service agreement from K/W Control Systems, Inc., the leading supplier of power systems for computers, with more than 3,000 systems installed coast-to-coast.

Now there's UNIBLOCK, so you won't have to worry about lighting and thunder.

No wonder we're taking the UPS market by storm!



CONTROL SYSTEMS, INC.

South Plank Road, Middletown, New York 10940
Phone: (914) 355-6741 TELEX No. 13-7428

Power Protection

(Continued from page 136)



This collection of batteries backs up the UPS at Boeing Computer Services, providing a 15-minute cushion for the computer-services vendor. The batteries are by Allied Electronic Components Co.

showed that sags, (which are dips to 96 volts or less), accounted for 92 percent of the disturbances in 24 locations over a two-year period.

These problems often are referred

to collectively as "dirty power," but that's something of a misnomer. It's really irregular power. Most of these fluctuations last for only a moment. How can such minute events damage

a computer? Much data processing takes place at speeds of one millionth of a second or faster, speeds that magnify the impact of the tiniest interruptions. Data flow is disrupted, causing files to disappear, errors to erupt, or systems to stop functioning.

Often, a small-scale power problem seems to be a glitch in the software. You investigate, but can't find an offending bug in the code. "When the software appears to fail like that, a manager may go after the vendor with teeth bared," says Warren Lewis. "But it's probably a power disturbance."

Even after a power mishap ends, its effects may linger. If errors are caused while data are transferred from disk to tape, the problem won't turn up until the files are called out of storage—perhaps days or weeks later.

You can often blame your neighbors for voltage disturbances, which

(Continued on page 143)

Powerful ways to shield power

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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.

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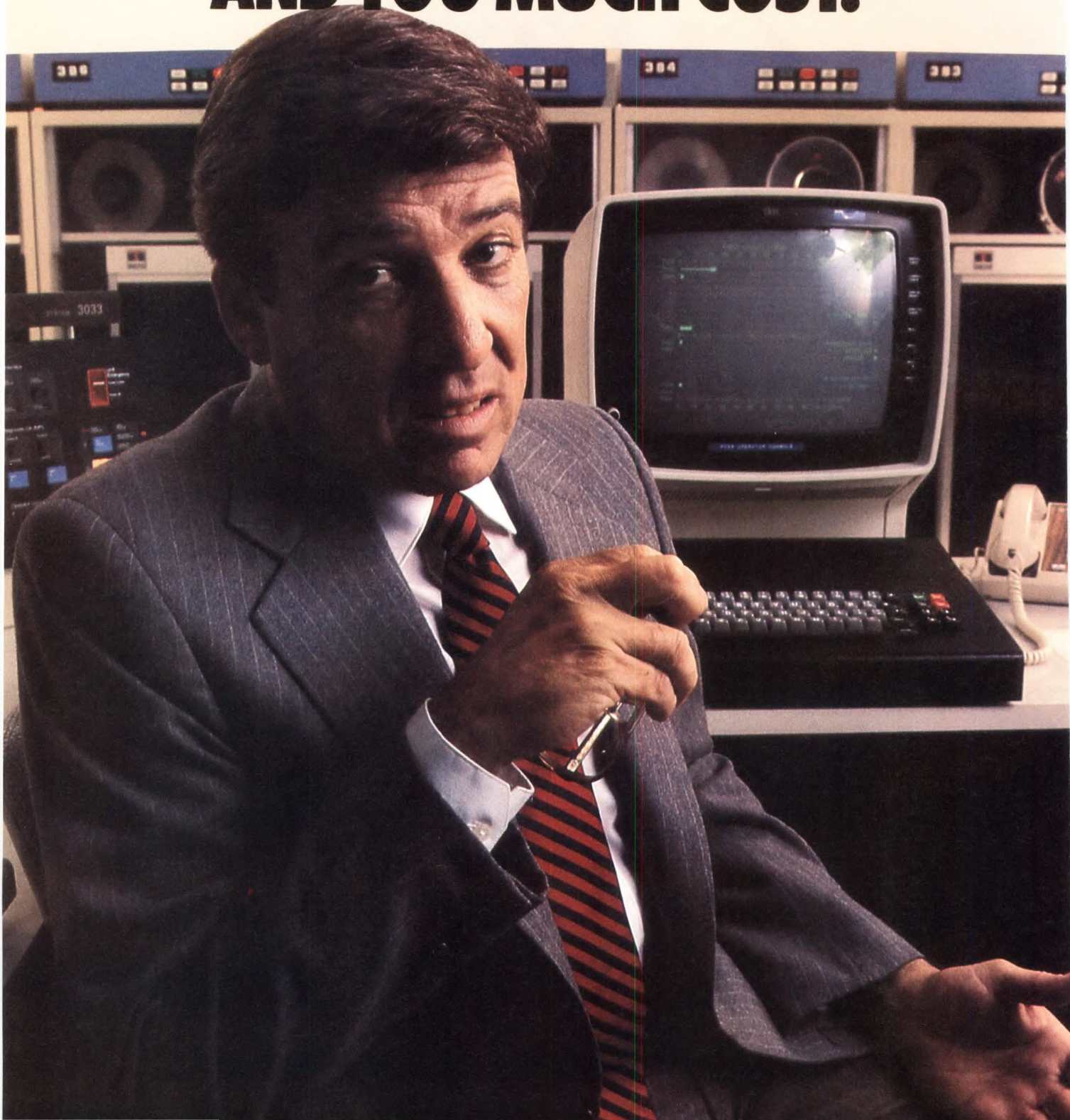
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**I THOUGHT I
HAD TO CHOOSE BETWEEN
TOO LITTLE POWER PROTECTION
AND TOO MUCH COST.**





THEN I FOUND THE EXIDE ELECTRONICS SERIES 2000 UPS.

Traditionally, for moderate sized mainframe computer installations, it was a choice between two undesirables: too little power protection and too much cost. Voltage regulators or line conditioners left them vulnerable to flickers and power outages; uninterruptible power supplies provided all of the protection, but at too much cost.

Now there is a better alternative. The Exide Electronics Series 2000 UPS: it gives you complete protection at an installed cost as much as 30% below other UPS systems in its class. The Series 2000 provides complete protection against spikes, transients, line noise, brownouts and blackouts. Whatever happens, your equipment and your data are protected.

A UPS SYSTEM THAT BELONGS IN THE COMPUTER ROOM!

Just as the Series 2000 fits your budget, it also fits your computer room. The compact system, including battery pack, requires only 16 square feet, less than a

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UPS PROTECTION WAS NEVER THIS AFFORDABLE!

Exide Electronics' Series 2000 UPS is a new direction in uninterruptible power; designed specifically for the computer user who wants complete protection — without

the cost and space requirements that have been associated with UPS. Look into the Series 2000 for yourself. It's the first UPS with big system performance at a small system price.



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At any moment it can happen: A power outage wipes out your computers, and when it does, you lose big—in time, money and in important data.

What's more, power fluctuations are not only a problem for computers, but for many other types of sensitive electronic equipment. Telecommunications systems,



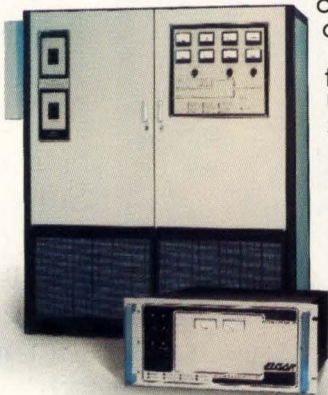
Available in models ranging from 400 VA to 25 kVA single-phase and 10 to 50 kVA three-phase, Elgar UPS feature full kVA load rating from 0.7 lagging to 0.9 leading P.F. All three-phase and single-phase units rated 15 kVA and higher include a full electronic static switch as a standard feature. Other models are available with the static switch as an option.

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This sight strikes terror in the hearts of all computers.

security equipment, process-control devices and laboratory instruments—all rely on clean, continuous power.

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system for you—from the Mini-UPS, designed primarily for low power applications such as microprocessor-based

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To put it simply, when you order a UPS from Elgar, we'll deliver complete, continuous power from clean-up to back-up—and a much rarer commodity: peace of mind.



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Power Protection

(Continued from page 138)

are frequently caused when heavy-duty motors, strip heaters, and other apparatuses that consume large amounts of power are turned on or off. Many corporations experience increases in irregular-power problems when they move into a city or an industrial park.

Brownout blues

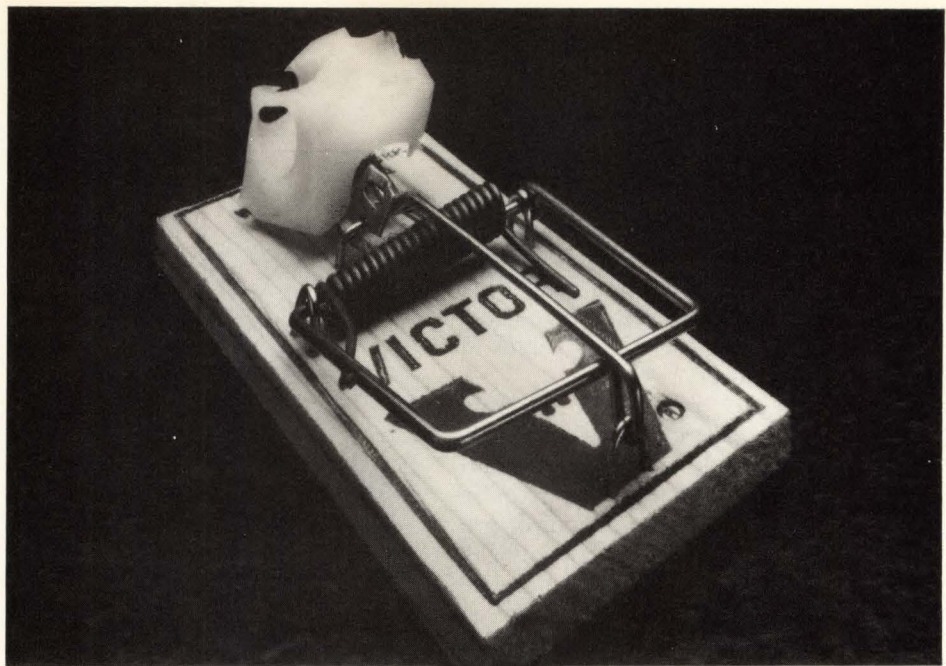
Brownouts are a less-frequent problem. A brownout occurs when a utility reduces the available voltage because of a capacity overload or a generating-equipment failure. Your equipment may continue to function during a brownout, but it may become more sensitive than normal to the inevitable line noise and other power aberrations.

Blackouts, the most severe of all electrical glitches, are caused by a variety of factors: utility-equipment failure, lightning, or even an errant car knocking down a strategic power pole. A blackout starts with a temporary loss of juice, followed by a brief surge of power, and then a breakdown. The voltage fluctuations that precede a blackout can severely damage computers. Even if no data are lost or damaged, you can lose a lot of time and money in the hours it takes to restart and reload your computers.

Knowing the basics

No matter how much money you spend on sophisticated protection equipment, it will work about as well as an empty box if your data center isn't properly wired and grounded. Many mainframes and minis have special grounding requirements. Don't let yourself be so distracted by vendor claims about state-of-the-art technology that you overlook this most fundamental of precautions.

Ed Muxo, president of Computer Power Solutions, makes a decent living correcting grounding and wiring inadequacies—most of which his clients don't discover until an outage drives them to their knees. One user spent millions of dollars building a bunker to house two UPSs and two diesel-powered rotary generators. But when the next blackout hit, the



By building better products and providing the largest network of service engineers, Emerson has become the world leader in Uninterruptible Power Systems.

Ralph Waldo was right.

"Build a better mousetrap and the world will beat a path to your door."—Ralph Waldo Emerson

Ralph Waldo was right! How else can you explain the fact that Emerson Electric Co. is the world's largest supplier of Uninterruptible Power Systems? With over 500 million watts of installed UPS power, enough to satisfy the total power requirements of Washington, D.C., Emerson's Industrial Controls Division is far and away the industry leader.

During the 17 years Emerson has been the leader in manufacturing Uninterruptible Power Systems, they have proven one absolute truth—having the biggest, most colorful advertisements does not make you Number 1—having the most reliable products and best service does.

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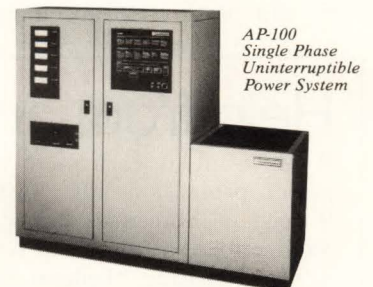
When it comes to protecting sensitive equipment from power fluctuations and power outages, Emerson's

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CIRCLE 78

Power Protection

(Continued from page 143)

protection equipment didn't work because it had been wired incorrectly. To correct the problem, Muxo had to shut down the user's data center for 10 costly hours.

Computer rooms are dynamic places. New equipment is continually brought in and the old is repositioned or moved out. As equipment configurations change, so do power-protection requirements. Yet many data centers are locked into using rigid, conduit-encased wiring that is expensive and time-consuming to alter. Too many conduits can squeeze the computers out of their rightful places, as aerospace manufacturer Rockwell International discovered. Rockwell was forced to abandon its Downey, CA, data center after packing the floor so tightly with conduit that there was no space for new circuits.

At Rockwell's new data center, in Seal Beach, CA, Neil Ellis, information-systems manager, decided to make flexibility a way of life. He installed a movable computer-power module that puts electrical connections and grounding components in the hands of the data-processing department. System III from Computer Power Systems contains flexible cables, receptacles for computers, and a transformer in a separate cabinet on wheels. Because the unit is small (30 by 36 by 40 inches) and mobile, Ellis' staff can move it to accommodate



The low-profile Line 2 Power Conditioner from Topaz protects minicomputers from noise and sags, and doubles as a distribution unit.

changing power-supply requirements. New cables, cut to length, can be added quickly.

The System III also lets Ellis' staff monitor, control, and relocate electrical sources without hassling with rigid conduit-enclosed wiring. It costs \$200 per kilovolt-ampere (kVA). Power modules like the System III are also available from computer-hardware vendors like Digital Equipment Corp. (DEC) and Burroughs.

Once your data center is properly grounded and wired, you're ready to determine how much power protection your organization requires. If even a small amount of downtime would cripple your operations, you

should install either a static or rotary UPS with backup batteries, possibly supplemented by a diesel backup-power source. "Selecting a UPS is a black-and-white issue," says Jeffrey Eastham, a Houston-based consultant. "You either need one or you don't. No other piece of equipment lets you ride through outages lasting more than a flicker of a second."

Static UPS improvements

At one time, the size, weight, appearance, and complexity of static UPSs prohibited organizations from installing them in computer rooms. Their lead-calcium batteries, which produce hydrogen, required specially ventilated quarters and time-consuming water checks. "A typical UPS designed to provide maximum standby time used to have huge banks of batteries," says Leonard Gottlieb, chief executive officer of Nova Electric, Nutley, NJ. "In many cases, the batteries were neither necessary nor desirable, and the cost was very high."

But that's the past. Several UPS vendors are offering much smaller UPSs that fit neatly in any computer room. They have gel batteries that can be installed on standard flooring and require no maintenance. Usually, the five-to-15-minute capacities of the batteries provide more than enough breathing space to ride out an outage, says Gottlieb. Nova's new Integra system, a combination static UPS and gel battery, fits in a data center. Prices range from \$12,000 for a 5-kVA unit to \$45,000 for a 30-kVA model.

Exide Electronics also offers scaled-down static UPSs—the Series 2000 for small mainframes like the IBM 4300 and System/38, and the Series 1000 for superminis like the DEC VAX and Hewlett-Packard HP 3000. The Series 2000 costs between \$30,000 and \$50,000, depending on kVA rating; the Series 1000 costs under \$6,000.

Daniel Collins remembers the old UPSs—they were monsters whose batteries sometimes oozed sulphuric acid. When he took a job as production manager at the *Morning*

Help from an objective source

If you want to learn more about power protection, the National Bureau of Standards has a new publication that may help you.

The 100-page "Federal Information Processing Standards Report No. 94" includes guidelines on the power and grounding requirements of large- and medium-scale computer systems. It costs \$13, and is available from the National Technical Information Services Department of the U.S. Department of Commerce, Spring-

field, VA 22161. The phone number is (703) 557-4650.

The Bureau of Standards is developing a similar guide for personal computers, word processors, and intelligent terminals. In fact, you may be able to contribute to the research. If you've had power problems with this kind of equipment, the bureau would like to know about it. Contact Steve Recicar at the National Bureau of Standards, A216 Technology Bldg., Washington, DC 20234.

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CIRCLE 79

IFPS

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Power Protection

(Continued from page 144)

News and Observer in Raleigh, NC, Collins decided to buy a maintenance-free UPS. The newspaper recently installed six of Tandem Computer's Nonstop fault-tolerant systems, which tolerate any disturbance except power failures. Collins

installed a Series 2000 from Exide to cover that final possibility. Occupying 16 square feet, the Series 2000 is one-third as big as a conventional UPS.

Large-scale operations may require more backup power than that

provided by smaller UPSs like the Nova and Exide models. The Bellevue, WA, data center of Boeing Computer Services Co., which provides timeshared data-processing services for 2,000 customers in the United States and abroad, is one such installation. Power problems have a double impact in Boeing's case. The vendor of computer services suffers, but so do its clients.

To guard against a power interruption, Boeing Computer Services and Emerson Electric designed a \$3.75 million UPS. Ten 1,200-kilowatt diesel generators supplied by KEM Equipment Co. (at a cost of \$3 million) provide additional backup. Ten large strings of lead-calcium batteries, installed for \$1 million, fill the gap between the first sign of power failure and the startup of the generators. This elaborate setup protects and backs up 19 mainframes—a Cray 1-S, six Control Data Corp. models (one 170/825, two 170/720s, one 170/875, and two 170/760s), and 12 IBM models (two 3031s, six 3033s, and four 3081s).

Reliable rotary power

Until two years ago, only solid-state UPSs were considered reliable. However, rotary UPSs have recently begun to push into the limelight. They don't offer the same degree of protection as the top-of-the-line static UPSs, but rotary models provide enough protection for some corporations.

A rotary UPS is a motor-driven generator that supplies refined power suitable for computers. Utility-supplied power runs the generators, which in turn supply "new" power to computers. In contrast, static UPSs refine utility-grade power.

Rotary devices are deceptively simple, a fact that makes some users nervous. They're afraid the moving parts will wear out, causing malfunctions. Such fears may have been well-grounded several years ago, says Dick Bowyer of Computer Power Products, a rotary-UPS vendor. But the new units are far more reliable,

(Continued on page 150)

Line power noise, interrupts & glitches got you down?

Noise from switching equipment, power interruptions and unsteady voltage are more than simple annoyances — they can cost you money. Errors and equipment damage are common results of faulty utility power. To avoid these problems rely on Computer Power, Inc. We offer a complete line of standby power and line conditioning systems. And our price has the competition spiked.

Computer Power has the system to handle virtually any line disturbance you encounter.

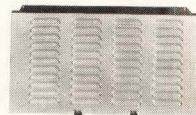
We're the UPS experts. Our UPS system protects against switching noise, lightning, brownouts and blackouts. At the instant of power failure, it automatically switches to standby power with absolutely no interruption. Models are available to 75 KVA. For isolation from common and transverse mode noise, our LCI series is your choice. Special separation between primary and secondary windings enable these units to deliver maximum isolation 10 times more effective than ordinary isolation transformers. The LCR series, our most cost-effective line conditioner, uses a ferro-resonant transformer to provide super high isolation, suppression of equipment switching noise and virtually foolproof regulation vs. input



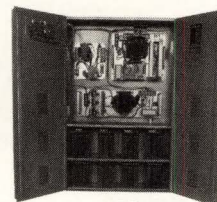
LCR



LCS



LCI



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voltage changes. For line conditioning, isolation and utility voltage stabilization in a lower cost unit, our LCS series is ideal. Designed primarily for low cost mini and micro computer systems, the unit can be mounted on the floor under the computer.

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Emergency Power Engineering, Inc. has power protection systems for all computer applications, and for all budgets. Their unique "total system approach" is designed to provide maximum protection for any new or existing computer installation regardless of size.

A modular concept enables EPE to tailor power protection to your present needs, and to expand as your level of criticality increases. Sensitive computer equipment is protected with the latest in reliable, solid-state technology. And an extensive network of sales and service offices provides dependable support for all EPE power protection systems.

The acknowledged leader in computer power technology offers the most complete line of systems available:

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- POWERBLOC power conditioning units
- Static uninterruptible power supply systems
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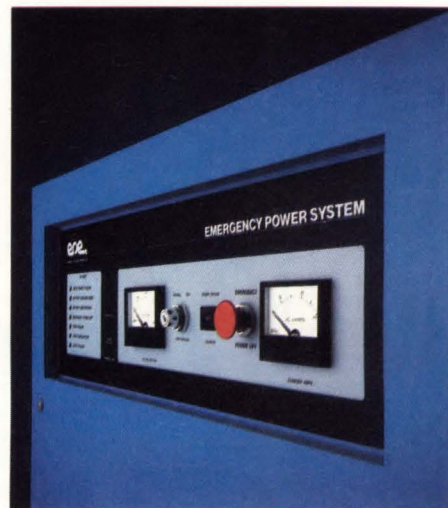
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Others say they solve your computer power problems.

We say they're not keeping current.

Most power conditioners are based on technologies developed decades ago. It's old technology...attempting to protect the new technology of the 80's.

Not one adequately protects the ultra-sensitive microcircuits in your computer from harmful electric *noise*. As important, not one provides the electric *current* your computer needs to operate effectively.

Not one. Except Oneac.

Only Oneac power conditioners are designed specifically for your modern computer. So no one can hold a candle to Oneac's complete power protection capability.

Power in pulses.

Your computer uses pulses of electric current. It takes large pulses to start it up, smaller ones to keep it running.

The only way other power conditioners can provide these large pulses of current is to be oversized.

This results in a serious trade-off. Oversized traditional power conditioners tend to be unstable. They cause the electric power to waver out of control—which can permanently damage your computer.

There are no such trade-offs with Oneac. Exclusive technology eliminates *all* harmful electrical noise. Yet, this same sys-

tem still provides the electric current pulses your computer needs from first start up and all through the day.

No oversizing is needed. Oneac power conditioners provide start-up current that's up to 20 times normal operating current.

What's more, Oneac products run cool and quiet. And are plug-compatible with most modern computers.

Join the leaders.

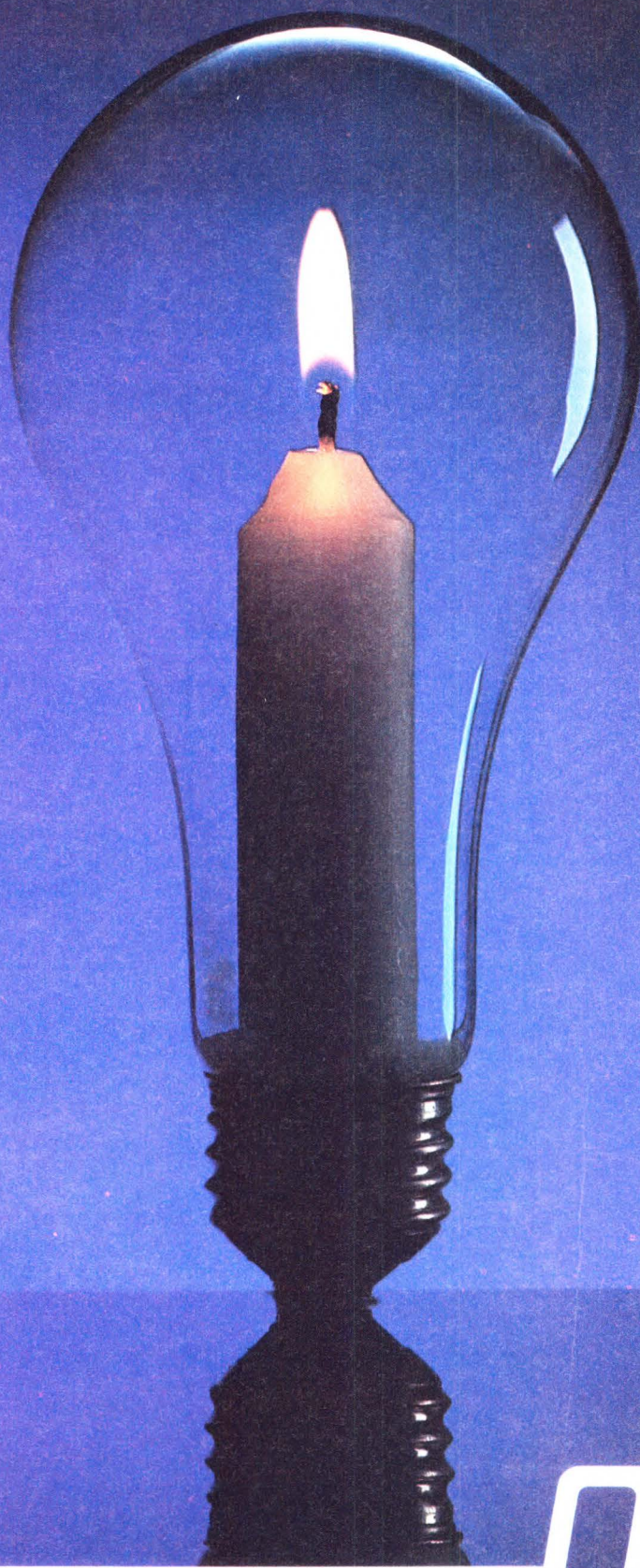
Already, many leading names in business computers have selected Oneac to solve their power problems. Shouldn't you do the same for your computers?

We invite you to compare specs with the others. Ask them about current. Ask them about noise. And ask them about the trade-offs they want you to make.

Then, ask us. We'll prove to you that they're not keeping current.



Oneac: Power that performs.



ONEAC

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2207 Lakeside Drive
Bannockburn, Illinois 60015
312/295-2800

For info, circle 82
For salesperson, circle 83

Power Protection

(Continued from page 146)

he claims. The key part of a rotary generator—the carbon “brushes” that actually produce electricity—now last about five years and cost only about \$50 to replace. Bearings last up to 10 years and cost \$1,000 to replace. A hand-held acoustic testing

device lets you know when bearings are about to give out. Many rotary UPS users do repairs and perform maintenance chores themselves.

Rotary UPSs offer several advantages over solid-state models. The moving parts of a rotary unit are far

less sensitive to environmental factors than the solid-state circuitry of static UPSs. Bowyer's company has installed them on a loading dock and in a Tucson, AZ, parking garage. Thus, it saved the expense of building an environmentally controlled structure. Rotary UPSs also cost about half as much as static devices, a persuasive reason for buying one. “It's hard to get the boss' approval for a static UPS unless you've had a major failure,” says Bowyer. However, don't be misled. Rotary UPSs are not stand-ins for solid-state units. “Motor-generator UPSs are a stopgap measure,” says Bowyer. “Most users have a failure they can't handle within a year of purchasing a unit.”

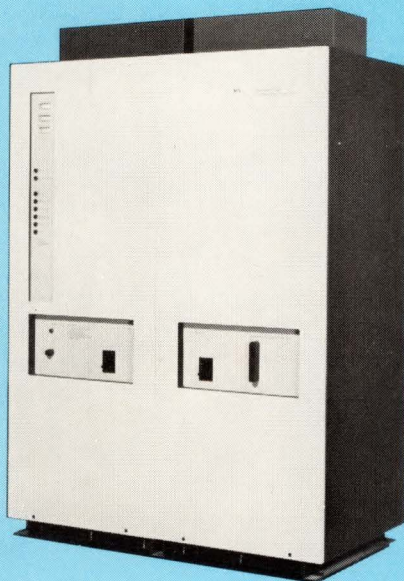
United Credit Bureau has a rotary UPS from Computer Power Products to protect the power supplies for a DEC PDP-11/44, a PDP-11/70, and a VAX-11/780 that process millions of transactions daily. Although the prices for static and rotary UPSs, in this case, were about the same, Don Lo Cicero bought the rotary unit because it will be cheaper to operate. “A 150-kVA static UPS might have cost between \$40,000 and \$60,000 annually in extra air conditioning,” he says. “Ten years ago, when electricity cost about one-fifth of what it does today, I wouldn't have minded spending the extra money. But today I do.” United Credit Bureau's 50-kVA rotary UPS, encased in a sound-proof enclosure, sits in the computer room.

A rotary UPS won't protect you in the event of an outage of more than a half-second, but it does offer effective protection against spikes, sags, and transients. Still, rotary units provide better protection than transformers because they tolerate a much wider range of poor-power input, while maintaining a more precisely regulated output of current. Unlike transformers, rotary units provide enough uninterrupted power to be able to bridge the momentary outages that may be caused by lightning and utility-grid switching. That is the opinion of Kenneth G. Brill, who is the president of Atlas En-

Many have tried to match Solidstate Controls UPS simplicity and reliability...but can't.

■ Ferroresonant reliability. Significantly fewer components yield unmatched dependability in service.

■ Scott-T connection. The Scott-T connection of transformers handles 100-percent unbalanced loads without experiencing stability and/or regulation problems, offering the advantages of a single-phase transformer in a three-phase device.



■ Patented zero-break static switch. Assures a truly uninterruptible (not even one-quarter of a cycle) make-before-break power transfer.

■ SCI's design maintains high-crest-factor (nonlinear) loading without costly special circuitry or the need to increase the inverter KVA rating.

■ Remote status panel (not shown). Available to monitor most critical UPS functions.

■ **The Powerbase 2000** is specifically developed for EDP applications. It is available in single-phase sizes from 10 to 30 KVA and in three-phase sizes from 20 to 100 KVA.

Since 1962, Solidstate Controls, Inc. has been a recognized leader in the design and manufacture of UPS and power conditioning equipment used worldwide by electric utilities, refining, petrochemical and processing plants, EDP and telecommunications.

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THIS SPECIAL ISSUE
FROM COMPUTER
Decisions**

Power Protection

(Continued from page 150)

ergy Systems, a supplier of computer-power systems based on motor generators.

Data centers are relocated for many reasons, among them cramped quarters and the high cost of urban real estate. If a move or expansion is

in your corporation's future, consider housing your UPS and backup power supply in a relocatable shelter.

"Our movable structures give managers flexibility," asserts Bob Robinson, president of Acran Inc., a shelter manufacturer in Austin, TX. The

U.S. Navy has eight shelters made by Acran that are designed to be airlifted anywhere on the globe. Each shelter contains a 100-kVA UPS from Exide Electronics, a seven-minute battery system from C&D Batteries, and a 200-kilowatt diesel generator from Stewart & Stevenson.

The equipment backs up the power supplies of submarine-tracking stations that labor under often unpredictable power-supply conditions in foreign countries. Some of these installations had up to seven outages a day, each lasting 15 minutes or more, until the backup facilities were put together. Acran's shelters cost from \$100,000 to \$400,000.

Every vendor has a different method of smoothing the little aberrations that account for the majority of computer-power mishaps. Data centers hampered by these problems don't necessarily have to invest in UPSs. There are other alternatives. Take the Power Sifter from Amtek Systems. Its solid-state filters dampen the power line like a shock absorber. In addition to weeding out spikes, surges, and line interference, the Power Sifter allows most systems to ride through many flash outages, the vendor claims. It costs less than a rotary UPS, which performs a similar function.

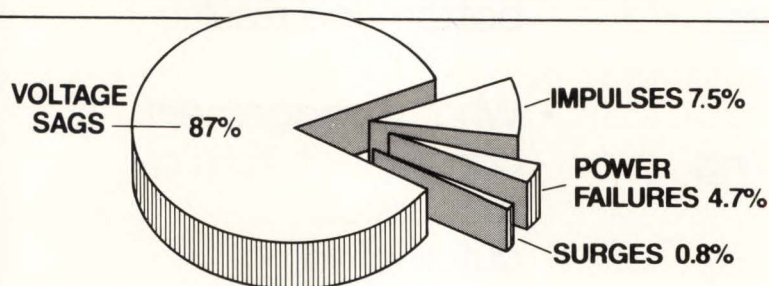
Mosher Steel Co., Houston, installed a Power Sifter to protect a Burroughs B3800 and a Datapoint Arc network. Before the installation, the data center was vulnerable to surges and went down several times a month, says Orville Q. Guthrie Jr., dp manager. Buying a UPS was beyond Guthrie's budget. For about \$3,000, Guthrie bought the Power Sifter, which he claims has eliminated 90 percent of the surges and disturbances that had plagued his data center.

External voltage regulators are another possibility, but they've become the subject of a heated debate. "Many of the new computers have a built-in switching power supply that acts as a voltage regulator," says Ted Nestar, national sales manager of Shape Magnetronics, a power-prod-

BELL LABS FINDS 87% OF POWER DISTURBANCES AT COMPUTER SITES ARE VOLTAGE SAGS!

Sags. Not Spikes. Not Surges. Voltage Sags!

Bell Telephone Laboratories monitored commercial electric power at 24 computer sites of Bell Operating Companies, Western Electric, and the AT&T Long Lines Department. Utility-supplied power was monitored for up to 22 months, with an average per site of more than 11 months and total observation time of 270 months. Here is what Bell found:



Sags Outnumbered Spikes Even During Storms!

Surprising, indeed! Even to the Bell Systems engineers who conducted the study.*

Your Power Is Probably Like Ma Bell's

Chances are your computer is exposed to the same kind of power line sags, impulses and occasional failures. Nasty, costly events that can cause data loss, faulty computations, disk-head crashes and sudden shutoffs.

With Sags The Key Culprit, Why Zero In On Surges?

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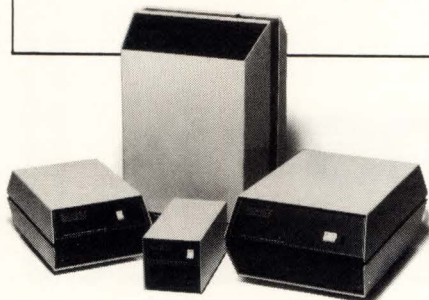
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*"The Quality of U.S. Commercial AC Power," Goldstein, M.; and Speranza, P.D.; IEEE April 1982.

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Power Protection

(Continued from page 152)

uct vendor. "The need for external regulators is diminishing, but they are still useful in some cases."

Shape is introducing a line conditioner that regulates frequency like an outside voltage regulator and filters out high-frequency noise and

spikes. Unlike regular conditioners, the new device doesn't siphon off power for its own operation (some conditioners take 20 percent of the power they filter). It frees nearly all of the juice for applications. The price for a 10-kVA model is \$4,000; a

75-kVA model costs \$22,000.

Oneac's Frank Breletich dismisses external voltage regulators as a device of the past. In some cases, transformers can actually harm a computer, he says. "These devices can't transfer energy in the way that modern electronics demands," he says. "To overcome these inadequacies, traditional conditioners must be oversized, reducing their efficiency, increasing their cost, and causing them to be destructively unstable." Oneac's answer to the problem is Condition One, a unit that will remain stable when confronted with the dynamics of computer electronics, according to the vendor.

"The computers of 10 years ago could tolerate 10 times more noise than today's systems."

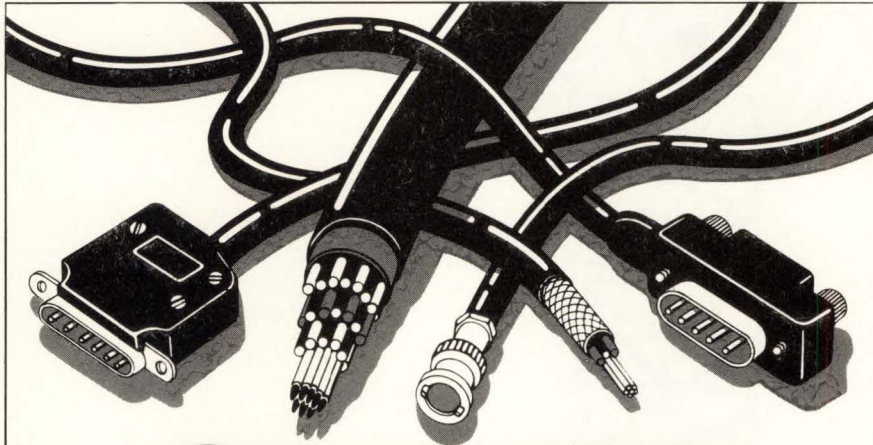
Breletich, Oneac

Whether you need a solid-state UPS, a rotary UPS, or a transformer, the vendor you select should be willing to back up the product. Insist on obtaining an unedited list of installation sites from each vendor you're considering, advises consultant Warren Lewis. Ask other users of each vendor's equipment about the quality of service, overall costs, and the equipment's performance record.

Even after you've selected a vendor, insist on a "penalty clause" in your contract that holds the vendor responsible for costs incurred during equipment failures.

Sound like a lot of work? No one said it would be easy to learn the ups and downs of power protection. But by giving the juice flowing through your data center your personal attention, you'll ensure that when power demons strike, your computers will be shielded. □

Your organizations' personal computers need power protection, too. See Part II of this article for suggestions on how to economically shield them from power glitches.



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Part II: Personal Computers

Shielding Computers From Power Mishaps

You can spend a small fortune defending your organization's personal computers against power demons. Where do you draw the line?

by Martin Lasden, Western Editor

You and your personal computer just got zapped. Everything was proceeding normally as you queried the mainframe in Des

Moines about the carburetor-parts inventory. But as the numbers flashed on your screen in Dubuque, a power sag

(#*!&!) wiped them out. The numbers aren't lost; you'll be able to retrieve them by repeating the query procedure. But such

Power Protection

(Continued from page 155)

aggravating delays aren't what the vaunted information age is all about.

The consequences of an incident like this, which is based on two true stories, aren't tragic. The micro-to-mainframe connections of large corporations usually provide a backup for personal-computer users. More than anything else, the problems caused by power mishaps are nuisances that disrupt the work flowing through your organization.

There's also an element of betrayal. When power glitches strike, you feel betrayed by a machine you've come to trust. When you're driving by the neighborhood schoolyard, you trust your car's brakes. Flying at 50,000 feet, you trust your jetliner's wings, and when you're cruising the high seas you trust that you won't go down with the ship. So it is with personal computers, the new machines on the block.

Like many workplace machines, personal computers promise to make you a more productive and knowledgeable decision-maker. But to acquire these career-abetting advantages, you've got to have faith in the machine's ability to operate when you need it most. Chances are, if you're a regular user, your machine has been trustworthy. And yet, there's always the chance that you'll be hit hard where it hurts most: in the power line.

No matter how snazzy your micro is, no matter how many bits, bytes, or read-only memories it contains, the machine is only as good as the juice that flows through it. Adulterate that juice for a fraction of a second and what was a cache of invaluable information can be turned into a dump of useless gibberish. Such is the devastation that a flaky power line can inflict. And such is the marketplace in which the power-protection vendors ply their wares.

The vendors speak of spikes and transients; of common- and normal-mode noise, and of radio-frequency and electromagnetic interference. They're really saying that a lot can go wrong. Listen to vendors, and they might convince you to spend \$500 to

protect your personal-computing investment, listen to them some more, and they might even convince you to spend \$1,000. Keep listening, and you might be persuaded you need \$2,000 worth of power protection. Because each of your corporation's

computers probably didn't cost much more than that, \$2,000 is a pretty big price to swallow. But don't worry about the price, say the vendors, think about what *could* happen.

The more you learn about the power you feed your computer, the more

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paranoid you're likely to become. It's the same feeling you get after reading through an encyclopedia of diseases. The diseases are real enough, but taking the threat so seriously that you never leave your home without wearing a gas mask would be ridiculous.

Caution is a healthy reflex, but it must be tempered by a realistic assessment of the risk and how much it's going to cost to minimize it. Keep this in mind when evaluating power protection.

Suppose you're working on your

computer and the power suddenly goes out, wiping out an entire file. That's hours of hard work down the tube. A day, a week, perhaps even a month, is wasted. As *Computer Decisions'* Microsystems Editor Susan Foster Bryant observes: "What the technology gives, it can just as easily take away. Of course, there is a solution. The solution is to buy more technology."

Uninterruptible power systems (UPSs), the battery-powered boxes that keep your computers going after the lights go out in Georgia, California, or wherever you happen to be, come in two varieties. Standby units kick in when the power goes out and continuously operating units stay on whether the wall socket is alive or dead. The key distinction between the two UPSs is that standby units cost less, but online systems are considered more reliable.

For a standby unit, the shadow of a doubt about reliability is prompted by the switch from wall socket to battery during an outage. In the moment it takes to make that switch, will data be blown into oblivion? Vendors are trying to reduce this minute gap to nothing. Cuesta Systems Inc., for example, makes Datasaver (a 90-watt version sells for \$395; a 200-watt version for \$695), a standby unit that can effect the transfer within eight milliseconds.

Is eight milliseconds long enough? In theory it is, for AC power flows in sine-wave cycles that are 16 milliseconds long. By making the transfer within the time it takes to complete a half cycle, the Datasaver kicks in at what's called the "zero crossover point" of the wave. Consequently, most personal computers won't falter. However, some personal computers can't hold what's stored in their memories for a half-cycle. According to industry sources, these computers include models made by Altos, Televideo, Fortune, Morrow, and Radio Shack (Tandy). Sources disagree over which of these computers can and can't be run safely off a standby.

One standby-UPS vendor, Topaz Inc., claims to have closed the gap

BY LIEBERT

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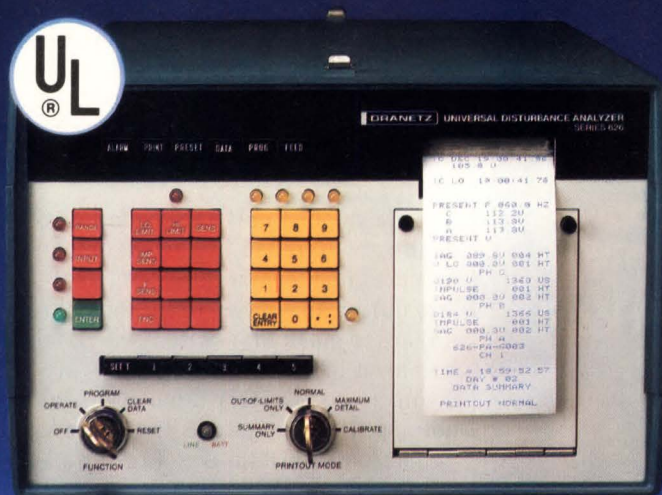
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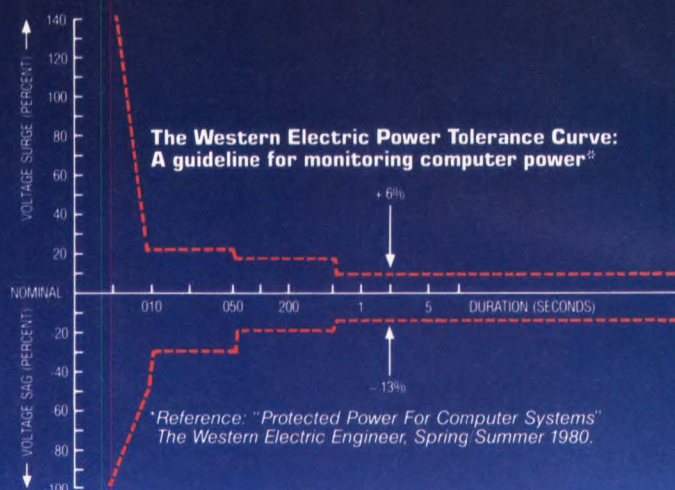
POWER LINE FLUCTUATIONS OUTSIDE ACCEPTED LIMITS ARE A MAJOR CAUSE OF COMPUTER MALFUNCTION. IDENTIFYING THE DISTURBANCE WITH A DRANETZ SERIES 626 CAN SAVE YOU FROM COMPUTER DISASTERS.



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When power disturbances fall outside the dashed-line boundaries, system operations may be disrupted. Use of the Dranetz Series 626 Disturbance Analyzer allows the actual disturbances and their causes to be pinpointed. By precisely recording each disturbance, along with its time of occurrence, magnitude and duration, the Series 626 enables you to identify the problem. It then becomes a straightforward matter to choose the most appropriate and cost-effective solution.



So before you start to tear down your EDP installation in a costly, investigative search of malfunctions, check your power source. With a Dranetz Series 626 you can reduce downtime by rapidly identifying your system's exact problem.

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Power Protection

(Continued from page 157)

even tighter. Its machine kicks in in four to six milliseconds, the vendor says. Topaz sells a 400-VA unit for \$695, an 800-VA unit for \$890, and a 1,000-VA unit for \$995. But even Topaz concedes that its boxes don't work very well when attached to the hard-disk version of the IBM Personal Computer, the PC XT, a machine that's notorious for its lack of tolerance for power transfers.

The alternative is to buy a box that puts out a continuous flow of juice. Online UPSs, or, as vendors like to call them, "true UPSs," serve as the



ongoing power source for your computer. Power supplied through the wall socket just keeps the unit's batteries charged. Consequently, when the lights go out, there's no switching. Powering a personal computer

with one of these UPSs costs from \$1,000 to \$1,600. (One model, a portable 120-VA unit from BITS Power Systems Inc., costs only \$495.) That is the price you pay for absolute safety—that is, at least until the box itself fails. In that event, a static transfer switch built into the box, allowing the wall socket to override the UPS if it fails, might save your computer's memory.

However, endowing an online UPS with a static transfer switch can be expensive, says Richard A. Caprigno, marketing manager at Sola. Adding

Protection for micro power

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Power Protection

(Continued from page 159)

such a switch to Sola's UPSs ups their cost \$1,200. Not many users are willing to pay up to \$2,800 to protect a personal computer, he says. Sola makes 400-VA and 750-VA units that sell for \$1,406 and \$1,500, respectively.

Weighing cost against benefit, Gould Electronics boasts a decided advantage. It sells a 500-VA online box for \$1,300, for which you can buy a \$195 static-transfer-switch circuit board that plugs into the unit.

If you're willing to shell out the

cash for an online UPS with a static transfer switch, does that mean you're absolutely safe? Not exactly. What if the UPS *and* the power supplied by your utility fail at the same time? Get the picture? Paranoia comes easily. Suffice it to say that the more protection features you buy for your corporation's personal computers, the safer the computers are going to be.

However, power protection for personal computers involves more than just a question of cost. Coming up with the best protection you can afford also means sifting through a lot of information to make prudent choices. Even engineers have a hard time agreeing on power-related issues, and you can't hope to assimilate an engineer's expertise before you buy.

The following are fundamental questions you might want to ask yourself and answer before buying a UPS.

How big a box should I buy? The key factor is volt-amperes, abbreviated as VA. (Volts x amps = volt-amperes.) If, for example, 120 volts are coming out of the wall socket (the usual single-phase voltage in North America) and your computer is drawing two amps of current, you need a 240-VA UPS. If only it were that simple: Some manufacturers rate equipment not in terms of VA, but in terms of watts. The two figures may not be the same. If a vendor talks about wattage ratings, ask for a VA rating. That is the number you need to know.

Another consideration: A certain-size UPS might serve you well for the moment, but if you add hard disks or peripherals to your personal computers, you may need a bigger box. If you have a standby UPS, you may need a different box. When you buy a UPS, exercise some foresight and give yourself room to grow.

Sine wave or square wave? A bargain-priced UPS is a 200-watt-rated unit from Saft America Inc., selling for \$549. One of the reasons Saft's UPS is less expensive is because the current it puts out flows in



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Power Protection

(Continued from page 160)

a square rather than a sine wave. Most microprocessors can digest such power. But you may get into trouble with peripheral devices like printers and hard disks. Square waves could cause the motors of these devices to overheat.

Voltage peaks are at the heart of the wave issue. The peak of a square wave is more than 20 percent lower than that of a sine wave, and it makes a motor run faster than normal. So, if you've got peripheral devices on the line—and most corporations do—it's usually best to go with a power-protection device that produces sine waves. Once again, however, it's not quite that simple. There are sine waves and then there are sine waves. Cuesta's Datasaver generates a stepped sine wave, which is an approximation of a real sine wave.

There's also the issue of so-called clean sine waves. Topaz's standby machines put out sine waves with less



The Datasaver from Cuesta Systems offers inexpensive standby power to save the contents of a computer's memory when the lights go out.

than 7 percent harmonic distortion. Gould's online UPSs generate sine waves with 3 percent total distortion. The conventional wisdom is that the cleaner the sine wave, the more dependable the UPS.

Square-wave devices should not be counted out, however. One new square-wave standby UPS that's rather innovative comes from Kalgo

Electronics Co. Inc. Kalgo is headquartered in a part of the country where the big power problem is power dips and spikes caused by frequent startups and shutdowns of huge industrial machines. Rather than taking over the load completely with each dip in utility-supplied current, Kalgo's unit supplements it, maintaining a constant flow to the computer.

How much battery time? When the power goes out, UPSs have buzzers, sirens, and flashing lights to let you know you're working on borrowed time, that is, battery time. The amount of battery time you have in the event of a blackout is an important detail to consider when making a UPS purchase. Most UPSs that are appropriate for personal computers provide about 10 minutes of back-up power, with the option of hooking up more external batteries to expand the safety cushion.

(Continued on page 190)

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CIRCLE 93

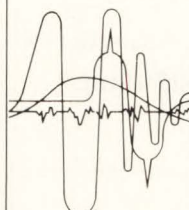
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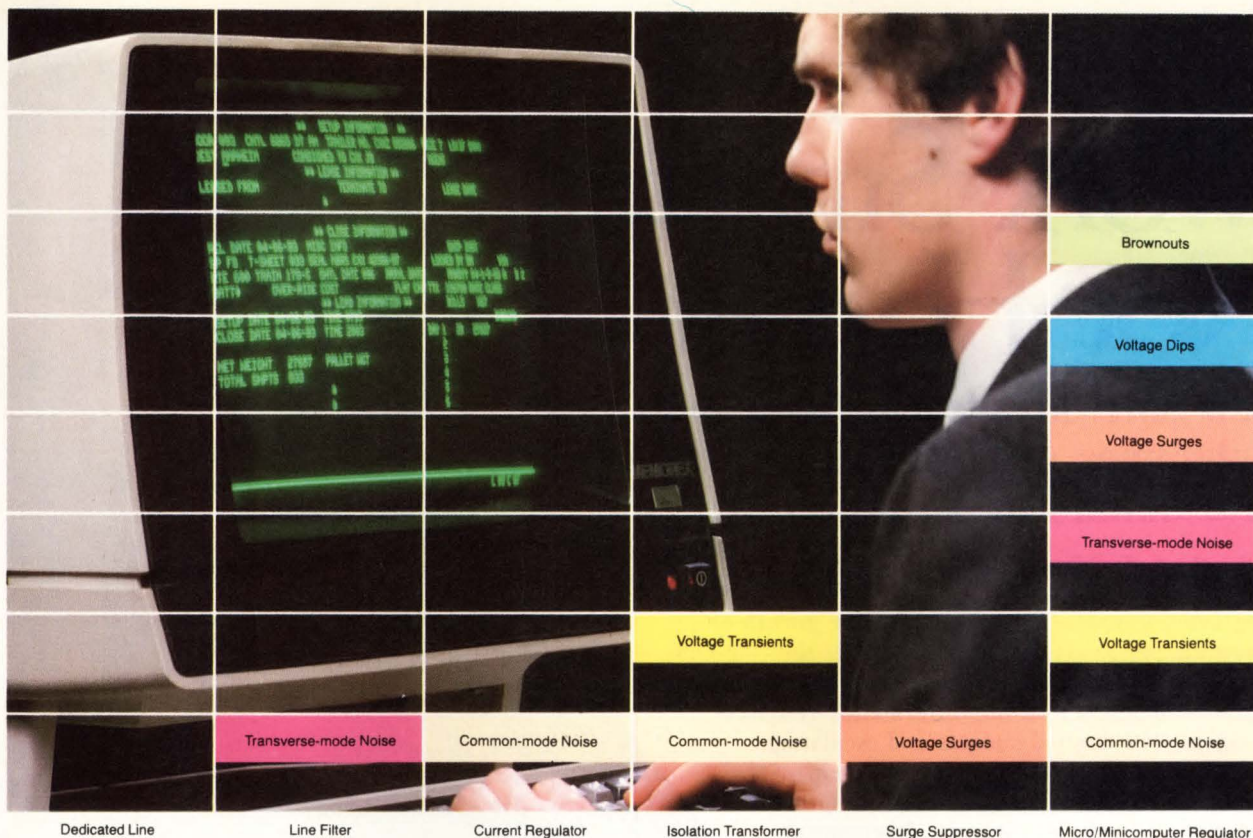
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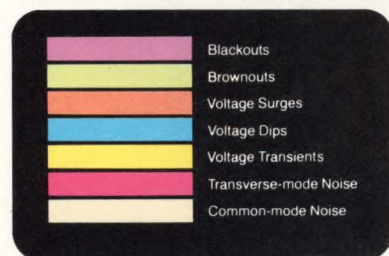
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kinds of problems—from line noise (common and transverse) and transients, to voltage fluctuations (dips and surges) and brownouts. Without it, you can expect periodic system malfunctions, lost computer memories and costly reprogramming, burned out computer chips, premature damage to circuitry.

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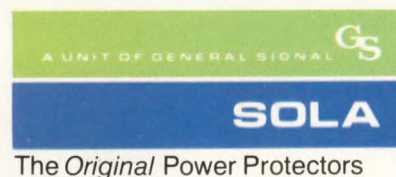
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CIRCLE 95



To Raise Productivity **Work Smarter, Not Harder**

New software-development tools and techniques are helping companies save dollars by saving effort.

by David Kull, Management Issues Editor

Programming-productivity levels and the growth of computing power make it easy to project that the U.S. population will soon be spending all its time coding to keep its computers working. Information-resource managers, with limited budgets and escalating demands for applications, don't need such projections to know there's a need to improve productivity—now. Fortunately, developments in software-engineering techniques and technology offer immediate help and hope for solving the long-term problem.

Defining and measuring programming productivity has never been easy. Most researchers have based

Photo by Alan Bernstein





Programming Productivity

(Continued from page 165)

productivity measurements on the number of lines of code produced by a given amount of effort. This approach has obvious drawbacks—not all code has the same value or requires the same amount of talent or time to produce, for example. But when used carefully to analyze specific aspects of software development, even this imperfect formula can help improve management decisions.

Focusing too closely on lines of code, however, may distort the productivity picture and cause managers to overlook more promising avenues for improvement. The aim, after all, is to provide computer applications that enhance a business, not to create lines of code. Instead, productivity assessments should take into account a system's complete life cycle—from planning, through development, to day-to-day operations. Within that framework, there are several more opportunities to save than there are in trying to increase a programmer's output by 20 lines of code per day.

T. Capers Jones, manager of programming-technology analysis for ITT, points out that coding typically accounts for only 15 percent of the software costs of large systems. Doubling coding efficiency, therefore, would bring only a 7.5 percent productivity increase. According to Jones, the greatest software expense, and, therefore, the function with the highest potential for savings, is defect removal.

Finding and removing programming errors—mistakes that cause a system to stop or to produce incorrect results—accounts for about 35 percent to 40 percent of a system's software costs, Jones says. Managers can take aim at these expenses with methods that prevent defects during development and that more easily identify and remove those that creep through. Jones contends that these methods may soon make possible zero-defects programming.

The time to avoid defects is during the planning phase. According to Jones, about 45 percent of defects in larger systems are due to poor design, 25 percent to faulty coding, and the



rest to secondary errors ("bad fixes") and incorrect documentation. But not only can careful planning minimize programming defects; it can also prevent the wasting of time on superfluous code or unnecessary programs. (Managers have been known to drive programmers' productivity to zero by asking for a program module that isn't needed. On a broader scale, multimillion-dollar projects have been scrapped because they couldn't do the intended job.) According to a

A manager can improve efficiency during the coding phase without squeezing extra effort from programmers.

report by the consultancy John Diebold & Associates, almost *half* of all systems developed are never implemented. Providing more operational reliability than is really needed also wastes time and resources.

Efficient design

Though increasing the design effort may lead to a decrease in productivity during that phase, the tradeoff will surely be worthwhile. Besides, advances in development techniques are allowing planners to improve designs with little extra effort. And some new approaches and tools for automating design tasks may even raise productivity in that phase.

"Requirements specification is the least automated, most problematic

aspect of the software-development process," says consultant Philip Teplitzky, a principal with the Plagman Group. "Most analysts use any old format they want to develop program specifications—flowcharts, diagrams, whatever."

A first step toward better specification development would be adoption of a standard questionnaire by analysts, Teplitzky says. The form would include spaces for listing information about standard program characteristics—frequency of use, necessary response time, and so on. It would ensure that analysts collect all needed information the first time, rather than having to chase after missing details later. It would also ensure that all analysts provide the same general information in the same form, decreasing the likelihood of errors due to faulty communication, or "noise," as Teplitzky calls it.

A more comprehensive approach would be the establishment of a formal development methodology—one that allows more precise communication between users and analysts than does English, but requires less skill to employ than do procedural programming languages. The HIPO (hierarchy, input-process-output) method of system charting, in the 1960s, was the first major effort toward this approach. The concept has since been refined through several methodologies, with particular features aimed at the requirements of different program types. ITT, for example, developed its Galileo methodology for use in telephony programming, which requires numerous parallel operations.

According to Jones, more than 150 formal development notations are available today. The key is to select or develop one that meets the organization's or project's needs. Many business-applications developers prefer the Warnier/Orr methodology. Its diagrams and symbols are particularly helpful in linking descriptions of data to be processed and operations to be performed—an important consideration for most business systems.

(Continued on page 168)

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Programming Productivity

(Continued from page 166)

The development methodology determines the amount and type of documentation necessary during the planning stage. Generally, documentation represents a tremendous proportion of software development. According to Jones, about 100 natural-language words support every line of programming code in a typical system. For large systems, paperwork represents about 15 percent of the software costs. The best way to improve productivity here is to take documentation out of the hands of high-priced analysts and programmers and give it over to clerks and automation.

In *Programmer Productivity, Achieving an Urgent Priority* (Reston Publishing Company, 1984, \$49.95), author Girish Parikh points out that a full- or part-time staff librarian can relieve programmers and analysts of many time-consuming, nontechnical duties. A librarian can maintain programming and systems manuals, document changes, respond to project-status inquiries, and perform light technical tasks.

It is not difficult to cost-justify a librarian, Parikh contends. Programmers simply record the time they spend on these tasks over a few weeks for an average. A manager can then assign a librarian to take up any portion of that load. If a team of programmers averages 40 hours a week on nontechnical or light technical chores, a manager can, in effect, add a full-time programmer for the price



Carolyn Farias, data-processing officer at Valley National Bank of Arizona in Phoenix, points to increased uniformity, completeness, and timeliness of documentation as benefits of the bank's new operations documentation generator.

of a clerk.

Philip Teplitzky says, "Analysts shouldn't waste their valuable time drawing pictures." Fortunately, some relatively simple graphics packages can do such jobs during program planning. A package that helps construct flowcharts and diagrams is a good beginning. More sophisticated tools follow and store the analyst's graphic manipulations, written logic, and coding for later revision or reuse.

The Case 2000 Workstation from

Nastec Corp. provides these capabilities on a microcomputer. An organization can enter its own methodology so that designers can call up commonly used symbols or combinations with single keystrokes. DocumentOrr, a package from Ken Orr Associates that runs on the Case 2000, provides the Data Structured Systems Development Methodology, which is based on Warnier/Orr concepts.

At United Services Auto Association in San Antonio, TX, the 39 programmers and analysts assigned to an accounts-receivable project recently began sharing nine Case 2000s. According to project director Jerry Barloco, the workstations not only helped create the project's design, but the documentation they produced helped in communications with the system's prospective users.

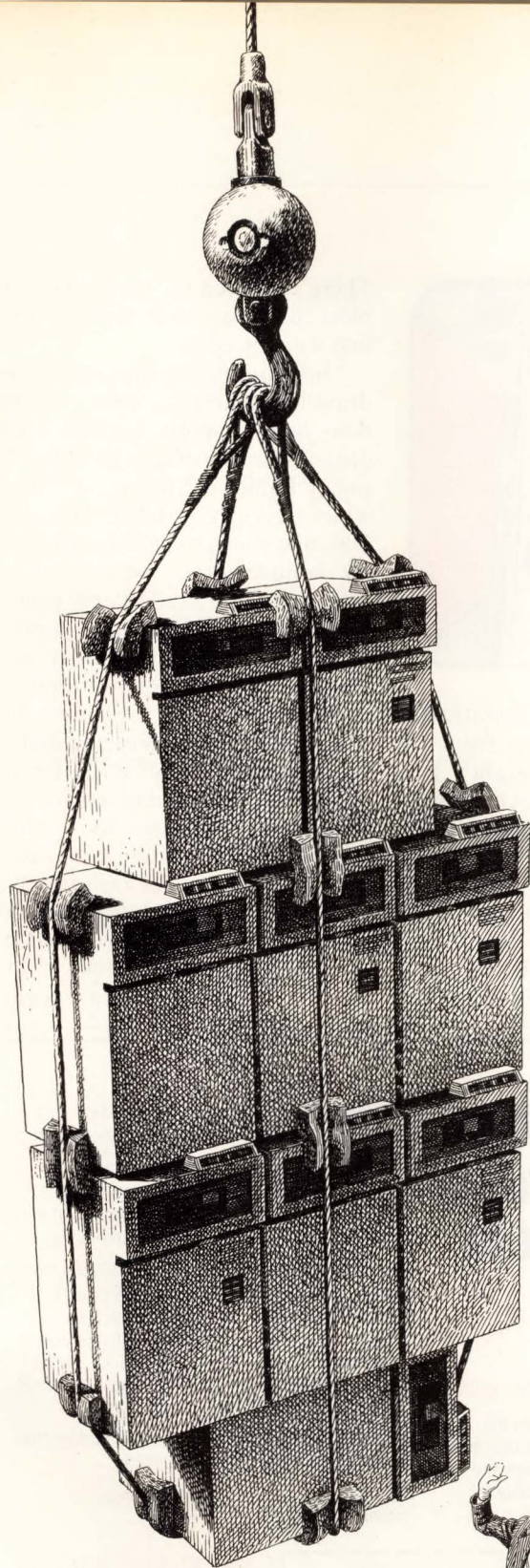
"We installed our own development methodology on the workstations," Barloco explains. "It includes some fairly cryptic symbols and code, so I had reservations about presenting it to users."

In a series of development sessions with the analysts, though, users readily grasped the methodology, Barloco says. The analysts used it to describe current and proposed systems in detail, which allowed users to spot faults and suggest improvements. The programmers would then bring up the original design on the workstation and make revisions.

The system automatically tracks

Generators, development systems

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Programming Productivity

(Continued from page 168)

changes, a particularly helpful feature, Barloco says. In all, he feels, the Case 2000 has provided "dramatic" productivity increases, though he's reluctant to cite a percentage because it's difficult to relate this project to others developed without the tool. Besides, he expects many productivity increases to show up later in the project, as programmers work from a design that's been constructed and documented more carefully than most.

Diagraphics for Data Processing (DFDP), a package from Adpac Corp., helps analysts create data-flow diagrams via IBM 3270 terminals. The interactive, menu-driven system provides figures for the major methodologies and allows users to define their own parameters. Another Adpac product, Design, analyzes flow diagrams to create a "logical data model."

On the operations side, Docu/text-200, a package from Diversified Soft-



ware Systems Inc., automatically produces documentation from an OS(VS) production program's job-control language. The package generates flowcharts, input/output lists, control-card forms, and other documents by scanning the job-control language and then combines them with setup, restart, and distribution documentation created by the programmer and stored in a disk file.

There's no need for paper. The complete run book can be brought up on-line when needed.

"Just eliminating the need to hand-draw flowcharts has been a tremendous help," reports Carolyn Farias, data-processing officer at Valley National Bank of Arizona in Phoenix, which recently installed Docu/text-200. She points to increased uniformity, completeness, and timeliness of documentation as additional benefits.

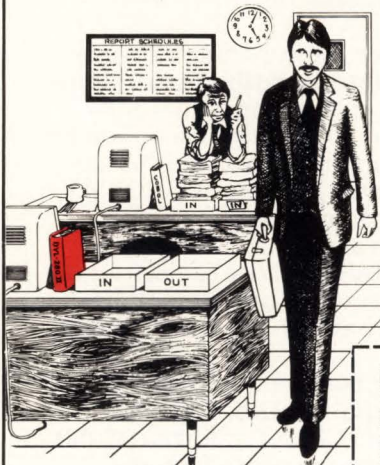
Design and documentation offer a lot of room for productivity gains. But there are also ways of improving productivity during the coding phase that don't rely on squeezing more effort from programmers. After good designs and documentation are established, programmers may employ more efficient coding and testing techniques, as well as tools for generating programs and reusing code.

Experts agree that the most efficient programming method is "top-

(Continued on page 174)

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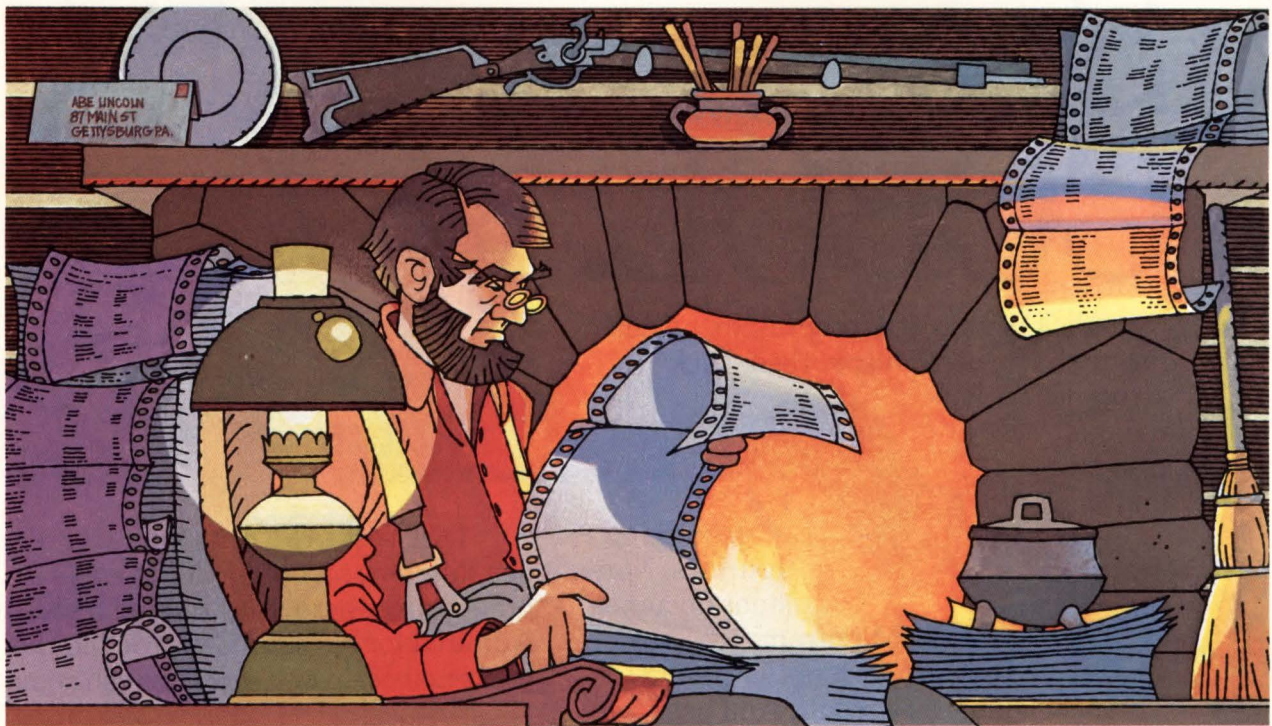
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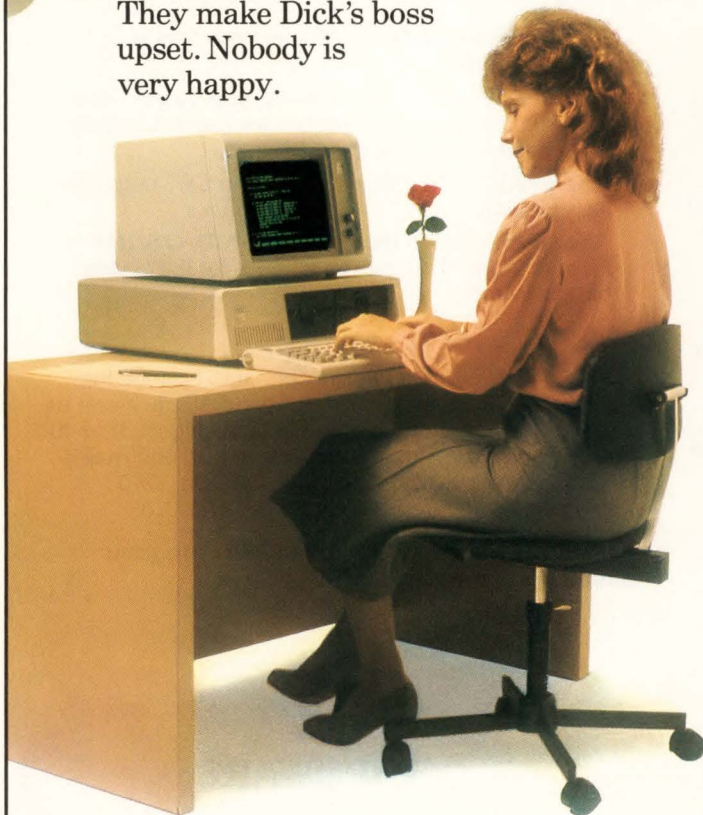


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Programming Productivity

(Continued from page 170)

down." Top-down programmers break broad system designs into modules that can be completed and tested while work on other parts of the project is still in progress. Coding that builds an entire program from the bottom up may *seem* more pro-

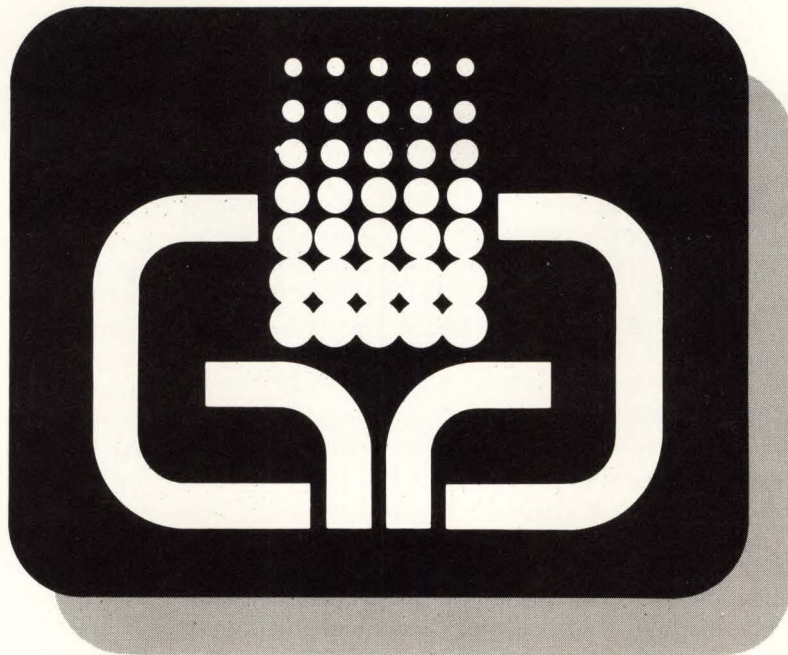
ductive because it rapidly produces instructions from the start. But by the time bottom-up programmers test and debug their products, the get-it-right-as-you-go, top-down programmers will have caught up with and passed them.

Structured approaches, which simplify programs by limiting unwieldy logical constructions, also hold efficiency bonuses that become more apparent after the coding is done. A programmer may move a bit slowly while learning the structured tech-

Generators, development systems

Vendor	Package	Requirements	Price	Circle
Applied Software (305) 626-4818	FSE+	IBM MVS, SVS, MVT with TSO	\$2,500/yr.	791
Arkansas Syst. (501) 227-8471	WSU Program Generator	IBM S/34	\$345	679
David R. Black & Assoc. (412) 787-5100	Cobol Program Generator	Sperry, Prime, Honeywell, Data General, Harris	\$30,000	680
M. Bryce & Assoc. (513) 761-8400	Pride	Several mainframes and minis	\$80,000	681
BSC Computer Syst. (409) 977-0842	Flexsys 4	IBM Series/1	\$10,000	673
Burroughs (313) 972-8334	Linc	Burroughs mainframes	\$45,000 to \$120,000	781
	Business Partner	Burroughs mainframes	\$122,000 to \$280,000	
Business Controls (201) 791-7661	SB-5 Automated Cobol	DEC minis	\$5,000	670
Bytel (415) 527-1157	Cogen	Several micros and minis	\$950 to \$7,500	682
Century Analysis (415) 680-7800	Impact 6	NCR mainframes	\$15,000 to \$29,500	683
Cincom Syst. (513) 662-2300	Mantis	3270-type terminals	\$35,000	684
Cognos (415) 943-7277	Quick	HP 3000	\$8,000	726
Commercial Syst. Lab (205) 821-1133	C/Script 11	Data General with DBAM	\$20,000/AOS \$24,000/AOS/ VS	685
		Data General with RDOS	\$11,000	
Computer Assoc. Int'l. (516) 333-6700	CA-Earl	IBM 370, 30XX, 43XX	\$13,000/DOS \$16,500/OS	686
Computing Productivity (802) 496-4320	IP3	IBM 43XX, 30XX	\$15,000 to \$40,000	687
Cortex (617) 237-2304	Application Factory Inform	DEC VAX-11/750, /780	\$15,000	688
		DEC VAX, PDP-11	\$6,000 to \$19,000	
Cullinet Syst. (617) 329-7700	ADS/On Line	IBM 360, 370, 30XX, 43XX, and PCMs	\$40,000	689
Database Syst. (602) 265-5968	Transact Entry	Prime Series 50, DEC VAX	\$12,500	690
		Prime Series 50, DEC VAX	\$12,500	
Data Mgt. Assoc. (302) 655-8986	Magic/MPS	Several micros	\$795 to \$995	775
Data Products (913) 541-1502	DGA	IBM 370, 43XX, 30XX, and PCMs	\$12,500	691
Dylakor (213) 366-1781	Dyl-280	IBM 360, 370, 43XX, 30XX	\$11,000	692
Electronic Data Syst. (214) 661-6215	Applicator	IBM mainframes	\$20,000/MVS	693
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MAY 13-17, 1984 ANAHEIM CONVENTION CENTER, ANAHEIM, CALIFORNIA

Programming Productivity

(Continued from page 174)

For information on the tools. . .

Given the wide variety of software-productivity tools available, it's not easy to ferret out information on the best choices. The accompanying lists provide a good sampling of products—but they can't give specifics on each. More detailed sources of information include the *Guide to Software Productivity Aids*, \$95, from Applied Computer Research of Phoenix, AZ, and *Data Management Decisions*, \$995, from Real Decisions Corp. in Stamford, CT. The guide covers 742 products under 22 classifications. *Data Management Decisions* presents in-depth reviews of 34 data-management systems.

niques and will not be able to take the logical shortcuts of traditional programming. The results will contain fewer errors to begin with, however, and the program's simplicity will allow for easier maintenance and fault detection.

One way to achieve the benefits of structured programs, even after a system has been developed with unstructured techniques, is through a structured retrofit. For about \$1 to

\$2 per line, Peat Marwick Mitchell's Catalyst Group will rework a program into a structured mold.

Ameritrust, in Cleveland, used the service to restore maintainability to a 10-year-old, 10,000-line program for time deposits. According to Benedict Lechowicz, vice president for advanced system design, without the retrofit, modifying the program to process new IRA accounts would have been impossible. With the retro-

fit, says Lechowicz, the modification took only three weeks. The bank has since retrofitted all of its systems.

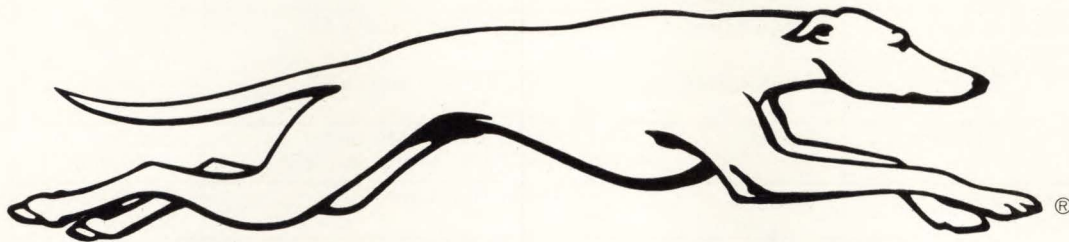
Design and code inspections also raise productivity by reducing expensive, effort-draining faults. Testing with sample data is a somewhat inefficient way of uncovering program defects. Tests can't fully cover the range of possible problems the program may encounter during operation. Reviews, on the other hand, do well in catching mistakes—and training development personnel in inspection techniques can make the reviews even more efficient.

IBM's installation-management document on inspections (GC20-2000-0) differentiates between structured walk-throughs and inspections. Walk-throughs are informal reviews that the developer runs and involved programmers, designers, and testers attend. Inspections are a scheduled, integral part of the development pro-

Generators, development systems

Vendor	Package	Requirements	Price	Circle
Four-Phase Syst. (408) 255-0900	Maestro	Four-Phase hardware	\$80,000	694
GE Information Svcs. (301) 340-4000	Mark III	Several computers and terminals	Timesharing based on usage	698
Generation Sciences (212) 532-8555	Gamma	Any system with ANSI Cobol support with keyed access	\$90,000 to \$150,000	695
Group Operations (202) 887-5420	Editor II	IBM 360, 370, and PCMs	\$15,000	696
GT Software (404) 955-8866	BMS/GT	IBMs and PCMs under DOS/VS(E), VS/1, or MVS with CICS	\$5,500 to \$7,900	697
H & M Syst. Software (201) 599-9111	Cfast	IBMs and PCMs with CICS	\$10,175/DOS	699
	Mfast	IBMs and PCMs with CICS	\$12,300/OS \$6,500/DOS \$7,975/OS	
Henco Software (617) 890-8670	Info	Several mainframes and minis	\$9,000 to \$25,000	700
Higher Order Software (617) 661-8900	Use.It	DEC VAX	\$15,000 to \$150,000	701
IMSL (713) 772-1927	Library	Most minis and mainframes running Fortran	\$2,000 to \$3,000	702
Informatics General (818) 887-9040	Mark V	IBM 370, 43XX, 30XX, and PCMs	\$100,000	703
	Mark IV	IBM 370, 43XX, 30XX, and PCMs	\$40,000	
	Trans IV	IBM 370, 43XX, 30XX, and PCMs	\$20,000	

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Programming Productivity

(Continued from page 176)

cess and follow a rigorous routine. They are moderated by a professional from outside the development team who is specially trained in the techniques—particularly in the human-relations skills—needed to lead a group of colleagues through an exercise in self-criticism.

An IBM study found that formal inspections of the detailed design phase saved 94 programmer hours

per 1,000 lines of code over similar projects using walk-throughs; inspections of the coding phase saved 51 hours per 1,000 lines. (These results take into account the time spent on preparing for and holding the inspections.) In addition, tests indicated that projects done with inspections produced finished programs with 38 percent fewer errors—an outcome that adds to productivity

gains.

T. Capers Jones notes that, with inspections, one can recognize "error-prone" modules. In typical programs, for example, 4 percent of the code might contain 40 percent of the defects.

"Bugs tend to clump in the more difficult portions of programs," Jones says. "During inspections, the programmers should point out the most

Generators, development systems

Vendor	Package	Requirements	Price	Circle
Information & Syst. Research (412) 262-5507	RIMS/MPG	DEC PDP-11 and VAX	\$5,000 to \$15,000	705
	RIMS/GRAF	DEC PDP-11 and VAX	\$1,250 to \$2,500	
Information Builders (212) 736-4433	Focus	IBMs and PCMs under VM/CMS, MVS, and VSI	\$66,000 to \$110,000	704
The Innovators (919) 854-2540	Innopak systems	Datapoint minis	\$2,500/DOS \$5,000/RMS	706
Intel (512) 258-5171	System 2000	IBM, Control Data, Sperry	\$50,000	707
Interactive Tech. (503) 644-0111	RDM	DEC PDP-11	\$2,495	708
Jacksonville Software Svcs. (904) 724-1818	RDE11/RFM	Burroughs	\$11,500	709
JEM Assoc. (703) 471-9550	PDE	IBM Series/1	\$750	710
Al Lee & Assoc. (214) 446-9015	Magec	IBM mainframes	\$28,000	711
Lifeboat Syst. Designer Team (212) 831-3100	Formula II	Several micros	\$695	671
Mathematica Products Grp. (609) 799-2600	Ramis II	IBMs and PCMs under OS, VS, MVS, VM/CMS, DOS/VS, and DOS/VSE	\$24,000 to \$124,000	712
Mgt. and Computer Svcs (215) 648-0730	Promacs	IBM 360, 370, 43XX, 30XX	\$18,000/DOS \$24,000/OS	713
Morino Assoc. (703) 734-9494	MICS	IBMs and PCMs under MVS	\$28,600	714
Multiplications (617) 864-5810	Accolade	IBM 370, 43XX, 30XX	\$28,000/DOS \$39,000/OS	715
	Imagine	IBM 370, 43XX, 30XX	\$45,000/DOS \$59,000/OS	
National Information Syst. (408) 257-7700	Accent R	DEC System 10/20	\$40,000	668
Netron (416) 636-8333	CAP	Wang VS	\$16,000	774
New England Syst. Tech. (617) 435-9031	EZ-Prog	Data General	\$2,400	716
On-line Business Syst. (415) 391-9555	OBS Wylbur	IBM 370, 43XX, 30XX, and PCMs	\$27,500 to \$55,000	717
On-line Software Int'l. (201) 592-0009	Freestyle	IBM 360, 370, 43XX, 30XX	\$50,000	718

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Today, Wollongong software products not only operate under UNIX, but also under DEC's VMS and our proprietary EUNICE which provides a transparent link between UNIX and VMS on the same host computer.

System-level packages

These run under VMS or EUNICE for VAX users, or UNIX for PE 3200 users.

IP/TCP Internet Protocol Transmission Control Protocol is the newly adopted Department of Defense standard which provides a set of cooperative processes allowing two or more host computers to communicate.

R/M COBOL is a high-level implementation of the ANSI 74 COBOL standard, designed for efficient development and execution of COBOL business applications. Features include GSA certified COBOL, Level-2 relative and indexed file access methods, plus full arithmetic capability.

Full Screen Editor supports advanced programming and text processing requirements, concurrent file editing, and formatting.

Metaport products

EUNICE A comprehensive suite of software which provides VAX users with the unique ability to merge their native VMS environment with state of the art UNIX commands and utilities.

REX Runtime EXecutive provides all necessary interface software to allow application-level programs developed under UNIX to properly execute with VMS.

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WOLLONGONG

Programming Productivity

(Continued from page 178)

difficult sections, so they can be given special attention."

Though design methodology, top-down programming, structured techniques, and inspections all contribute to productivity gains, according to most experts, they are merely a good beginning. Barry Boehm, author of *Software Engineering Economics* (Prentice-Hall, 1981), says that, all else being equal, modern programming practices can account for a 50 percent productivity increase. Jones sees a similar percentage increase from these. Both see much more significant improvements coming from more expert personnel and more helpful programming tools.

In Boehm's Constructive Cost Model (Cocoma), productivity varies by a factor of four according to the



development team's expertise. That is, a highly experienced team—analysts with at least 12 years' experience, programmers with more than three years on the job—will produce systems four times as fast as a team of neophytes. And Jones says

that "superstar" professionals can deliver productivity gains of up to 75 percent. According to Teplitzky, there's a lesson for managers in these figures: They'll get a higher return from one programming whiz making \$65,000 a year than from three average programmers making \$30,000 each.

"Unfortunately, there aren't that many geniuses around," laments Teplitzky. "And no matter how long you or I go to school, it's not going to turn us into programming Michelangelos."

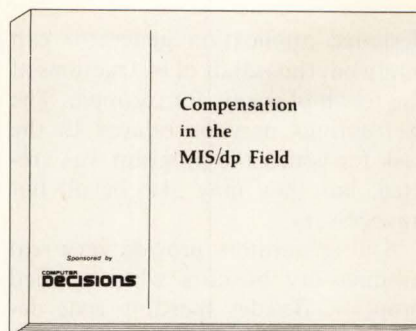
To make substantial gains, not only must you have high-caliber technical staffers, you must also have tools that will boost the productivity of your average—and even untrained—people. The most promising

Generators, development systems

Vendor	Package	Requirements	Price	Circle
Oxford Software (201) 288-1515	UFO	IBM 360, 370, 30XX, 43XX under CICS/VS	\$27,000/DOS \$38,000/OS	719
Pacific Int'l. Mktg. Grp. (213) 215-0964	Data Expediter	IBM under OS	\$11,000	720
Pansophic Syst. (312) 986-6000	Easytrieve Plus MIS/OL	IBM 370/115, 43XX, 30XX, and PCMS IBM 370/115, 43XX, 30XX, and PCMs	\$21,000/DOS \$27,000/OS \$29,000/DOS \$35,000/OS	721
Phoenix Computer (213) 827-4500	Condor	IBM under DOS	\$19,500	778
Phoenix Syst. (412) 471-8380	System-80	Several micros	\$995 to \$34,000	722
Productive Software Syst. (516) 433-7600	EZ-List	IBM S/34	\$600	723
Professional Computer Resources (312) 932-2200	Factfinder	IBM S/34	\$2,995	724
Progeni Syst. (213) 215-0964	DPS Progeni-M Progeni-D	Burroughs B1000 and up	\$40,000 \$9,000 \$35,900	725
Pro-IV (617) 486-9621	Pro-IV	DEC	\$20,000	772
Raytheon Computer Svcs. (617) 431-7700	Readycode	IBM and PCMs under OS/MVS or OS/VM	\$50,000 to \$120,000	727
Rendeck (617) 367-9180	Adders (data entry) Adders (mapping) Guest	IBM with CICS IBM with CICS IBM with CICS	\$16,500 to \$20,000 \$1,000 to \$4,000 \$22,500/DOS \$29,500/OS	728

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Programming Productivity

(Continued from page 180)

of these tools—program libraries, application generators, and very high-level languages—all operate on the same basis: Much of the code they contain was first written for some other program. The tools vary according to how much of this code they provide, its applicability to the problem at hand, and the ease and efficiency with which programmers can draw on it.

Managers should approach productivity claims for these tools carefully—particularly if they are based on lines-of-code generated. A poorly

designed application generator can pump out thousands of instructions at the touch of a key, for example. The instructions may be related to the task for which the program was created, but they may also be all but unnecessary.

Still, generators provide very real productivity benefits when applied properly. Besides speeding code development, they provide code that's been well tested, debugged, and documented. Many allow improved design through rapid prototyping. Others let end users take over some of

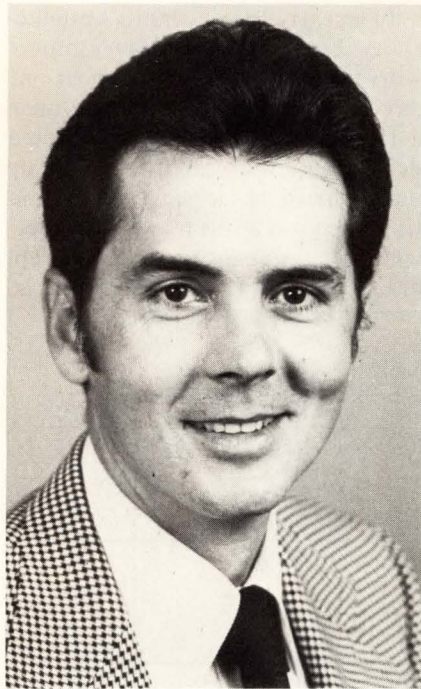
their own programming chores. It's a matter of fitting the tool to the job.

Selecting the tools

Productivity aids can help with a range of programming needs—from development of large online systems to extraction of single reports from a database. But the same tool will not work well at every point along this range. Libraries of commonly used programming functions, for example, are particularly helpful for trained programmers, who have the skills to locate the code they need and, if nec-

Generators, development systems

Vendor	Package	Requirements	Price	Circle
Sage Syst. (301) 231-8686	APS	IBM 30XX, 43XX, and PCMs	\$100,000	730
SDA Federal Syst. (301) 345-6060	CL/1	IBM 360, 370, 30XX, 43XX; Honeywell 6000/6600; Sperry 1100	\$35,000 to \$55,000	736
Signal Tech. (805) 683-3771	Smartstar	DEC VAX under VMX	\$4,080 to \$13,600	779
Software AG (703) 860-5050	Natural	IBM 360, 370, 43XX, 30XX	\$40,000 to \$60,000	731
Software Applications (212) 986-2515	Codabol	IBM 360, 370, and PCMs	\$5,000	732
Software Clearing House (513) 451-6742	UPG	NCR VRX and B-Series	\$2,975	733
Software Express (713) 270-5218	Appgen	Systems under Unix, Xenix, Pick operating systems	\$6,000	735
Software Mgt. Syst. (303) 799-3469	Escape	Prime	\$10,000	737
Software Plus (214) 783-1019	Fastmap	IBMs and PCMs under OS or DOS	\$4,900	738
SPSS (312) 329-2400	SPSS-X	IBM under OS, DEC VAX	\$4,000/yr.	739
STSC (301) 984-5000	APL*Plus	Several mainframes, minis, and micros	\$595 to \$25,000	740
Systems Formation (602) 966-4358	Forge	Prime Series 50	\$18,500	741
Syst. Support Software (513) 435-9514	Quickjob III	IBM, Sperry	\$5,445	742
Technalysis (612) 925-5900	Generation II	Burroughs B1000	\$10,000	782
The Office Manager (206) 246-7022	Speed II	Wang VS	\$12,500 to \$50,000	744
Tominy (513) 984-6605	Data Base-Plus	IBM S/36	\$19,500	777
Value Computing (609) 482-2500	SMT	IBM under VS1, IBM under MVS	\$7,500 \$8,500	745
Wang Labs. (617) 459-5000	Pace	Wang VS	\$10,000	669
Wollongong Group (415) 962-9224	Eunice	DEC VAX	\$15,000	773



A microcomputer-based automated design system at United Services Auto Association helps analysts plan systems and communicate their ideas to users, says Jerry Barloco, project director for customer accounting.

essary, to modify it to their requirements.

Organizations can save their own code for reuse with the help of librarian packages, such as Panvalet from Pansophic, or Librarian from Applied Data Research. Readycode from Raytheon Computer Services provides a collection of pretested code. It allows developers to build programs by specifying combinations

of functional modules. Through question-and-answer interaction, the package helps the programmer draw out the right modules from six functional classifications—editing, sorting, reporting, updating, combining, and exploding data. (According to the vendor, Readycode typically provides 85 percent of a program. The programmer codes the rest.)

Applications generators and very high-level languages permit simple commands aimed at specific kinds of problems. They are somewhat easier to work with than libraries and require less skill of users, but they also provide less flexibility. These factors create a series of productivity trade-offs.

If the inflexibility of a fourth-generation language means that programmers must exit frequently to a third-generation language to code for "special cases," the staff must be bilingual. Having to learn two languages and then having to bounce back and forth between them is inefficient. And if a report generator or nonprocedural language allows end users to take over programming chores, the productivity of programmers rises, but what about that of the end users, who must take time from their regular duties to learn and then use the tool?

Philip Teplitzky poses another question: "Is it better to have an executive spend three hours creating a report or have a programmer take two days to build it into a system?"



This question has no easy answer. It depends, among other variables, on the report's importance to the executive, and on the programmer's ability to provide the report just as the executive wants it. Ideally, programming tools allow information-resource managers to give users both the routine information they want and the ability to easily research unusual questions. But if this means adopting a *collection* of tools, the organization may be faced with another inefficiency.

"If you have one language for graphics, another for queries, and another for applications development, you end up in the interface business," states Dan Merrell, an internal-management consultant for the Union Carbide Corp., Danbury, CT. "It helps to acquire all your tools from a single vendor."

Union Carbide recently selected Mantis, a development system from Cincom Systems. The selection com-

Documentation packages

Vendor	Package	Requirements	Price	Circle
Business Computer Design (312) 920-0959	Docu-Mint	IBM System/34, /36	\$850	656
Communication Sciences (612) 332-7559	Explain	HP 3000; IBM 43XX, 30XX	\$11,000 \$15,000	657
Consumer Syst. Svcs. (312) 325-2102	JCLflow	IBMs and PCMs under OS or DOS	\$7,500	658
Diversified Software Syst. (408) 998-0414	Docu/Text 200	IBM 360, 370, 43XX, 30XX, and PCMs	\$7,500 to \$31,500	659
Executec (214) 239-8080	Promptdoc	Micros running MS-DOS	\$1,000	660
Information Concepts (202) 429-9610	Cobconv	IBMs running Cobol	\$1,550	662

Programming Productivity

(Continued from page 183)

mittee felt it provided an integrated set of aids appropriate for end users and programmers. One of the primary benefits of having a single tool is the reduced amount of training needed—end users and programmers need not learn how to use a new tool each time they develop a new system. Maintenance is also easier when the language is uniform from one system

to the next, Merrell notes.

Three or four database administrators at each Union Carbide location structure the databases and files, freeing the programmers of these concerns. While this particular job requires great expertise, Merrell estimates that it halves the skill level required of the corporation's 400 programmers.

In an early test of Mantis's productivity benefits, two programmers with two days of training spent one day duplicating and improving upon a 19-screen system that had taken a department four months to set up under the PL/1 language. The Mantis system was a full-blown prototype, with linked screens that could accept data. The original work produced

File-management packages

Vendor	Package	Requirements	Price	Circle
Compuware (313) 540-0400	File Aid SPF	IBMs and PCMs with MVS or MVS/XA	\$7,200 to \$15,100	661
	File-Aid Batch	IBMs and PCMs with OS	\$5,200 to \$10,800	
Dataware (716) 876-8722	Filecomp	IBM 370 and PCMs under DOS or OS	\$3,000	667
	Text Comparator	IBM 370 and PCMs under OS	\$3,000	
MacKinney Syst. (417) 833-9553	Source Program Compare	IBM mainframes	\$495	663
	CICS On-line File	IBM mainframes	\$995	
Software Consulting Svcs. (215) 861-7920	Diffis	Any system with Ansi Cobol	\$500	664
Sterling Software Mktg. (916) 441-7234	Comparex	IBM mainframes	\$8,000/OS \$4,000/DOS	776
VM Systems Grp. (703) 243-5514	V/Temp	IBM mainframes	\$2,050	665
	V/Find	IBM mainframes	\$1,370	
XA Systems (408) 970-0400	Data-Xpert	IBM under TSO/ISPF	\$30,000	666

JCL generators, standards, enhancements

Vendor	Package	Requirements	Price	Circle
The Productivity Grp. (212) 678-7165	JClegislator	IBMs and PCMs under OS, VS1, or MVS	\$3,500/3 years	746
	Preprocessor	IBMs and PCMs under OS, VS1, or MVS	\$2,500	
Rubel Software (617) 876-7993	DCL	DEC PDP-11 or under RSX-11M V.32	\$795	747
Safe Software Syst. (314) 965-3803	JCLsafe	OS MVS, VS, MVT, or VM operating systems	\$12,500	748
Software Module Mktg. (916) 441-7234	JOL	IBM 360, 370, 43XX, 30XX	\$50,000 to \$60,000	749
Tone Software (714) 991-9460	Tone 3	IBMs under OS/VS1	\$29,900	750
	Tone 4	IBMs under OS/MVS	\$29,900	
Triangle Software (408) 554-8121	JCLcheck	IBM 370 or PCMs under OS/VS	\$15,500	751
University Computing (214) 353-7100	UCC-20	IBMs and PCMs using UCC-2	\$10,500	752

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Programming Productivity

(Continued from page 184)

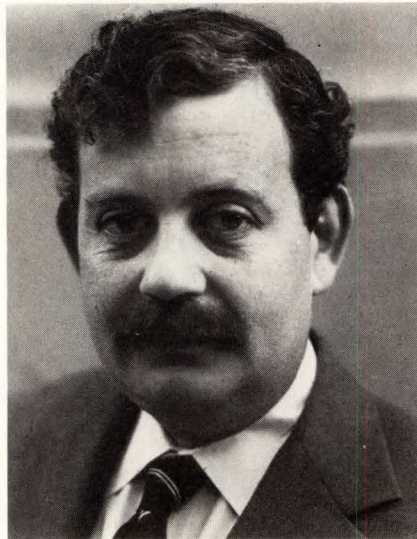
screens that could only be viewed.

Merrell notes that the productivity gain from the language comes not only from the rapid coding, but from more rapid design, testing, and documentation. Since the language is interpretive, he says, testing is done line-by-line and documentation is automatic.

Other development systems, including ADR's Ideal, Cullinet's Ads,

A manager can drive a programmer's productivity to zero by asking for a program module that isn't needed.

and Information Builders' Focus, provide a similar range of programming capabilities, according to Merrell. But they differ in the types of databases and files with which they



"Requirements specification is the least automated, most problematic aspect of software development," says consultant Philip Teplitzky of the Plagman Group.

work. Freestyle, a data-management product introduced by On-Line Software International in January, tran-

sends these limitations, allowing users to access, manipulate, and update information regardless of how it is organized and stored in the computer. End users and programmers can use the same language to make the same queries on an ad hoc basis or as part of a processing application. The package accesses data via a Content Address Method, in which an index allows searches according to a record's content rather than through sequential file reading.

Another new package, Corvet, from Analysts International Corp., provides a spectrum of automated help—from early design through development of files, screens, and reports to Cobol code and documentation generation. It also helps generate test data and allows easy modification of completed programs.

Fourth-generation languages also differ in the amount of computer resources they require. Henco Software Inc.'s Info allowed programmers at

Librarian packages

Vendor	Package	Requirements	Price	Circle
Applied Data Research (201) 874-9000	ADR/Librarian	IBM mainframes	\$25,000/OS \$20,000/DOS	753
Cincom Syst. (513) 662-2300	LMS-11	IBM mainframes IBM 360 and up	\$15,200 \$22,500	754
Computer Software Unltd. (901) 754-8332	Marian	IBM 370 and 43XX	\$9,000	755
ESI (904) 224-5182	Lionl	Burroughs large and medium mainframes	\$10,000 to \$15,000	756
Goal Syst. Int'l. (614) 888-1775	Flee/XP	IBM 370, 43XX, and 30XX	\$5,040	757
Mathematica (609) 799-2600	Titan	IBM and PCMs under DOS/VSE	\$12,000	758
National Syst. (313) 996-1969	Track I	A range of mainframes	\$8,000	759
Pansophic Syst. (312) 986-6000	Panvalet Panexec	IBM 360, 370, 43XX, and 30XX IBM 370, 43XX, 30XX, and PCMs	\$10,000 to \$15,000 \$20,000 to \$30,000	760
Phoenix Computer (213) 827-4500	Condor/Camlib	IBM 360, 370, 43XX, and 30XX	\$19,500 to \$24,500	761
Softool (805) 964-0560	CCC	A range of minis and mainframes	\$5,045 to \$30,000	762
Software Corp. of America (703) 471-1545	EasyProclib	Any IBM under OS	\$6,000	763
VM Software (703) 821-6886	VMLib	Any system running VM	\$4,500	764

Equitec Financial Controls in Oakland, CA, to develop large applications in about one-tenth the time they required under Basic.

According to Verne Van Vlear, vice president and general manager of Equitec, a data-processing subsidiary for a real-estate syndicator,

Relatively simple graphics packages provide commonsense automated help during program planning.

the Info programs were less efficient than those done in Basic. "But the compromise of less machine efficiency for greater programmer productivity was worthwhile," Van Vlear says. "Besides, as our analysts become more expert with the tool, they're learning to optimize their programs."

Robert Becker, director of infor-



mation services for publisher Richard D. Irwin in Homewood, IL, agrees that the machine-efficiency for programmer-productivity tradeoff is a bargain. Becker's two senior analysts and five programmers, who are inexperienced in online databases, have used Software AG's Natural language on Adabase to automate the Dow Jones subsidiary's file of more than 250,000 customers.

"There was no way we could have developed our online applications without Natural," Becker says.

"We've had some response-time problems, but they've been minuscule compared to the manual system's limitations. Early in the project, a four-minute database search turned up a record the customer had been looking for manually for 3½ days without success."

Design and code inspections raise productivity by reducing effort-draining, expensive faults.

Additional main computer memory, on order, should speed the responses, Becker feels. He also believes additional experience will enable his staff to use Natural more efficiently.

Portability of programs generated by fourth-generation languages also affects productivity. If a program can be used just as easily on one machine

Testing and debugging packages

Vendor	Package	Requirements	Price	Circle
Application Development Syst. (408) 264-2272	Xpediter	IBM 370, 303X, 308X, 43XX, and PCMs	\$27,500	765
Boole & Babbage (408) 735-9550	XPF/Cobol	IBM mainframes and PCMs	\$30,000	766
Computer Assoc. Int'l. (516) 333-6700	CA-Optimizer	IBM 360, 370, 30XX, 43XX, and PCMs	\$15,000 to \$32,500	767
	CA-Eztest/CICS		\$12,500 to \$17,500	
	CA-Eztest/ISB		\$6,750	
Computer Syst. Research (203) 678-1212	Debugger Controller	IBMs under MVS	\$9,500	768
Compuware (313) 540-0400	Abend-Aid	IBM mainframes	\$3,800 to \$6,500/DOS	769
	DL/1 Abend-Aid		\$6,800 to \$16,000/OS \$5,300 to \$8,200/DOS	
Consumer Syst. Svcs. (312) 325-2102	Databasic	IBMs and PCMs under OS/DL1/IMS, or DOS/DL1	\$23,500 OS \$13,500 DOS	770
	Test/IMS	IBMs and PCMs, OS IMS, or DB/DC	\$21,000	
The Productivity Grp. (212) 678-7165	Fixit	IBMs and PCMs under DOS, DOS/VSE	\$500	771

Programming Productivity

(Continued from page 187)

System design and methodology

Vendor	Tool	Requirements	Price	Circle
Adpac Computing Languages (415) 981-2710	Design	IBM mainframes	\$19,500 \$2,000/yr. renewal	783
	DFDP	IBM mainframes	\$9,500 \$1,000/yr. renewal	
AGS Management Syst. (215) 265-1550	SDM70	Any system	\$39,500	784
Cara (312) 968-8100	System Development Standards	Any system	\$41,500	785
Nastec (313) 353-3300	Case 2000	Nastec micros	\$15,000	786

ent hardware. Pro IV, a fourth-generation language from Pro IV Inc., generates applications transportable across a range of minicomputers and as on another, an organization can avoid rewrites when it upgrades equipment, or it can share applications developed at one installation with other facilities operating differ-

personal computers, for example.

Bell Labs' Unix operating system has inherent productivity benefits, including ease of programming, automated documentation, and standard operating procedures. It also has a good measure of portability. However, adapting Unix to a particular machine may take five to 10 work

years. Metaport, a package from the Wollongong Group, circumvents this drawback by allowing Unix and the computer vendor's operating systems to coexist on the same machines.

Several interrelated factors determine software-development productivity—design and programming techniques and automation, the pro-

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Vendor	Tool	Requirements	Price	Circle
Peat Marwick Mitchell (312) 938-1000	Catalyst Structured Retrofit	IBM 370, 30XX, 43XX, and PCMs	\$1 to \$2/line	793
Phaser Syst. (415) 434-3990	m3278/SPF	IBM PC; micros running CPM-86	\$2,150	787
Solosystems (408) 945-1700	1116 Solostation	Solosystem micros	\$22,925	788
Ken Orr & Assoc. (913) 273-0653	DocumentOrr	Case 2000	\$1,500	789
Tech. Information Products (617) 273-5818	Business Analysis	IBM mainframes	\$50,000 to \$150,000	790

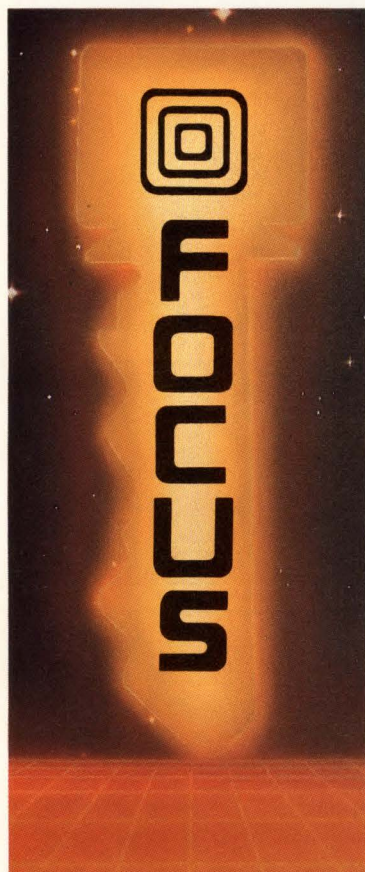
grammers' and analysts' training and skills, the quality of documentation and maintainability of programs, end-user training and computing, and the use of commercial software.

According to author Boehm, efforts to deal with the attributes contributing to software costs have a multiplicative effect. In other words,

simply upgrading the experience level of personnel could increase productivity by a factor of 4. Instituting modern programming techniques alone could increase it by 1.5. But doing both could multiply it by 6.

A comprehensive approach to increasing professional productivity requires a concerted effort, with top

management's support. And the program must be ongoing—the organization's software needs and means of meeting them will change over time. Philip Teplitzky likens systems development to a system. "A system is dynamic," he says. "It must be flexible, able to modify itself in order to accomplish its original mission." □



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Power Protection

(Continued from page 162)



Gould Electronics offers a \$195 static transfer switch for its 500-VA online UPS, which sells for \$1,300. The switch immediately transfers a computer to utility-supplied power if the UPS fails.

When Sola Electric designed its 400-VA UPS, the objective was to provide 10 minutes of backup. But the designers learned that for an additional \$25, they could boost the battery time by 20 minutes. Sola's unit provides the additional breath-

ing space for \$1,617.

When considering the issue of battery capacity, however, don't lose sight of the reason most users buy UPSs. Most users don't expect to run their computers from a UPS during a power problem, but only to save the

data on the computers. For that, you'll need only enough time to safely file data. Thus, for most users the question of whether a UPS should provide 10, 15, or 20 minutes of emergency battery time is academic.

Besides supplementing power, your organization may also need to condition it. Power surges can not only wipe the memory clean, but also can damage the computer itself. The danger of surges, or spikes, is real. Just within your office building, spikes can be generated every time a large copier is turned off. Meanwhile, violent storms replete with lightning bolts can zap your computer into a useless pile of junk. To protect your computer against such attacks, virtually all UPSs integrate power-conditioning features.

But because power disturbances are more frequent than blackouts, a lot of users opt for a power conditioner alone without the backup of a UPS. Like UPSs, however, when

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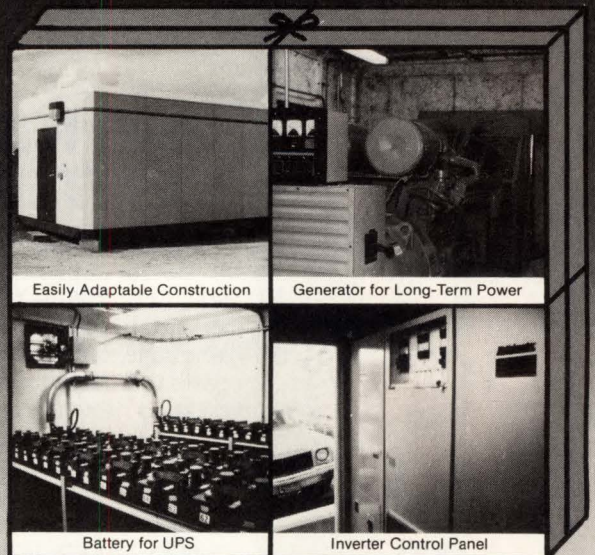
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you've seen one conditioner, you haven't seen them all. Prices range widely.

At \$60, Electronic Protection Devices Inc. offers the Lemon, a surge-shielding device. For more substantial protection, EPD also offers the Lime, which has an on-off switch, for \$90. The vendor also makes the \$140 Orange, which protects against electromagnetic interference (EMI) and radio-frequency interference (RFI).

Another line of power-conditioning products, built by RKS Industries, is priced between \$70 and \$110 and incorporates a unique three-stage design to shield computers from high-speed spikes and large power surges. The first shield is a sensing component called a silicon avalanche diode. It detects power spikes in less than five trillionths of a second (or five picoseconds). The second-stage shield, a metal-oxide varistor, blocks middle-range spikes. And the third line of protection, a

gas-discharge tube, is slower to respond than the other two, but dissipates the largest surges.

Exlin Inc. offers what it claims is an even more sophisticated protection device—at over three times the price. Dale Scott, Exlin's marketing vice president, affirms that, at \$375, most micro users won't buy the product to protect against a hypothetical threat. More often, these users are trying to solve an ongoing problem. In parts of the country with heavy industry or frequent thunderstorms, dirty power is a constant irritant, says Scott.

Because the threat of power-related disasters seems so remote, most users won't spend \$375 to solve a hypothetical problem. But that doesn't mean such power problems are not on managers' minds. Over the last year and a half, Kensington Microware has sold more than 150,000 System Savers to users of Apple Computer personal comput-



ers, making the product one of the best-selling Apple peripherals.

Made only for Apples, the System Saver fits onto the side of the machine. At \$90, it is a combination fan, surge suppressor, and line filter.

For about \$1,500 per micro, you can buy power protection that's flexible and effective. But if your budget is limited or you're faced with an astronomical cost to protect many machines, you're going to have to do some homework to install power protection. You have several options, but whatever you do, do something. It's a lot better than worrying about being zapped. □

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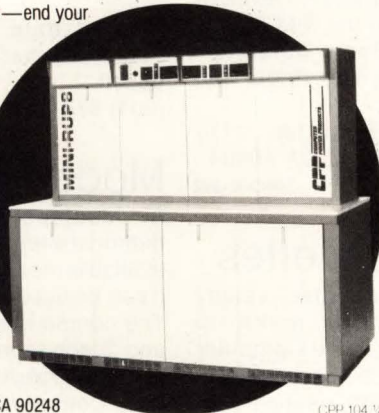
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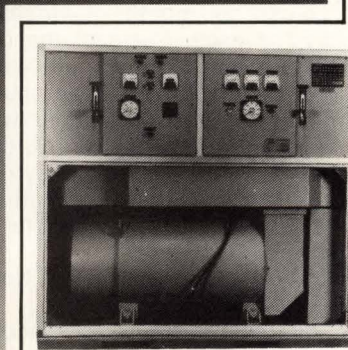
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Bell & Howell Co., Interactive Communications Div., 7100 N. McCormick Rd., Chicago, IL 60645.
(312) 673-3300. **CIRCLE 248**

JCL on Apple

Five courses making up Part II of Deltak's "MVS/SP Job Control Language" series are now available for the Apple II Plus. Students should have already taken the Part I courses. Courses can be rented for \$50 to \$125 per course per month, or purchased for \$1,750 each. Users of the company's Phoenix/DS computer-based training system can now select courses from "The VM/SP CMS Series," which are priced the same as the JCL courses, or instruction on the Easytrieve, SAS, ADRS II, or Focus software packages, which can be rented for \$17 to \$40 per student.

Deltak Inc., 1751 W. Diehl Rd., Naperville, IL 60566.
(312) 369-3000. **CIRCLE 249**

Multiplan course

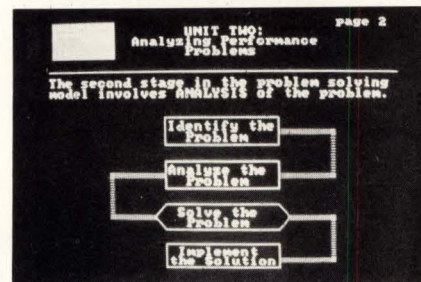
"Fundamentals of Multiplan" is from a family of self-paced training courses that run on systems using Bell Labs' Unix operating system. These audio-digital courses combine video instruction with simulations of a package's capabilities on the user's terminal. The course can be interrupted, repeated, or switched off so the student can operate his or her terminal online. The Multiplan course is for beginners. It costs \$1,800, and the required playing unit costs \$1,610. If the course and

playing unit are rented, the costs are \$200 and \$205 per month respectively.

User Training Corp., P.O. Box 970, Soquel, CA 95073.
(408) 354-6433. **CIRCLE 250**

Management series

The first two of nine proposed courses in the Management Diagnostic Series and the Management Training Series have been introduced. They are "Assessing Personal Management Skills," which costs \$350, and



"Leading Effectively," which costs \$450. Versions of the programs run on the IBM PC or PC XT, or on the Apple II.

Thoughtware Inc., 2699 S. Bayshore Dr., Coconut Grove, FL 33133.
(305) 854-2318. **CIRCLE 251**

Learning 1-2-3

"Putting 1-2-3 to Work" is a self-study course designed to teach professionals how to use the popular integrated package from Lotus Development Corp. It runs on the IBM PC, as do all of the vendor's personal-computer-based courses. Price: \$95 per person.

National Training Systems Inc., 1111 Broadway, Santa Monica, CA 90401.
(213) 394-7685. **CIRCLE 252**

Graphics cassettes

Thirteen color videocassettes, a study guide, and a textbook make up "Introduction to Interactive Computer Graphics." The course teaches techniques for creating mathematical representations of curves and surfaces, designing curves and surfaces, model-

ing three-dimensional objects, scaling and rotating graphics, and more. Price: \$4,810 if purchased. \$975 if rented. A preview package costs \$115.

AMCEE Inc., 225 North Ave. N.W., Atlanta, GA 30332.
(404) 894-3362. **CIRCLE 253**

PC novice's guide

The "How to Use Your IBM PC" package guides users from an obvious beginning point, plugging in the machine, up to complex problem solving, and includes introductions to nine popular software packages. It runs on the IBM PC or PC XT. Price: \$75.

American Training International Inc., 3770 Highland Ave., Manhattan Beach, CA 90266.
(213) 546-4725. **CIRCLE 254**

Authoring system

The ADR/Adroit system, based on the IBM PC, can be used to generate computer-based training courses. It consists of an authoring and presentation system. The PC can be made to emulate an IBM 3270 terminal in order to simulate mainframe applications to be taught. Videotape and videodisk can be integrated into the system. The authoring and presentation systems cost \$2,800 and \$300 respectively. ADR's library of educational videotapes is being made available for Adroit.

Applied Data Research Inc., Route 206 & Orchard Rd., Princeton, NJ 08540.
(201) 874-9000. **CIRCLE 255**

Modem options

A videotape on "Modem Options" demonstrates and explains what each available modem option does and how it can be used in different applications. The course is available in both $\frac{1}{2}$ -inch and $\frac{3}{4}$ -inch tape formats, costing \$150 and \$180 respectively.

Data Communications Brokers, 3000 Research Rd., Champaign, IL 61821.
(212) 352-3207. **CIRCLE 256**

PERIPHERALS

Emulating terminals

The Cybernex SA-830 terminal emulates the Burroughs TD830, 89X, and E.T.1000. In addition, it offers 16-page memory, concatenation with auto-bypass, serial and parallel printer support, and 10 programmable function keys. Price: \$1,695. The 1014 graphics terminal emulates the Tektronix 4010/12/14, providing 1-megapixel display memory, Plot 10 compatibility,



and raster-scan reliability. Price: \$2,695. Model XM3270 terminal communicates with both IBM and DEC mainframes. It supports Simware and Perle protocol converters. Price: \$1,295.

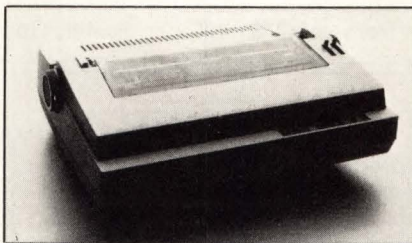
Cybernex Ltd., P.O. Box 911, Station U, Toronto, Ontario, Canada M8Z 5P9.

(613) 741-1540.

CIRCLE 241

Printer and crts

The Letterpro 20 letter-quality daisy-wheel printer is compatible with most personal computers. It prints at 20 cps, offers over 100 different character printwheels, and has several interface options. Price: \$900. The QVT 211 GX terminal executes three-dimensional engineering designs as well as complex business graphics. It can be used as a preview terminal for CAD/CAM work. This terminal emulates Tektronix 4010/4014 commands and is compatible with Digital Research GSX and Tektronix Plot 10 graphics software. Price: \$1,295. The QVT-103 terminal emulates Digital Equipment Corp.'s VT52, VT100, and VT131. It features a 14-inch screen, 14 editing keys, eight



user-programmable functions, and two pages of screen memory. Price: \$1,095. The Documinder, designed for use with the Qume bidirectional forms tractor, automatically collects and re-folds the forms as they are being printed and gives the paper a smooth path into the tractor. Price: \$75.

Qume Corp., 2350 Qume Dr., San Jose, CA 95131.

(408) 942-4000.

CIRCLE 242

VT100 to IBM

The MC-80/600-1 communications processor emulates an IBM 3274-51C controller, converting a DEC VT100-compatible terminal into an IBM 3277-1, 3277-2, 3278-1, 3278-2 terminal communicating with the IBM host using the EBCDIC bisync communications protocol. It supports all screen-formatting capabilities and all keyboard functions and performs full-screen mapping and extensive on-line and offline diagnostics. It provides up to 16 Kbytes of ROM and 16 Kbytes of RAM and has two serial communications ports. Basic unit is \$1,495. An additional port costs \$200. A modem-sharing port is optional.

Innovative Electronics Inc., 4714 N.W. 165th St., Miami, FL 33014.

(305) 624-1644.

CIRCLE 243

Printers for IBM

A line of high-speed printers is available for the IBM System/34, /36, /38, or the Personal Computer. ABS 400 band printer emulates the IBM 5225 matrix printer and has a typical print rate of 400 lines per minute. Price: \$8,795. The ABS 600, 1000, and 1500 band printers, with speeds of 600, 1,000, and 1,500 lpm, emulate the IBM 5225 and cost \$9,750, \$14,395, and

\$22,995 respectively. The ABS 150, 300, and 600 matrix line printers emulate the IBM 5225 matrix printer and have optional graphics. Prices are \$5,195, \$7,395, and \$9,195.

Ampak Business Systems, 2640 Walnut, Tustin, CA 92680.

(714) 731-4217.

CIRCLE 244

Storage subsystem for DEC minis

The Virtual Information Processor/Extended disk storage subsystem provides the host with an average access time of less than 10 milliseconds. It has a capacity of 760 Mbytes in a 5 $\frac{1}{4}$ -by-19-by-26-inch unit. Price for the VIP/X with a DEC host adapter for VAX-11 and PDP-11 is \$23,995.

U.S. Design Corp., 5100 Philadelphia Way, Lanham, MD 20706.

(301) 577-2880.

CIRCLE 245

Mini/micro printer

A multifunction serial dot-matrix printer for minicomputers and high-performance microcomputers runs at a 400-cps draft speed and at a 100-cps letter-quality speed. A tabbing feature allows the print head to travel at up to 650 cps when bypassing blanks in a line. Other features include four type fonts and full



dot-addressable graphics. Draft-quality model MT-440I is \$2,395. Model MT-440L, with both draft- and letter-quality modes, costs \$2,695. MT-440D, which also prints barcodes and OCR characters, is priced at \$2,995.

Mannesmann Tally Corp., 8301 S. 180th St., Kent, WA 98031.

(206) 251-5500.

CIRCLE 246

ACCESSORIES

Workstation clusters

The Clustered Workcenter consists of up to six workstations around a central utility core so that it offers the maximum amount of work surface, while requiring the minimum amount of floor

space. Users can have privacy without feeling closed in. The modular design and options allow for expansion as needs change. The central core keeps cables, lighting, and power equipment out of sight but accessible. Basic price is from about \$1,800 per cluster. Op-

tions include air-flow system, a variety of storage components, and specially engineered lighting configurations. The fabric-covered designer panels come in three heights and 30 colors.

Tab Products Co., 1400 Page Mill Rd., Palo Alto, CA 94304.

(415) 852-2400.

CIRCLE 201

NOW YOU CAN ADD IBM® 3270 TERMINALS IN MINUTES INSTEAD OF DAYS.



PATENT PENDING

Introducing the Coaxial Doubler™ from Fibronics. Try it for 30 days. Free.

With a pair of new Coaxial Doublers from Fibronics, you can add or move an IBM 3270 terminal or printer anywhere you want in minutes! And without technical assistance.

That's because Doublers support two terminals on one existing coaxial cable. And they're as easy to install as a lightbulb.

You don't waste time and money waiting for someone else to pull a new dedicated cable.

Anyone can install the Doubler.

No special tools, software, set-up or adjustments are necessary. Just plug three cables into each Doubler unit. One Doubler connects the controller to the shared cable. The other Doubler connects the shared cable to two terminals.

What's more, Doublers are extremely compact, maintenance free and require no electrical power.

The Doubler is transparent to your IBM terminals and printers.

Doublers support the full speeds of IBM terminals at distances up to 5,000 ft. With absolutely no degradation of response time and no changes to hardware or software.

Call toll free 1-800-DOUBLER for a free 30-day trial.

Doublers cost only \$490 a pair and are covered by a full five-year warranty.

They also come with a free 30-day trial. Call now and we'll send you a set of Coaxial Doublers within 48 hours, complete with connecting cables if needed.

Don't think twice. Order yours today. And the next time you add or move a terminal, turn waiting time into working time.

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IBM® is a registered trademark of the International Business Machine Corporation.

CIRCLE 111

Undercarpet cable

A 75-ohm coaxial data cable for interfacing terminals with host computers is installed directly on structural floors and covered with carpet squares. It's sold on 250-foot reels at \$1.10 per foot, and on 1,000-foot reels at \$1.00 per foot. The installer merely pinches the cable to force out the center conductor and drain wire, peels out the length desired, inserts the cable into a connector, and secures the connector onto a transition board containing standard cable leading to the terminal.

Thomas & Betts Corp., 920 Route 202, Raritan, NJ 08869.

(201) 685-1600.

CIRCLE 202

File organizer

Weber's Disk-File System makes it easy to file and find any floppy disk. The stackable files come in five sizes, with either lift-off lids or pull-drawer sleeves. Prices: \$5.95 to \$10.95 for 5¼-inch and \$15.95 to \$16.95 for 8-inch disks. The file system includes backstops to hold disks upright, blank dividers, ID labels, cross-reference and table-of-contents cards, color-coded disk ID labels, and color-coded disk dividers.

Weber & Sons Inc., 3468 Hwy. 9, RD 4, Freehold, NJ 07728.

(201) 431-1128.

CIRCLE 203

Mini/micro diskette

The Stagemaster Premium Series diskettes have special features to help enhance durability, reduce wear, and ensure interchangeability among drives. They are single- or double-sided and offer a variety of format options. The 5¼-inch diskettes have storage capacities of up to 1 Mbyte per disk, and the 8-inch up to 1.6 Mbytes. They come 10 to a package, at \$45 to \$65 per package.

Control Data Corp., 8100 34th Ave. S., Bloomington, MN 55420.

(612) 853-8100.

CIRCLE 204

Wp systems with added power

The AES Savin 7100 Personal Work Station combines the functions of a word processor and microcomputer. It can be used for forms handling, financial reporting, and records management. It features single or dual drives with storage capacity from 93.5 Kbytes to 1 Mbyte, and includes a bidirectional printer. Price: from \$5,995. The more versatile 16-bit Model 7200 Office Support System supports up to four workstations, has network and communications capability, supports 5¼-inch Winchester or floppy disks, and comes with printer. It can be used for financial calculations, records management, electronic mail, scientific reports, and other applications. Price: from \$17,995.

AES Data Corp., 9 W. Broad St., Stamford, CT 06904.
(203) 967-5400.

CIRCLE 221

Slides from PC or Apple graphics

The Palette interactive film recorder produces 35mm slides and 3¼-by-4¼-inch instant photographs of IBM PC or Apple graphics. It also produces color hard copy from monochrome computers, allowing the user to control color selection and location. The \$1,500 price includes camera backs, hardware, software diskette, exposure unit, and cable.

Polaroid Corp., 575 Technology Square, Cambridge, MA 02139.
(617) 577-2000.

CIRCLE 222

Screen scenes

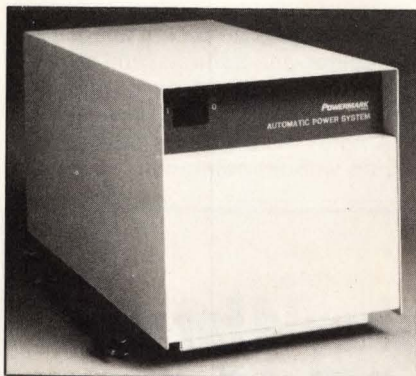
Screenshooter takes photographs and slides of a crt. It permits use of Polaroid 600 color-print film, Polachrome 35mm slide film, or 35mm color or black-and-white film. Total package, which includes a Polaroid One Step 600 camera, costs \$169.

NPC Photo Division, 1238 Chestnut St., Newton Upper Falls, MA 02164.
(617) 969-3487.

CIRCLE 223

Power backup

Powermark Automatic Power Systems provide up to three hours of backup power for PBX stations, terminals, and other computer-based equipment.



These portable systems plug into a standard 120-volt outlet. Price: from \$779.

Powermark, 3855 Ruffin Rd., San Diego, CA 92123.
(619) 565-8363.

CIRCLE 224

Standby power

The Line-Saver uninterruptible power system regulates RMS AC output voltage and increases battery efficiency to increase backup time. It's available in

120/240 volt, 60/50 Hz and costs under \$400. It has an internal 12V rechargeable battery, four surge-protected and EMI/RFI-filtered AC outlets, power-failure warning system, external battery connectors, and a 6-inch detachable three-prong grounded cord set with CEE-22 connector.

Kalglo Electronics Co. Inc., 6584 Ruch Rd., Bethlehem, PA 18017.

(215) 837-0700.

CIRCLE 225

Time analyzer

The Elapsed Time Analyzer (Eltan), working with the Duquesne QCM Performance Monitor and SPI reporting facility, shows the elapsed time accumulated by the various components of a system while processing a particular workload. The \$6,000 device helps determine the cause of delays and reports on resource usage at various levels. It provides an online breakdown of wait times and usage times.

Duquesne Systems Inc., 2 Allegheny Ctr., Pittsburgh, PA 15212.
(412) 323-2600.

CIRCLE 226

FOR JUST \$50 YOU CAN MOVE MOUNTAINS.

From the
prairies, to t
mountains to
the oceans
white with
snow, God

From the
prairies, to
the
to the oceans
white with
snow, God

From the
mountains, to
the prairies
to the oceans
white with
snow, God

With The Writer from Hayden Software, you can move "mountains", "prairies", sentences – or even entire paragraphs with ease.

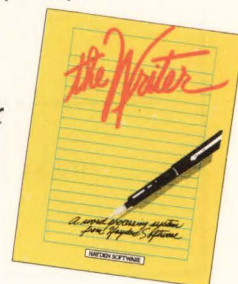
Based on the powerful PIE:Writer, The Writer gives you all the word processing features you would expect in software costing hundreds more. And its simple format makes it very easy to use.

So when you're ready to move up to real word processing for very little money, The Writer* from Hayden is the only way to go.

For more information, see your local retailer, or call 1-800-343-1218 (In MA 617-937-0200). Hayden Software, 600 Suffolk St, Lowell, MA 01853.

*Runs on the Apple II, II+, Iie, the IBM PC and compatibles.

HAYDEN SOFTWARE



CIRCLE 112

DATA COMMUNICATIONS

Linking SNA nets

Employing newly enhanced software products, terminal users in one IBM SNA network can access information and application programs in another independent SNA network. With these

new interconnection capabilities, each network retains its data-management procedures and controls, and remains configured, defined, and managed separately. Previously, independent SNA networks could not be interconnected without combining them, and

configuring a new network. The new capabilities could support applications for: corporations that are merging or a large organization that wants to divide a large, rapidly expanding SNA network into smaller SNA networks. Users can join two networks, for example, by assigning SNA gateway functions to one of the hosts and one of its communications controllers. The gateway is created by enhanced SNA software products running in the host and controller. The new SNA interconnection capability is provided for MVS/370 and/or MVS/XA operating systems. In its most bare-bones configuration, the new SNA interconnection capability costs about \$6,300 in initial license fees, plus about \$1,600 in monthly lease fees.

IBM (Contact local sales office.)

CIRCLE 227

Is DSS doing all it should for you? Attending DSS-84 can make the difference. April 1-4, Plaza of the Americas, Dallas, Texas

Are you designing or implementing a Decision Support System? Trying to make the one you have work better? Attempting to establish more management control? Whatever your relationship to DSS, you should come hear what the country's foremost experts have to say about the latest developments in this rapidly-changing field. Our annual conferences have come to be known as the world's leading DSS events in the 1980's. DSS-84 promises to be the best ever. You'll participate in sessions geared to your needs: "Getting Started." "Getting Value." Or "Getting Management Control." Plus a forum on the "New Wave in DSS" led by DSS pioneer Dr. Peter Keen. What's more, you'll see the latest in hardware and software innovations that can make your job easier and your DSS more effective.

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Ross Systems
SAS Institute Inc.

For more information, contact:

DSS-84, 290 Westminster Street, Providence, RI 02903, (401) 274-0801

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The Institute for the Advancement of Decision Support Systems

CIRCLE 113

Satellite system

Data-Sat is a satellite receiver for corporate data networks. It allows reception of high-volume point-to-multipoint 56-kbps data information and converts it to data out for any location within a satellite coverage area six to eight times faster than the land-line rate. Data capability can be added to an existing earth terminal with no other equipment. Price: under \$4,000. An optional TDM demultiplexer is also available for electronic mail, reservations, or network-control capabilities. Price: under \$4,000.

Modulation Associates, 897 Independence Ave., Mountain View, CA 94043.

(415) 962-8000.

CIRCLE 228

Integrated modems

The Omnimax Integrated Modems are compatible with all the Omnimax multiplexers and backward compatible with other Racal-Milgo modems. These 2400, 4800, and 9600 bps single-card modems are easily configured for a variety of network applications. With the Omnimax 30 or 40, operating parameters can be changed. With the 80, 160, or 320, modem-operating parameters are adjusted by soft-strapping and can be sent downline to remote integrated modems. Price: from \$700.

Racal-Milgo, 8600 N.W. 41st St., Miami, FL 33166.

(305) 592-8600.

CIRCLE 229

Phone management

A comprehensive telephone-management service that provides data polling, report processing, and complete vendor service and support is now available. Called the Total Telemanagement System (TTS), the service can cut phone costs and improve network performance for companies with \$5,000 or more in monthly telephone billings. TTS includes data collection by the vendor's Telepol II disk-based storage unit and report processing by the mainframe-based Telemanagement Software System (TSS). Issued monthly, reports include cost allocation and summary listings for all levels of the organization. The polled data are processed in the vendor's data center, using its TSS. The TTS installation charge is approximately \$1,500, and monthly billing is \$795 for up to 200 extensions or 20,000 calls per month. Larger systems can also be accommodated.

CP National, Software & Systems Div., 242 Old New Brunswick Rd., Piscataway, NJ 08854.
(201) 981-8100.

CIRCLE 230

Voice/data mix over twisted pair

Simultaneous transmission of data—both IBM 3270 and asynchronous—and voice signals over standard twisted-pair telephone wire is now possible using several products known collectively as Davoxnet. Davoxnet is expected to significantly reduce the cost of cabling and wiring for communications networks in large organizations. Whereas the cabling for a 3270 terminal alone can cost from \$3 to \$7 per foot, the new products use existing telephone wiring. Included in the product family are two new workstations: the Series 1921 professional PC deskset (\$2,375) and the Series 1911 intelligent terminal (\$2,175). The new workstations can be connected to the vendor's controller for 3270 operation by either ordinary telephone wire or coaxial cable. Within the workstations, voice and data signals are combined onto two pairs of telephone wires. Installing a Davoxnet workstation involves plugging its standard telephone cord into the existing telephone wall jack and making simple connections at the tele-

phone room. The other primary component is the Davoxnet interface (eight ports, \$750). It is used as the standard Davox controller to convert from telephone-wire to co-ax communications. Through this adapter, an expansion



controller can also be connected to a master controller using twisted-pair wiring. This permits as many as seven host-addressable devices to share one pair of telephone wires.

Davox Communications Corp., P.O. Box 328, Merrimack, NH 03054.
(603) 424-4500.

CIRCLE 231

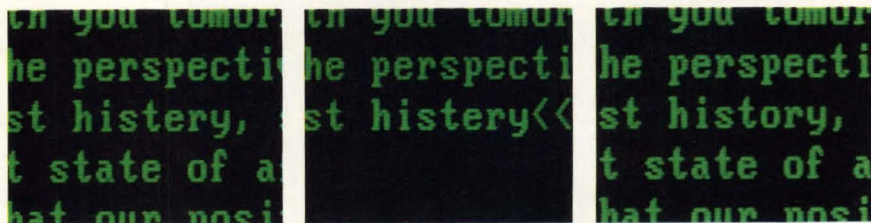
Full-duplex modem

The CDS 224 SD (Super Duplex) modem is said to be the first 2,400-bps, full-duplex, dial modem to combine an integral three-port statistical multiplexer, error correction, and automatic dialing. Estimated price: \$1,695. Intended for applications involving multiple asynchronous devices with stringent data-comm error tolerances, the CDS 224 SD gives users the backup advantages of ordinary dial-up telephone-line transmission, eliminating the need for leased lines. Its stat mux supports 14 asynchronous port speeds from 50 to 9,600 bps, which the user sets through his or her keyboard, as well as an "auto-baud" port where the mux is automatically matched to the user transmission speed. As an autodialer, the modem supports both Touch-Tone and rotary-dial systems.

Concord Data Systems, 303 Bear Hill Rd., Waltham, MA 02154.
(617) 890-1394.

CIRCLE 232

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With The Speller from Hayden Software, incorrect spelling is a thing of the past.

Its 20,000+ word dictionary automatically checks your spelling and makes corrections. Which means that your letters, papers and reports will be letter perfect time after time.

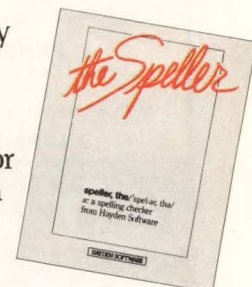
And while it's tough on spelling errors, it's easy on your pocketbook.

The Speller* from Hayden. Think of it as a dictionary for tomorrow at yesterday's prices.

For more information, see your local retailer, or call 1-800-343-1218 (In MA 617-937-0200). Hayden Software, 600 Suffolk St, Lowell, MA 01853.

*Runs on the Apple II, II+, IIe, the IBM PC and compatibles.

HAYDEN SOFTWARE



SECURITY

Multilevel system

Multi-Lock is a multiple-level security module for All-Screen, a CICS application in the Genesys online Human Resource Management Systems. Access clearance is determined by confidentiality of data, and access rights can be controlled down to the field level. The system is based on an unlimited number of security locks, each of which can contain an infinite variety of confidential statements or rules. All-Screen with the Multi-Lock enhancement is \$40,000 for DOS and \$45,000 for OS.

Genesys Software Systems Inc., 10 Grafton St., Lawrence, MA 01843.
(617) 685-5400. **CIRCLE 205**

SNA encryptor

The SNA Encryptor 305, interfacing directly with IBM Personal Computers and mainframes, encrypts data for transmission and storage security. It allows the PCs to communicate with the 30XX and 43XX using encrypted

communications. The \$1,595 device also provides the PCs with synchronous and asynchronous communications and with capabilities of the 3274 Control Unit, several 3270 terminals, and a printer.

Futurex Security Systems, 9700 Fair Oaks Blvd., Fair Oaks, CA 95628.
(916) 966-6836. **CIRCLE 206**

Fireproof box

Diskettes, microfilm, and microfiche can be placed in a box that keeps temperature below 125 degrees Fahrenheit and humidity below 80 percent. The box, priced at \$395, fits into a legal-size, fire-resistant record container.

Fireking International Inc., 900 Park Place, New Albany, IN 47150.
(812) 948-8400. **CIRCLE 207**

System/36 covers

A set of heavy-duty vinyl covers protects the IBM System/36 from dust and overhead water hazards. Cpu cov-

er is \$95, line-printer cover is \$70, and terminal cover is \$40. All come with a five-year warranty.

S3 Supply Co., 201 Mortimer Ave., Rutherford, NJ 07070.
(201) 939-2421. **CIRCLE 208**

PC access control

PC Lock II controls access to the IBM Personal Computer and compatibles in DOS 2.0. It consists of a circuit board and diskette that encrypt data and provide password protection so data cannot be changed, read, or copied. Various levels of protection can be placed on different segments, and passkeys can be changed, added, or removed at any time. It also includes a Softlock system, which restricts proprietary software to specific computers and controls communication with a mainframe. Encrypted data can be sent to other PC Lock II users via public-communication systems.

MPPi Ltd., 2200 Lehigh, Glenview, IL 60025.
(312) 998-8402. **CIRCLE 209**

TERMINALS FROM TRANSNET

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	LA12A	Portable Printer	182.	101.	69.	
	LA120KSR	DECwriter III	220.	122.	83.	
	LQP02	Letter Quality Printer ...	269.	149.	101.	
	VT101	CRT Terminal	115.	67.	43.	
	VT102	CRT Terminal	143.	80.	54.	
	VT131	CRT Terminal	153.	85.	58.	
	VT220	CRT Terminal	110.	62.	42.	
TI 	TI707	Portable Terminal	62.	35.	N/A	
	TI820KSR	Terminal Pkg.	211.	117.	80.	
	TI850	Printer w/Tractor	57.	32.	N/A	
	TI855	Dual Mode Printer	86.	48.	32.	
TELE-VIDEO 	TV914	TiN/Swivel CRT	62.	35.	N/A	
	TV950	CRT Terminal	103.	57.	39.	
	TV970	TiN CRT Terminal	115.	67.	43.	
NORTHERN TELECOM	NT6K00	Displayphone	124.	69.	47.	
	NT6K55	Modem 212/A	47.	26.	N/A	
ENVISION	215	Color Txt/grph CRT	306.	170.	115.	
	230	Color Graphics CRT	623.	346.	234.	

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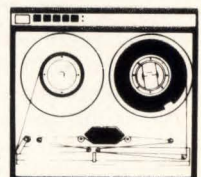
In NJ (201) 688-7800 • (800) 526-4965 • TWX 710-985-5485

CIRCLE 118

MAG
TAPE
POWER
FOR
YOUR
PC!

Microcomputer users and vendors can now add nine-track, main-frame-compatible tape drives to their single- and multi-user systems and reap the benefits of having the only TRUE STANDARD for DATA INTERCHANGE WORLD-WIDE. Choose from two drives: the hi-performance 75ips (non-vacuum column) drive, and the auto-loading 45ips drive. Both come with the following interfaces.

- RS-232C: supports full handshaking and async/bisync/isosync protocols.
- IEEE-488: supports subsets SH1, AH1, TE5, LE3, SR1, RL2, PP2, DC1, DT0 and CO.
- IBM-PC: DMA interface with DOS 2.0 driver and utilities, including hard-disk fast copy.



**TDX PERIPHERALS
TELEBYTE**

CIRCLE 119

Paper shredders

Two high-speed, maintenance-free paper shredders feature self-sharpening steel cutting cylinders and quiet operation. Speedishredder 30 accepts 20-thick full-width printouts; it costs \$2,150, plus \$260 for an optional wheeled stand. Model 22 handles six



full-width printouts continuously; price is \$1,165, and \$80 for the stand.

Moore Business Center, 1400 S. Wolf Rd., Wheeling, IL 60090.
(312) 520-3245.

CIRCLE 210

VM control

Tubes is a software system that restricts and controls access to IBM's virtual machines. It also increases the ease and flexibility of using virtual memory. It gives each user concurrent access to up to 12 different systems with an installation-defined menu screen detailing all of the facilities or systems to which that particular user is permitted access. The user can be connected with a system by pressing a 3270 PF key. Lease price is \$150 monthly for one or two years.

Macro 4 Inc., 1 W. Hanover Ave., Mt. Freedom, NJ 07970.
(201) 895-4800.

CIRCLE 211

Modem/host check

The Backus Computer Security System, a multi-channel device installed between host and dialup modems, performs security checks before the caller enters the host. A typical six-port system, which accommodates three incoming calls simultaneously, is \$1,495. Log-on and password recognition is handled externally to the host, and access to the directory for password changes can be done only from the central site by a designated individual. Each caller must present a designated account number and pass-

word, and optionally a phone number. The system will then disconnect and dial the caller back.

Backus Data Systems Inc., 1440 Koll Circle, San Jose, CA 95112.
(408) 279-8711.

CIRCLE 212

TRS-80 protection

The Code Keeper cassette-loaded program protects the TRS-80 Model 100 from unauthorized entry and secures all files in the computer's random-access memory. It uses 1 Kbyte of memory and prohibits anyone without the correct password from running any of the programs. Price: \$25.

Sherman Electronics, P.O. Box 63-04, Miami, FL 33163.
(305) 944-2111.

CIRCLE 213

Micro protection

Data Defender is a burglar alarm that prevents the theft of personal and microcomputers. A pressure-sensitive mat is placed under the equipment;

unweighting of the mat triggers an alarm, which can be reset only by the keyholder. Price: \$190; additional mats are \$32 each. Up to 10 mats can operate from one control module. A backup battery provides protection during power outages.

Picotronics Inc., 820 E. 47th St., Tucson, AZ 85713.
(602) 624-8771.

CIRCLE 214

Wang OIS control

OIS Security-Plus, compatible with the Wang OIS Security System, controls access rights to word-processing document, library, or advanced-functions applications. Initial license fee is \$1,000. Levels of security include physical security, user/ID password, log-on procedure, menu screens, programming, file protection, user program access, and workstation restrictions.

GABA, 15010 Ventura Blvd., Sherman Oaks, CA 91403.
(213) 907-6622.

CIRCLE 215

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Lou and Paul Jones
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Director's Room

STATUS:
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appointment

Dinner with
Lou and Paul Jones
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University Club

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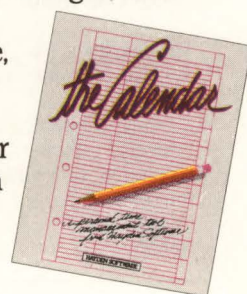
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For more information, see your local retailer, or call 1-800-343-1218 (In MA 617-937-0200). Hayden Software, 600 Suffolk St, Lowell, MA 01853.

*Runs on the Apple II, II+, IIe, the IBM PC and compatibles.

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ADVERTISER INDEX

Abbott, Langer & Associates.....	129,181	Kato Engineering.....	191
Able Computers.....	97	K/W Control Systems.....	137
ADP/Autonet.....	26		
Amcor Computer Corp.....	190	LEA, Inc.....	22
Ampex.....	93	Liebert Corporation.....	156-157
		Lorain Products.....	34
Battelle.....	95		
Best Energy Systems.....	16	3M Static Control.....	35
BMS Data Handling.....	109	Masstor.....	169
		Mathematica.....	51
Cambridge Systems.....	71	Micom.....	Cover 4
Candle Corporation.....	161	Micro Focus.....	172-173
Cap Gemini DASD.....	52	MSA.....	45
CGA Software.....	1		
CIE Terminals.....	107	National Computer Graphics	
Compaq Computer.....	Cover 2	Association.....	175
Compupro.....	121	National Electric Cable.....	154
Computer Network Corporation.....	89	National Information Systems.....	14
Computer Power.....	146	Nicolet Zeta.....	105
Computer Power Products.....	191	Northern Telecom.....	20-21
Computer Power Systems.....	54	Northwest Digital Systems.....	6
Com-Site International.....	62		
Computer Transceiver Systems, Inc.....	30	Oneac Corporation.....	148-149
Compuware.....	171	On-Line Software.....	31
Corporate Contingency Services.....	85	Oxford Software.....	11
CPT Corporation.....	97		
Cullinet.....	49	Panasonic.....	67
Current Technology/Amtek.....	162	Pansophic.....	47
		Para Research.....	52
Datagraphix.....	33	Power Distribution.....	32
Data Plotting.....	15	Professional Systems.....	190
Datapoint.....	36,37		
Dataware.....	50	Qume.....	119
Digital Communications Associates.....	60-61		
Digital Communications Associates/		Radio Shack.....	43
TAC.....	24-25	Raytheon.....	28-29
Dranetz Technologies.....	158		
DSS '84.....	196	Shape Magnetronics.....	160
Dylakor.....	170	Siemens Corp.....	79
Dysan.....	113	Software AG.....	53
		Software International.....	8-9
Elgar.....	142	Sola.....	163
Emcom.....	59	Solid State Controls.....	150
Emergency Power Engineering.....	147	SPSS, Inc.....	7
Emerson I. C. D.....	143	Sterling Software Marketing.....	42
EPS, Inc.....	103	Strategic, Inc.....	14
Execucom.....	145		
Executive Management Systems.....	115	Telebyte Technology.....	198
Exide Electronics.....	140-141	Televideo.....	17
		Topaz.....	81
Fibronics.....	194	Transnet.....	198
Fiquench.....	162	Triad Power Systems.....	4
		Triangle.....	23
Genicom.....	Cover 3		
Genigraphics.....	19	UCC Systems.....	76-77
Genstar REI.....	200	Unilogic Ltd.....	126,128
Gould, Inc.....	135	USPS.....	83,185
Greyhound Computer Leasing.....	177	U.S. Robotics.....	39
Group Operations.....	70		
		Value Computing.....	3
Hayden Book Co.....	108, 130-131	Ven-Tel.....	5
Hayden Software.....	195,197,199		
		Walker Interactive.....	167
Information Builders.....	189	Wang Labs.....	27
Integral Systems.....	123-125	Welco Industries.....	16
Integrated Technologies.....	18	Wilson Jones.....	40-41
Interface.....	153	Wollongong Group.....	179
Intermec.....	127		
Isoreg.....	152	Xor Corporation.....	117

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CIRCLE 122

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CIRCLE 125

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