

COMPUTER DECISIONS

FEBRUARY 12, 1985

THE MANAGEMENT MAGAZINE OF

WILEY PUBLICATION

INTERVENING
WHEN PROBLEMS
COME TO WORK

Salary survey

Relational
DBMS takes off

Voice-data
integration

Save on taxes



THE NCR PC IS COMPATIBLE WITH PEOPLE, TOO.

Getting along with all kinds of people is one of the most endearing qualities of the NCR PC4.

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Perhaps its good looks have a lot to do with this. But its beauty is more than skin deep.

Its smart, integrated cabinet takes up precious little space on your desk.

There are no complicated wires or clumsy boxes to set up. All you have to do is plug it in.

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The NCR PC even comes with two special self-teaching programs that will have you computing in a matter of minutes. NCR PAL shows you how to use the computer itself. NCR TUTOR introduces you to word processing, spreadsheets and other popular business programs.

And if you get lost along the way, there's a built-in HELP command you type in to get you back on track.

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Of course, it's also compatible with thousands of programs available at computer stores everywhere.

And it's compatible with industry standard hardware. Which means you

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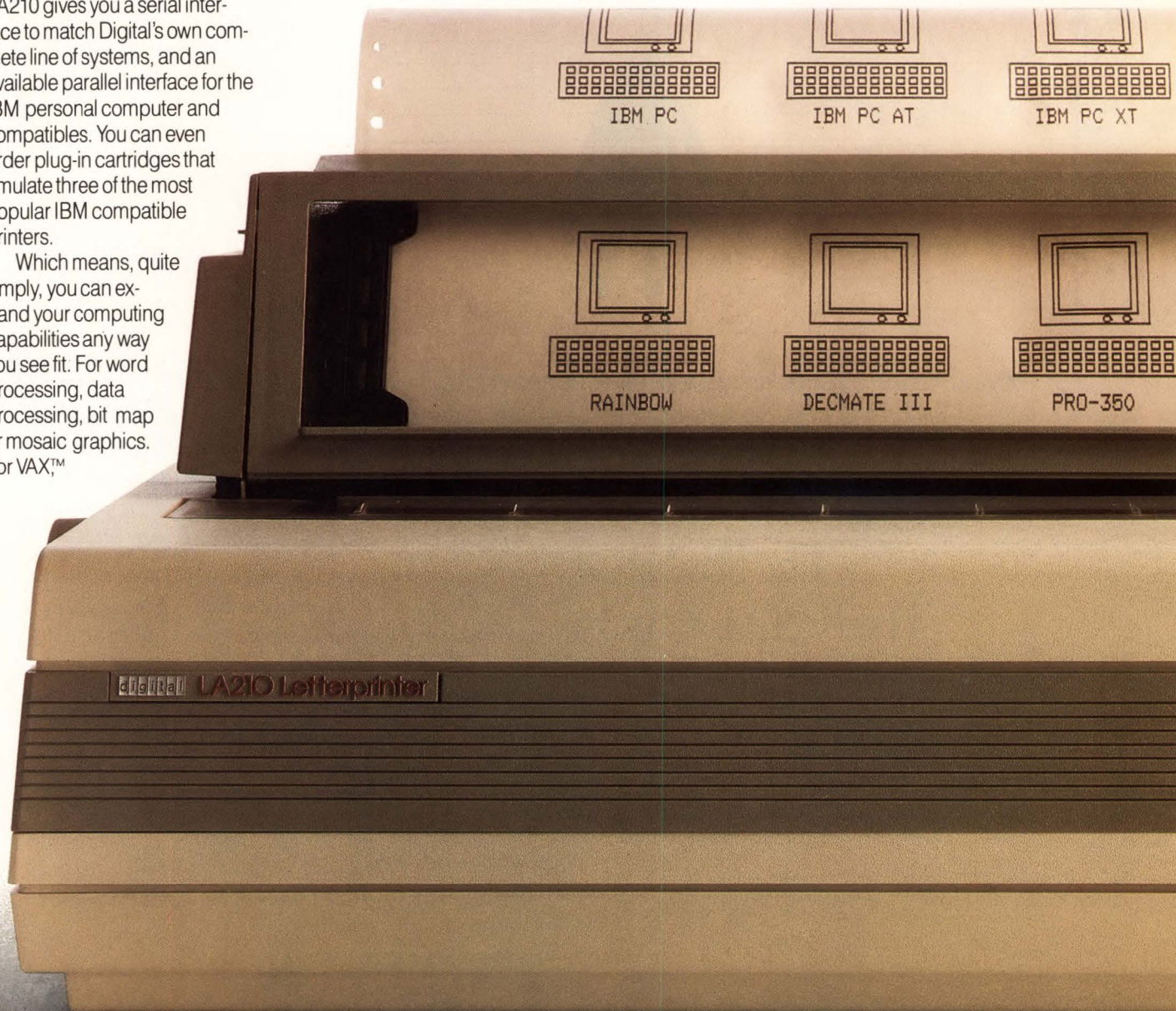
But when your needs

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All with a single printer.

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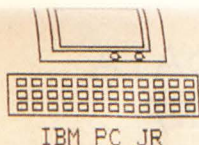
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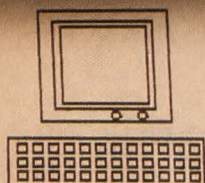
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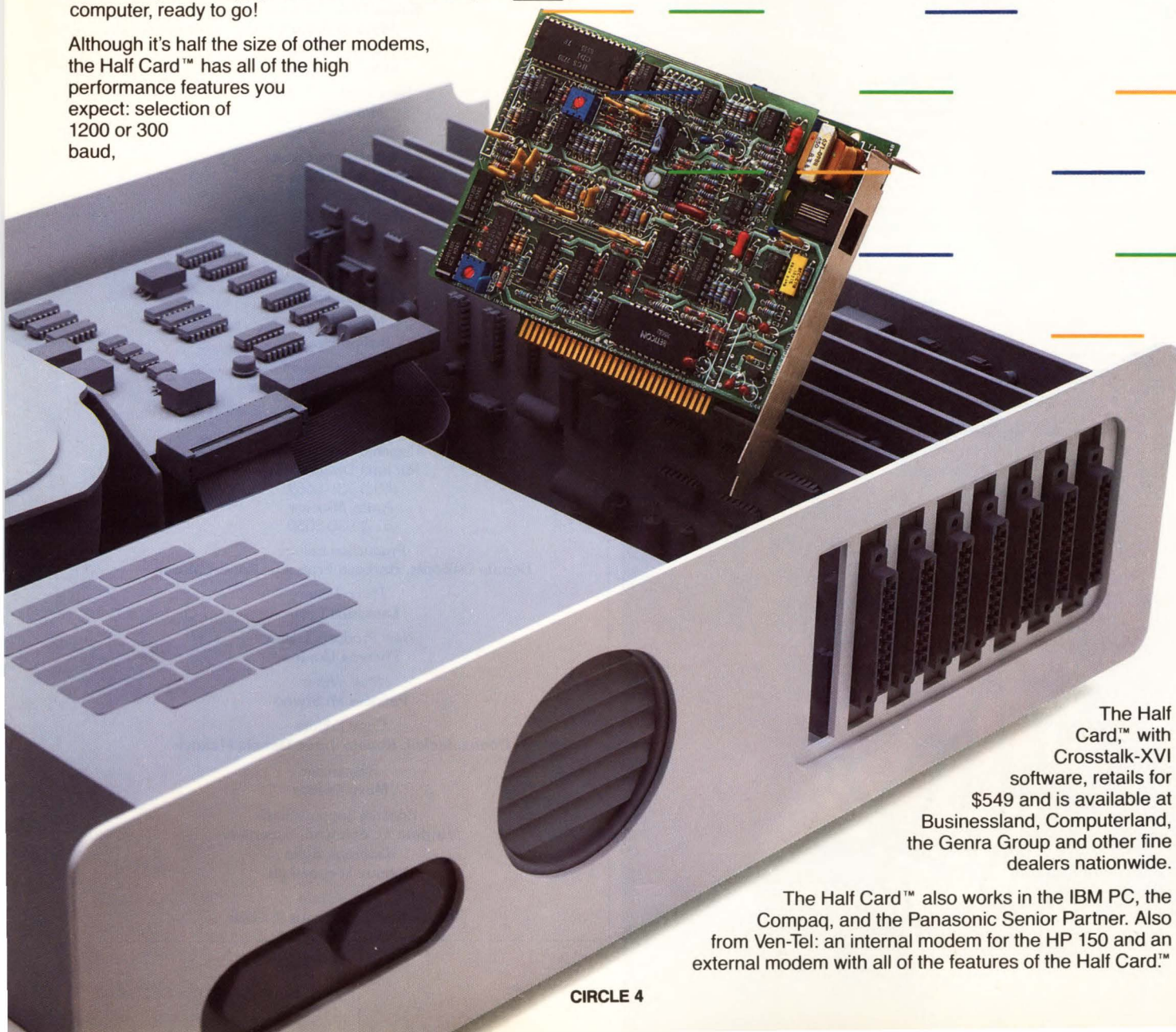
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*Source Datamation Magazine 1983 Brand Preference Study of printer preference by end users and OEM's.

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November 12,

Mr. Phillip Wallace
Bonwit Construction Company
60 East 42nd Street
Suite 2530
New York, New York 10165

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Per our conversation of Friday, November 9, take this opportunity to tell you in more Xerox line of Diablo Daisywheel Printers.

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With a range of 20 to 60 characters per 1 to 3 pages per minute, it's perfect

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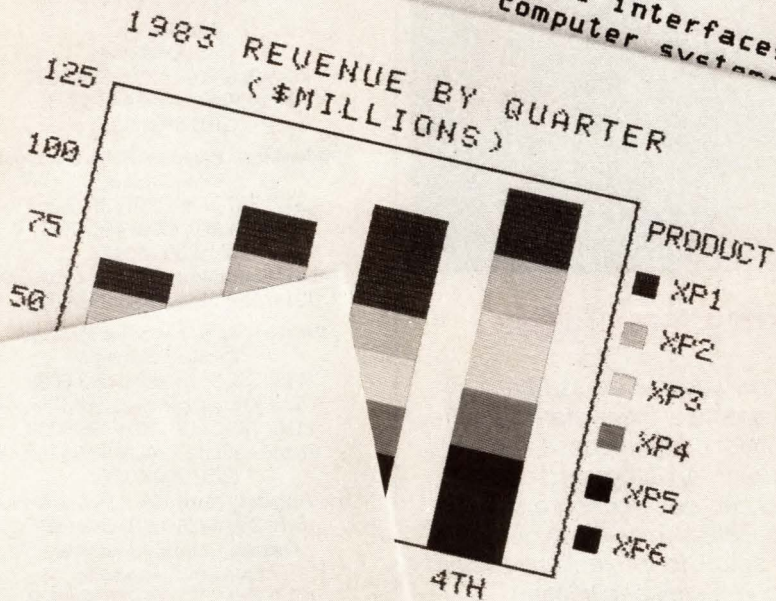
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CIRCLE 7

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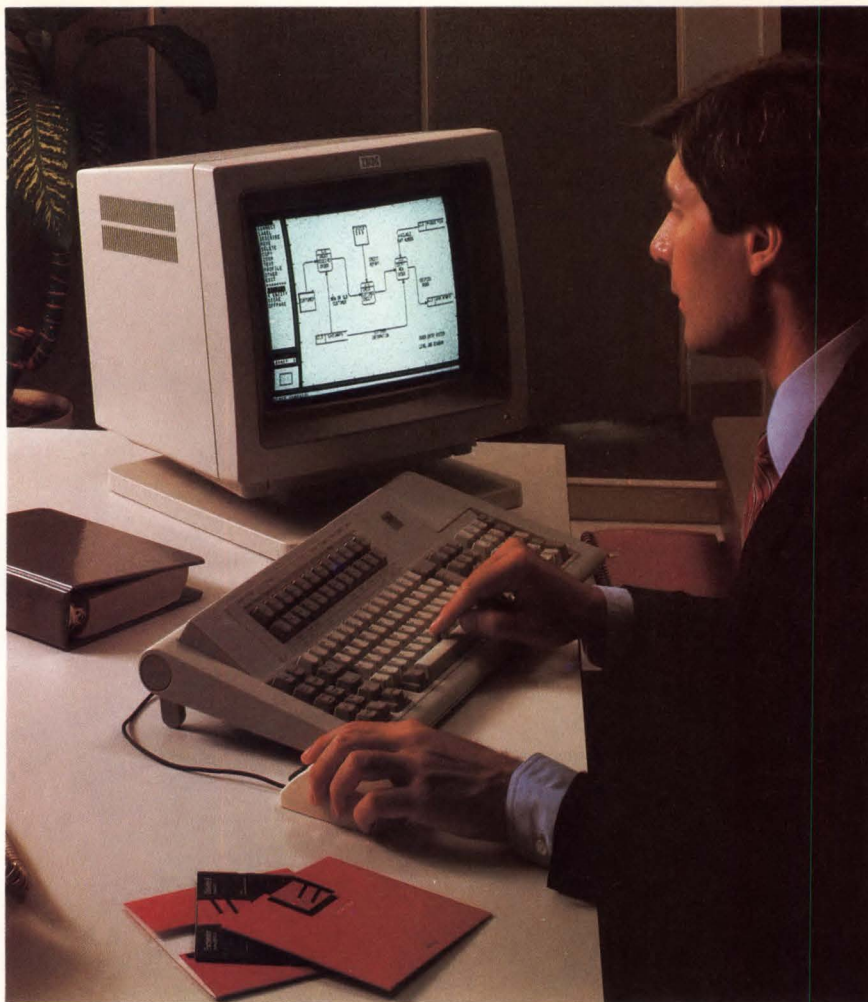
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IBM'S GOOD OLD BOYS

On top of all its other advantages, IBM has an extra advantage over its competitors: a network of former employees and officials. Many former IBMers are in positions to recommend or at least influence the purchase of computer hardware, software, and services. Others are in political offices that put them in a position to influence public policy.

Big Blue's special advantage is apparent when one leafs through the pages of the IBM Alumni Directory, published semi-annually by Bob McGrath, who heads the recruiting outfit that bears his name in Dallas. This little directory of some 100 pages—it costs \$15—is powerful testimony to the pervasive influence of IBM.

Former IBMers hold quite a few of the top MIS/dp jobs in major corporations. About 5 percent of the 3,500 individuals listed in the directory are MIS/dp executives.

Another substantial category is consultants who are in a position to influence the specification of products and services by major corporate customers. The best known of these consultants is James Martin. And how about the "consultants" who recommend securities on Wall Street? Some of

them, notably Ulrich Weil of Morgan Stanley, are former IBM employees.

Two of those listed have achieved national elective office. Donald W. Riegle, a Democratic senator from Michigan, worked for IBM between 1961 and 1964 as a senior pricing analyst. Rep. Robert Garcia, a Democrat from New York's 21st District, serviced IBM electromechanical calculating machines between 1957 and 1962. Garcia left IBM to join the old Bendix Computer Corp. as a maintenance specialist;

he moved along to Control Data Corp. when the Minneapolis-based manufacturer bought Bendix Computer.

The directory does not list former members of the board of directors. Two notables from this group are Cyrus Vance, secretary of state under President Carter, and Harold Brown, Carter's secretary of defense.

Many former IBM employees now head their own computer or software companies. In fact, graduates of IBM's sales force comprise the largest group-

ing in the IBM alumni club. The most renowned of these is Ross Perot, whose recent sale of Dallas-based Electronic Data Systems to General Motors made him a billionaire. Others, like Gene Amdahl, are already on their second or third ventures. In one sense, all those who leave Big Blue to stake out greener pastures live by an IBM tradition: Thomas Watson Sr., the founder of IBM, honed his selling skills at NCR.

IBM is so dominant that an analysis of the old-boy network's affect on sales probably wouldn't be worth the effort. There's no doubt, however, that in many ways IBM's alumni help it. That's an edge competitors will find tough to beat. □

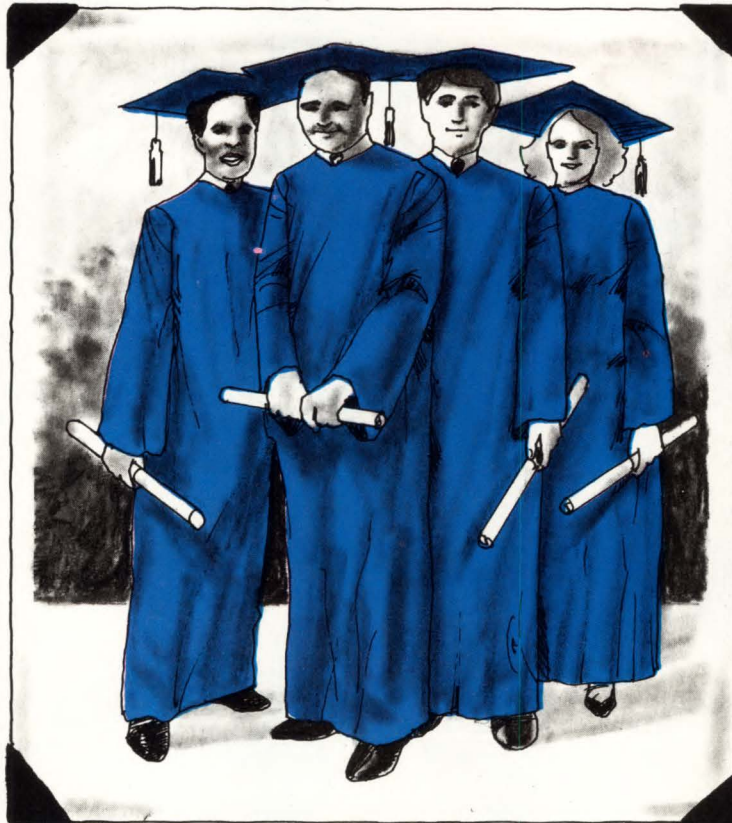
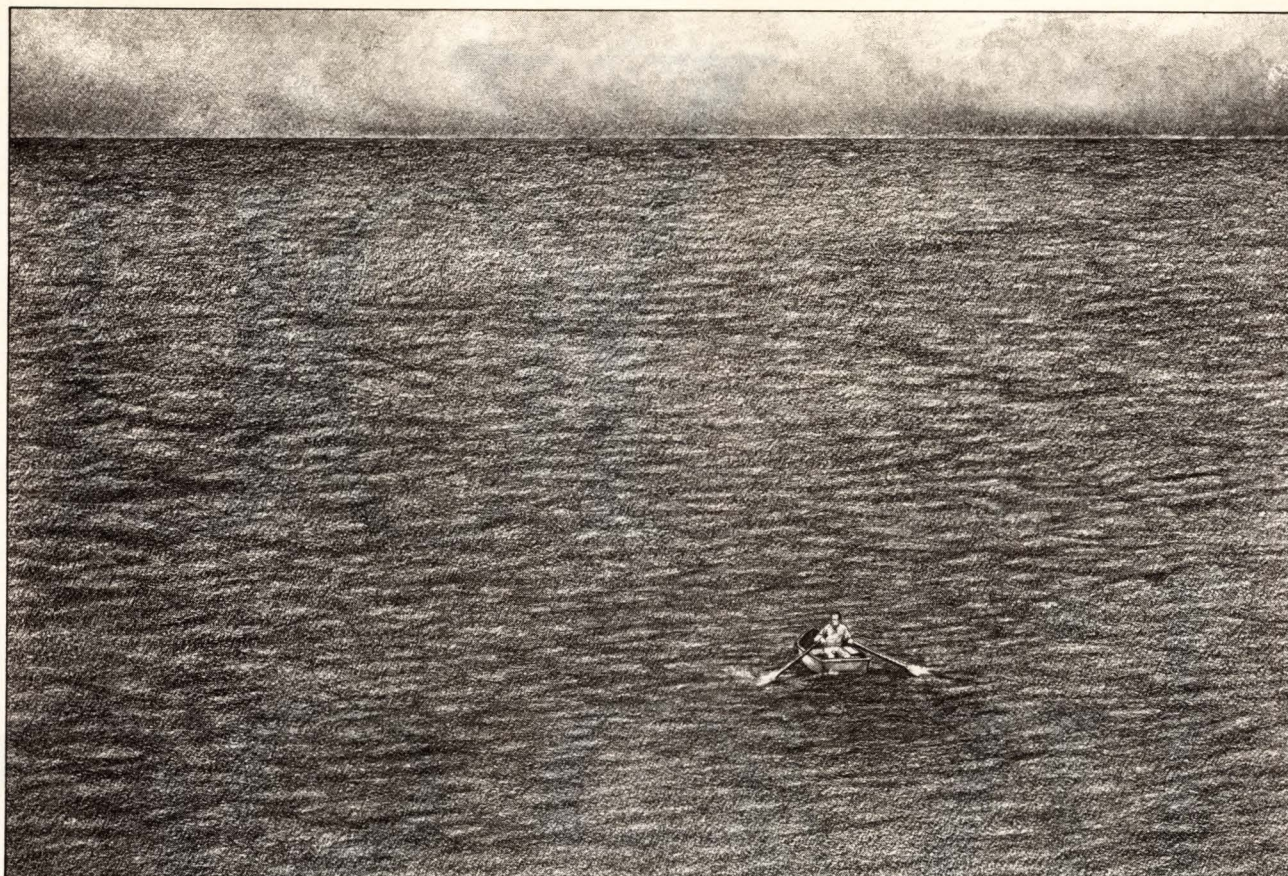


Illustration by Dan Culhane



Before VM Magic, embarking on a migration from one disk type to another was a formidable undertaking.

At last, an effortless path for DASD migration.

Now you can migrate to the new, faster disk device types in only the time it takes to copy your files—a matter of hours, instead of months or years consumed by program and job control conversions.

VM MAGIC bridges the distance between incompatible disk device types and guest operating systems running under IBM's Virtual Machine Facility (VM) *without* conversions or program modifications.

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Edited by Joseph Braue, News Editor

DP UNIONS: THE QUESTION IS WHEN



Illustration by Dan Culhane

Are dp personnel about to join teachers, nurses, lawyers, and other professionals at the bargaining table and on the picket line? The recent wholesale transfer of 7,000 dp employees from General Motors (Detroit) to its new acquisition, Dallas-based Electronic Data Systems Corp., and the petition by some of these employees for representation by the Washington-based United Auto Workers (UAW) has some MIS/dp managers wondering if a more widespread movement is afoot.

Dp managers in other industries say they see little, if any, movement by their subordinates toward unionization. Yet, if labor experts are correct, dp workers will join the ever-increasing number of white-collar workers who are organizing.

"The unionization of dp workers is

happening, albeit slowly," says Matthew Goodfellow, director of the University Research Center, an independent industrial-relations research outfit in Chicago. The smokestack industries are shrinking and with them the number of unionized blue-collar jobs. White-collar workers, on the other hand, now make up more than 54 percent of the

American work force. The shift from blue- to white-collar jobs is mirrored in the shrinking of big blue-collar unions.

According to the National Labor Relations Board, in 1970 unions won 55 percent of the 7,773 elections held to determine whether new petitioning units were to be unionized. In 1983, there were only 3,492 elections held and unions barely won 48 percent. Blue-collar unions are trying to pick up the slack by recruiting in the high-growth sectors, including dp. They've been having some success with lower-level workers—tape librarians, data-entry clerks, telecommunications-hardware technicians, and so forth—largely because these workers are classified as office staff and technicians.

However, few programmers and systems analysts, the elite among dp

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- Should designers lighten-up data centers? 22
- Framework top integrated package in one test 28

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Experienced buyers are fully aware of the differences between implementing a *simple* software system and one that's really *comprehensive*. They also know any system that fails to meet a company's functional goals will quickly start causing serious problems—from billing backlogs and material shortages to a constant flow of frustrated end users.

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(News continued from page 16)

professionals, are union members. They perceive themselves as "professionals," a classification that doesn't jibe with the union stereotype. More important, their employers generally classify programmers and analysts as professionals, exempting them from automatic inclusion in "non-professional" units and giving them the prerogative to form separate units, if they want to be organized.

Mark Chernoff, economist for the Communications Workers of America (Washington), the bargaining agent for AT&T telephone workers, notes that corporations often give computer professionals the same benefits as unionized workers.

In 1974, the American Postal Workers Union (Washington) organized the workers in the five U.S. Post Office dp centers and included the dp professionals on a "rider." At that time, recalls Nathan Guerrero, labor-relations representative at the San Mateo, CA, center, "the computer programmers and analysts saw an advantage in having a voice in the union."

But the attitudes have been reversed during the last 10 years. "The dp professionals rarely exercise their union rights today," says Guerrero, "and, in general, they want to be outside the union environment."

Dp managers informally polled in various industries agree. They see little or no success by organizers at arousing interest for unions among programmers and analysts.

So what's going on at GM? Jim Lloyd, manager of systems and programming at American Motors (Southfield, MI), expresses the opinion of several observers that the GM-EDS predicament is unique. "The corporate cultures at GM and EDS are completely different and the people being moved from one to the other are getting quite a shock," he says. "The union effort there is a totally isolated situation without precedent."

Ken Riedlinger, senior vice president of EDS, claims that "90 percent of the

transferred workers are not interested in joining the union." Figures support him. Petitions filed with the UAW represent only 700 of GM's 7,000 dp employees scattered all over the country.

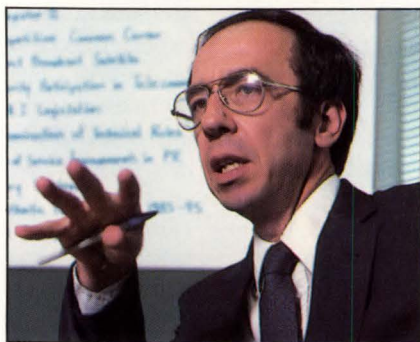
Even UAW official Dave Mitchell is not optimistic about the current drive. "When white-collar workers at GM got into trouble in the past, they came to the UAW for help," notes Mitchell. But GM has always settled with the workers before the unionizing process was completed. "GM also has already moved to solve the problems in this situation," sighs Mitchell.

Goodfellow, no cheerleader for unions himself, still maintains that white-collar and professional unionization in

all fields is the wave of the future. He thinks it's because unions desperately need new sources of revenue. Union leaders believe that "information-age" workers will turn to unions for the same reasons laborers and tradespeople have done so in the past: to settle grievances and provide protection and promotion.

The alternatives will be to join service unions, professional unions, or to hitch onto the hardcore blue-collar unions like the UAW. The UAW claims to have the muscle to get professionals what they want, but, chuckles Goodfellow, "professionals would not be in the kind of company they would want to keep." —Anita Micossi

ACCESS CHARGES TO RAISE LEASED-LINE RATES



Under the leadership of Mark Fowler, chairman, the FCC is reshaping the leased-line pricing structure.

The Federal Communications Commission's (FCC) recent redesign of the leased-line pricing structure will cause users to pay more for service.

Just how high leased-line rates will go is uncertain. Although AT&T Communications—the main provider of leased-line service—has petitioned the FCC for increases in private-line rates, the FCC's approval or disapproval is not expected for some months. AT&T is seeking an average of 8.6 percent more for private lines, to take effect March 4, to offset the higher access charges it pays to local telephone com-

panies. In the past, the FCC has delayed decisions on increases to review objections.

Not only is it difficult to speculate how much of an increase leased-line users can expect, it is impossible to say which users will get hit the worst. According to Brian Moir, who represents the International Communications Association, leased-line rates will increase "quite dramatically in some cases" as the result of the new ruling. Robert Ellis, president of the Aries Group, a Rockville, MD-based telecommunications consulting firm, adds, "The basis for the new private-line tariffs is radically different from that of earlier tariffs and will greatly increase the complexity and cost of private-line service. Some users' bills will jump by 200 percent." In other cases, however, the basic leased-line rate charged by AT&T will decrease.

In general, users with leased lines that travel long distances between only a few locations will fare better when final rates are settled upon, says AT&T spokesman James Byrnes. On the other hand, users with leased lines

(News continued on page 22)

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NOMAD2, the premier 4-GL/DBMS, and SQL/DS, IBM's wave-of-the-future database system, have been combined to form the single most powerful information management resource available. And those who have seen this dynamic combination in action agree that the two systems were made for each other.

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NEWS & COMMENT

(News continued from page 18)

connecting many locations in a network and those who are not located near the switching facility of their leased-line vendor will probably be hit with greater increases, Byrnes says. Before divestiture, AT&T averaged out the cost of using local switching facilities among all its leased-line customers. Now, users will have to pay leased-line charges based on the actual cost of service.

Chief among the new costs that will determine users' leased-line bills are access charges, which reimburse local telephone companies for providing the connection between customers and leased-line facilities. The local telephone companies have submitted at least three access-charge proposals to the FCC. In response, the FCC ordered the local telephone companies

to scale back their access-charge proposals, according to Regina Keeney, FCC tariff analyst, "to relieve long-distance carriers and high-volume users from the shock of sudden and unprecedented tariff increases." In a set of proposals filed in December by the National Exchange Carriers Association (NECA), the organization that represents most of the local telephone companies, access-charge increases were reduced from \$1.2 billion to \$1.06 billion—a cut of about 10 percent. If they are not delayed by the FCC, the new rates will be effective this week. However, past experience suggests the FCC will postpone final action on the access charges for several months.

In a related decision, the FCC ruled that state public-utilities commissions should give corporate Centrex and

multi-line users breaks on access tariffs. Local telephone companies would have to prove that high-volume corporate Centrex users are seriously considering bypassing the local telephone company in favor of their own private branch exchanges. The decision is aimed at allaying fears that big corporations will drop Centrex—or central switching—to avoid paying increased telephone-company bills that reflect the access charges.

Currently, multi-line business users are levied access charges for regular telephone lines according to the type of service they use and when it was installed. Under the new proposal access charges can rise up to \$6 per month per line—a significant increase for businesses, universities, and hospitals—all high-volume Centrex users.

—J.B. Miles

DO WINDOWLESS DATA CENTERS SHED LIGHT?

Many data-center designers, ignoring recent scientific findings that suggest lack of sunlight can adversely affect employees' health and

productivity, are continuing to build windowless facilities.

According to studies by a group of psychiatrists from the National Insti-

tute of Mental Health (Rockville, MD), exposure to sunlight promotes chemical changes in the body that affect moods. Sunlight deprivation, they say, may result in a condition called seasonal affective disorder, or SAD—symptoms of which are irritability, anxiety, drowsiness, and sadness.

Why, then, is the windowless data center the rule rather than the exception? Some data-facilities engineers say security considerations as well as glare and temperature inconsistencies caused by sunlight make incorporating windows into their designs impractical. Instead, these designers opt for bright color schemes and "natural" lighting effects.

However, some organizations, recognizing that a well-lighted environment can conduce to increased productivity, are building data centers with windows. James Olsavsky, an architect who designed the data center for RMI, a Niles, OH-based



Will windowless data centers like the above continue to be the design norm?

In the overnight air express business, it's axiomatic: It's people, not planes that deliver. So improving worker efficiency is critical. That's why Burlington Northern Air Freight uses Davox integrated workstations. In customer service, for example, they found Davox systems help people work about "twice as fast" as the previous system.

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Today Davox systems are at work in Fortune 1000 companies in a broad variety of applications, from securities trading to telemarketing

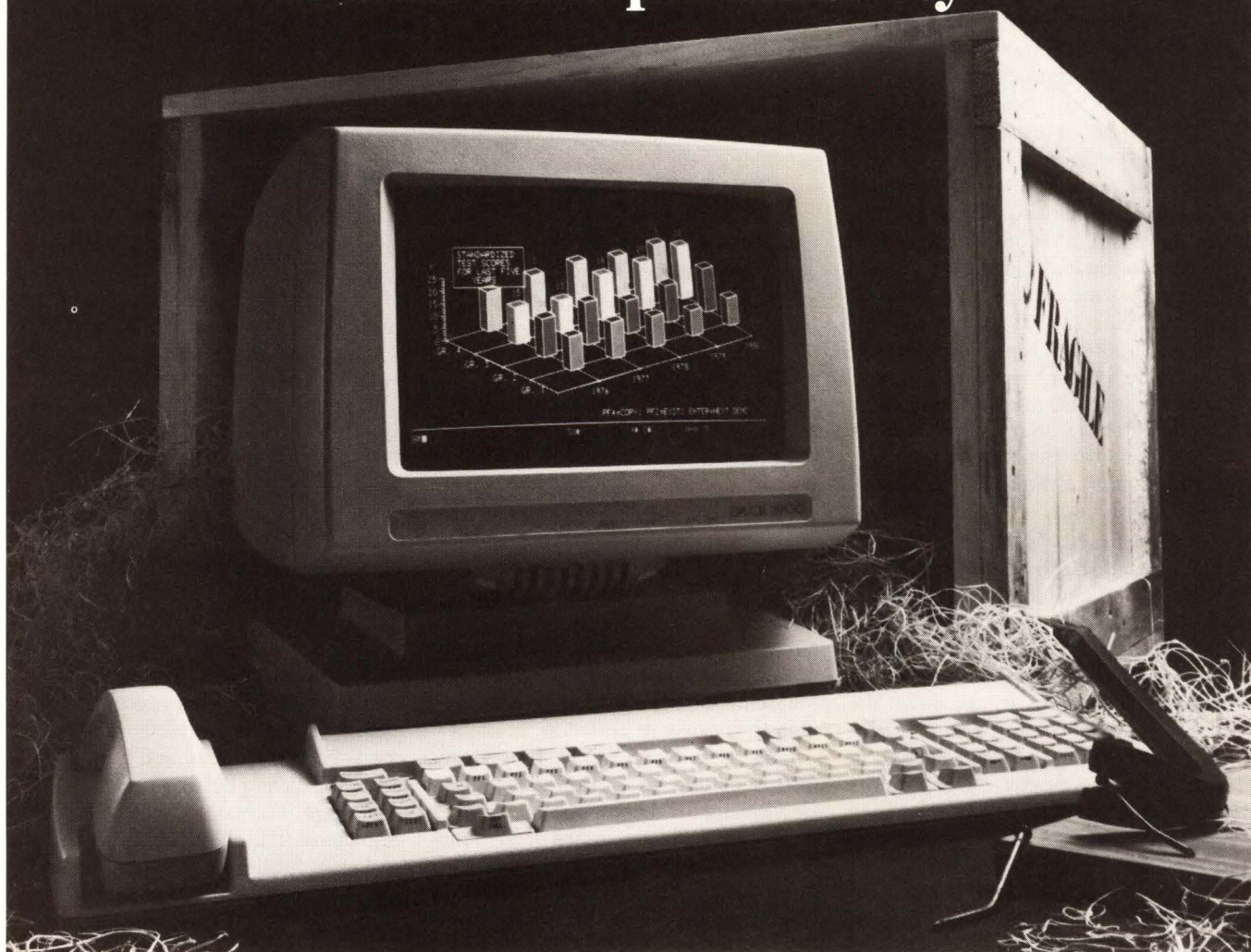
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manufacturer, decided to go this route. According to Olsavsky, RMI's president, Jim Daniels, did not want a windowless workspace. Olsavsky and Daniels, agreeing that employees' psychological well-being was more important than the problems sunlight might create for VDT users, found the right balance.

"Instead of dealing with the problem of glare by eliminating windows altogether," says Olsavsky, "we selected ergonomic furniture so that anyone sitting in front of a crt can adjust his or her chair, or adjust the position and tilt of the crt." The computer room of the RMI data center, says Olsavsky, is located toward the center of the building so it does not receive harsh, direct sunlight. Employees who sit nearest the windows do not view VDT screens all day.

But to most data-center planners, windows are not essential to good design. "In a data center, windows are not necessary," says Robert Baier, electrical engineer for Larson & Darby, a Rockford, IL-based engineering firm that is building two very large, windowless computer centers for Sundstrand Corp. and Barbara Colman Co. in Rockford. "Direct sunlight makes it too bright for employees to work on crts," Baier says. "Glaring light sources will cause eye fatigue. Rather than use windows, we try to soften the interior design of a data center to make it more pleasing to employees."

One way to "soften" a design scheme is through the use of color. Gottfried Consultants, Los Angeles, which designed an underground data center for the First Interstate Bank of California, used light earth tones on walls and partitions to cut down the harshness of the bank's fluorescent lights. According to David Zewind of Gottfried Consultants, "Dark colors create a closed-in feeling. We used light colors at First Interstate to create the illusion of expansion."

Data-center designers steer clear of designs with windows for another

reason. According to Corkey Wildenboer, vice president of Data-sphere Inc., a dp facilities-engineering firm located in Cranford, NJ, windows in data centers can be hazardous to computer hardware, particularly if the windows surround the computer room itself. "The computer room is designed for machines, not people. As a result, humidity and temperature in the computer room must be carefully regulated. It's difficult to control these factors if there are windows." What is Wildenboer's vision of the ideal data center? Interestingly enough, it is similar to James Olsavsky's design for the RMI data center. Wildenboer would locate the computer room at the core of the building and situate offices and windows around the building's perimeter. This design is not easily achievable, he says, because many data

centers begin as empty warehouses that need extensive renovation to meet these requirements.

If renovation is not possible, how else can a windowless design be improved? David Zewind of Gottfried Consultants suggests that painted murals can go a long way in brightening a dark space. Sometimes known as *trompe l'oeil*—fool the eye—this technique imbues a two-dimensional surface with the semblance of three dimensions.

Effective lighting is a less extravagant approach than *trompe l'oeil*, but potentially as sophisticated. Vita-Lite, manufactured by Duro-Test Corp. (North Bergen, NJ), is a fluorescent lamp that simulates daylight. According to Ruth King, director of government sales, Vita-Lite improves visual acuity and reduces fatigue.

—Theresa Conlon

EBB & FLOW DATAPOINT PULLS BACK

Datapoint Corp. (San Antonio, TX), maker of the Arc local-area network, is planning to close its Fort Worth, TX, plant and lay off 240 workers. Company spokesman Tom Maldenhauer says Datapoint is closing down its operation in Fort Worth to reduce expenses and to bring "inventory more in line with demand." The Fort Worth facility manufactured Datapoint's small business computers, terminals, and disk-storage devices, as well as its Arc products. These products will now be made in reduced quantities at the company's San Antonio plant. Although Datapoint does not anticipate more cutbacks in staff, Maldenhauer said the vendor is continuing to "review its situation."

Televideo Systems Inc. (San Jose, CA) is cutting back production of its slow-selling IBM-compatible personal computer, following losses of \$7.9 million last quarter. At the close of 1984, Televideo's stock price had fallen from \$22, its 1983 rate, to \$3 per share.

According to company spokesman Jay Shotwell, Televideo will try to recoup this year by emphasizing its multi-user supermicros and developing a new marketing strategy for its personal computer.

Keeping a close eye on the bankruptcy of *Storage Technology Corp.* (Louisville, CO) will be the sole job of *The Storage Technology Monitor*, a new weekly report published by Technology News of America (New York). The report will contain abstracts of all legal documents filed in the STC bankruptcy case; updates and summaries of financial data; commentaries from bankruptcy lawyers and computer-industry authorities; and reports on key players in the bankruptcy. The report costs \$695 per year and can be ordered by calling (212) 334-9750.

Storage Technology has fired 190 employees (half the workers) at its optical-disk facility in Longmont, CO. The vendor has been spending \$3 mil-

(News continued on page 28)

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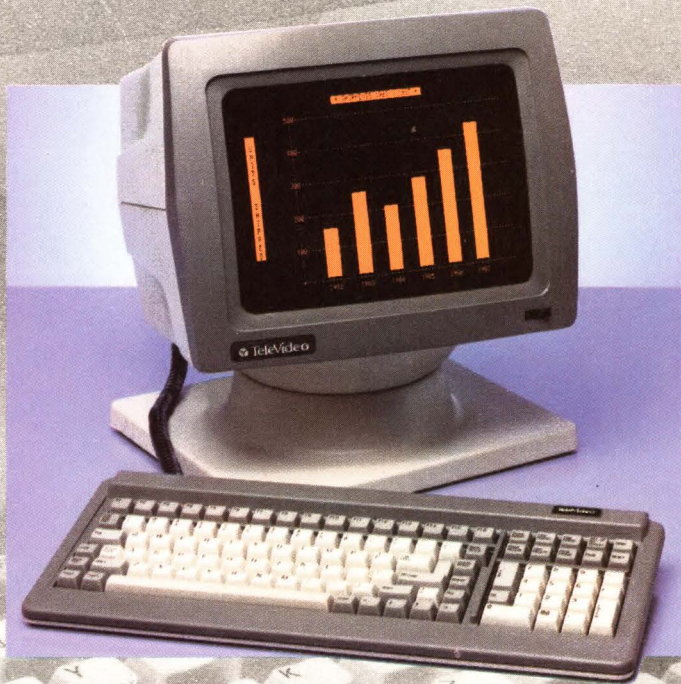
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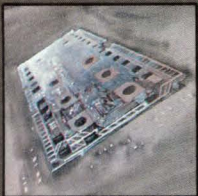
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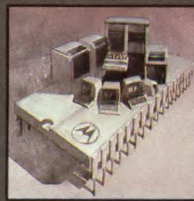
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1984
Motorola/Four-Phase announces The 6000 Series—a milestone in productivity that delivers information processing performance today, and expansion capabilities for tomorrow.

NEWS & COMMENT

(News continued from page 24)

lion to \$5 million a month to develop optical disks since last year.

In other Storage Technology news, Ultimate Computer Services (Denville, NJ) announced that it is expanding third-party maintenance services on selected STC products. For more information, call (201) 625-8700.

Exxon Corp. is trying to sell its office-systems division, an employer of 2,300 worldwide. The office systems division, based in Stamford, CT, markets four products: the Qyx typewriter; Qwip, which transmits facsimiles of text and graphics via telephone lines; the Exxon 500 word processor; and a sophisticated ink-jet printer.

The introduction of Verbex' low-cost Model 4000 has apparently not stalled parent company Exxon (New York) from putting the Bedford, MA, manufacturer of voice-recognition systems on the block. Although one source inside Verbex claims that "it's not in Exxon's interest to dump us at this time" because of the profit potential of the Model 4000, Chris Seelbach, president of Verbex, admits to looking for a buyer. John McCurry, manager of public affairs for Exxon Enterprises, concurs.

Other hi-tech acquisitions, such as Exxon Nuclear Co. (Bellevue, WA) and Zilog (Campbell, CA), are safe, according to McCurry.

Innovative Software Inc. (Overland Park, KS).

The ratings on various criteria for the integrated programs—defined as software offering at least word processing, database management, and spreadsheets—were as follows:

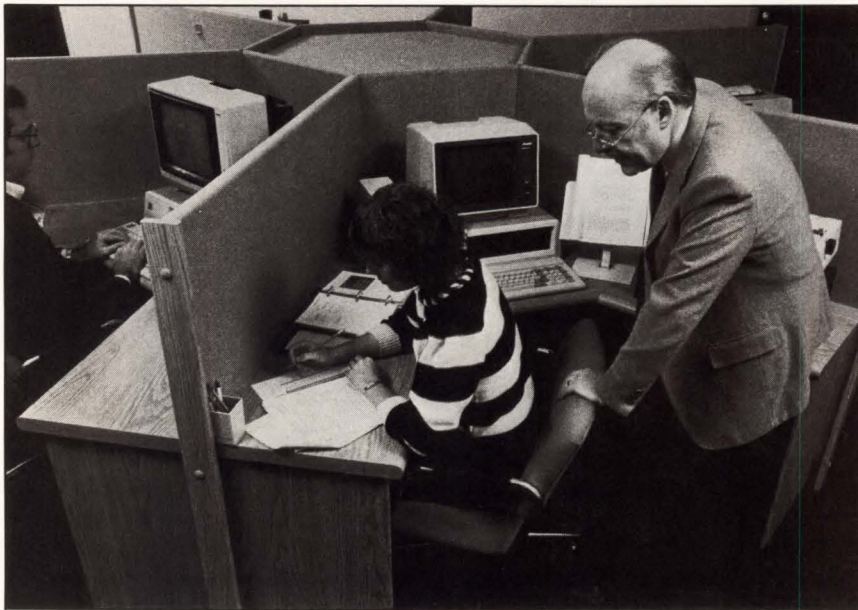
- Framework (\$695) was rated tops for ease of learning and use, and for error handling.
- Enable (\$695) was rated as the fastest overall program, the best for word processing, and the package that could perform the most functions.
- Dunsplus (\$1,700) was picked as the best for database management.
- Symphony (\$695) and Dunsplus were rated tops for spreadsheet applications.

Dunsplus is actually a splicing together of Lotus 1-2-3 from Lotus Development Corp. and Multimate Professional Word Processor from Multimate International Inc. (East Hartford, CT). Although Dunsplus doesn't feature common commands for word processing and spreadsheet functions, it received a high rating in the survey. This suggests that the quality of the component parts of the integrated packages is more important than standardization of commands, says Joseph M. Segel, chairman of Software Digest Inc. "Everybody talks about the importance of having a consistent command structure," Segel says. "But here we have a package that came out on top without it. This shows that the refinement of these integrated packages is important."

All of the integrated programs were rated as weak in the database function. Segel notes that the 15 integrated packages received only fair ratings compared to the *Digest's* previously published ratings for single-function software. Only two packages, Framework and Dunsplus, received three-star ratings. Six packages, including Symphony and Goldengate from Cullinet Software Inc. (Westwood, MA), received two-star ratings.

The speed of the packages differed widely. For example, the time it took

ALL INTEGRATED PROGRAMS ARE NOT EQUAL



Software Digest's Segel, seen here with a tester, says users prefer better performance over standard commands in integrated packages.

Software Digest (Wynwood, PA), recently tested 15 integrated-function programs for IBM-compatible micros. In the study, published in the December 1984 issue, Framework from Ashton-Tate (Culver City, CA) and Dunsplus from Dunsplus (Wilton, CT)

tied for the top ranking.

Enable, from a startup outfit called The Software Group (Ballston Lake, NY), took second place. Symphony from Lotus Development Corp. (Cambridge, MA) shared third place with Smart Software Systems (\$895) from

NEWS & COMMENT

for a package to load a test-spreadsheet file ranged from 16 seconds (Corporate MBA, a \$695 package from Context Management Systems, Torrance, CA) to 146 seconds (Aura, a \$595 package from BPI Systems Inc., Austin, TX). To do the same task, Symphony took 21.2 seconds; Framework, 33.2; Enable, 33.2; and Goldengate, 46.6. All testers were equipped with personal computers sporting 512 Kbytes of internal memory and hard disks.

Segel says his is the only outfit to test programs with users who don't have experience on packages similar to the program being tested. Such experience, Segel claims, would skew a user's judgment. Six novice and six experienced testers were selected to rate the integrated packages for ease of learning, ease of use, and error handling. Experts rated the packages for performance and versatility. For more information call (215) 649-7000.

TALK IS CHEAP

The day when an executive can dictate a letter to a word processor that understands everything he or she says is still several years away. Now, most voice-recognition devices are used outside the office for industrial tasks that depend on a few commands. At up to \$40,000, such devices are cost-effective for workers who input information into a computer while their hands are busy. However, these products are becoming smarter and cheaper. With some models available for under \$5,000, voice-recognition technology will soon find its place in the office, say manufacturers.

Votan's VTR 6000 Voice Terminal, priced at \$3,950, is a potential office machine. A stand-alone subsystem with its own chassis, power supply, microphone, and speaker, the VTR 6000 is connectable to any

computer supporting an RS-232C serial port, has a vocabulary of 64 utterances in any language, and offers speaker-dependent voice recognition. The Fremont, CA-based manufacturer also sells a plug-in voice card for the IBM Personal Computer for \$2,450.

The VTR 6000 is being used by General Electric Corp. (Fairfield, CT), for integrated-circuit inspection, by some airlines for in-flight data access, and by organ-transplant centers for matching donated organs with patients. When, for example, a doctor receives a donated organ and phones a transplant center, the VTR 6000 at the other end of the line asks for pertinent information, checks a database to find an appropriate match, and relays the information to the waiting physician.



Votan's plug-in card for micros allows packaged software to be updated by voice input.

The Model 4000 from Verbex (Bedford, MA), is a speaker-dependent device priced at \$4,900 that has a 100-word vocabulary. More powerful and considerably more expensive at between \$18,000 and \$40,000 is Verbex' Model 3000, which has a vocabulary of 360 words. Model 3000 is used at a General Electric parts-distribution center in New Concord, OH, for inputting data about parts shipments. With the new system, GE workers spend less time verbally inputting information than they did when they filled out reports.

Kurzweil Applied Intelligence of

Waltham, MA, plans to announce a device with a 1,000-word vocabulary this spring for between \$6,000 and \$8,000. The device will be based on discrete speech-recognition technology, which requires users to pause for a quarter-second between utterances. Devices like the Verbex Model 3000 require no such pause, but they have more limited vocabularies.

Can a 10,000-word device be far behind? "Watch this fall," suggests Bob Joseph, marketing director for Kurzweil.

—Anita Micossi

HONEYWELL STUDIES OA

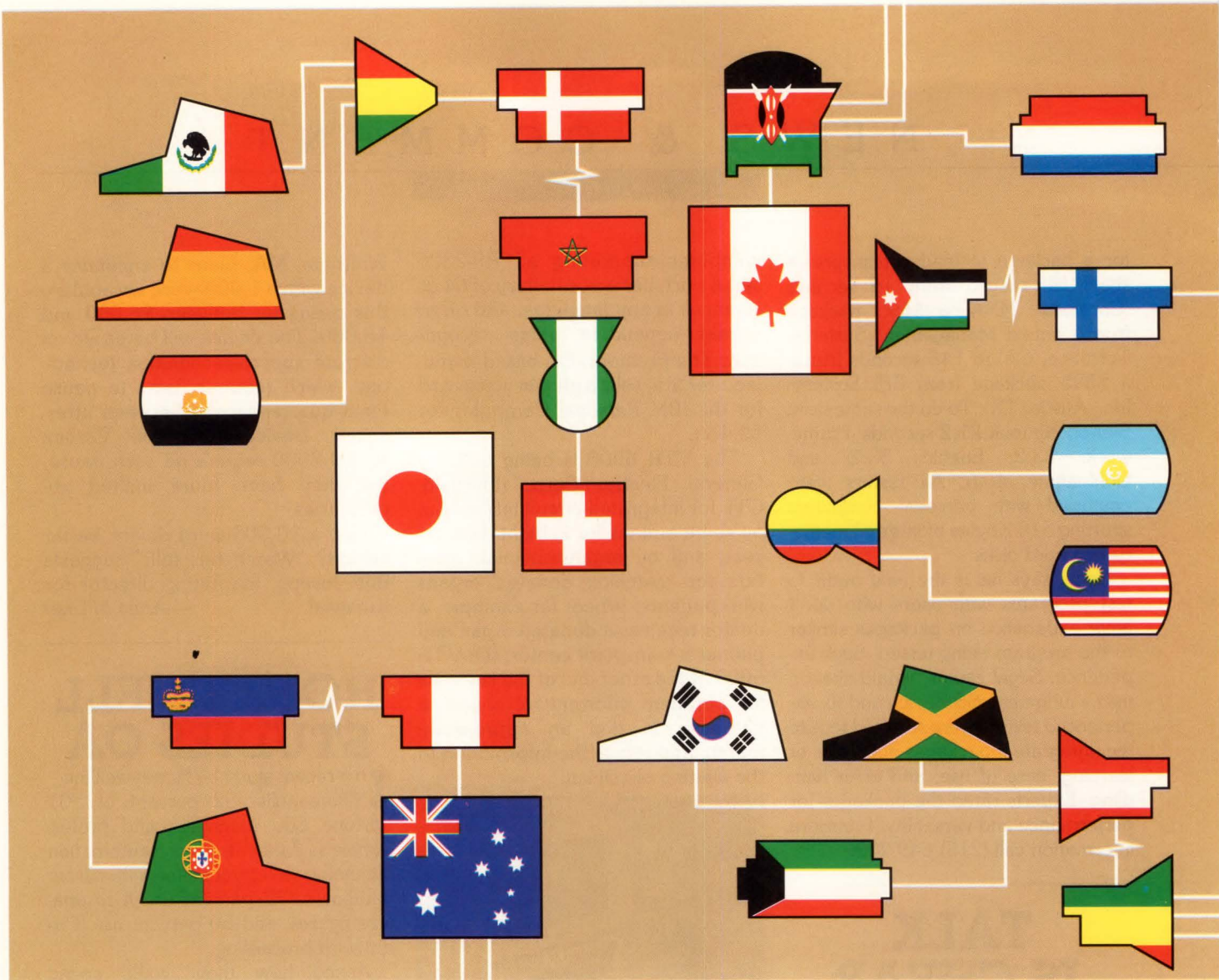
In a recent study by Honeywell Inc., Minneapolis, 82 percent of 701 Fortune 500 managers and professionals said they use office-automation technology to extract information from databases, 73 percent use it to analyze figures, and 50 percent use it to do word processing.

Asked how they would spend \$10,000 to increase their personal productivity, 65 percent of the respondents said they would buy computer hardware or software. Only 13 percent said they would add staff.

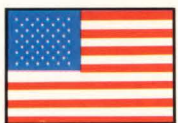
Although about 20 percent of the respondents said they rarely or never use terminals, personal computers, or word processors, 70 percent believe this equipment is very useful. However, less than 40 percent of those surveyed rate electronic mail, electronic-message centers, and teleconferencing facilities as very useful. About one in four of the high-level managers surveyed reported he or she does not have access to computers.

The survey was sponsored by Honeywell Technalysis, a research program funded by the vendor to examine technology's impact on business and residential users, and was conducted by Public Attitudes of New York.

(News continued on page 32)



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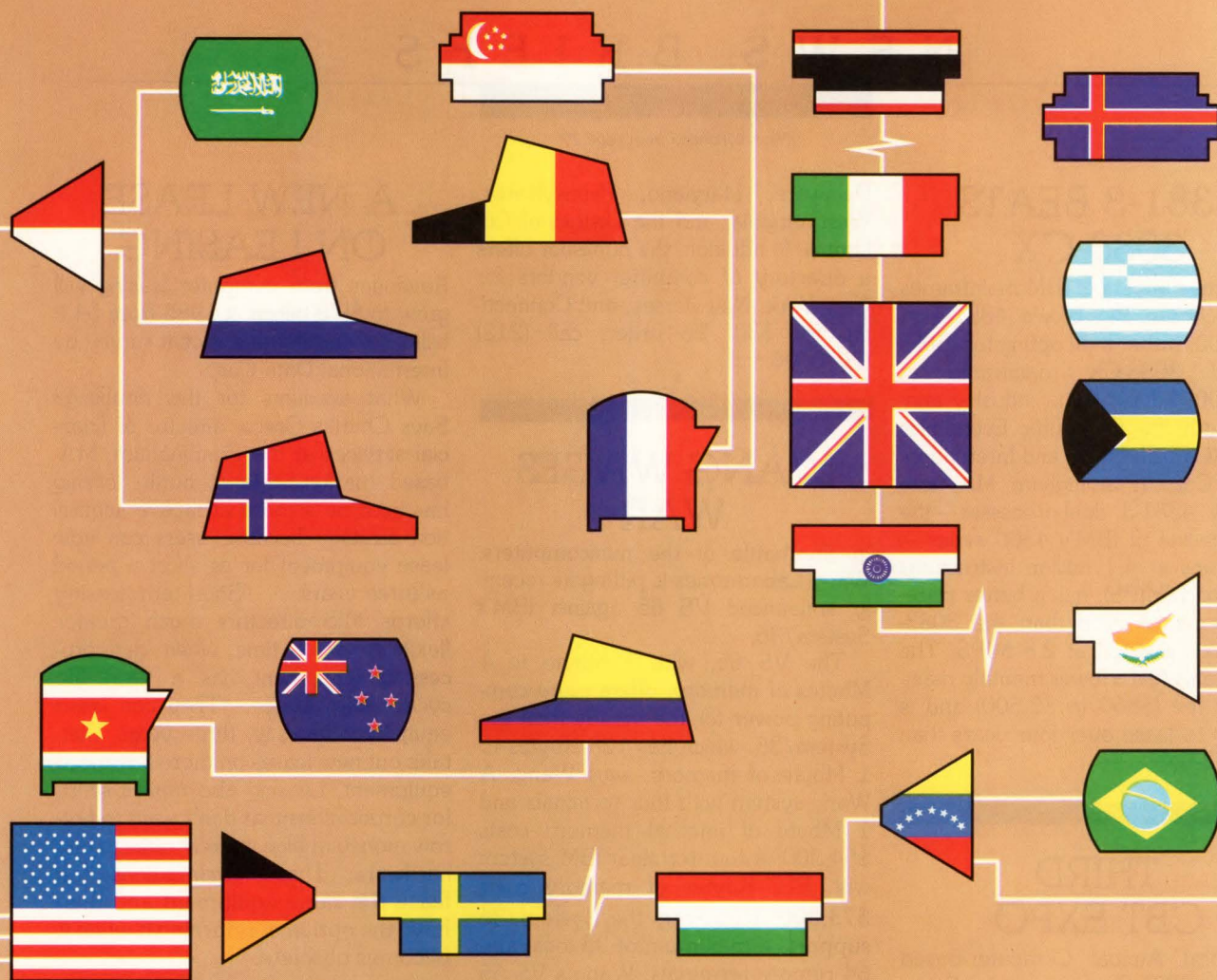
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NEWS BRIEFS

(News continued from page 29)

4381-3 BEATS 3083-CX

Prospective buyers of IBM mainframes should choose Big Blue's 4381-3 at \$825,000, rather than opting for IBM's high-end 3083-CX mainframe at \$830,000, advise some industry analysts. Both the Computer Economics Report (Carlsbad, CA) and International Data Corp. (Framingham, MA) note that the 4381-3 dual-processor—the top-of-the-line of IBM's 4300 series—which runs at 4.1 million instructions per second (MIPS), has a better price-to-performance ratio than the 3083-CX, which is rated at 2.8 MIPS. The 4381-3 also has a lower monthly maintenance fee (\$860 to \$2,500) and is cheaper to lease over four years than the 3083-CX.

THIRD CBT EXPO

The Third Annual Computer-Based Training (CBT) Conference and Exposition sponsored by *Data Training* magazine will be held March 17 through 20 at Loew's Anatole Hotel in Dallas. Fifty vendors will exhibit hardware, courseware, and CBT services. Speakers include users and vendors. Fees for the conference are \$400 for three days and \$160 for single days, for those who register before February 22. For information, call (617) 542-0146.

DATA-CENTER DIRECTORIES

The latest computer-installation directories for northeastern states, published by Computer Management Research Inc., are now available. Each costs \$465. The New York Metropolitan edition covers New York, New Jersey, and Connecticut; the New England edition focuses on the New England states; and the Mid-Atlantic edition deals with

Delaware, Maryland, Pennsylvania, West Virginia, and the District of Columbia. In addition, the publisher offers a directory of computer vendors for New York, New Jersey, and Connecticut for \$30. To order, call (212) 683-0606.

WANG WAGES WAR

In the battle of the minicomputers, Wang Laboratories is pitting its recently announced VS 65 against IBM's System/36.

The VS 65, with 1 Mbyte to 4 Mbytes of memory, offers more computing power for the money than the System/36, which has 128 Kbytes to 1 Mbyte of memory, says Wang. A Wang system with four terminals and 1 Mbyte of internal memory costs \$54,300; a four-terminal IBM system with 512 Kbytes of memory costs \$73,000. However, the System/36 supports a maximum of 36 local and 64 remote terminals; Wang's VS 65 supports only up to 30 local and 16 remote terminals.

For users with plans to upgrade, Wang promises complete software compatibility with upper-end VS 85, VS 100, and VS 300 systems. According to a Wang spokesman, conversion problems will make it difficult for System/36 users to upgrade to, say, IBM's low-end 4300 Series mainframes.

Users who want to hook IBM Personal Computers into the Wang VS 65 have another cost to consider. Each PC requires an emulation board, which costs about \$1,500, so it can act as a Wang workstation. Further, at press time, Wang did not have a way to transfer files between the PC and the VS 65. Wang promises quick action to correct this deficiency, but it will still cost about \$2,000 to hook one IBM PC to a Wang minicomputer. The spokesman hinted action on prices, too.

A NEW LEASE ON LEASING

Revenues from computer leasing will grow to \$9.8 billion in 1985 from \$4.6 billion, according to a recent survey by International Data Corp.

What accounts for this doubling? Says Charles Greco, director of financial services at the Framingham, MA-based market-research outfit, leasing has become a more attractive acquisition strategy because users can now lease equipment for as short a period as three years. "Short-term leasing affords MIS directors much greater flexibility at a time when data-processing equipment has a short life cycle," says Greco. "They can lease equipment for, say, three years, then take out new leases on more advanced equipment. Leasing also makes sense for corporations that don't want to borrow money at high interest rates to buy hardware. These organizations can lease the same equipment and then have the option of returning it when it becomes obsolete."

PROGRAMMING WITH STYLE

Style, a fourth-generation language introduced last summer by Foothill Research Inc., is the Milpitas, CA-based manufacturer's bid for the language of choice for 32-bit mainframes and minis.

Foothill, claims Don Johnson, product manager, "has kept a low profile to ensure that Style is a sound product." Although Style is currently available only for Data General Corp.'s MV Series computers, Johnson says Foothill will beta test the product on the DEC VAX line of minicomputers this spring. The manufacturer plans to introduce an IBM-mainframe-compatible version before the end of this year.

Prices for Style range from \$23,000 to \$45,000. For information, call (408) 945-0450.

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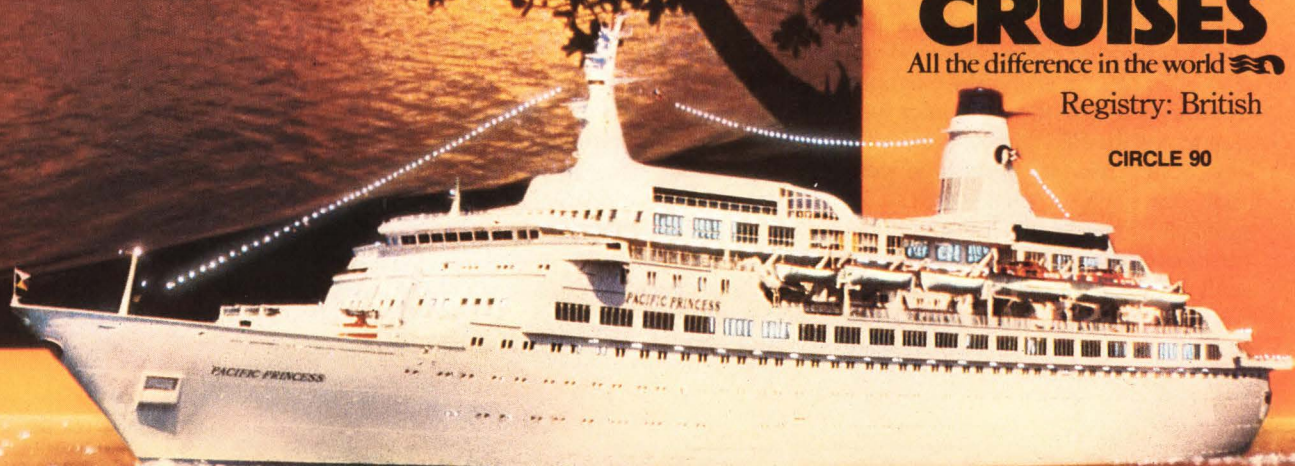
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CIRCLE 90



PERSONAL COMPUTING

by Susan Foster Bryant, Microsystems Editor



TALK NATURALLY

Did you ever feel like telling your personal computer exactly what you thought of it? With the advent of natural-language interfaces, that day may be just around the corner.

What is a natural language? Most programs require that the user key in exact program commands, file names, and data. Natural language lets users enter commands in conversational English, the same way they would make a request of any co-worker or subordinate.

Another advantage of natural languages is that the same command can be worded several ways. For example, suppose you tell the computer you want to see the BiPi Division's sales for 1984, but accidentally mistype your input, use slang, or omit words. Conventional languages won't respond, but with a natural language, your computer won't be confused by errors. In other words, you don't have to speak in the logic of an algorithm to communicate

with this software. Natural-language programs take what you input and translate it into computer code. The computer will then execute your instructions.

A limited number of natural-language programs are available for personal computers. But before long the market will be flooded with software—particularly as mainframe-software vendors (such as Artificial Intelligence, Waltham, MA, with its Intellect program) squeeze natural languages into personal-computer-sized bites.

Until recently, the alternatives to natural languages were computer languages such as Basic, Cobol, and Fortran. These highly-structured languages are wonderful mediums for expressing algorithms and data structures that the computer can understand. The only problem is that most managers and their employees don't "speak" these languages.

And what about managers weary of

passing requests for reports to the data-processing department, which is already overloaded with requests? Both dp and management will welcome any program that can ease end-user access to corporate databases. Natural languages just may be the answer.

Software manufacturers have been working on natural-language software to respond to these needs. Their products have made databases more accessible by allowing users to simplify user/personal-computer communications. Most natural-language systems use knowledge of syntax and semantics to carry out simple tasks. These systems need knowledge bases that contain basic rules and information on the English language, handling many different queries and grasping incomplete and ungrammatical sentences at the database front end. Less-complicated natural-language systems recognize only key words and phrases.

Natural-language systems have their

(Continued on page 36)

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(Continued from page 34)

limitations. For example, each package can only comprehend questions about a specific, limited field of knowledge. So a natural-language system for sales information is unable to answer questions about employee health benefits.

Another problem with natural languages, particularly those for micros, is the amount of memory these systems eat up. The vagaries and nuances of the English language necessitate very sophisticated products requiring much memory space and processor time.

Because of the relatively limited memory capacity of many corporate personal computers, software manufacturers must struggle to develop natural-language systems that can respond intelligently to most queries without overburdening the user with too many requests for clarification. If the user has to supply the computer with an abundance of information, the natural-language system will become a productivity detractor.

The amount of "clarification dialogue" that must go into the user/computer interaction depends on the amount of knowledge built into the system itself. This built-in knowledge will also determine whether the natural language is generic or specialized. Generic natural languages have broad capabilities. Any database can work with them, as long as the natural-language system can recognize the database management system. Some generic programs include Clout from Microrim Inc. (Bellevue, WA), Savvy from Excalibur Technologies Corp. (Albuquerque, NM), Intellect from Artificial Intelligence Corp. (Waltham, MA), and Themis from Frey Associates (Amherst, NH).

Clout version 1.0 from Microrim was introduced last April as an add-on to

the company's R:Base database management system. Clout version 2.0, introduced last October, gives users access to most popular software packages, allowing analysis of data from R:Base, dBase II, PFS:File, and Lotus 1-2-3—in his or her own words.

Clout's conversational mode of interaction eliminates the need to learn or remember burdensome command syntax. Instead, users may ask for files using slang or abbreviations. Users can also adapt Clout to their own applications by adding up to 500 of their favorite phrases, formulas, and synonyms to Clout's 300-word vocabulary. And Clout checks for spelling errors and recognizes words regardless of minor distinctions, such as upper- or lower-case and singular or plural form.

To access products other than R:Base, Clout uses a feature called Filegateway, which translates software files into a database format that Clout can understand. Menus lead the user through the conversion process, asking for the type and name of file to be translated plus the name of the new data base. Filegateway creates new files during the conversion while maintaining the integrity of the original files.

Clout also lets users combine data from several different software programs without having to reinput data. It cross-references information from the different files so the user doesn't have to know which particular file the data are in. Clout automatically scans up to 490 files and will join as many as five files to answer one question. Clout costs \$249.

Artificial Intelligence Corp.'s Intellect, at \$69,500, is clearly in a different league. But it's worth taking a quick look at Intellect because its personal-

computer version will soon be available. The mainframe version of Intellect is the only natural-language system that can interface with major databases, graphics systems, and statistical-analysis tools. It uses several sources of information to analyze user queries: two lexicons, coded rules of grammar, programmed knowledge of the database structure and database information, and assistance from the users themselves.

Although Savvy from Excalibur is less sophisticated than Intellect, it bears scrutiny. For personal computers, this database interface, which costs \$395, works with pattern-matching algorithms, has a large vocabulary, and lets users import and export files from different databases, operate them on the Savvy system, and interface them with dBaseII.

Savvy uses the adaptive pattern-recognition processing technique. When queried, the program performs translations from English-language questions to the actual memory address. This technique allows the user flexibility for misspellings and inexact wording.

Naturallink from Texas Instruments, Dallas, while not exactly a generic or specialized system, is a natural-language interface to the Dow Jones News/Retrieval database. With Naturallink, the computer creates a natural language for the user to understand. It presents the user with a windowed screen. Each window contains words that make up a portion of the whole query. The user selects one of the options, and based on his or her choice, the program displays another set of options for selection. The program then builds a query and displays it as the user moves through the various window options. Naturallink costs \$150.

With natural-language products just beginning to hit the market, most managers will want to know: What problems do I have that natural language can solve? How do these products function in the corporate world? In my next column I will detail how the Security Pacific National Bank of Los Angeles found answers to these questions. □

Current Query Context

are there any poor performers
rank them by salary

NAME	salary	IQTR	IQTRP
LEE	\$25,500.00	\$243,000.00	\$150,000.00
ADAMS	\$25,500.00	\$190,000.00	\$80,000.00
ALLISON	\$27,000.00	\$174,000.00	\$200,000.00
FERRIS	\$27,000.00	\$95,000.00	\$150,000.00
CHU	\$29,700.00	\$235,000.00	\$275,000.00
LAWREN	\$29,800.00	\$295,000.00	\$325,000.00
LAKE	\$30,000.00	\$95,000.00	\$200,000.00
BERRY	\$31,000.00	\$143,000.00	\$150,000.00
WALSH	\$33,000.00	\$143,000.00	\$200,000.00
BOSLEY	\$30,000.00	\$143,000.00	\$200,000.00
JAMES	\$30,000.00	\$170,000.00	\$200,000.00

Enter query or ESC to return to main menu.
R)

Current Query Context

list the salespeople with salary greater than average
which of those are in california
are there any poor performers

Did not understand: poor performers
Please enter a synonym or change spelling.
R:salespeople with sales less than plan

Do you want to make this a permanent definition? (Y/N)

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STRICTLY SOFTWARE

by David Kull, Software Editor

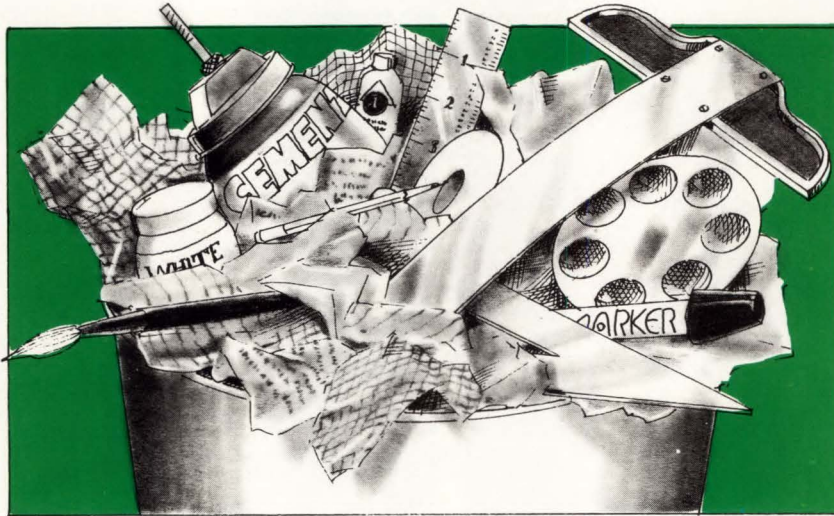


Illustration by Dan Culhane

TOOLING UP FOR DESIGN

The analysis-and-design phase of a software project sets the goal and maps the route to it. If mistakes are made early on, they can be devil a project to the end—slowing its development, leading to incorrect coding, requiring continual retracing of steps, and, in the worst case, resulting in a system that doesn't work as intended and is difficult to maintain.

Software designers begin analysis and design by working with potential users of a new system to identify the tasks the system must perform. The designers then devise a plan to produce a system that meets users' requirements. That sounds easy enough, but this is the point at which problems often arise. Because users' ambiguous English statements must be translated twice—first by software designers, who shape them into workable plans for systems developers, and then by the systems developers themselves, who transform these plans into syntactically precise computer languages—the re-

sulting paraphrase may not reflect the original intention.

To make the translation more precise, software engineers have been working to create formal approaches to design that provide a framework for interpretation. The aims of these methodologies are to help software designers cover all the essential points in their analyses, and to help them develop designs that are complete, accurate, and easy for systems developers to implement.

Recent research has produced a variety of tools that automate much of the designer's work, enforce a methodology's standards, and ease the translation of plans into programs. Some of the newer tools allow software designers to create diagrams and manage documents—two important functions for converting concepts into specifications. The newest products, which automatically translate design specifications into executable code, allow designers and users to pass their in-

structions directly to the computer. And project-management packages, which help development teams allocate resources and plot their work schedules, make the entire design life cycle more efficient. These applications are integrated in some packages.

Action Diagrammer, an entry-level microcomputer package from Database Design Inc., runs on the IBM Personal Computer and, as its name suggests, automates the production of action diagrams. These allow the software designer to move from the general to the particular when identifying and explaining a system's components. The designer builds an action diagram by inserting increasing levels of detail into a list of statements that describe the system in broad terms. Vertical brackets enclosing listed statements of operations represent program modules and indicate the system's basic structure. By adding modules and nesting brackets to embellish earlier ideas, the designer can move from a system sketch

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to executable code. At the most detailed level, Action Diagrammer generates control statements for a variety of third and fourth-generation languages.

At the Denver office of Coopers & Lybrand, the Cleveland-based Big Eight accounting firm, Barbara Graham, manager of information-systems consulting, uses Action Diagrammer in strategic planning for systems and in analyzing and describing organizational structures. She finds the package's ability to "expand and contract" levels of

detail particularly useful when she explains a system's structure to users. "A designer can choose the level of detail appropriate to his or her audience," says Graham. "A designer might use more general information to formulate policy with top executives, then introduce additional details when discussing implementation with managers."

Somewhat more complex than Action Diagrammer are tools that are built around data-flow diagrams—the basic elements of structured design meth-

odologies—which help users and designers visualize the systems they are building. Data-flow diagrams use boxes, circles, and other symbols to represent a system's processes and data files. Arrows connecting the symbols show how the data flow among them. Like action diagrams, data-flow diagrams can depict a system at various levels of detail. At the highest level, for example, an order entry might be shown as one of the procedures in a

(Continued on page 44)

DESIGN AIDS

Vendor	Package	Requirements	Price	Circle
Adpac Computing Languages (415) 974-6699	Design	IBM mainframes	\$19,500 \$2,000 per year renewal	517
Advanced Tech Int'l. (212) 869-8686	Super PDL	VAX 11/780	\$15,000	518
AGS Management Syst. (215) 265-1550	SDM/Structured SDM/70 ISDM	Methodology Methodology IBM PC	\$40,000 \$40,000 \$10,000	519
Arthur Andersen (312) 580-0069	Honeywell Middleware and Dictionary Systems Method/1	Honeywell DPS 8, DPS 6	\$30,000	520
	Design/1	Methodology with IBM PC component IBM PC and PC XT	\$50,000 \$15,000	
M. Bryce & Assoc. (513) 761-8400	Pride-ASDM	Wide range of minis and mainframes	\$80,000	521
	Pride-SDM PMC ²	Methodology Wide range of minis and mainframes	\$30,000 \$35,000 to \$45,000	
Cara (312) 968-8100	System Development Standards	Methodology	\$41,500	522
Database Design (313) 971-5363	Action Diagrammer Data Designer	IBM PC	\$495	523
		IBM mainframes under VM/CMS, VS1, VS2, or MVS; DEC VAX	\$3,000	
	Hierarchical Design Aid Information Planner	Same systems	\$3,000 \$25,000	
Deltacom (215) 355-4758	Prism	IBM PC; IBM mainframes under TSO, OS, or VS	\$40,000 to \$125,000 for Prism; \$20,000 for PC Workstation	524
ETA Int'l. (617) 527-8200	DBDS	IBM mainframes	\$28,000	525
Four-Phase Syst. (408) 864-4211	Maestro	Maestro workstation	\$197,000 for 24-workstation configuration	526
Higher Order Software (617) 661-8900	Use.It	DEC VAX	\$92,000	527
Holland Syst. (313) 995-9595	Logical Database Design	IBM mainframes and PCMs	\$45,000	528



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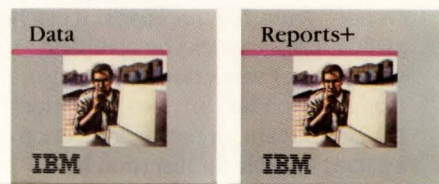
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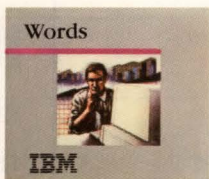
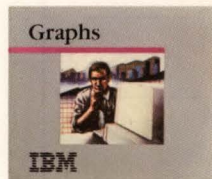
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CIRCLE 25

IBM

Personal Computer Software

(Continued from page 40)

distribution system. The next-lower level would show the procedures that comprise order entry and the flow of information among them.

Detailed, written descriptions of processes, data, and their relationships are the specifications that the programmers—or code generators—work from. These must be maintained as separate documentation, which, when done manually, requires a prodigious clerical effort. Most software designers would be grateful if the design tools built around data-flow diagrams provided only graphic support, relieving them from the tedious task of drawing diagrams by hand. But the tools have an even more important function: They manage written documentation and provide some verification of the design's logic.

Design 1, offered by Arthur Andersen & Co. independently or as a component of Method 1, the Big Eight accounting firm's integrated design package, is a personal-computer pack-

age that manages documentation. It features a system dictionary, which cross-references related documentation entries. The package reports on the system-wide impact of design changes, points out processes that have been referenced but not described, and performs other checks on the design's logic. It also allows analysts to develop input forms and report prototypes that simulate how the system will finally operate.

At Browning-Ferris Inc., a nationwide waste-disposal corporation headquartered in Houston, Design 1 was recently used by a development team to design an accounts-receivable, billing, and revenue-reporting system. According to Michael Perroni, project manager, six designers using the tool on three IBM PCs completed the detailed design in about five months. Before, it took twice as many designers seven months to design a comparable system by manually drawing diagrams, using word processors for documentation, and prototyping reports with the organization's

mainframe-based database management system.

Another package, Structure(s), designed by Ken Orr and Associates, creates structured data-flow diagrams and manages detailed documentation on the IBM PC XT, PC AT, and IBM mainframes. The vendor's code generator produces Cobol code from the completed design.

Structure(s)' mainframe version was used recently by a development team and the human-resources department at Pacific Bell in San Francisco to create a personnel-data system. Sus Rondeau, staff manager of personnel-data systems, says Structure(s) helped technically unsophisticated users and beginning analysts to conceptualize their design more fully and to render diagrams more accurately than they could using manual methods. "If the designers gave different data elements the same name, for example, or built in a report without providing for its data, Structure(s) would catch the mistake," she says. The code generator produced

DESIGN AIDS

Vendor	Package	Requirements	Price	Circle
IBM (914) 765-1900	Plancode/I	IBM mainframes under CICS/IMS, VM, TSO, DOS/VS, or OS/VS	Lease \$625 to \$764 per month	529
	Generalized CICS Application Development Architecture	IBM mainframes under CICS, DOS/VS, or OS/VS	\$11,000	
Independent Computer Syst. (602) 866-2600	ICS System Control	Honeywell Level 6, DPS 6/MOD 400	\$10,000 per site	530
Intech (617) 491-7380	Excelerator	IBM PC and PC XT	\$9,500	531
ISDOS (313) 663-6027	PSL/PSA	Wide range of minis and mainframes	\$48,000	532
	PSA-SA	IBM PC and compatibles; DEC Rainbow 100; TRS 80 Model IV	\$3,000 per component	
McDonnell Douglas Automation (314) 232-0232	Stradis DFD Draw	IBM mainframes IBM PC	\$40,000 \$500	533
Management & Computer Svcs. (215) 648-0730	Systemacs	Methodology	\$22,500	534
	Estimacs	IBM PC XT, PC Model 5150 under DOS; Apple II Plus, IIe	\$15,000	
Nastec (313) 353-3300	Case 2000	Nastec workstation	\$15,000	535
	Lifecycle Manager	Same workstation	\$25,000	
	Design Aid	Same workstation	\$950	

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most of the system's program from Structure(s)' requirements definition.

Excelerator, a design tool from Intech that runs on the IBM PC XT, provides graphics for creating data-flow diagrams and diagrams that depict a system's file structures. The package also facilitates the designing of reports and data-entry screens. Documentation is cross-referenced and keyed to the diagrams. By placing the cursor on a diagram symbol and pressing a button, the designer can call up either another diagram that shows the element in greater detail or the associated documentation. The system also produces a variety of reports that helps the designer verify the design's consistency.

Ronald Wormser, senior systems specialist for Du Pont's Biomedical Product Group in Wilmington, DE, used Excelerator to help users understand a new manufacturing resource-planning package his employer was installing. Rather than design a system from the ground up, Wormser used the tool to describe both the existing, pri-

marily manual system and the new package. The technique provided users with "before and after" pictures of the firm's manufacturing system.

The speed and ease with which he can model systems with Excelerator enhances his creativity, says Wormser. Because he is able to experiment with changes in quick succession, he feels better able to refine his ideas—a big plus when he and a user work out ideas together at the IBM PC. "I was used to the scribble-and-erase technique," Wormser says. "With Excelerator, I can complete a design in a fraction of the time it would take to do it manually."

Personal computers are fine when designers communicate one-on-one with users. But they pose a problem when many designers on a large project try to communicate with each other. Because only one designer at a time can use a personal computer, design teams using stand-alone equipment for large projects must either share disks or communicate via local-

area networks. They also need a system for managing design changes and tracking design versions. The Brown-Ferris development team, for example, which shared disks from the Design 1 project, assigned one team member to disk management.

However, there are design tools for multiple users. Maestro, a design-and-development tool from Four-Phase Systems, for example, provides and enforces a structured methodology. It allows an organization to define the elements necessary for various types of documentation. Then it prompts designers to be sure they include all of them. Designers describe their systems with pseudocode—highly formatted English statements that adhere to Maestro's methodology. A menu at the bottom of the screen helps designers formulate the pseudocode. Maestro then produces charts that depict the system. The package also generates much of the third-generation code—in most cases Cobol—needed to make

(Continued on page 48)

DESIGN AIDS

Vendor	Package	Requirements	Price	Circle
National Syst. (313) 996-1969	Trac I	IBM PC; DEC VAX	\$995 to \$3,495 for IBM PC; \$15,000 to \$29,000 for DEC VAX;	536
	Trac II	IBM PC; DEC VAX	\$995 to \$2,495 for IBM PC; \$15,000 to \$24,000 for DEC VAX	
Ken Orr & Assoc. (913) 273-0653	Structure(s)	IBM S/38, IBM mainframes and PCMs	\$16,000; \$21,500 with Structure(s) Code Generator	537
	Structure(s)/PC	IBM PC XT, PC AT	\$1,995	
Quantitative Software Mgt. (703) 790-0055	Slim (Software Lifecycle Model)	DEC 2060 under TOPS-20; HP 85, 86, 87; IBM PC	Lease \$25,000 to \$35,000 per year	538
Shawware (416) 632-6015	SDDA	IBM S/34, S/36	\$1,400 (Canadian)	539
Spectrum Int'l. (213) 417-5150	Spectrum-1 (Project Management)	Methodology	\$30,000 to \$60,000	540
	Spectrum-2	Methodology	\$30,000 to \$60,000	
	Spectrum-3	IBM 43XX and up	\$30,000	
Synerlogic (613) 238-5213	Act/1	IBM mainframes	\$29,500 to \$47,000 (Canadian)	541
Teledyne Brown Engineering (205) 532-1000	Tags	Apollo computer systems	\$105,000 for 8-node workstation network	542
Visible Syst. (617) 369-1800	Visible Analyst	IBM PC, PC XT, PC AT	\$2,000	543

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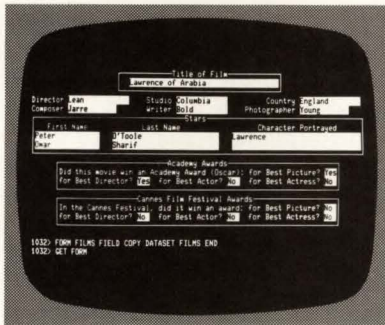
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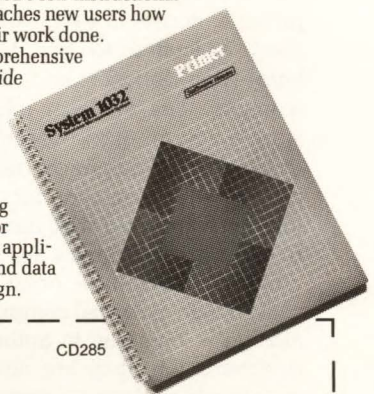
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BIRTH OF A METHOD

The gap between theoretical scientific breakthroughs and their pay-offs in practical applications is usually measured in years. But if a recent discovery by Narendra Karmarkar, a 28-year-old AT&T Bell Laboratories mathematician, delivers on its promise, corporations will be cashing in on an answer to complex-problem solving very soon. Karmarkar's new method offers a way to find the best solution to problems having hundreds or even thousands of variables and perhaps billions of possible answers. Believed by a number of top mathematicians to be 50 times faster than the current method of analysis, Karmarkar's approach will allow operations researchers to tackle analyses that heretofore have been too

complex to handle efficiently.

Karmarkar's method applies to a variety of commercial problems—an airline trying to efficiently coordinate the scheduling of routes, crews, servicing, and refueling; an energy producer managing the movement of oil among ships, storage tanks, and refineries; a distributor seeking the most inexpensive way to deliver products. The linear-programming method currently used to solve these problems employs the *simplex method* developed by George Dantzig in 1947. Linear programming approaches a problem as a multidimensional geometric shape. Each corner of the form represents a solution. An analyst looks along the form's edges for a fast route to the best solution. Karmarkar's tech-

nique, on the other hand, takes a shortcut through the center of the shape.

Corporate decision-makers will not have to grasp the details of Karmarkar's discovery to take advantage of it. A number of relatively easy-to-use decision-support packages based on the simplex method have been available for years. Software developers at AT&T and other software houses are reportedly already writing programs that implement Karmarkar's method. If his approach holds up under testing, these programs will yield solutions to problems that now require 24 hours of computer time—and, therefore, are essentially unsolvable if an answer is needed sooner—in half an hour.

the system run. The original pseudo-code appears as notations embedded in the program.

Maestro runs on Four-Phase machines, which communicate with a variety of mainframes. For larger design projects, access to each working document is limited to two team members—the designer and the project manager. The manager may later release a version of the document to the design team. The project members can call up the document for review on their terminals, but they cannot alter it. Eventually, hard copies are released to other members of the organization.

Although personal-computer design aids go a long way in automating the designer's job, they are no match for mainframe packages designed to build large, complex systems. Pride-ASDM from M. Bryce & Associates is a mainframe package that emphasizes logical design—descriptions of what the user wants a system to do—over physical design—how the tasks are to be done.

Analysis begins with descriptions of desired outputs, such as the frequency of a report, required response times, and the information to be included. Pride-ASDM automatically analyzes these elements, groups related items into subsystems, and determines which data must be input or stored and which procedures performed to produce the desired results. The analyst sees several iterations of design changes, noting the effects each decision has on the system. The automated analysis also checks the design's consistency to guarantee, for example, that it doesn't contain inputs that are never used. Only when the logical design satisfies users does the analyst begin to develop detailed specifications for each subsystem.

Another mainframe package, Act/1 from Synerlogic, is based on a rapid-prototyping method in which the designer can quickly show users how parts of the system will look. These scenarios show the data entry required, what the displays will look like, the se-

quence of inputs and outputs, and other external system characteristics. The designer can rapidly build and modify scenarios because they do not perform actual data processing and because Act/1 controls movement between data-entry forms and reports. The scenarios evolve into development specifications as the designer and users work through iterations.

A third mainframe package, Problem Statement Language/Problem Statement Analyzer (PSL/PSA) from ISDOS, allows designers of detailed systems models to define a large variety of "objects," which, unlike data-flow diagrams, includes both processes and files, and their relationships. The PSA section of the package performs rigorous checks on a design's validity. PSA also creates extensive documentation and automatically checks the consistency of work done by the members of large development teams.

Although PSL can fully describe many kinds of systems, it does have a drawback: It takes experience to master the program's syntax. A new package, PSA-SA, attempts to solve this problem by providing menus and other support for the beginning user. According to Michael Mushet, systems manag-

(Continued on page 142)

Somewhat more complex than a design tool that automates action diagrams are those built around data-flow diagrams.

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by John Seaman, Data Communications Editor

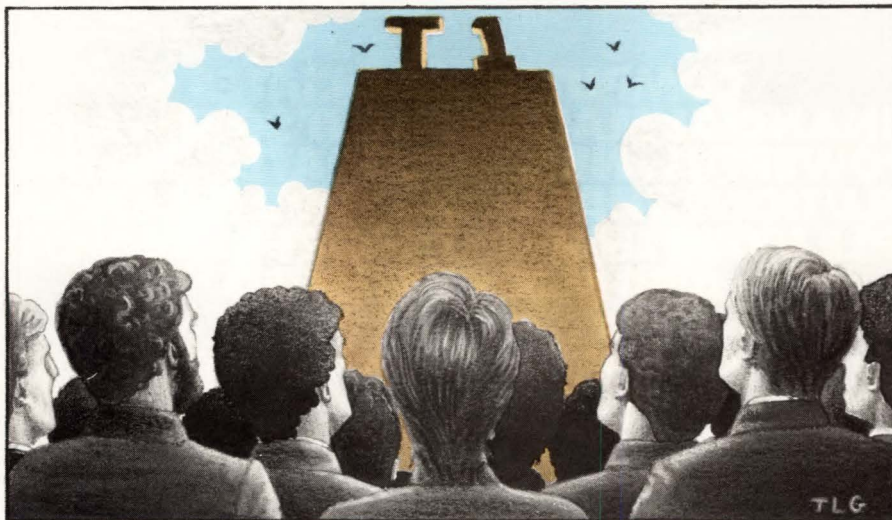


Illustration by Ted Glazer

MORE MUX FOR THE BUCK

The AT&T divestiture has given corporations several attractive options for reducing costs—among them the T-1 carrier. At 1.544 million bits per second (Mbps), a single T-1 link can carry heavy loads of bulk data much more cheaply than many low-bandwidth lines comprising the equivalent in capacity. But the effective use of a T-1 carrier requires a T-1 multiplexer, and to date, users have been disappointed in the capabilities of available T-1 muxes.

T-1 muxes are improving, however, as a number of innovative vendors add intelligence to their products. This intelligence permits network management and control, dynamic bandwidth allocation, digital-speech compression, and circumvention of failed trunk circuits—without additional hardware or separate network-management systems.

At least 27 vendors offer T-1 muxes of various kinds, but very few muxes are rated as being intelligent. Most experts agree that the Link/One from

Timeplex (Woodcliff Lake, NJ), Infostream 1500 and Infostream 2000 from Infotron Systems (Cherry Hill, NJ), and the Megamux line from General Datacomm Industries (Middlebury, CT), qualify as intelligent T-1 muxes. Of the intelligent T-1 muxes, Integrated Digital Network Exchange (IDNX) from Network Equipment Technologies Inc. (NET), Menlo Park, CA, is perhaps the brightest.

With IDNX, NET claims, networks can be designed and built to fit specific business needs. In many cases, IDNX results in significant reductions in total network mileage that save operating costs. At the same time, the many alternate paths IDNX offers increase the network's reliability.

Right now, NET is wrapping up beta-site testing of the IDNX. Beta-site users were reluctant to speak for attribution, but one large west-coast retail chain volunteered to comment on its experience with the IDNX, provided the organization was not identified.

"Our beta-test configuration is rather small," says a spokesperson for the organization. "We have a point-to-point T-1 link between two IDNXs. At each end of the link, we have a Rolm CBX [type of private branch exchange.] Half of our phone calls are going over a T-1 link between the two IDNXs and the other half are transmitted directly on a second T-1 link between the two CBXs. Before we acquired the IDNXs, the entire load was handled by the CBXs. We also have a third T-1 link to pick up the load should either of the primary T-1 links fail," she says.

The retail organization is "muxing" one of the T-1 links to carry additional phone lines. They are testing the advantages of the IDNX against what the CBX could provide alone, with the objective of getting more capacity out of a single line.

The key to the IDNX is NET's proprietary software. Unlike IDNX, most other T-1 muxes include little or no

(Continued on page 54)

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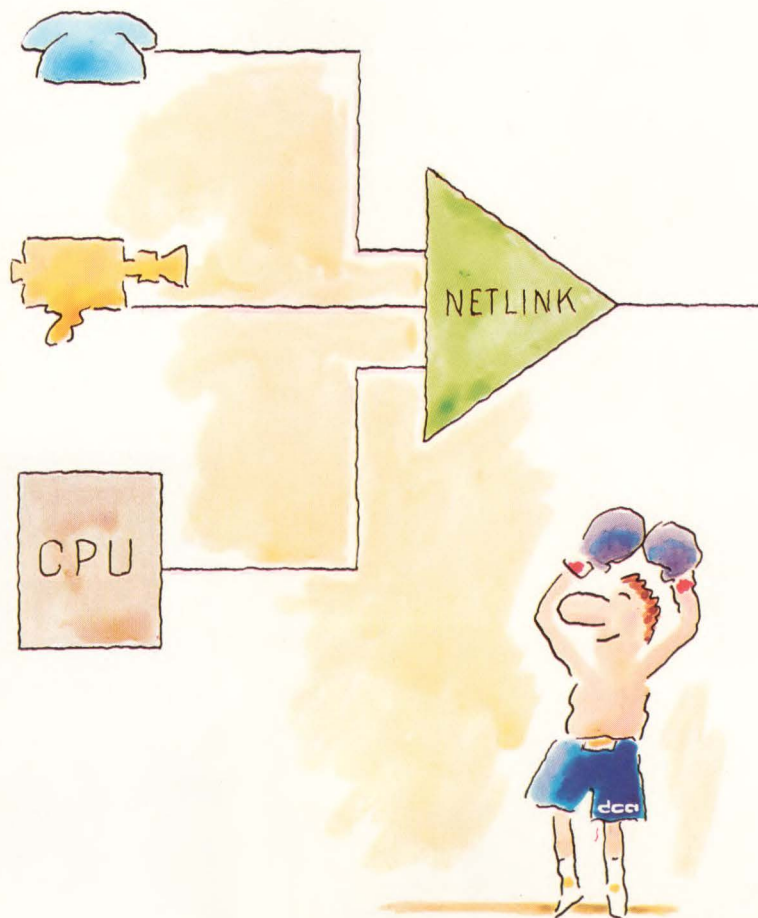
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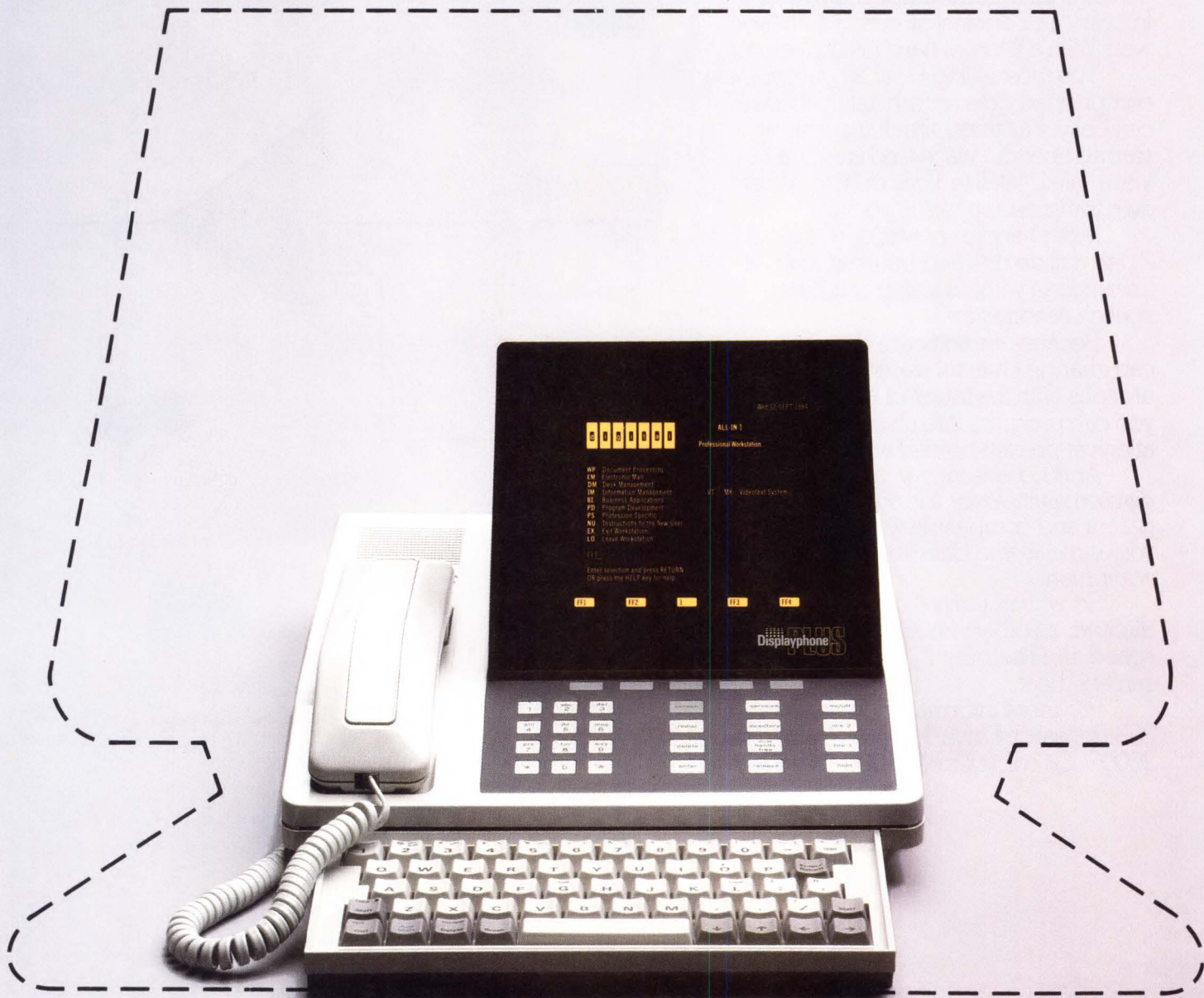
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To find out more about the Displayphone-Plus terminal, call 1-800-328-8800, or write to Northern Telecom Inc., Advanced Communications Terminals Division, P.O. Box 202048, Dallas, TX 75220-9990.



(Continued from page 50)

software, says Anthony Russo, marketing vice president at NET. They depend, instead, on associated hardware, such as PBXs or network-control systems, to accomplish what IDNX can handle by itself. "The IDNX can be used as a stand-alone or in conjunction with a PBX, depending on user requirements," says Russo.

Using dynamic bandwidth allocation, IDNX establishes virtual circuits and automatically selects the optimal path to meet network conditions. In any network with many paths between source and destination, the IDNX routes voice, data, video, and facsimile calls to avoid congested or failed T-1 trunks.

Russo adds that digitized voice input is accepted directly from compatible channel banks or digital PBXs. If the unit's voice-compression feature is not invoked, voice is retained in the industry-standard, 64-Kbps pulse-code modulation format. When needed, IDNX's programmed software invokes speech compression consistent with the class-of-service specified by the network operator.

A single IDNX node may be directly connected to as many as 32 other IDNX nodes. This capability, coupled with advanced network-management software, allows networks of almost any design to be built.

In addition, IDNX is fully compatible with all digital offerings from AT&T (Accunet T1.5, Accunet Reserve 1.5, Skynet, and DDS) and from the Bell operating companies. The new unit is also compatible with digital microwave, fiberoptic, coaxial cable, and satellite.

"With the IDNX," says Russo, "voice, video, and data calls may be set up between similar data ports anywhere in the network on demand." This is particularly useful for high-bandwidth applications such as video teleconferencing or computer-to-computer file transfers. Only the bandwidth needed for a call is allocated to it and only for the duration of the call. Bandwidth does not need to be permanently assigned for infrequently run applications.

A key feature of the IDNX is its ability to provide up to 4:1 speech compression while retaining fidelity close to

T-1 facilities can provide a solid basis for building an integrated backbone network.

the quality users received before the AT&T divestiture. In addition to supporting 64-Kbps pulse code modulation, the standard on AT&T lines, the IDNX offers two compression methods: adaptive differential pulse code modulation and digital speech interpolation, or the re-use of the empty spaces between spoken words. Using both techniques in tandem, the 4:1 rate can be achieved, if necessary. On a per-port basis, a class of service or priority is assigned, which determines whether a particular call will be handled by means of 64-Kbps pulse code modulation, 32-Kbps adaptive differential pulse code modulation, or adaptive pulse code modulation with digital speech interpolation.

Among the other muxes, Timeplex's Link/One T-1 mux is mentioned by a number of experts as a device comparable to the IDNX. Bill Flanagan, spokesman for Timeplex, calls Link/One a very sophisticated network facilities-management device for T-1 networks.

Flanagan would not contrast Link/One with IDNX directly, but he claims that Link/One will accommodate alternate routes and automatically reroute trunks in the network. Analog voice inputs are converted to a digital 32 Kbps, although not to adaptive differential pulse code modulation. Timeplex is planning to upgrade to ADPCM in the near future. Flanagan adds that Link/One, like the IDNX, was designed from the ground up for T-1 muxing.

Flanagan emphasizes that the facilities-management feature is built into each Link/One node's hardware and software. The dedicated microprocessor in each node is accessible locally or from another location. "If you lose an entire node that is normally your control point, you can still control the net-

work from some other point," he says.

Infotron Systems has recently announced its new T-1 multiplexers, Infostream 1500 and Infostream 2000. Beta tests are starting up right now and deliveries will begin in the second quarter of 1985. The muxes are designed for use with hardware from Infotron, particularly the IS4000 matrix switch.

General Datacomm Industries also has plans to move into the intelligent-device arena. John McDonough, product-line manager for time-division multiplexers, says that the Megamux is a field-tested, proven product. "We have installed over 100,000 port connections in the field. Granted, our Megamux is not an intelligent solution—it's strictly a hardware device. And it offers only a single T-1 trunk. But a pair of Megamuxes at a single node can be used to provide alternate routing, and the pair of them will price out at about the same price as a single Link/One," he says.

General Datacomm Industries is beginning to ship its Megamux Plus, a software-configurable, diagnostics-oriented T-1 mux. But users looking for a truly intelligent T-1 mux with at least two T-1 trunks from General Datacomm Industries will have to wait for the Megamux II, sometime later this year or in 1986.

How do the four products price out? A minimum IDNX configuration, with 48 ports and a single T-1 trunk, costs about \$35,000. At the top of the line, a fully equipped node for a data center, with 768 ports, 512 of which can be active at any one time, and the 32 T-1 trunks, costs about \$150,000. From Timeplex, a minimum Link/One configuration, with four ports and a single T-1 trunk, costs about \$10,000. At the top of the line, 200 ports and five T-1 trunks cost about \$100,000. From Infotron, a unit configured for 64 ports costs \$45,000; for 128 ports and more than 30 T-1 trunks, the cost is about \$78,000. Finally, a basic Megamux with a single T-1 trunk from General Datacomm Industries costs \$11,000. A top-of-the-line Megamux serving 54 ports with a single T-1 trunk costs \$34,500. Megamux Plus, scheduled to replace Megamux early this year, will have the same price schedule. □

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CIRCLE 31

FOLLOWING THE LEADERS

by Michael D. Millikin



DEC is betting that its new VAX 8600 mini will mark a return to rosier days.

DEC: HIT OR MIPS WITH VAX 8600

It is a mistake, according to Kenneth H. Olsen, president of Digital Equipment Corp., to gauge DEC's success or failure with a microcomputer yardstick. "You can't measure us by our micros," Olsen says. "That's not what we are. We manufacture large systems. That's what the world needs."

Reaffirming this position last November at the unveiling of the VAX 8600, DEC's new high-end minicomputer, Olsen said, "We have little to contribute in the field of personal computers," and added that "micros are cheap, short-lived, and not very accurate." On the other hand, the VAX 8600—which Olsen calls a minicomputer to beat all minis—is just the kind of product that carried DEC to its status as the world's second-largest manufacturer of computers.

After a brief period of corporate confusion marked by a 73 percent drop in earnings in the first quarter of last year and the failure of DEC's Rainbow per-

sonal computer, the Maynard, MA-based vendor has returned to its roots—a solid line of minicomputers built on the same architecture (VAX) and software system (VMS). DEC is also pushing use of multi-processor setups (VAXclusters) to provide heavy-duty computational power, and has promised to hook its products together via the Ethernet local-area-network scheme. Clustering was introduced in 1983 and has proved to be popular. DEC has installed more than 1,500 clustered configurations—more than 1,000 in 1983 alone.

DEC's earnings slumped a year ago, DEC executives insist, because order processing was snarled, shipments of disk drives were delayed, and micro sales were lower than expected. Since then, DEC's corporate structure has been centralized: The 38 entrepreneurial units that once comprised a more loosely organized corporation have been restructured into three Area Management Centers, which are responsi-

ble for profits, losses, and domestic sales.

DEC's management shake-up (11 out of 24 vice presidents have departed since 1982) seems to have helped, offsetting the late arrival of the VAX 8600. At the end of the first fiscal 1985 quarter, DEC's earnings jumped 41 percent from those of the first quarter of 1984. The computer manufacturer had a pretax profit margin of 6.9 percent for the quarter—a figure closer to margins achieved during DEC's halcyon days. DEC's revenue from equipment sales increased 49 percent in the same quarter, a figure DEC executives expect to increase now that the VAX 8600 has been released.

Almost a third of DEC's total operating income is derived from service, however, and the vendor is positioned very well in that arena. According to a recent survey by International Data Corp., Framingham, MA, users rank DEC's field service as the best in the business.

(Continued on page 58)

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(Continued from page 58)

Service revenues increased 25 percent in 1984. To keep that segment of its balance sheet growing, DEC is branching out into third-party service—a move necessary to counter service-revenue losses if users' interest in mainframes and minis wanes, according to the Association of Field Service Managers (AFSM), Ft. Myers, FL. The AFSM predicts that DEC will become a full integrated-service provider and will even service competitive products that are networked with its own.

The VAX 8600, released two years behind schedule, represents part of DEC's effort to keep its 30,000 VAX users happy. Although this new minicomputer, based to a large extent on VAX engineering, is not a technological coup, analysts agree that its arrival will give DEC time to work on a follow-up product. More than twice as fast as DEC's next-most powerful VAX and with clustering power yielding up to 65 million instructions per second (MIPS), the 8600 is unmatched by other superminis, according to Peter Lowber, an analyst with the Boston-based Yankee Group. Lowber believes DEC's tighter management structure, networking strengths, and extensive product line will make the manufacturer a formidable force in 1985.

Matching the 8600's performance standard is not an insurmountable task for DEC's competitors. DEC's competition has expected the 8600 for years. In fact, one week before DEC finally unveiled the new VAX, which runs at 4.2 MIPS, IBM announced a dual-processor version of its 4381 supermini that packs a 4.6-MIPS punch. Big Blue designed the new device so that users of the single-processor version of the 4381 could upgrade to a dual-processor model. Users of the DEC

DEC SUES C. ITOH

A burst of legal activity by Digital Equipment Corp. has sounded a warning that the number-two computer maker will not stand by while competitors copy DEC products.

"We have no problem with others emulating our products," says Joseph Codispoti, a DEC spokesman. "We do have a problem with copying."

DEC filed suit recently against C. Itoh Electronics of Japan and its U.S. subsidiaries in federal district court in Newark, N.J. DEC is charging the Japanese manufacturer with trademark violation, claiming C. Itoh copied the appearance of DEC's wedge-shaped VT 220 terminal and keyboard. According to Codispoti, C. Itoh's CIT 220+, promoted with the slogan "We've got DEC's number plus a whole lot more," violates a design that is "distinctly and uniquely Digital." DEC is also claiming the Japanese computer maker

violated DEC copyrights by duplicating its instruction manuals and video-screen instructions.

In the British arena, DEC has taken aim at several other manufacturers, sending letters warning of copyright violations of DEC's VT 220 keyboard to Lear Siegler of Santa Monica, CA; Televideo Systems Inc. of San Jose, CA; Zentec, of Santa Clara, CA; Cifer, a British manufacturer; and DDT, which sells Zentec products in Great Britain.

Due to a greater number of legal options in Great Britain, DEC filed an earlier complaint against C. Itoh in that country, says Codispoti. It resulted in C. Itoh agreeing to halt its distribution of the terminals in Great Britain.

Robert Cowan, vice president of marketing for C. Itoh Electronics Inc. of Los Angeles has declined to comment on the DEC lawsuit.

—Lee Keough

VAX 11/780, on the other hand, do not have a similar option to acquire the power of the 8600. Rather, DEC is taking trade-ins of VAX 11/780s toward the 8600. Still, DEC executives say, computers do not live by MIPS alone. "We don't want to talk only about MIPS," says Shields. "What is important is the tasks the 8600 can perform in a given set of time." But DEC's fiercest competitors, Data General Corp., Westboro, MA, and Prime Computer Inc., Natick, MA, are talking MIPS. Data General's MV/1000 runs at 2.5 MIPS, but the vendor asserts that its product's price-to-MIPS ratio is better than DEC's. Data General is also rumored to be working on a single-processor device, code-named "Hawk," that will run at 5 MIPS. Not to be outdone, Prime has declared a goal of 10 MIPS by the end of the decade.

Within the range of products based on the VAX architecture and VMS system, DEC can provide computing power of between .3 MIPS in a desktop computer all the way up to 65 MIPS in a cluster of 8600s. With DECnet networking software, a mini-

computer system can be designed in any number of permutations. (DEC boasts that it already has installed more than 18,000 network nodes—more, it claims, than any other minicomputer manufacturer.)

At the DECworld '85 exhibit in Boston, DEC hooked together its entire product line—from VT200 terminals to a cluster of 8600 minis—and used a satellite dish to link the Boston network to one in California. DEC also made good on its commitment to create application environments for strategic industries: manufacturing, finance, research, and education.

DEC's new-found single-minded devotion to its old-line philosophy has inspired some analysts to reconsider previous doubts. "Fourteen months ago, I called DEC a second-tier computer company," says Adolf F. "Sonny" Monosson, publisher of a DEC-specific newsletter. "Now I like to call DEC the number-one computer company that only happens to be number two." □

Michael D. Millikin is a writer and consultant based in Boston.

MIPS MEASURED Vendor Device MIPS

IBM	4381	4.6
DEC	8600	4.2
Data General	...MV/1000	...2.5



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OFFICE AUTOMATION

by Miriam Lacob



Illustration by Ted Glazer

SINGLE-SITE SURVIVORS

It may take a considerably smaller investment to automate a single-site office than it does a Fortune 1,000 corporation, but that doesn't mean the same risks and long-term concerns don't apply. Like their Fortune 1,000 compatriots, single-site OA planners don't purchase equipment for the short haul. With less money to spend, single-site planners have little room for error. They must do it right the first time around—and that means ensuring that the system will be expandable and serviceable five or 10 years down the line.

With these problems in mind, *Computer Decisions* launched an annual survey of OA experts to assess the five-year futures of well-known vendors. In this year's survey, 75 members of the Office Automation Society International were asked to predict which of 39 vendors would still be around in five years and to rate these vendors separately as suppliers to Fortune 1,000 corporations and to single-site organiza-

tions. The January 15th issue lists the respondents' views on Fortune 1,000 suppliers. Here are the results of the single-site survey.

Respondents were asked to assign a rating of "sure survivor," "likely survivor," or "not likely to survive" to each vendor. A "weight" of 10 was assigned to each "sure-survivor" vote, 6 to each "likely-survivor" vote, and 2 to each "not-likely" vote. Because 32 experts responded to the single-site survey, the highest possible score any vendor could attain was 320.

IBM, which clinched first place in the Fortune 1,000 survey, tied Wang Laboratories for first place in the single-site survey. IBM edged out Wang on "sure-survivor" votes, with 25 votes to Wang's 23. Apple Computer, which was voted number one in last year's single-site survey, slipped back to its 1982 third-place position.

Although IBM regained first place, some OA experts say this lead does not signal Big Blue's unqualified success

with single-site buyers. A major problem, they say, is the incompatibility of IBM's upgraded products with older systems.

Unseated by IBM and Wang, Apple Computer fared better in the single-site survey than in the Fortune 1,000 survey, in which it dropped five places to 12th position. Apple is followed closely by Hewlett-Packard, which has made steady progress in the single-site survey, moving from 11th place to third place in three years.

Apple is not the only manufacturer that lost ground in the 1984 survey. Digital Equipment Corp. (DEC) dropped from third place to sixth place. Some analysts ascribe DEC's poor showing to a general perception that the No. 2 computer maker is more committed to minicomputers than it is to personal computers.

Like DEC, Tandy Corp. (Radio Shack) has lost some ground to Hewlett-Packard. Dropping to ninth place

(Continued on page 64)

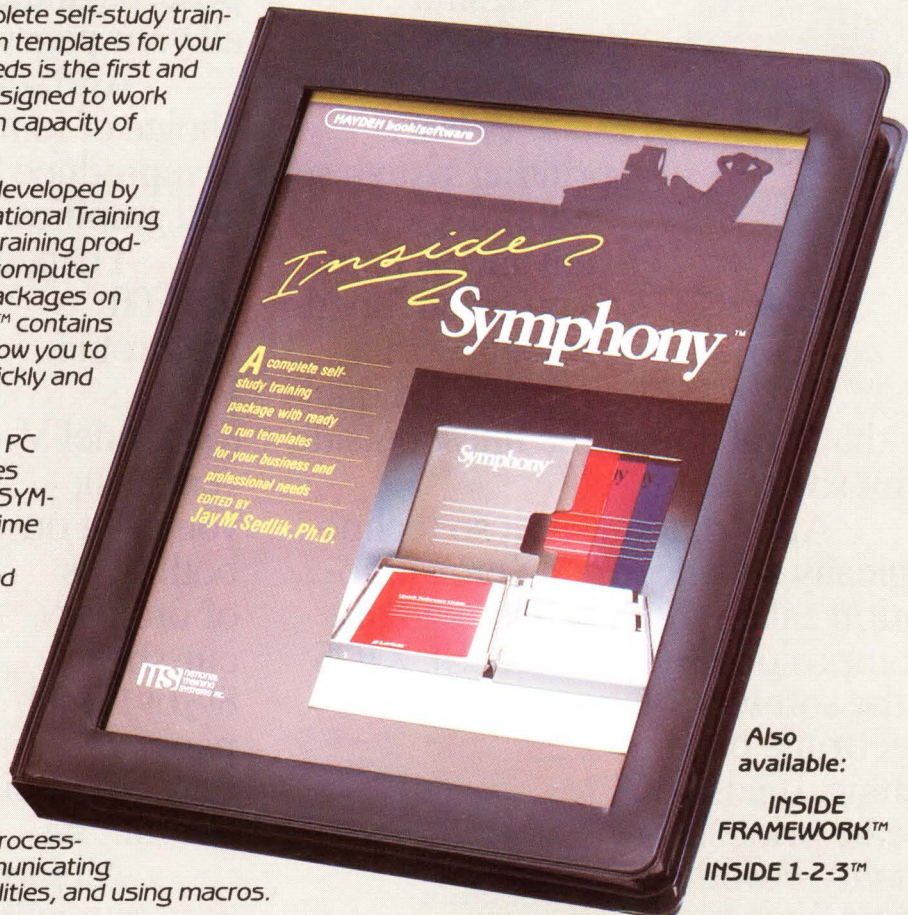
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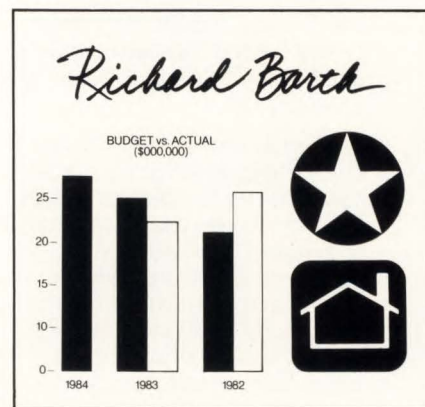
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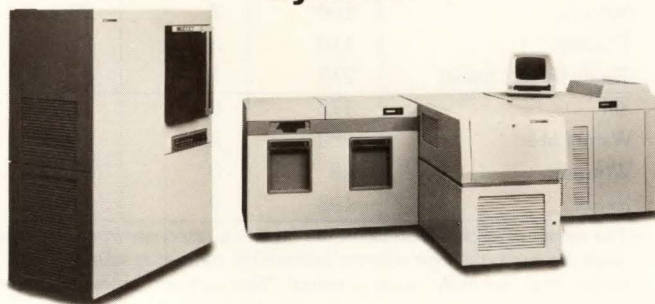
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OFFICE AUTOMATION

(Continued from page 60)

from sixth place, Tandy rates considerably higher as a single-site supplier than as a Fortune 1,000 vendor.

Nevertheless, some OA experts believe Tandy will have to improve its

service policy to keep its place in the top 10. "The average 50-employee office can't retain a high-priced staffer just to service equipment," says Robert L. Bland, director of computer services for Giffels Associates, Southfield, MI.

"An OA planner for a single-site office should look for a manufacturer that can install a system and make it work." □

Miriam Lacob is a free-lance writer based in New York City.

THE SINGLE-SITE SURVIVORS

Company	1990	SS Votes	Ranking	Prior Survey	SS Votes	1982 Survey	SS Votes
AES Savin	96	0	30	—	—	—	—
Apple Computer	264	20	2	334	31	162	10
Anaconda-Ericsson	72	1	32	62	1	—	—
Anderson Jacobson	124	3	23	114	4	54	1
AT&T Technologies	262	20	3 (tie)	218	16	128	10
Bell & Howell	144	6	18	172	11	—	—
Burroughs	160	6	15	180	7	70	1
Canon	170	8	12	—	—	—	—
Computer Consoles	112	4	27	—	—	—	—
CPT	146	4	17 (tie)	160	7	124	6
Data General	236	16	5	170	8	70	0
Datapoint	164	6	13	152	4	76	1
A.B. Dick	116	3	26	134	3	78	1
Digital Equipment	250	20	4	272	19	152	12
Exxon Office Syst.	122	6	24	158	6	48	0
Hewlett-Packard	262	19	3 (tie)	230	16	116	7
Honeywell	128	4	22	182	7	84	2
IBM	280	25	1 (tie)	312	30	178	17
Kodak	180	11	10	192	11	—	—
Lanier (Harris)	136	3	21	184	6	148	9
Motorola (Four-Phase)	140	5	20	126	4	74	0
NBI	190	7	8	124	4	132	5
NEC Information Syst.	162	7	14	130	8	92	1
Nixdorf	100	1	29 (tie)	88	2	60	0
Northern Telecom	186	5	9	162	8	74	2
Olivetti	146	5	17 (tie)	138	5	92	2
Philips (Micom)	120	2	25	82	4	90	1
Prime Computer	142	3	19 (tie)	174	8	88	0
Rolm	198	9	7 (tie)	114	4	62	1
Royal	82	0	31	104	2	80	0
Sony	150	3	16	152	6	94	2
Sperry	142	4	19 (tie)	122	3	58	1
Syntrex	100	2	29	98	3	74	0
Tandem	110	3	28	104	2	94	1
Tandy (Radio Shack)	218	12	6	230	14	160	10
3M	172	8	11	180	10	—	—
Wang Labs.	280	23	1 (tie)	256	21	172	16
Wordplex	68	0	33	84	2	26	0
Xerox	198	9	7 (tie)	222	14	136	8

The ratings of single-site survivors are based on responses from OA experts asked to predict which OA vendors will still be in the game in five years. Scores in the year columns indicate the cumulative tallies for each vendor of "sure-survivor" votes (10 points), "likely survivor" votes (6 points), and "not likely" votes (2 points). "Sure-survivor" votes (denoted as SS Votes) are listed on the chart.



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HOW TO HELP TROUBLED WORKERS

When Art the Analyst comes in stoned, sloshed, or upset about a weekend standoff with an ex-spouse, your neck, as well as his, may be in the noose.

by J.B. Miles, Washington Editor

Seemingly ordinary people, some of whom might even work for you, can pack a fairly bizarre range of personal baggage into their morning briefcases. Take Conrad. He's single, 32 years old, fluent in several programming languages, and working for a major Washington political organization. He's bright, talented, and ambitious. He's also a white-collar junkie, with a strong taste for cocaine.

Then there's Phil, 52, a programmer for a leading eastern insurance carrier. His short-range output is terrific, but his long-term assignments are spotty—inaccurate summaries, missing data. You

suspect Phil might be an alcoholic.

Finally, there's Laurie, 23. She's a Stanford graduate, and this is her first job. She's catching on fast, but she's been absent from work seven times in the last six weeks. Is it her boyfriend, who once had a brush with the law for selling some kind of drug? Or is it her night classes in advanced programming languages?

That's only a small sampling of problems your employees—and you—could face. Other examples could include the recent divorcee who's now squiring around a major vendor's 25-year-old appointments secretary, and



Photo by Jeff Glantz



TROUBLED WORKERS

the accounts manager who's sometimes stoned on the drugs her doctor prescribed for tension.

If these folks only give you a slight case of the jitters, or if you think such a rogue's gallery operates only in other managers' backyards, think again. Research indicates that at any given time in the average workplace, one employee in five is preoccupied with a personal problem—at the expense of his or her job performance. And that's just the half of it.

There are three types of employee problems. First there are the relatively short-lived preoccupations, such as anxiety over a child's school behavior, a spat with a spouse, and other typical family crises. Then, there are problems due to an underlying personality disorder. These include chronic financial strain, travel phobia, credit-card abuse, sexual anxiety, and serious family stress.

Finally, there are those problems that are deeply embedded in the employee's personality, and these are more common than you may think. One in six employees suffers from a serious emotional disorder, one in 10 is an alcoholic, and one in 20 has a drug problem. (The latter represents a special problem; drug addicts may become suppliers to other employees to fund their addiction.) Estimates like these of the extent to which employees bring

their problems to the workplace are relatively conservative. For example, the "Big 3" disorders just mentioned are diseases of denial—the sufferer goes to great lengths to deny or disguise them, not only from managers or fellow workers but from himself or herself, as well. Similarly, some employee maladies are just beginning to surface as real problems. Common household varieties of depression, for example, used to be considered merely pesky symptoms of other problems—curable, much like the common cold, with a few aspirins and a few days' rest. Research now shows, however, that the manifestations of depression in the workplace are serious, extensive, and expensive; they affect not only the depressed individual, but all co-workers, as well.

The cost of all this is astronomical. The direct cost to U.S. businesses of such employee ills as alcoholism and drug abuse alone is estimated to reach \$75 billion annually, and it's heading steadily upward. This estimate does not account for the less tangible, but still serious, cost brought about by the reduced morale and efficiency of employees who are adversely affected by another's behavioral problems.

It doesn't take a great amount of astuteness to realize that even large corporations are hurt by employee problems. Managers should be concerned about these problems and act to miti-

gate them. It's smart business to help the troubled employee, especially the one who occupies a critical niche in your corporate framework.

For the most part, managers accept the responsibility of dealing with some of their employees' personal problems. But many are uncertain about how far they should go. They need to know more about limits of analyzing employee problems and assessing corrective steps. And in today's litigious and rights-conscious society, managers need to know a great deal more about such matters as their employees' right to privacy.

Harrison Trice, a researcher at the Cornell University School of Industrial and Labor Relations, Ithaca, NY, is outspoken about the manager's responsibility to intervene when an employee's performance is slipping because of personal problems. "Managers have to manage people, even if their job is to manage computers. And managing people means managing the job performer, especially those with problems," says Trice.

Terry York, director of the U.S. Information Agency's Advisory, Referral, and Counseling Service (ARCS) agrees: "I've heard managers say they're more interested in getting out their products than in dealing with human problems; they maintain they're not qualified to intervene in an employee's troubles. But you shouldn't be a manager unless you have people skills. Solving these kinds of problems goes with the turf."

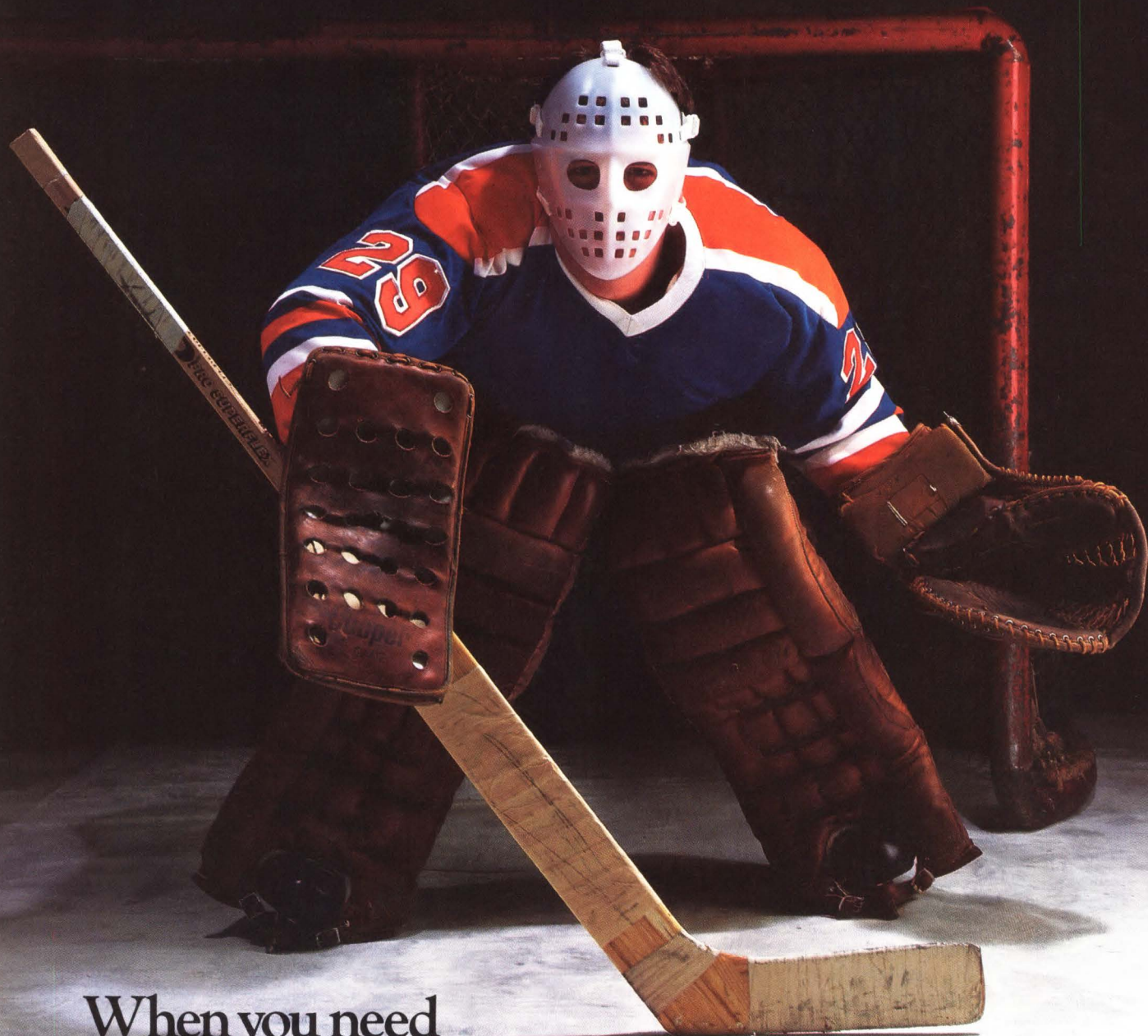
York, Trice, and others consider the manager the front line when it comes to dealing with human problems. Ideally, the manager is a conduit, able to skillfully intercept and monitor the many signals given out by an employee who is having problems, and savvy enough to help determine the best approach for intervention—whether it's a quiet conversation, referral to an in-house consultative employee-assistance program, an up-the-line referral for discipline, a lateral transfer, or a recommendation for dismissal. Firing is always the last, and most expensive, resort.

Jim Talley, MIS/dp manager for the Washington-based Organization of



Photo by Jon Crispin

A manager's involvement with a troubled employee should be restricted to mitigating the effect of the employee's problem on his or her performance, says Harrison Trice of Cornell University.



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American States, is responsible for computer operations and systems development for OAS' connections with 31 member nations. Talley, who describes himself as a "techie" constantly on the firing line, says he isn't qualified to handle many types of employee problems, and admits he usually tries to bypass and avoid such confrontations at all costs. But, he adds, "I do have to get involved in these problems, because they usually don't disappear by themselves. If I wait too long, they get worse, and then service to my clients suffers."

If you agree with Talley about your responsibility to intervene when your subordinates bring personal problems to work, you probably are still concerned about the limits of your responsibility. How, for example, do you intervene without becoming heavy-handed, or worse, getting in over your head into problems that might be much too complicated for you to handle?

A simple rule of thumb about management limits should be etched onto the brain of all who supervise others. Its application could save millions of hours of unnecessary headaches and millions of dollars in revenues due to poor time management. It can also reduce threats of legal action from employees who have had—or think they have had—their rights to privacy violated. The rule is this: The personal problems of employees are private until job performance deteriorates because of them. Sound simple? It is, but it's amazing how the pressures of a hectic production schedule mixed with a sincere desire to help someone can obscure this rule. Keeping the privacy rule firmly in mind helps the manager remember the necessary limits to what is his or her—and the company's—function when an employee is behaving or performing poorly. Forgetting it, the manager often gets drawn into problems not of his or her own making, and usually beyond his or her control.

In *How to Help a Troubled Employee* (Association Management, 1983), William Hoffer provides a tongue-in-cheek list of stages he says managers go through when dealing with employee problems:

- "Praying for a miracle:" The manag-



Photo by Rhoda Baer

Managers who say they aren't equipped to handle employee problems are dodging responsibility, says Terry York of the U.S. Information Agency. Human problems are every manager's province.

er ignores the problem—and the employee.

- "Reason will prevail:" Characterized by a short series of heart-to-heart talks.

- "Pleading:" Includes random begging, cajoling, threatening.

- "Bleeding:" The manager disciplines, fires, forces to resign, transfers, or retires the employee.

If Hoffer's stages seem amusing or cute, think about them again. He's put his finger on some tendencies that, admit it or not, most of us have exhibited from time to time without achieving productive results. Chances are, such oversights have taken place at considerable cost to employers and to our own self-esteem as well.

A few dos and don'ts, sprinkled with a liberal dose of common sense, might help managers deal with employee personal problems in a way that works for, rather than against, the corporation.

Do operate from a well-defined strategy for intervention that is endorsed by brass and top managers. If corporate strategy is absent or vague, develop stringent guidelines for your own behavior.

Do insist on full organizational support for your decisions. This is your

right as a manager.

Do help your corporation clarify vague, unspecific, or ambiguous policies concerning troubled employees. If you are a front-line manager, you shouldn't be exposed to unnecessary risks resulting from poorly stated company policies, or from the whims, unwritten rules, or hidden agendas of your own superiors when it comes to managing subordinates with personal problems.

Do avoid the clinical approach. Given today's trend toward analyzing employee motivation and psychology in the workplace, managers can readily slip into the trap of defining and redefining the symptoms of everything from employee drug abuse to bed-wetting, without ever coming to terms with the need for specific action in particular cases.

Don't try to be the company shrink. It's not your job. Leave the diagnosis to the pros. All you have to do is keep your eye on the employee's performance. As Cornell's Trice says: "The manager never has to make a clinical diagnosis. It's his job to make a performance diagnosis."

Don't let yourself become the informal company guru on personnel policy. Chances are if you're a decent compassionate listener with a good record of employee problem-solving, you'll occasionally be called on by your bosses or peers to lend a helpful ear to other employees. This can be acceptable for a time, but it's not necessarily a good practice.

Don't become your employees' pal. You may have a terrific relationship with employees before or after work, but if they are having personal problems, you're not going to help by getting enmeshed in all the details. Pat Renfro, manager of personnel for the 1,400-member American Newspaper Publishers Association in Reston, VA, says it's human nature to give advice, "but if it doesn't work well, the employee feels let down, and will avoid further contact, or worse, become angry and hostile."

Don't allow yourself to actually enjoy the role of "confessor" to your troubled employee. Richard Orlando, a

(Continued on page 74)

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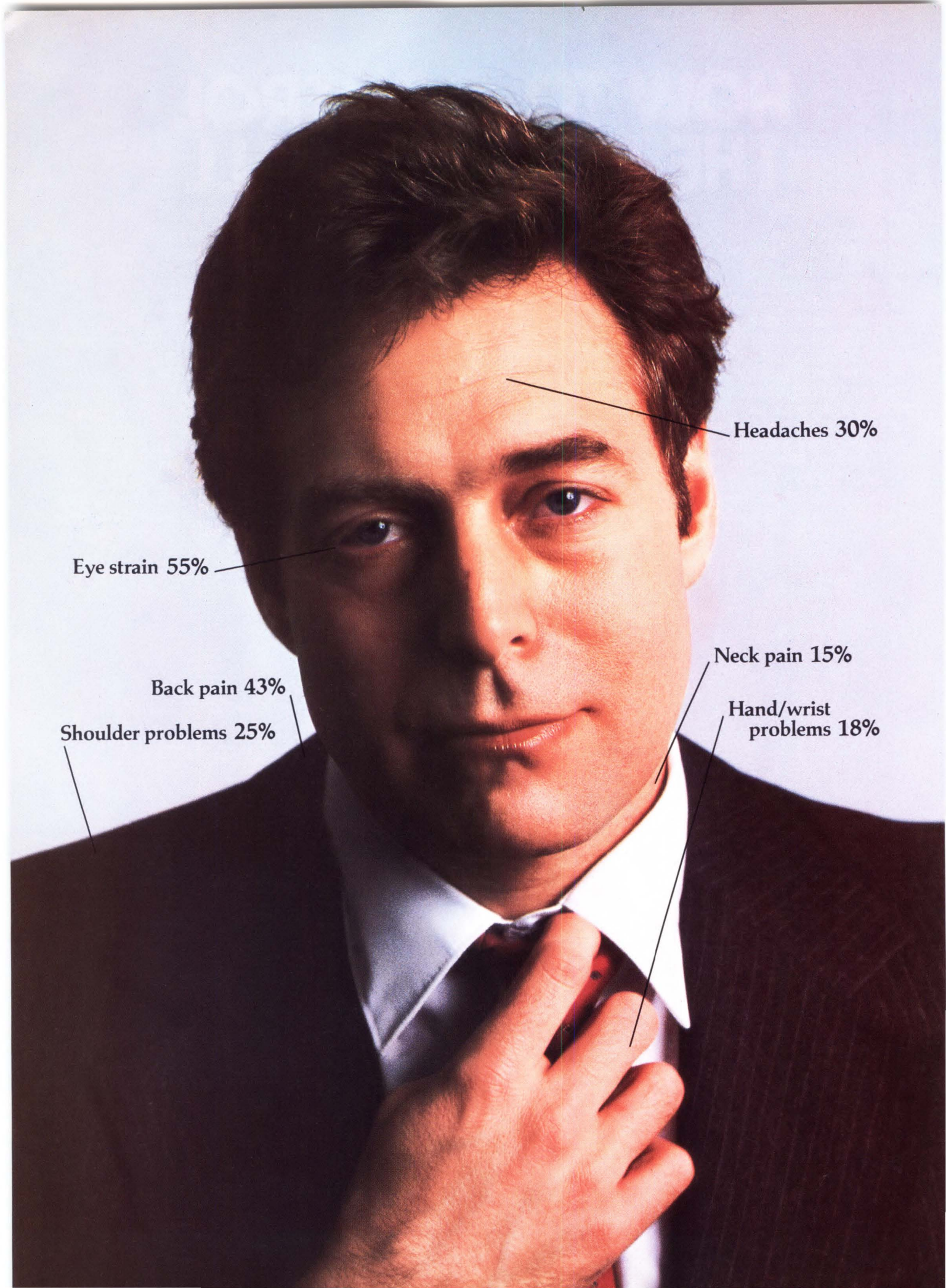
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Back pain 43%

Hand/wrist
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The chart below is disturbing. It shows the kinds of problems computer users are having.

Computer-induced problems (%)

Eye strain	55%
Back pain	43%
Headaches	30%
Shoulder	25%
Hand/wrist	18%
Neck pain	15%

(Source: "Ergonomic Principles in Office Automation" Pub. 1983 by E.I.S. AB, Sweden.)

(Source: "Ergonomic Principles in Office Automation." Pub. 1983 by E.I.S. AB, Sweden.)

Before you dismiss them as trivial, consider two things:

First, more than twenty states are now prepar-

ing legislation to protect computer users from problems like these.

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(Continued from page 70)

Cambridge, MA-based clinical psychologist and computer specialist, says some managers feel more powerful—and maybe feel a twinge of voyeurism—when their subordinates reveal some of the seamier details of their personal lives.

If you've got a case of managers' blues at this point, cheer up. There is a wealth of programs, counseling services, consultants, and useful literature to help you help your employees—without risking your own neck on the job.

Within the past 10 years, for example, the number of employee-assistance programs has grown from about 400 to more than 5,000. Usually company-sponsored or supported, they meet a variety of employee problems—everything from alcohol counseling and hospitalization to financial advice. And they work! Their organization and thrust vary from corporation to corporation, depending on the need and savvy of those who set them up and use them. Some of them are supported and staffed by company-paid professionals; others are available through a growing network of community services to smaller companies and businesses; still others are tiny pinpricks of light on the personnel horizon.

Few managers doubt the effectiveness and usefulness of employee-assistance programs, both in terms of cost-effectiveness for the organization and the help they give to the troubled worker. Although they differ slightly in function according to the organizations they serve, the most effective ones operate according to a general time-tested set of operating principles. These include:

- Independence. Even in-house employee-assistance programs operate as separate units. They are staffed by qualified professionals whose judgment is respected by corporate brass and who serve as on-the-spot advisors to personnel managers and top decision-makers.

- Confidentiality. The confidentiality of an employee who brings problems to an employee-assistance staffer is guaranteed. Once a manager refers an employee to such a program, the details of

the problem belong to the helping professional and the individual.

- Easy access. Nobody seeking help should have to jump through hoops to get it. And nobody using the services should continually have to explain where he or she is going and why. A fluid, easy system can be developed be-

tween the manager and employee. The most an employee should have to tell a supervisor about attendance at such a program should be: "I'm going to the personnel department this afternoon for one hour, and it is arranging for weekly sessions on Wednesdays at 2 p.m. for the next two months."

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● Performance-based referrals. An employee referral to an assistance program is always based on his or her work record. Ideally, the manager will make the referral, saying something like this: "Look, I think we're having a problem. Your job performance is not showing your usual high standards,

you've been absent from work six times during the last seven weeks, and you've been in two arguments with your supervisors in the last month. If you're having some kind of personal problem, I don't need to know its details, but I'm going to refer you to our employee-assistance program."

● Follow-up. The manager as a front-line observer and referral agent doesn't need to know all the details about the employee's problem. But some method of cross-checking between the employee-assistance staffers and the manager is needed to see if performance is being enhanced by treatment. Has the employee's attendance record improved? How about relationships with other employees? Are quality-of-work requirements, such as accuracy of data, deadlines, and so on, being satisfied?

● Volunteer basis. Mary Joyce Pruden, director of a Corning, NY, employee-assistance program that serves, among other corporations, Ingersoll-Rand, Woodcliff Lake, NJ, and Corning Glass, Corning, NY, has developed what she calls a "constructive confrontation" technique. It lets a manager help the troubled employee recognize that a problem exists, based on performance-related evidence. But Pruden stresses that the final decision on the employee's participation in an assistance program belongs only to the employee. "The manager can help by strongly recommending the program as a helpful step the employee can take for his or her own benefit, but only that employee can decide to go."

● Full management support. Obviously, no program, however well-designed, will work without the backing of its principal users. The major clients of employee-assistance programs are organizations that have come to recognize the validity and cost-effectiveness of helping troubled workers improve job performance. Managers know the company's balance sheet will also show improvement as a direct result.

It also pays to make use of national services and hot lines set up for particular problems. Your local chapter of Alcoholics Anonymous is one such service. And the national cocaine hot line (1-800-COCAINE) is another. Others can be found in the Yellow Pages.

Once you recognize the advisability of approaching an employee whose job performance is suffering from a personal problem, how do you make your move? Before you approach the individual, heed a few tips:

(Continued on page 76)

BY LIEBERT

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(Continued from page 75)

- Don't delay the inevitable; it won't help you or your employee.
- Don't analyze your employee's motivation—analyze job performance only.
- Never apologize for your role as manager.

- Avoid verbal overkill; don't argue about the record or get into a circular debate. Keep it short and simple.
- Don't make observations about the employee's personal style or limitations that are not strictly related to work performance.
- Don't take on the responsibility for

your employee's poor performance.

- Don't become a hero, a pal, or a confidante to your employee. Research shows that such relationships foster the unhealthy belief on the part of the employee that the manager is the only person who can help. And that can cause the employee to reject genuine help from professionals.

- Don't be fooled by employee denials or downplaying of the record. Statements like: "There's really no problem," "You and I are both probably overreacting," "Yeah, my work has suffered a little over the last month or so, but I'll get back on track" are very common. People with personal problems affecting their work will usually go to great lengths to deny the underlying causes, even from themselves. And they will manipulate, cajole, beg, even threaten, to protect themselves from this information. Don't be fooled by such denials, and keep your sights on the employee's performance.

Your approach to the problem employee, as a rule, must be cautious and even-handed. The legal ramifications of a botched intervention can be severe for both you and your employer. Follow these common-sense precautions when intervening.

- Document your intentions. It's always helpful, before entering a difficult situation, to jot down your objectives. You might include a timetable of the number of sessions you are willing to have with an individual before you recommend outside intervention.

- Know your own limitations, and those of your role as manager. Remember, you aren't expected to save anybody. You are responsible for employee performance; the final decisions affecting an employee's success or failure on the job is that employee's responsibility, not yours.

- Respect yourself and your employee enough to be absolutely clear about the performance level you expect.

- Focus, firmness, and fairness are the best tools you have. Focus on the employee's work performance and the steps that can be taken to improve it. Keep any dialogue or confrontation centered on job performance. Help the employee devise his or her own strategy for improving performance. □

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CIRCLE 42

ADDING MASS- STORAGE MUSCLE

Floppy disks are lightweights when it comes to micro storage. Make way for the heavyweight add-on contenders.

by Jack Newhouse

Many microcomputer managers still think adding megabytes of storage to personal computers is akin to attaching a Cadillac trunk to a Volkswagen Bug. Who needs it? Why not simply provide a few boxes of floppies? Is it worthwhile to store half a billion bytes of data?

It certainly is. Add-on mass storage is virtually required for the expanded use of micros in large organizations. Some software packages require large amounts of storage before any data are loaded. And, in an age of integrated software that offers everything from word processing and spreadsheets to graphics, users need more storage more often. Users also need a more efficient, more convenient storage medi-

um for information in big spreadsheet or individual-database formats than floppy disks can provide.

The lack of compatibility between magnetic storage media is also a problem. Any storage system that offers unique features and physical elements may not be compatible with a personal computer made by a different vendor. According to several analysts, the problem of buying one manufacturer's storage add-ons and have them "cooperate" with other vendors' machines has not been solved for the same reason that there is no "standard" microcomputer (although the IBM PC has become the de facto standard in many corporations): Manufacturers prefer to lock the buyer into their products and



ROSTIA MICROS

Photo by Bill Oliwa



BOOSTING MICROS

out of their competitors' products. Disk-drive incompatibility parallels the classic difficulty of transferring text or data from one brand of computer to another. Although it can be done, you still cannot directly wire an IBM PC to a DECmate III (from Digital Equipment Corp., Maynard, MA) and get much more than smoke.

Mass-storage add-ons for business-micro users are very popular. Now,

even in large corporations, micros can support the operations of smaller departments, a task only minicomputers or cluster systems once had enough power to handle. With high-capacity, mass-storage add-ons, micros can easily be outfitted as "departmental" computers, especially if they are equipped for more than one user (see Part I of this series in the Jan. 15th issue). Apple Computer Inc.'s products are

excellent examples of what micros with added storage can do. With the exception of news-networking operations, Ted Turner's complex broadcasting empire, Cable News Network, is run with the Macintosh, Lisa, Apple IIe and III micros, according to Rob Barnes, CNN's director of data resources.

Also, the overwhelming success of IBM's PC XT and the enthusiastic reception of the newer PC AT emphasize

MASS MICRO STORAGE

Vendor	Product	Requirements	Price	Circle
Alloy Computer Products (617) 875-6100	PC-Stor 52 (Hard disk: 41 Mbytes; Tape: 17.7 Mbytes)	IBM PC	\$5,995	483
CMC Int'l. (206) 885-1600	Targa + Tape (Hard disk: 10, 15, or 31 Mbytes; Tape: 25 or 55 Mbytes)	IBM PC	\$1,945 to \$1,995	484
Control Data (612) 853-8100	Fixed Disk Systems (Capacity: 18 or 30 Mbytes) Streaming Tape Drives (Capacity: 45 Mbytes)	IBM PC, PC XT, and PC AT Same systems	\$2,595 to \$3,989 (with controller) \$2,495 (with controller)	485
Datatron (714) 554-4520	Slim 2000 (Hard disk: 10 Mbytes; Tape: 10 Mbytes)	IBM PC	\$2,995	486
Datrex (602) 272-9491	Super XT (10-Mbyte online storage; unlimited offline)	IBM PC	\$1,995	487
Davong Syst. (408) 734-4900	Hard disk (Capacity: 10 to 43 Mbytes)	IBM PC, PC XT, and PC AT	\$1,950 to \$3,995	488
Dennison Computer (617) 890-5141	Floppy disks and high density diskettes (Capacity range: 250 to 1.6 Mbytes)	IBM PC, PC XT, and PC AT; and Apple micros	\$4 to \$6 per disk	489
Eicon Research (212) 719-5353	Tera-Drive (Floppy capacity: 1 or 2 Mbytes)	Apple IIe and II Plus	\$995 to \$1,595	490
Emerald Syst. (619) 270-1994	PS Series hard disk and tape units (Hard disk: 40 to 280 Mbytes; Tape: 60 Mbytes)	IBM PC, PC XT, and PC AT	\$4,350 to \$15,850	491
Falcon Tech. (206) 251-8282	Hard disk (Capacity: 10, 15, or 30 Mbytes)	IBM PC	\$3,995	492
Genie Computer (818) 991-6210	Genie 5 + 5 Winchester disk (Capacity: 10 Mbytes)	IBM PC; Apple IIe and II Plus	\$2,000 to \$4,000	493
Great Lakes (312) 884-7272	Hard disk (Hard disk: 10 Mbytes; Tape: 23 Mbytes)	IBM PC	\$2,490	494
Helix Lab. (818) 710-0300	Bubble boards (Capacity: 128 to 512 Kbytes)	IBM PC; Apple II	\$750 to \$1,495 \$475	495
Hicomp Computer (206) 881-6030	MBM-502A to -504AR bubble drives	IBM PC	\$995	496
IDE Assoc. (617) 663-6878	Hard disk and removable cartridge backup (Hard disk: 5 to 45 Mbytes; Tape: 5 Mbytes)	IBM PC	\$1,645 to \$5,145	497
Interface (213) 341-7914	Winchester disk system (Capacity: 25.1 Mbytes)	IBM PC	\$1,285 to \$4,295	498
Interphase (214) 350-9000	FDS-590 (Hard disk: 590 Mbytes)	IBM PC and PC AT	\$21,500	499

BOOSTING MICROS

that today's sophisticated software and applications have increased the demand for mass storage, either factory-equipped or from third-party add-on manufacturers. According to industry analysts, the PC XT is popular not because it's a better computer than the standard PC but because it has an attached 10-Mbyte hard disk and expanded memory. And it's a good bet that IBM's PC AT, with its 20- and 40-

Mbyte disks and up to 512 Kbytes of memory, will be a runaway best-seller.

At Air Products & Chemicals Inc., Trexlertown, PA, an industrial-gas manufacturer, the MIS/dp department is equipping the corporation's IBM PCs with add-on mass storage. When asked to list the departments that need so much storage, Charles Versaggi, information-center manager, replies, "You name it!" Office, manufacturing,

and research-and-development groups all use micros with add-on mass storage.

"We have an instrumentation group that has developed a database that has outgrown even the PC XT," says Charles Versaggi at Air Products & Chemicals. "In one of our large instrumentation-construction projects, we wanted all the data on one disk, and the work group needed to back up

Vendor	Product	Requirements	Price	Circle
Iomega (801) 399-2171	Bernoulli Box	IBM PC	\$2,695 to \$3,695	500
Mountain Computer (408) 438-6650	MT-4000-04 (Fixed disk: 35 Mbytes; Tape: 60 Mbytes) Space Saver Winchester disk (Capacity: 10 to 25 Mbytes)	IBM PC and PC XT IBM PC; Apple micros	\$5,595 \$995 to \$1,325	501
National Memory (415) 443-1669	PC8004 (Hard disk: 350 Mbytes)	IBM PC	\$14,900	502
Omega Electronics (214) 234-6900	Bubble boards (Capacity: 128 to 512 Kbytes)	IBM PC, PC XT, and PC AT	\$750 to \$1,825	503
Personal Micro (408) 737-8444	Hidey hard disk (Capacity: 10 Mbytes)	IBM PC	\$1,795	504
Quadram (404) 923-6666	Hard disk and cartridge backup; Quaddisk (Hard disk: 12 Mbytes; Tape: 6 Mbyte; Quaddisk: 72 Mbytes)	IBM PC IBM PC and PC XT	\$2,250 \$6,500	505
Quark (303) 934-2211	QC10 hard disk (Capacity: 10 Mbytes)	Apple II, Macintosh	\$1,995	506
Shugart (408) 737-7900	Optimem 1000 optical disk (Capacity: 1 Gbytes)	IBM PC	\$12,000	507
Standard Data (305) 971-2800	Hard disk and tape backup Hard disk: 10 to 71 Mbytes; Tape: 25 Mbytes)	IBM PC and PC XT	\$2,795 to \$6,995	508
Storex (415) 961-1980	Fixed or removable disks (Fixed: 5 to 25 Mbytes; Removable: 5 Mbytes)	IBM PC and PC XT	\$3,490 to \$5,995	509
Systems Peripherals (619) 693-8611	Hard disks (Capacity: 70 to 140 Mbytes)	IBM PC	\$4,995 to \$6,795	510
Tallgrass Tech. (913) 492-6000	Hardfile with tape backup (Hard disk: 70 Mbytes; Tape: 5 Mbytes)	IBM PC	\$7,495	511
Tecmar (216) 349-0600	Fixed and removable (Fixed: 10 to 33 Mbytes; Removable: 5 Mbytes)	IBM PC and PC XT; Apple Macintosh	\$1,995 to \$3,995	512
Toshiba America (714) 730-5000	500-Kbyte floppy drive	IBM PC	\$375 per floppy	513
Unidata Products (603) 436-8742	Unidisk 10- and 20-Mbyte hard disk and floppy backup	Xerox 820-II and 16/8	\$2,495 and \$2,995	514
Upland Tech. (516) 231-0700	Silo/PCX tape subsystem (Capacity: 67 Mbytes)	IBM PC, PC XT, and PC AT	\$2,990	515
Yipkon (201) 575-8722	Fixed disks, removable disks (Fixed: 10 to 84 Mbytes; All removable 5 Mbytes)	Many micros	\$2,999 to \$7,999	516

BOOSTING MICROS

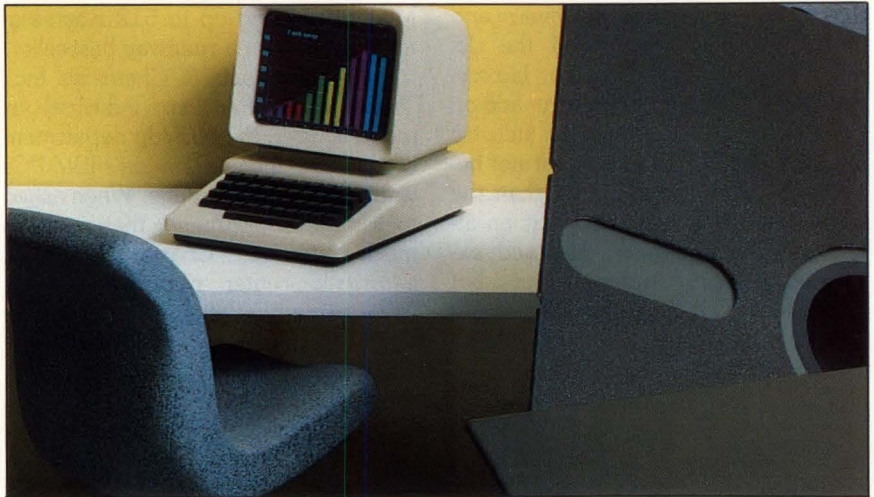
the database." These goals were met by using micros instead of plugging into one of the company's already-overloaded mainframes or buying a more costly mini. Versaggi says the micro solution worked thanks to 5-Mbyte removable cartridge disks. The group mixed and matched the disks, using them as needed for either primary or backup storage.

Another micro and large-capacity storage setup is used in manufacturing. "Order and inventory are quite specialized in that group, so we handle it with micros. We may put a separate application, such as purchasing, on a cartridge disk so that it doesn't interfere with the ordering application. That information must be kept separate," says Versaggi.

The amount of storage required for such projects is immense. If Air Products did not have the high-capacity hard disks added to its micros, "we wouldn't be using the micros for those applications," Versaggi adds. In this case, storage add-ons were a cost-effective solution to a large, but specific, problem.

Micro mass-storage options are many, including hard (Winchester-type) magnetic disks, super floppies, removable and fixed-cartridge hard disks, streaming magnetic tape, bubble-memory boards, and optical disks. What is appropriate for your organization—in terms of storage capacity, price, and backup system—may be overkill for others. For example, although the most popular hard-disk capacity is 10 Mbytes, vendors are offering more products in the 40- and 60-Mbyte range. Some vendors offer more online storage today than some mainframes could offer only a few years ago.

For business, the role of the floppy as the basic storage medium may be ending. Of course, at least one floppy-disk drive will still be needed by many machines for loading program. Floppies will also continue to serve well for storing specific collections of data. Also, some vendors are expanding the capacity of the floppy disk. Toshiba America Inc.'s 500-Kbyte super floppy in a space-saving half-inch-high disk drive costs \$375. But double-sided,



double-density floppies hold an average of only about 200 pages of information. What do hundreds, even thousands, of floppy disks have over the paper-choked offices of the past? Not much. Saving expensive space is important, and a 10-Mbyte hard disk will store about 6,600 pages of information, or as much data as about 33 floppies.

Purchasing and inventory-control applications may require plenty of storage, but a high-capacity disk is a relatively inexpensive solution. The purchasing department of a large financial institution, which requested anonymity, runs all purchasing and inventory-control tasks, including vendor performance and pricing, on a micro equipped with 50 Mbytes of mass storage. The department functions cost-effectively because its database of operating inventory allows it to make quantity purchases at discount. Without the 50 Mbytes of space to store and sort information, the department would need to run a much more expensive mini, rather than a micro.

Tallgrass Technologies' Hardfile 70 + 45 is another high-capacity add-on disk that has received high marks from users. It is sleek, takes up little space, and offers 70 Mbytes of formatted storage with tape backup for \$7,495. Software in the tape backup offers speedy streaming-tape directory searches. The 5-Mbyte tape copies the data on the disk in less than one minute. However, this capability may be more than you need, and you may find it difficult to justify the cost of this unit,

except in multi-user setups.

If you use the IBM PC and don't want to trade it for Big Blue's hard-disk models, or if you need more disk storage than even the PC AT provides, Quadram Corp. claims to have the answer to your problems. It's the Quaddisk, an updated version of Quadram's 72-Mbyte Winchester disk that emulates the PC XT. It mounts internally into the IBM PC and/or a compatible second floppy-disk drive slot and uses standard DOS commands for formatting, copying, backup, and restoring. Also, the Quaddisk's menu-driven utility file makes it easy to use. The Quaddisk costs \$6,500 and comes with a one-year warranty.

Valuable work space is often consumed by electronic hardware in bulky housings. If desk space is at a premium and you need less than 50 Mbytes of storage, Hidey may be the answer. Hidey is a 10-Mbyte hard disk add-on system from Personal Micro Computers Inc. for the IBM PC and compatibles. Hidey tucks neatly beneath the PC, and has a slot for storing the PC's keyboard inside the disk-drive casing. Priced at \$1,795, Hidey has its own power supply and multi-outlet, transient-protected power strip, giving users a single power switch for ease of use.

Another alternative for managers who need to equip users with additional storage capacity are removable cartridge disks. Unlike fixed disks, removable cartridges offer unlimited online storage. Regardless of capacity, when the disk is filled, all you do is replace it

with a blank cartridge, or you can record over old data on a used disk. This medium is particularly useful for securing sensitive data. If you don't want data to be accessible, take the cartridge off the machine and lock it up in a safe.

Despite their limitations, floppies do offer a stable medium. They are generally reliable, whereas hard disks are more vulnerable to smoke and dust contamination, and to head crashes. A floppy-disk system has the head riding right on the disk. A hard disk's head skims just above the disk, and if the drive is bumped or if there is a momentary power failure, the head can crash against the disk, causing loss of data and possibly damaging the drive.

A notable exception, however, are the Winchester-type disks, which circumvent contamination and head crashes by operating in a sealed container. Most manufacturers are also now packaging their drives in shock-resistant housing for further protection. Wise users will also provide an uninterruptible power-supply for hard disks. An additional means of ensuring data safety is to choose a system with tape backup that copies input byte for byte. If there is a crash, then only the data being entered at the instant of system failure will be lost.

Most computer-industry watchers expect that storage capacity of the standard business microsystem will soon be measured in billions, rather than millions, of bytes, as evidenced by users' enthusiasm for enhanced, hard-disk-equipped micros. "The desk-top computer of 1994 will make the IBM PC seem like a toy," says Maureen Fleming, an analyst with International Resource Development, a market-research house in Norwalk, CT. Fleming believes that future desk-top micros will be at least as powerful as today's minicomputers and will frequently be linked with a central mass-storage medium on a multi-user system.

The huge capacity of the optical disk is a few years down the road for most micro users. Today, storage add-on technology is varied, although most current offerings are Winchester-type hard disks with multimillion-byte capacities. Data stored on hard disks are frequently backed up on removable cartridge disk or tape, and the backup media are often housed within the primary hard-disk cabinet.

Many storage products are available for IBM micros, even the new PC AT. A hard disk and tape-backup upgrade kit for the IBM PC AT is available from Emerald Systems Corp., San Diego. The Back Up & Restore Utility (BRU) is 30 percent faster than the PC AT 20-Mbyte disk and offers from 40 to 280 Mbytes of storage, according to the vendor. The upgrade kit is installed in the AT. The price of a 40-Mbyte hard disk is \$4,350; the 60-Mbyte backup kit lists for \$1,950; and the 280-Mbyte hard disk costs \$15,850. The 280-Mbyte hard disk is suited to multi-user applications that allow the micro to run programs and act as a systems terminal that can access information loaded onto the main disk.

Many manufacturers provide a combination of fixed and removable hard-disk systems. The removable disk can be used as a backup or an expansion disk for additional storage capacity. Users should be aware, however, that some removable disks are constructed only for backup use and will play back only to the drive that recorded them.

The Super XT from Datrex Inc. provides two 5-Mbyte 5¼-inch removable cartridge disks continuously working together. Built-in redundancy assures continued operation if one of the drives malfunctions. Everything recorded on one disk will also be recorded on the second. Or, if backing up is for safety only, after the data are entered, the second disk can be either recorded on or stored offline. Designed for the IBM PC with full program compatibility with

"The role of the floppy as the basic storage medium for business may be ending."

the PC XT, the Super XT sells for \$1,995.

Several fixed or removable 5¼-inch hard-disk systems are available from Storex Corp. for the IBM family of micros. Their prices range from \$3,490 for a 15-Mbyte fixed and 5-Mbyte removable cartridge-disk system to \$5,995 for a 30-Mbyte fixed-disk and 5-Mbyte removable-disk combination. Extra 5-Mbyte cartridge disks cost \$125. Storex' storage systems require no special commands or software, can be used with any DOS application, and are compatible with most local-area networks.

For users who require extra-sturdy disk systems, there are several solutions available. One, from Iomega Corp., is the Bernoulli Box. The Bernoulli Box offers one or two cartridge 10-Mbyte floppy disks placed in protective, sealed containers. The floppies thus gain the stability and protection of hard disks. The two disks fit into the "box," which has its own power supply. The Bernoulli Box was designed for use with the IBM PC, and it resists bumps and thumps that may crash hard-disk systems. The Bernoulli Box costs \$2,695 for a single disk, and \$3,695 for two.

Cartridge tapes are another storage option. Magnetic tape is primarily used for backup only because saving and loading data is slower than with disks. However, it is less expensive than other storage options. There are two ways that magnetic tape works: as streaming tape, where the data are copied byte by byte, and as unstreaming tape, where data are copied in files. (Tape systems used only for backup will be covered in the next part of this series, in the Feb. 26th issue of *Computer Decisions*.) However, there is a particularly compact product worth considering that can be used

"What do hundreds, even thousands of floppy disks have over the paper-choked offices of the past? Not much."

(even if it is a bit slow) for primary storage. Silo PCX from Upland Technologies Inc., a new ¼-inch, 67-Mbyte tape system, emulates a diskette drive on the IBM PC, PC XT, and compatibles. Users can employ the same save and load commands as they do with the computer's disk drive. Priced at \$2,990, Silo PCX even provides its own backup through redundant recording.

The IBM micro-to-business link is so strong that a majority of mass-storage add-on manufacturers produce devices for the IBM PC family and compatibles. However, many companies offer products for a spectrum of micros. Yipkon Corp., for example, supplies fixed and removable Winchester-type hard disks for many personal computers. Prices range from \$2,999 for a 20-Mbyte fixed hard disk to \$7,999 for an 84-Mbyte model. Yipkon also has a 5-Mbyte removable hard-disk subsystem for backup functions for \$2,399, and combinations of fixed and removable hard-disk systems from 10 to 57 Mbytes priced from \$3,799 to \$7,999.

For users who need maximum protection against dust and dirt or temperature extremes in a storage medium, a bubble drive (at least for the IBM micro family and some compatibles) may be the solution. Slow to become available, and formerly an expensive choice when compared to other storage media, bubble drives are finally a practical technology.

Bubble drives provide 250,000 to half a million bytes on an accessory board that emulates floppy-disk loading and unloading, installed in a slot inside the micro. Bubble drives are a nonvolatile medium, which means that when you save information on the bubble board, it remains there, even when you turn off the machine. You can, of course, erase whatever you save at any time, just as you can with floppy-disk drives. In fact, after installation, your computer won't be able to tell the difference between a disk drive and a bubble drive.

Bubble boards have been tested at punishment and temperature extremes without damage or loss of data. Bubble drives are claimed to be five times fast-

"Today's sophisticated software and applications have increased the demand for mass storage."

er than floppy drives, with 1,000 times the reliability. Therefore, this alternative suits any user who has disk-intensive applications, such as word and text processing and small software-development projects.

Optical disks, another storage alternative, come in two varieties: read-only and read-write. A read-only disk plays only the information that comes on it. It cannot be either erased or added to. The read-write disk is a blank that the user fills up. After it is written on, it may be read, but the information can't be changed.

A read-write-erase laser disk is still off in the future, and the technology itself has been stalled in the research phase for longer than its developers expected, according to Joan de Regt, senior consultant with IRD. "Every year has been the year that optical disks would come to market," she says. "But then it doesn't happen. Making these new products available to users continues to be a problem." The read-write-erase disk will allow users to "read" whatever is on the disk, write whatever they choose, and change or erase data at will. Now there are still problems in optical-disk development with imaging materials and lasers, according to Dr. Joseph W. Shepard, vice president of the engineering systems division at 3M Corp., Minneapolis. Describing the laser disk's drawbacks in the *Journal of Micrographics*, Shepard says much work must be done before optical storage can be made cost-effective for micros.

However, read-only and read-write disks are starting to appear at computer trade shows across the country. Shugart Corp.'s long-promised

Optimem 1000 has finally been shipped to about 40 OEM evaluation sites, and a company representative says that Optimem, a 12-inch rotating laser optical disk and drive that stores 1 Gbyte of data, will soon be available.

Expanding the random-access memory (RAM) capacity of your micro may also be worth considering. Memory-expansion boards, or cards, offer additional space to input information while a user works on a project. But they are a volatile medium. When you turn off your micro, the information will be lost unless it is saved on a permanent storage medium, such as floppy or hard disks, tapes, or bubble cards. (Enhancement boards are the topic of the Jan. 29 "Boosting micros.")

Other new and revolutionary developments in mass storage will reach users during the next few years. For instance, several vendors plan to introduce a 4-inch optical disk for micros that will store as much on one side as about 100 5¼-inch standard floppies. And the Japanese are within one year of delivering a modification of the digital audio disk, similar to those silvery small records seen in music stores today. The difference will be that these audio-optical disks—still "read" by lasers—will read or record data. The CD-ROM, as this device is currently called, will cost between \$1,000 and \$1,500, and will store about 500 Mbytes of data. They will not, however, be erasable.

According to Michael Eley, a scientific engineer at IBM's research facility near Dundee, Scotland, IBM is thinking about thought itself. Located in what the Scots call "Silicon Glen," Big Blue is now working on an amino-acids coating on a substance—possibly silicon—that Eley says one of IBM's engineers believes will someday make it possible for all human knowledge to be stored on an object the size of a cigarette pack. Amino acids are the fluids of the brain, and IBM is attempting nothing less than trying to understand, and then to imitate, how the human brain stores information. Once corporate users receive this technology, the days of the floppies will surely be a thing of the past. □

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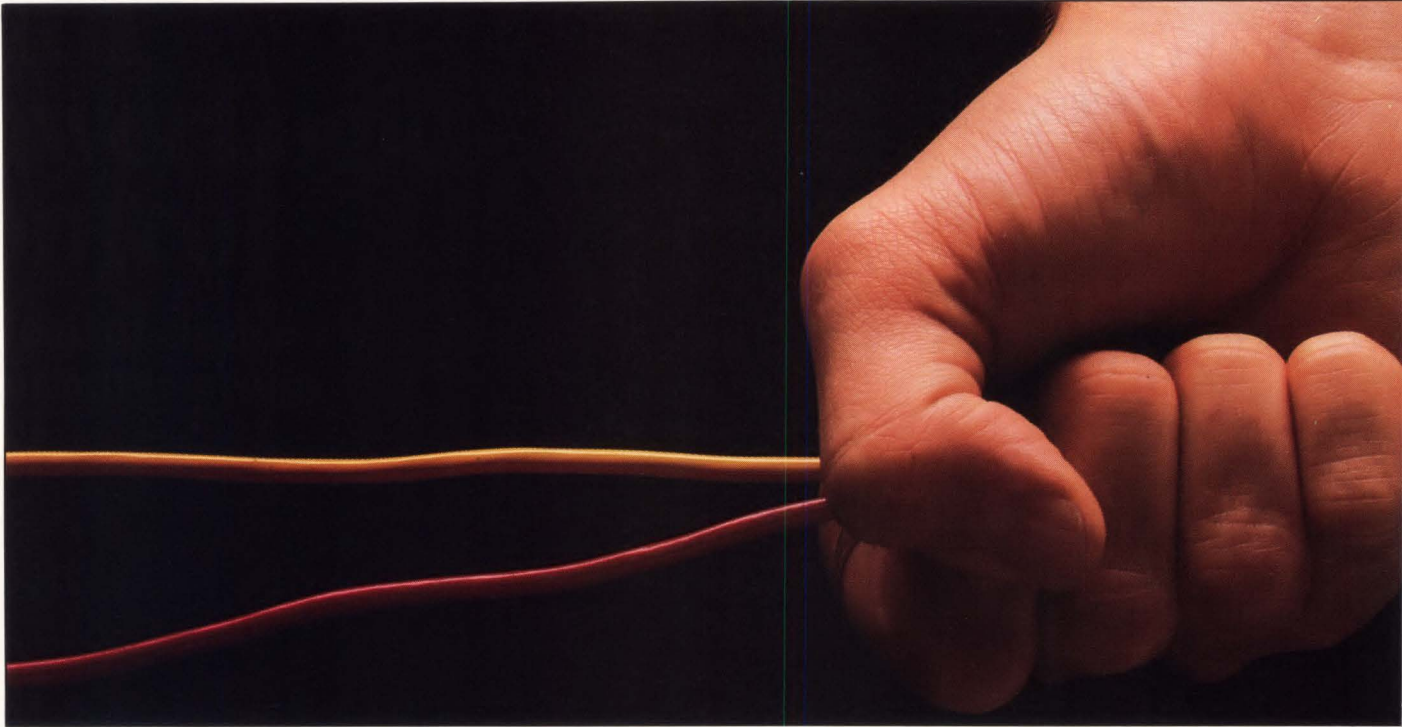


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CIRCLE 44



PART I: DOV GETS ON TRACK

The celebrated union of voice and data requires time, risk, and a steep investment.

by Gary Stix, Associate Editor

As voice and data communications struggle toward integration, MIS and telecommunications managers must confront a basic purchasing decision: whether or not to institute an all-digital network in which both voice and data are transmitted as digital pulses, or to install hybrid systems that send data over telephone lines.

The move toward integrating voice

and data on the same network, using integrated voice/data private-automatic branch exchanges (PBXs) or local-area networks (LANs), is probably inevitable. But is now the time to invest in these new systems? By waiting, will the technology become more reliable? Will the cost drop?

The rise of the personal computer and the corresponding need for the frequent transfer of files of information

among computers have created a demand for additional data-communications capacity. Although this need is growing, many offices have trouble justifying the total revamping of internal communications systems required for installing an LAN or a PBX.

Not every corporation is suited or ready to be a pioneer. The costs can be high and results long in coming. However, for the cautious or indecisive,

INTEGRATION

Photo by George Mattei



Jeff West, a systems analyst with Wisconsin Bell of Milwaukee, "Sometimes when you're pulling cable through a building, you have to go through shafts, then into another building and across and over again. It can wreak havoc on labor costs."

In an effort to avoid this expense, Wisconsin Bell installed about 300 of Teltone's Data Carrier Systems (DCS) at office sites throughout the state. The Teltone boxes are used to send data from workstations to DEC VAX-11/750 and /785 super-minicomputers. "Because the wiring in the building was so old, we were worried that this technique wouldn't work, but so far we've had no problem at all," says West.

At many offices, employees and terminals must be moved several times a year. Once a terminal is installed, employee mobility is limited because operators must be seated near their equipment. And each time the terminal is moved, new cable must be installed. This is a key advantage of DOV because the unit—and accompanying terminal and phone—can be plugged into the nearest phone jack.

Currently, there are at least six manufacturers that retail DOV products at prices from \$400 to \$600 per connection. While all units operate on the same principles, data-transmission speeds range from 9,600 to 19,200 bits per second (bps). Also, the maximum distance from a workstation to the central phone site can extend from 5,000 feet to more than 16,000 feet, using 26-gauge phone wire.

One such vendor, Micom Systems, offers Instalink, a DOV unit that achieves a higher speed, 19.2 kilobits per second (Kbps), by routing data in higher frequencies on the copper wiring at speeds as fast as 178 KHz. But Instalink can only extend 6,000 feet from the central telephone site to a terminal. Conversely, DOV units such as Teltone's DCS transmit at lower frequencies—36 to 40 KHz to send and 72 to 80 KHz to receive—producing a range of over three miles. The DCS' maximum speed, however,

there are now interim solutions that enable the simultaneous transmission of voice and data using existing twisted-pair wiring and analog phone technology. There are also specialized digital switches and workstations that permit limited integration of voice and data without disturbing the existing phone network.

In-place analog phone lines are perhaps the simplest way to integrate voice and data networks. Voice signals use only a portion of the available frequency spectrum—up to 4 kilohertz (KHz)—in twisted-pair wiring. Thus, data signals, combined (multiplexed) with their voice counterparts, can be transmitted at higher frequencies. This technology is known as data over voice (DOV). DOV devices modulate and demodulate the data stream, and act as both modems and multiplexers. They also use frequency filters to ensure the separation of voice and data signals. The data channel in the upper frequency range (from 36 to 178 KHz), is further subdivided to permit the simultaneous flow of full-duplex transmit and

receive signals.

DOV hardware, which consists of a small rectangular box with receptacles for the telephone line (RJ-11 jack) and a terminal or computer cable (RS-232 interface), resembles a standard dialup modem. Circuit cards attached at the telephone's main distribution frame supplement the modem/multiplexer functions. These cards separate voice and data signals for dispatch to their respective destinations: Voice signals are routed to a PBX and data are forwarded to the computer room.

Data-over-voice techniques are invaluable in offices where the cost of laying new wiring is prohibitive. Estimates for installing new coaxial cabling range from \$3 to \$7 per foot. Although pulling new twisted-pair wiring only costs a fraction of what cable does, it can still mean a total outlay of \$200 every time a terminal is moved. Moreover, many local governments have adopted regulations imposing additional costs for smoke-resistant cabling.

In some offices, installing new cabling may be almost impossible. Says

is only 9.6 Kbps. This lack of velocity occurs because DOVs that operate at higher speeds suffer a greater data distortion, thereby generating more errors, says Jack Merrow, Teltone's marketing manager for data systems. A third manufacturer, Coherent Communications Systems, says it has achieved the best of both worlds through superior modem and frequency-filter performance. Coherent offers a 19.2 Kbps transmission rate and the relatively long range of 13,000 feet.

In the past, most DOV technology has been oriented to the slower speeds and less-expensive hardware of asynchronous communication. DOVs have recently been adapted for limited use in synchronous networks, typically used in communication between large computers, such as those linked via IBM's Systems Network Architecture (SNA) protocol.

Some observers are skeptical of DOVs' suitability for the complexity of synchronous operation. "Using DOVs for synchronous networking may be brochure-level technology," says Ian Angus, president of Angus Telemanagement Group, a Toronto- and Boston-based consultancy. But Teltone's Merrow maintains that many customers are using DOVs to connect IBM front-end processors, which handle data-communications tasks for a

mainframe, and cluster controllers, which distribute signals from a communications line to the appropriate terminals. And by replacing limited-distance modems with DOVs, the cost and headaches of additional wiring are avoided.

If DOVs are used alone, a data network is formed in which every terminal station can only connect directly to the mainframe in a so-called point-to-point network. This makes communication with other terminals impossible. DOVs can, however, be used in conjunction with a data-only PBX, available from such vendors as Micom, Develcon (Warminster, PA), Infotron (Cherry Hill, NJ), Equinox (Miami), Codex (Mansfield, MA), Timeplex (Woodcliff Lake, NJ), and Gandalf Data. In this case, a terminal workstation can connect to other terminals or to higher-speed networks, such as an LAN, high-capacity T-1 lines, or an X.25 packet-switched network.

A data PBX and terminals equipped with DOVs can provide an inexpensive alternative to an integrated voice/data PBX, according to DOV vendors. A data network using DOVs and a data switch can be installed for about \$600 per line, while an integrated voice/data PBX may command as much as \$1,500 per connection. Maintaining separate switches for voice and data

can also add a measure of safety. For example, if a voice PBX fails, the data switch isn't affected, and vice versa.

Keeping voice and data independent can also ensure against the unpredictable performance of the integrated switch. In fact, some early purchasers found that voice capacity was the integrated PBX's only reliable feature. When Chevron Corp., the big San Francisco-based oil producer, bought a Northern Telecom SL-1 PBX three years ago, it had trouble getting the device to switch data. "The SL-1 wasn't functioning properly," says Robert Ward, a telecommunications analyst with Chevron. To remedy the situation, Chevron used Teltone's DCS equipment to channel data transmissions into Micom's Micro600 data switch. "It was easy to execute and they're very reliable," says Ward of the some 700 Teltone devices purchased. "We've had about a 3 percent failure rate during the entire time we've used them."

Chevron is the parent company of Chevron Research Co., a research-and-development center in Richmond, CA. Using the Teltone and Micom devices, employees at the development center can use personal computers or asynchronous terminals to communicate with Hewlett-Packard 1000 and DEC

(Continued on page 92)

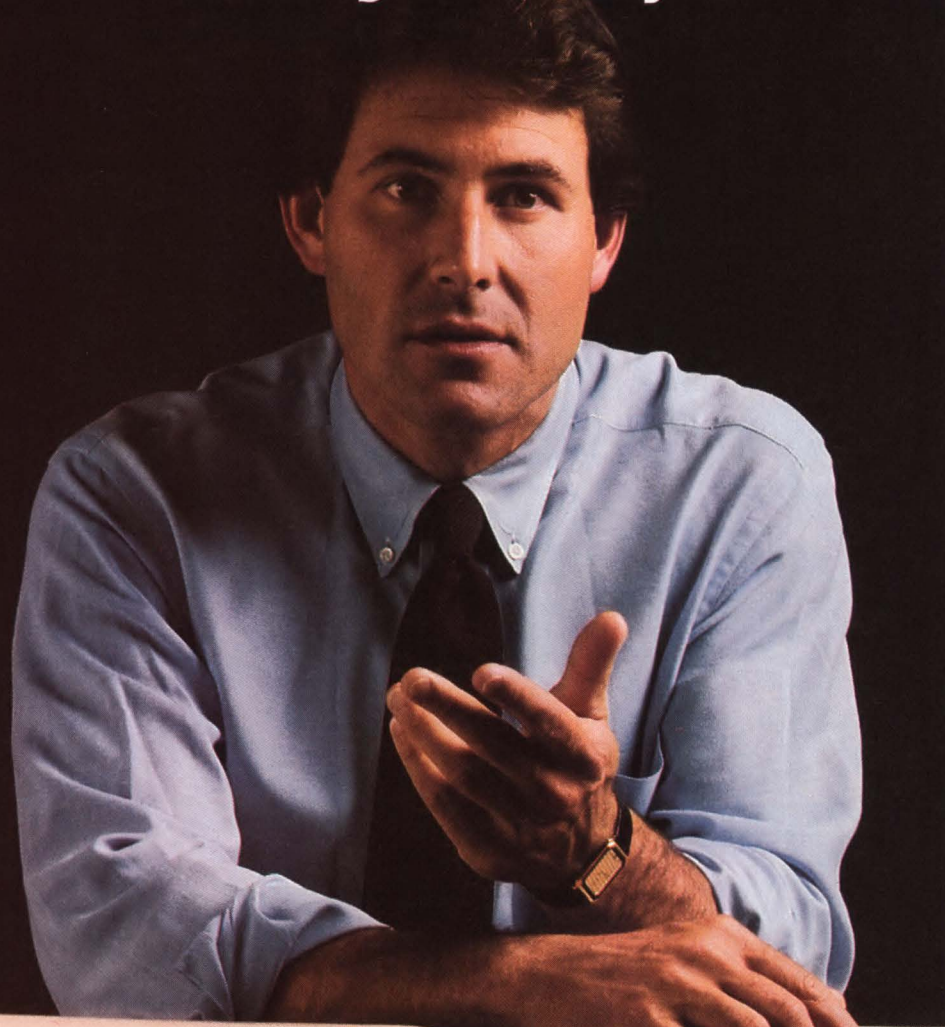
DATA-OVER-VOICE EQUIPMENT

Vendor	Product	Mode	Speed	Range*	Price**	Circle
Adminet (613) 230-7027	Simultaneous Modem	Async	9,600 bps	10,000 feet	\$495	401
Coherent Communications (516) 231-1550	Linemate 192	Async	19,200 bps	2.5 miles	\$400 to \$425	402
	Linemate 192	Sync	19,200 bps	2.5 miles	\$480 to \$500	
Energy Sciences (206) 881-2661	Data Over Voice Encoder	Async	9,600 bps	6,000	\$425 to \$500	403
Gandalf Data (312) 459-6630	Line Miser	Async, Sync	9,600 bps	15,000 feet	\$590	404
Micom (818) 998-8844	Instalink 460	Async	19,200 bps	6,000 feet	\$420 to \$500	405
			19,200 bps	15,000 feet	\$725	
Seiscor Tech. (918) 252-1578	IDVC-9600	Async, Sync	9,600 bps	17,600 feet	\$529	406
Tellabs (312) 969-8800	310 Datavoice	Async	9,600 bps	5,000 feet	\$425 to \$490	407
Teltone (206) 827-9626	DCS-2 DCS-2SE	Async	9,600 bps	1 mile	\$450 to \$500	408
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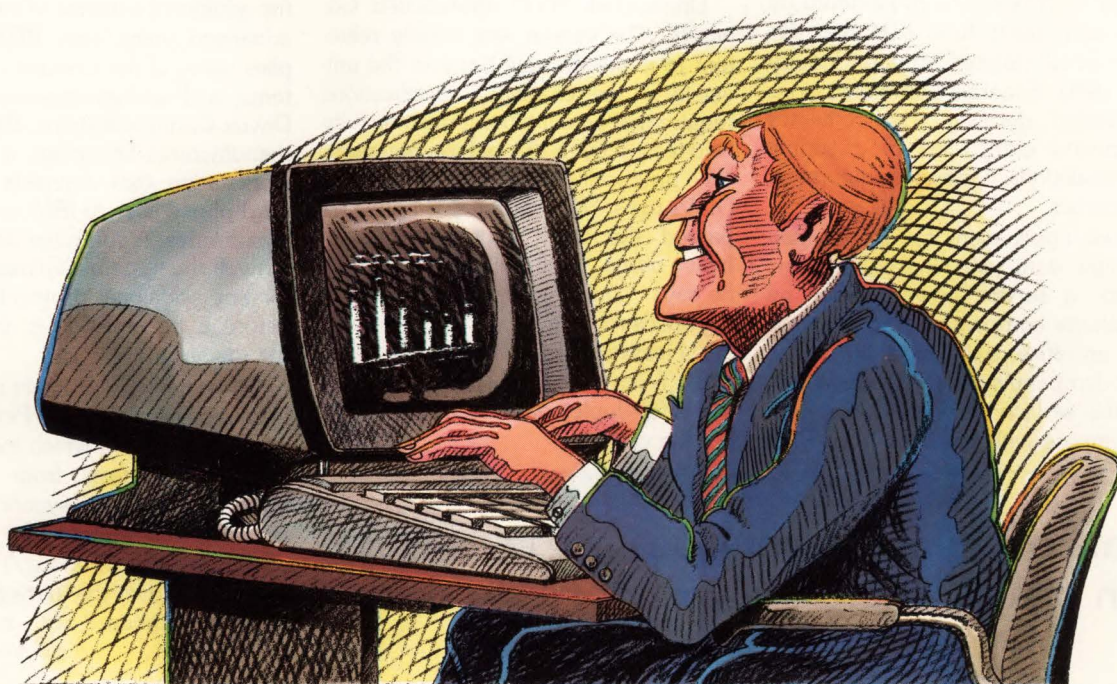
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(Continued from page 88)

VAX 11/70 and /780 minicomputers, other personal computers, and remotely located Amdahl mainframes.

Despite its numerous advantages, DOV can't be used on the public-switched network. Loading coils that upgrade transmission quality every three miles on local lines limit frequencies to the 4 KHz needed for voice transmissions. DOVs can, however, function if they're placed on an unloaded link within three miles of the local phone company's central switching office. Coherent Communications, a DOV vendor, is evaluating a pilot project in which a chain of gas stations will install terminals and DOVs to function as point-of-purchase devices, says Dennis McAlpine, director of marketing.

DOVs have also been considered as accessories for videotext computerized-information services. AT&T originally planned to offer DOV equipment for use with the Viewtron service located in Miami and operated by Knight-Rider. This idea was later discarded because the cost is prohibitive—the hardware alone costs \$600.

DOVs may yet get a chance to play a role in the local phone system. They can be used in combination with local-area data transports (LADTs), the specialized data services. But the development of LADTs has been hindered by formal complaints from IBM that this service would violate Computer Inquiry II, a 1980 Federal Communications Commission decision that regulates how phone companies may supply communications, computer equipment, and services.

Future applications for DOVs may also entail data switching on Centrex. Centrex, a service now provided by local phone companies, reroutes calls within an office, switching them at the phone company's central office. When, or if, this service becomes available, it will compete with offerings from PBX

manufacturers because DOVs can also be used to integrate data onto voice lines. Here again, development has been impeded by complaints about possible Computer Inquiry II violations.

Although DOVs are cheaper than fully integrated voice/data PBXs, they're not the most inexpensive choice available. For any building with enough installed wiring, limited-distance modems, often costing as little as \$100 apiece, can channel data to a PBX that can be switched to another location within an office complex. To do this, these modems require two additional phone extensions—one to receive data and the other to send.

For some networks, DOVs function as limited-distance modems. New York University's Manhattan campus has installed DOVs to be used solely as modems. The university's first attempt to use the units for simultaneous voice and data transmissions was a failure. "We jumped on the technology when it first came out because there are so many phone numbers in New York City and NYU's '598' was full," says Chris Duncan, NYU's senior telecommunications analyst. "We wanted to avoid additional line capacity. Unfortunately, we had trouble with the vendor's equipment. And it wasn't worth the time we needed to debug it."

Undaunted, NYU approached Coherent. The vendor was initially reluctant to make the sale because the university's purchasing specifications require that all equipment must be fully field-tested by NYU before payment. "We practically had to beg them to sell DOVs to us," Duncan says. But the unit passed the test, holding up under heavy usage. "Reliability's everything," he says. "During our registration period, heads roll if the system goes down." NYU leases a dedicated line from New York Telephone for \$18 a month, and sends full-duplex data streams throughout the campus.

An integrated voice/data PBX can become the locus for the coordination of voice and data.

DOVs can also serve as inexpensive replacements for synchronous modems. Chevron's Ward has considered using the Teltone units to supplant short-haul synchronous modems. According to Racal-Milgo, Sunrise, FL, prices range between \$700 and \$1,300. Ward noted, though, that DOVs lack the fault-diagnosis capabilities of synchronous modems and transmit over shorter distances.

While DOVs compare favorably with other equipment options, their purchase should only be considered after other choices for integrating voice and data signals have been evaluated. There are LANs and voice/data PBXs that can be used in conjunction with workstations that incorporate both computers and telephones.

Other equipment, like DOVs, takes advantage of the analog phone network. This equipment doesn't require the additional expense of an LAN or an advanced voice/data PBX, yet supplies many of the features of these systems, such as high-speed connections. Davox Communications, Billerica, MA, manufactures Davoxnet, a voice/data workstation that connects over standard phone lines to IBM or compatible mainframes. A controller device included with the system eliminates the need for any additional protocol conversion before a transmission is channeled to the mainframe.

Davoxnet can also gain access to information stored in IBM Personal Computers. Davoxnet, which includes a telephone and costs from \$2,500 to \$2,800, distributes synchronous data transmissions at up to 400 Kbps, or to 19.2 Kbps asynchronous. The data are transmitted over the extra pair of twisted wires, standard with many phone

(Continued on page 96)

Data-over-voice techniques are invaluable in offices where the cost of laying new wiring is prohibitive.

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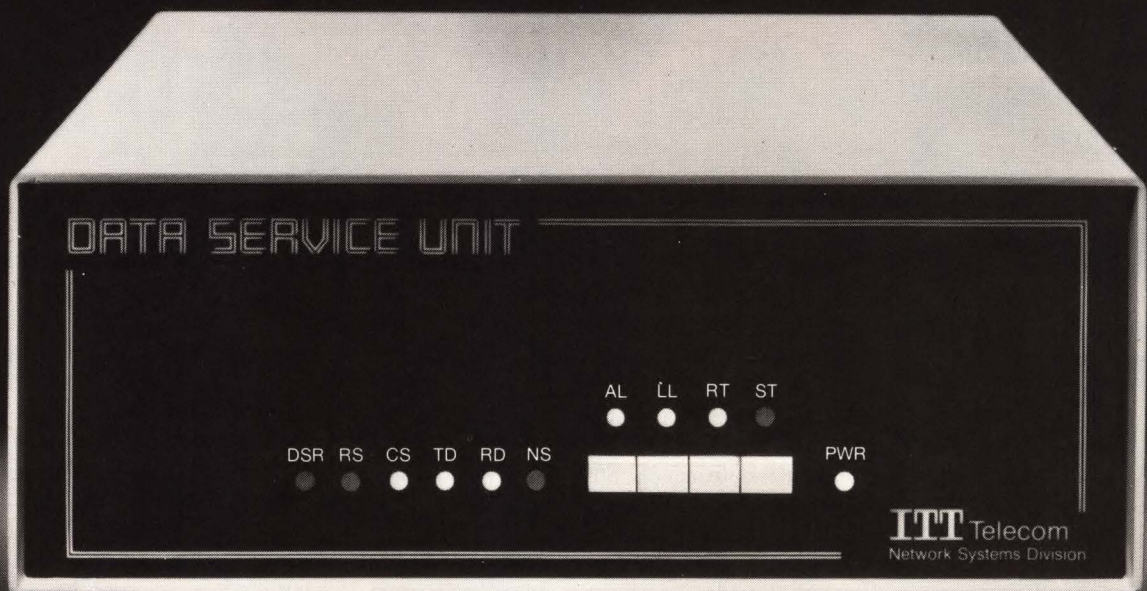
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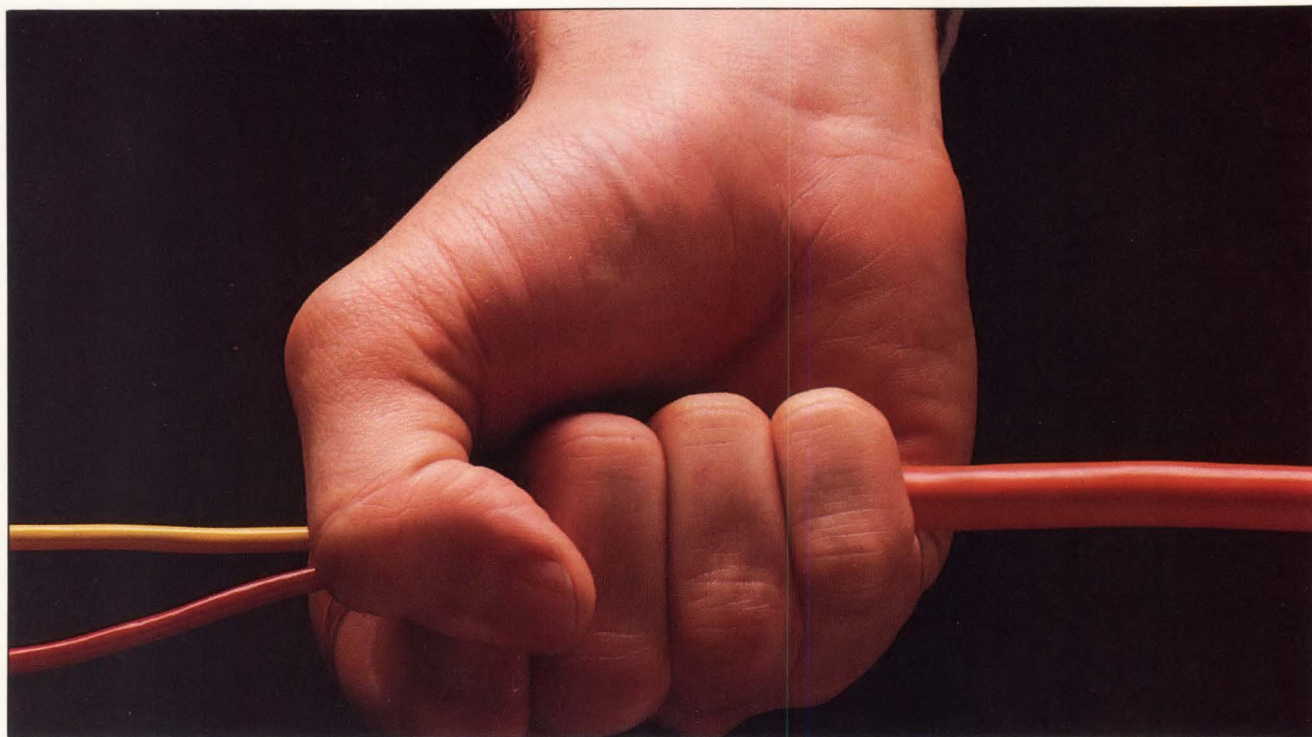
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(Continued from page 92)

systems. These wires provide support functions, such as lighting a phone console to indicate an occupied line.

In October, David Systems, Sunnyvale, CA, introduced its David Information Manager, targeted at furnishing the capabilities of a digital phone network and an LAN with existing PBX or Centrex facilities. According to the vendor, high-speed data—up to 2 megabits per second (Mbps), as well as low-speed asynchronous data—can be transmitted over existing twisted-pair wiring. The phone sets translate analog voice signals into digital code, and both voice and data are transmitted over phone lines to a digital switch that works in conjunction with an existing PBX. Cost per connection starts at \$1,200. "There's a big difference in the cash outlay," says Kevin Fong, David Systems' marketing manager. "You can install the number of stations you need without buying an entirely new PBX—and you don't have to worry

about installing cabling."

Several manufacturers, such as Houston-based Zaisan, supply analog workstations that integrate the functions of a telephone and a terminal. But to transmit simultaneous voice-and-data signals, an additional phone extension is required. Zaisan's workstation costs about \$1,000.

The decision to forego a corporate-wide digital communications system—be it an LAN or voice/data PBX—should be carefully weighed. Even if the capabilities of an all-digital system aren't currently required, they probably will be if your office becomes heavily automated. The MIS and telecommunications staffs should plan for this eventuality. "An end-to-end digital network is a key issue," says Gerald Mayfield, a Stamford, CT-based consultant for the DMW Group, Ann Arbor, MI.

DOV users are aware that the spread of digital networks is near, and many believe DOVs fit in well as an in-

terim measure. "We've been using Gandalf's Line Misers for about a year," says James W. Wood, industrial engineer at the U.S. Army's Edgewood Chemical Research and Development Center, Aberdeen Proving Ground, MD. "We got them because we lacked data circuits and we had to quickly hook up a lot of terminals. We once considered giving Misers to everyone, but it's a very expensive way to put in new circuits. To do this, we would have had to attach extra circuitry near the PBX, and we didn't want to fool around with the phone system."

Edgewood has found a solution by gradually installing T-1 multiplexers from Gandalf and Teltone to set up a high-speed data network. "A system like ours takes longer to install, but you can keep on adding new stations," Wood says. "It's also easier to maintain. Costs are about \$200 per connection with Gandalf's digital switch, the PACX."

Wood is quick to add that Edgewood's experience with DOVs hasn't been trouble-free. Until corrective filters were installed, the Gandalf DOVs generated interference on phone extensions that were shared by up to 12 Edgewood employees. "A couple of garbage characters would ap-

In-place analog phone lines maybe the simplest way to integrate voice and data networks.

pear on the screen when the phone's buttons were pushed," Wood says.

Manufacturers of LANs and voice/data PBXs, acknowledging that their products have not yet gained full acceptance, bide their time. The spread of personal computers has created a need for sharing files among many computers. DOVs, with top network speeds of 19.2 Kbps, prove inadequate, says Peter Janca, a DEC marketing manager. "You're probably going to want a voice/data PBX or an LAN," he says. For example, NYU's data-communications requirements have increased so rapidly that DOVs may eventually be replaced by an LAN, says Duncan.

The responsibility for maintaining analog phone equipment, like DOVs, has traditionally belonged to the telecommunications manager. In this case, DOVs have become a drawback because analog phones maintain an artificial separation between telecommunications and data processing. "The ultimate goal of office automation is to remove this separation," says consultant Angus.

An integrated voice/data PBX, on the other hand, can become the locus for the systematic coordination of voice and data needs, such as network troubleshooting (much in demand since the breakup of the Bell System); gateways to T-1 multiplexers; LANs; and mainframes. Andrew Balaschak, Rolm Corp.'s group-products manager, says the notion that DOVs cost substantially less than voice/data PBXs, priced between \$1,100 to \$1,400 per connection, is misleading because the price quoted for DOVs isn't usually included when determining the cost of an existing voice PBX. Once the cost of the PBX is added, the price difference between the two systems evens out, he says.

The need for high-speed, error-free transmissions coupled with available digital technology assures a future in which door-to-door digital networks will become the norm. Moreover, the capabilities of integrated digital technologies, which may eventually lead to esoteric applications like voice-to-text conversion, have just begun to be tapped. "If a corporation really wants

voice and digital integration, a voice-data PBX is the only way to go," says consultant Angus.

So where does DOV, a known, if imperfect system, fit in? DOVs provide a bridge, a temporary and inexpensive way to integrate voice and data over the existing phone lines until full-scale

digital systems can be tested and installed. ☐

In the next issue, Part II of this series will cover networking standards, such as ISDN. Part III, appearing in the March 12 issue, will focus on voice/data terminals.

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DID YOU RAISE THE ANTE IN '84?

1984 wasn't the year for big cuts or big bucks, say MIS/dp managers. Here's the bottom line.

by David Whieldon, Senior Editor

The good news for MIS/dp managers last year came in the form of fatter pay checks. The bad news: Despite a booming economy, MIS/dp management salaries rose more modestly than in previous years. According to *Computer Decisions'* sixth annual Salary-Status Survey, which was conducted by Abbott, Langer & Associates, MIS/dp managers' 1984 salaries rose an average of 6.6 percent, a figure that corresponds closely to findings of studies of other professions and that indicates MIS/dp management is doing just as well in terms of salary increases as other managers and executives.

Although MIS/dp managers didn't see as big a salary hike in 1984 as they did last year and the year before—7.8 percent and 9.1 percent over one year respectively—few had to fear wage freezes and cuts, a change from previous years. About one in three manag-

ers received raises between 5 percent and 7.9 percent. Only 14.4 percent of the survey's 1,328 respondents acknowledged not having received raises during 1984, and only 1.3 percent took pay cuts.

Other types of cash compensation, such as bonuses, profit-sharing, and stock options typically ranging from \$1,500 to \$5,000, were received by slightly more respondents in 1984 than in 1983. According to the survey, last year one in three managers benefited from cash bonuses, one in four took part in a profit-sharing plan, and one in five profited from stock options. Cash bonuses and profit-sharing were most common in the manufacturing and processing, finance, wholesale and retail trades, and in construction, mining, and agriculture.

Although the gains in cash compensation were modest at best in 1984, more respondents than ever benefited

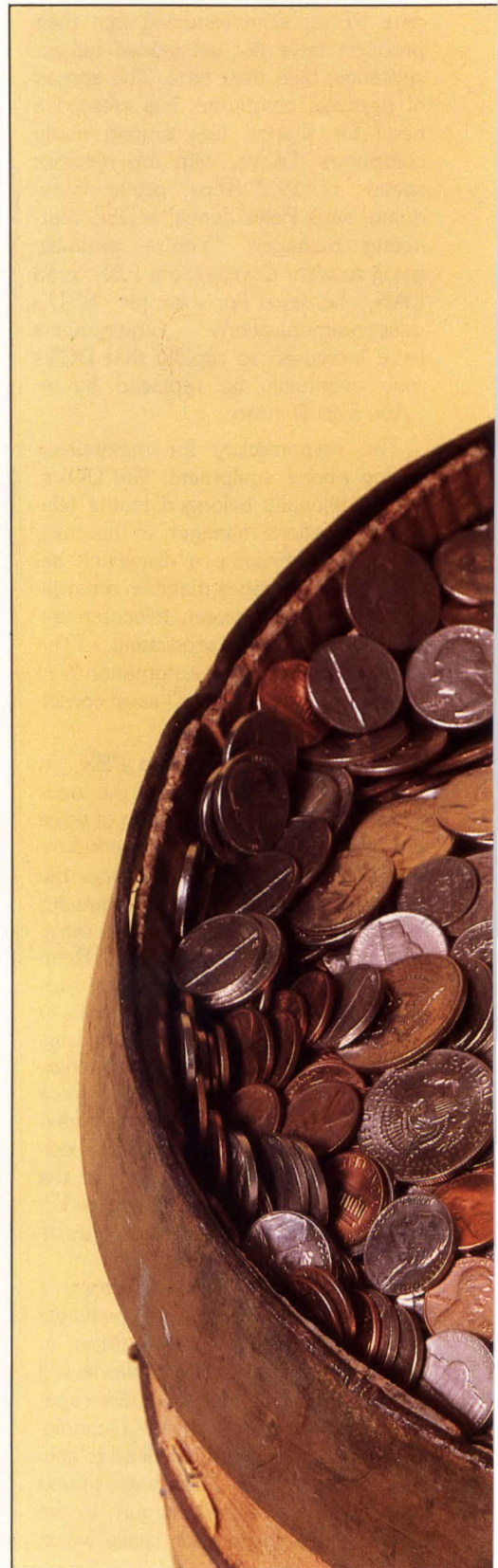


Photo by Rick Barrick



SALARY SURVEY

from indirect remuneration. One in three managers reported that their club and society memberships were paid for by their employers, as opposed to one in four the year previous. There was an even bigger increase in reimbursements for moving expenses, with the percentage of those covered doubling in 1984 to almost three in five. In addition, 25 percent of the respondents said their employers provide investment-fund management, an increase of 15 percent from 1983.

In 1984, according to the survey, an MIS executive (MIS/IS manager) typically earned \$45,000 annually nationwide. The median for MIS/dp managers was \$39,200. The typical salary for data-processing managers was \$36,000. As the accompanying charts indicate, salaries varied regionally and

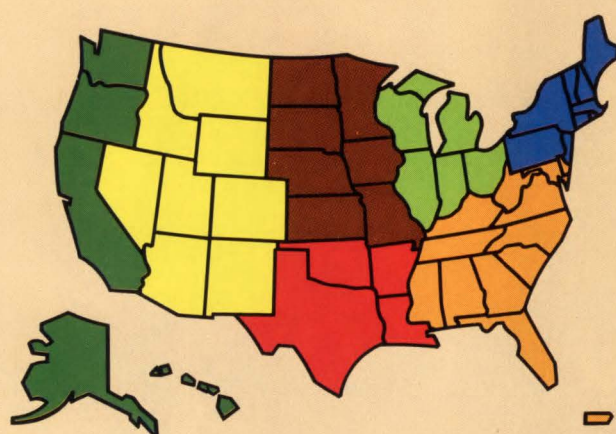
from one metropolitan area to another. They varied, too, by kind of organization, by sales volume or total assets, by MIS/dp budget, number of employees, and number of technical employees supervised. Organizations in banking and finance tend to pay MIS/dp managers best, followed by those in manufacturing, processing, and extraction—a trend noted in past surveys. In addition, as a rule, the more money an organization handles and the more employees it has, the higher is the salary of its MIS/dp managers. For instance, a corporation with an annual MIS/dp budget of \$10 million paid its MIS/dp manager more than twice as much as a corporation with a budget of less than \$100,000.

Just who is the typical MIS/dp manager? According to the survey, the

The median salary for MIS/dp managers was \$39,200.

MIS/dp Everyman is a man in his 40s who has been working in MIS/dp for about 13 years. He works for an organization that has a median of \$223,976,000 in sales and a median MIS/dp budget of \$854,546. (The average budget—all budget money divided by the number of respondents—was in excess of \$5.5 million.) Slightly more than 70 percent of the respondents are in charge of departmental or organizational dp or organizational MIS

REGIONAL AND METRO-AREA SALARIES



Overall median salaries

- Top MIS/IS executive \$45,000,
- Top MIS/dp manager 39,200, ■ Top dp manager 36,000

■ Northeast	N/A	■ Midwest	N/A	■ Southwest	N/A	■ Pacific	N/A
	\$39,000		\$40,148		\$36,500		\$45,500
	30,500		31,360		33,000		41,000
New York City	N/A	Ohio	N/A	Dallas-Fort Worth	N/A	San Francisco	\$52,000
	\$55,600		\$33,000		\$37,500	Oakland	N/A
	53,850		N/A		N/A		N/A
Philadelphia	N/A	Detroit	N/A	Houston	N/A	Los Angeles	\$54,816
	\$40,675		\$38,000		\$38,250	Long Beach	41,000
	33,900		N/A		N/A		40,000

Note: The regional salary figures, shown without labels, are median salaries in small towns up through moderate-size cities—and are typically lower than salaries in large urban centers.
N/A = not available

SALARY SURVEY

and 60 percent supervise one to nine employees. Three out of five MIS/dp managers surveyed say they would prefer staying in MIS/dp rather than moving into general management, but the majority would accept an MIS/dp position at another organization if the incentives were attractive enough. Among the chief incentives, a substantial pay increase was ranked first by 94 percent of those surveyed, followed by bonuses, greater challenge, more autonomy, profit-sharing, and better retirement benefits.

However, MIS/dp managers' willingness to change jobs for better pay should not be confused with desire. In 1984, only three percent of the respondents said they switched jobs for a salary boost. One manager reported that

she fared very well by so doing. Now in charge of MIS for a rental organization in a southwestern city, this young woman, still under 30, was offered a raise to move and has since received a second raise. Her employer increased her previous salary by 17 percent, bringing her present earnings to between \$30,000 and \$40,000. Would she switch jobs one more time? Yes, but only if she were offered between 23 percent and 26 percent on top of her present salary.

Although this manager's experience is the exception rather than the rule, her case illuminates the incongruity between what most managers say they are willing to do—change jobs for more pay—and what they do—remain where they are. Probably the same fac-



tors that have kept pay hikes low, such as the cooling of inflation and the stabilization of the MIS/dp job market, have kept managers from seeking more lucrative positions. The era of the runaway pay scale for MIS/dp talent appears to have ended, except, perhaps, in metropolitan areas like Dallas-Fort Worth, where MIS/dp job opportunities outnumber applicants.

Yet, the "playing it safe" strategy only partially accounts for MIS/dp managers' conservatism. The survey found that these managers are, indeed, content with their jobs and, although they believe that they are under more stress than general managers, they perceive their salaries to be "better than others." With the exception of 6.8 percent of the respondents who received promotions as well as raises, most of those surveyed received more money for doing the same work.

Just as the decline of cash compensation percentage-wise reported by MIS/dp managers is in keeping with national trends, so is the reduction of benefits—specifically, the extent of medical insurance coverage provided by employers—noted by the respondents. Although more managers than ever are receiving benefits of every kind and, according to the American Society of Personnel Administration, benefits now boost salaries by about 37 percent, one respondent in four from manufacturing and processing industries and one in three from the fields of finance, insurance, and government had to take some kind of cut in benefits, which indicates that upper management across the board is trying to keep a lid on the costs of medical and dental insurance. According to the survey,

WHICH INDUSTRIES PAY?

	Top MIS/IS executive	Top MIS/dp manager	Top dp manager
Banking, finance	N/A	\$41,200	\$31,380
Manufacturing, processing, extraction	\$45,000	39,786	35,500
Health services	N/A	33,750	33,000
Merchandising (wholesale, retail)	N/A	N/A	32,750
Government (including military)	38,693	34,650	N/A
Education	40,325	37,500	32,500

N/A = not available

BIG SALES—BIG CHECKS

Manufacturing, processing, and extraction gross sales	Top MIS/IS executive	Top MIS/dp manager	Top dp manager
\$100,000,000 to \$499,999,999	N/A	\$52,000	\$45,000
\$25,000,000 to \$99,999,999	N/A	40,000	36,500
Other than manufacturing gross sales			
\$100,000,000 to \$499,999,999	\$56,808	47,500	41,862
\$25,000,000 to \$99,999,999	44,500	42,000	36,044

N/A = not available

(Continued on page 104)

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SALARY SURVEY

(Continued from page 101)

managers in the south Atlantic states and mountain states saw the biggest reduction in benefits; those in the Pacific states were least affected.

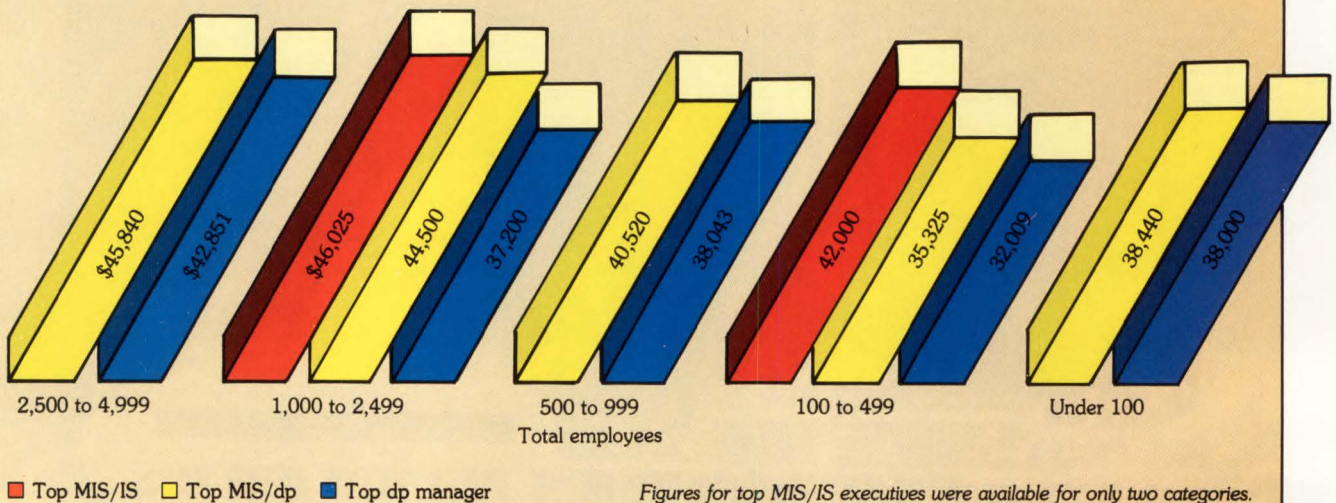
Like many large corporations, Southland Corp., the Dallas-based operator of the 7-Eleven convenience-store chain, has altered its benefits plan. "In 1983, we raised the deductible for medical coverage from \$100 to \$150," says Matthew A. Sauer, man-

ager of compensation and benefits. "We also instituted a hospital deductible, something we'd never had before. We changed our coinsurance, too, from 80 percent paid by the company and 20 percent paid by the employee to 70 percent and 30 percent respectively. Moreover, hospital stays have to be preauthorized by an outside agency before they are paid for. If approved, they'll be paid for at the 80 percent/20 percent rate, but if not, the 70 percent/

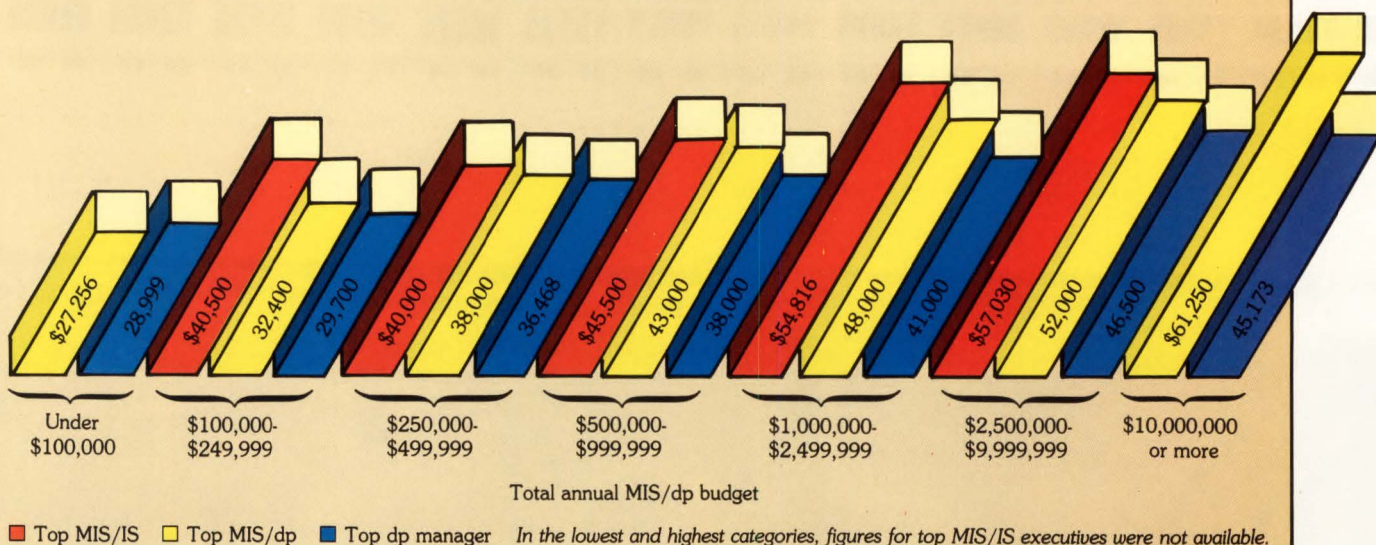
30 percent ratio applies. I see other corporations moving in this direction."

Does the direction corporations such as Southland are taking portend the worst for benefits packages? Not necessarily. In many categories, including life-insurance and dental coverage, the number of managers insured rose in 1984. An even more significant finding, however, is the fact that about 12 percent of those surveyed enjoy a cafeteria-style benefits plan, which al-

MORE PEOPLE—MORE PAY



BIG BUDGETS—BIG PAYCHECKS



SALARY SURVEY

lows them to choose the benefits they need most. A small but growing trend nationally, this option may reflect a movement away from the "all or nothing" philosophy that holds sway on both sides of the negotiating table. It also reduces the number of employees covered by two benefits packages, such as working couples who carry full medical coverage for themselves and their children under two separate plans. Not only is this flexible plan more cost-effective for employers, but it allows employees to substitute a desirable benefit for a duplicated benefit.

Although the reduction of medical benefits nationwide—a reaction to the soaring costs of health care during the last decade—is irrefutable, MIS/dp managers who work for large organizations with large revenues will fare better than those who work for smaller firms, which suggests that it helps to be in the right place even at the wrong time. This adage holds true for other benefits as well. For example, more than 90 percent of MIS/dp managers in the fields of finance, insurance, government, and education are offered pension plans, as opposed to slightly more than 70 percent of those working in wholesale and retail trades and in construction, mining, and agriculture. In addition, 96.6 percent of MIS/dp managers at corporations with sales of \$1 billion or more can look forward to retirement payments, while only 71.7 percent of MIS/dp managers in corporations with revenues of less than \$5 million can do so.

On balance, MIS/dp managers' direct and indirect rewards are substantial. 1984 was a year of gains; however modest. All signals suggest that as the economy slows in 1985, the good news will continue. □

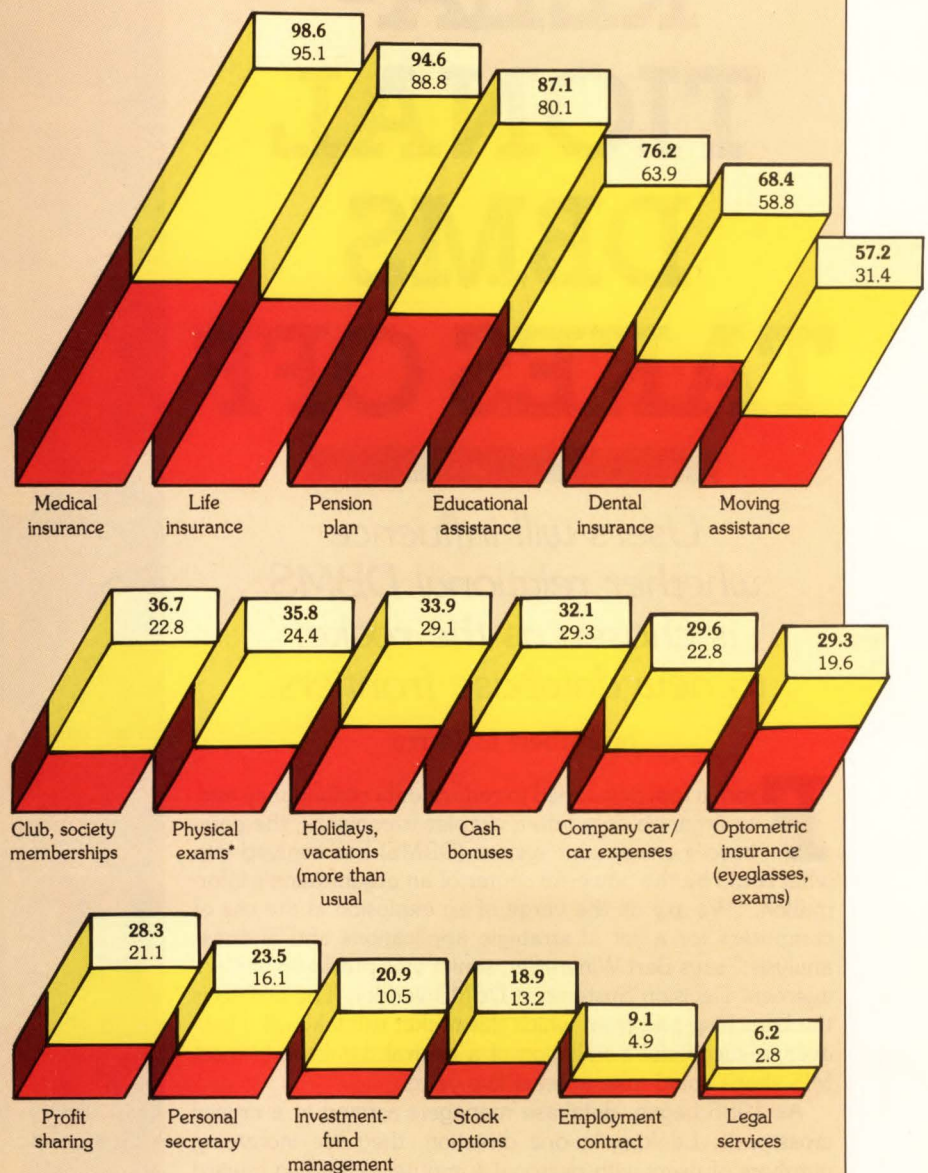
Computer Decisions' sixth annual Salary-Status Survey was mailed to 27,206 randomly selected MIS/dp managers in 50 states and Puerto Rico who constituted about 45 percent of its circulation list. The survey, which was supervised by Abbott, Langer & Associates, a consulting firm, consisted of two questionnaires: a personal questionnaire and a compensation questionnaire.

Abbott, Langer & Associates mailed

the survey to the managers on August 1, 1984. Recipients were requested to return the forms by September 20 with data effective August 1. The responses included 1,328 personal questionnaires and 1,089 compensation questionnaires.

For a complete listing of the findings of the survey, a report, entitled "Compensation in the MIS/dp field, second edition," is available for \$250 from Abbott, Langer & Associates, 548 First St., Crete, IL 60417. The phone number is (312) 672-4200.

BENEFITS PERK UP



■ % of managers in 1984 ■ % of managers in 1983

*Other than routine, these exams include stress tests and cardiovascular tests.

RELATIONAL DBMS TAKES OFF

*Users will influence
whether relational DBMS
is chosen as the rocket
to new database frontiers.*

by Robert L. Perry

From a tool developed to reduce data redundancy and to organize data into a simpler framework, the database management system (DBMS) has evolved into what could be the powerful center of an organization's information. "We are on the verge of an explosion in the use of computers for a set of strategic applications and business analysis," says Bert Winemiller, senior vice president of Management Decision Systems, a DBMS vendor. The DBMS is the launching pad from which this rocket will take off. However, a successful installation of a central database in most MIS shops could take at least five years.

As 1985 began, database managers arrived at a crucial crossroads. Looking in one direction, they see increasing numbers of users with personal computers charging toward the database. In another direction, programmers are carrying ever heavier burdens of application backlogs. In a third, corporate executives are demanding use of the DBMS for strategic advantage. In a fourth, vendors are selling truly im-

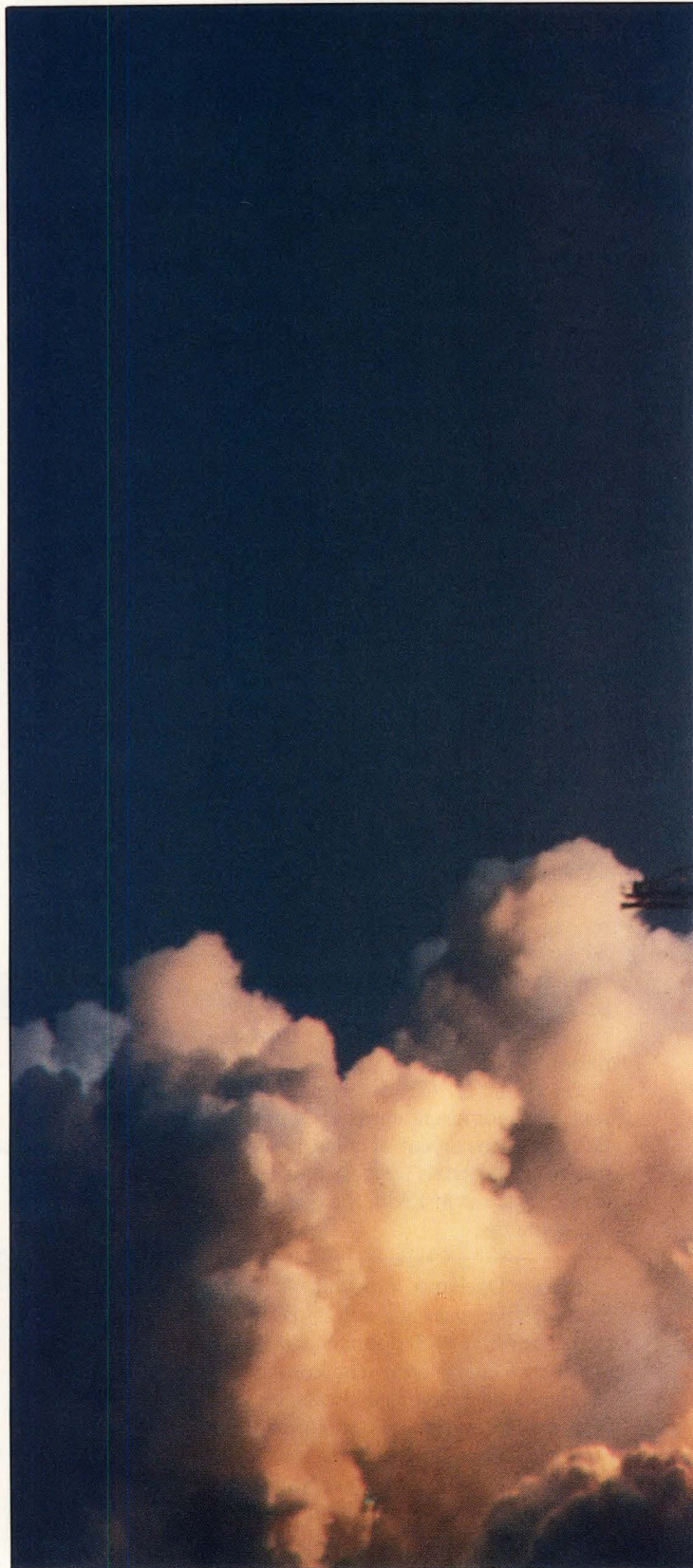


Photo by John W. Alexanders

proved DBMSs with families of applications development tools, micro-to-mainframe links, integrated applications packages, and bridges and migration software for links to older operating environments and DBMSs.

In the meantime, the countdown has begun. One telling sign is the frequent acquisition of vendors that produce applications software by vendors that produce DBMSs. The database vendors want to integrate applications software into their database systems.

Nonetheless, there is some contention over which type of DBMS will best serve the objectives of user organizations. Until recently, DBMSs for large systems had been oriented toward two methods: hierarchical, in which information is organized in rigid, tree-like structures and accessed by climbing from branch to branch; and network, which resembles, say, a spider's web, and allows more than two paths out of each tier or level.

For the past three years, however, relational DBMSs—based on a flexible, row-and-table format—have been vying for dominance. Says Stephen J. Gerrard, Applied Data Research (ADR) DBMS product marketing manager, "Last year, the relational concept solidified as the preferred approach, although there is a lot of confusion over exactly what a relational DBMS is and how it should be used."

The confusion and controversy will linger, but the trend is toward relational DBMSs. Gerrard stresses that ADR's experience has shown that the relational database is appropriate for all applications—from the simplest ones built by end users to high-volume applications involving millions of transactions per day. He notes that software developers and programmers find the relational DBMS far easier to use and, thus, the best tool to reduce the monumental applications backlogs found in most large MIS shops. In fact, many relational-database vendors tout productivity improvements on the order of 10 to 20 times over hierarchical systems.

Relational systems are appealing because hierarchical and network sys-

DBMS UPDATE

tems require in-depth knowledge of how to navigate the database structure with programming languages and of how to use the system's indices. A relational system does not require this knowledge. It allows the user to access information without having to go through a particular program to find data entered for that program. The user doesn't need to understand how the data are arranged within the database. The query language itself contains all of that information; thus, a query, in effect, automatically searches out data.

A relational DBMS also processes

records a set at a time. The computer will search for and identify all members of the sought-after set; for example, all past due accounts. By contrast, hierarchical DBMSs examine each record, and identify whether it is past due. If it is not, the system goes to the next record. If overdue, the system sends out a notice.

In addition to these time and money-saving attributes, the relational DBMS has a formal theoretical foundation, which provides rules for structure, maintenance, and integrity (preserving the data against unauthorized changes).

More important, organizations can add

fields, build new access paths, and split tables without disturbing other programs or data stored in the database.

Other essential elements in a relational DBMS include:

- A user-friendly relational-based language for executing queries and developing applications.
- Capacity for allowing relationships among data to be defined by users.
- Data are addressed by their value in tables, not by their positions within a field. The program will search for information regardless of where it appears in the field.

(Continued on page 110)

DBMS SOFTWARE

Vendor	Package	Requirements	Price	Circle
Advanced Data Mgt. (609) 799-4600	DRS	IBM 370, 43XX, 30XX under TSO; DEC VAX and PDP-11	\$15,000 per module.	409
Amcor Computer (502) 491-9820	Ambase	DEC VAX and PDP-11 minis	\$10,000 to \$37,000	410
Anistics (415) 965-9912	Aris	DEC System 20	\$50,000	411
Applied Data Research (201) 874-9000	Datcom/DB	IBM mainframes under OS or DOS	\$61,000 to \$104,800	412
Batelle Software (614) 424-5524	Basis Basis-DM	Many mainframes and minis DEC VAX	\$26,000 and up \$29,000	413
Cincom Syst. (513) 662-2300	Total	IBM mainframes; PCMs under MVS, MVS/XA, VS/1, or VSE	\$59,500 DOS	414
	TIS	IBM mainframes under MVS or VS/1	\$180,000	
	Ultra	DEC VAX-11/782 11/782 under VMS	\$49,400 to \$74,900	
Computer Assoc. Int'l. (516) 333-6700	CA- Universe Release 2.1	IBM mainframes under DOS/VS	\$110,000	415
Computer Corp. of America (617) 492-8860	Model 204	IBM mainframes and PCMs	\$150,000/DOS \$195,000/CMS \$235,000/OS	416
Contel Information Syst. (301) 654-9120	RTFile	DEC minis and micros	\$1,500 to \$8,500	417
CRI (408) 980-9898	Relate/3000	HP 3000, Series 37 office computers	\$9,950 to \$18,500	418
Cullinet Software (617) 329-7700	IDMS	IBM mainframes and PCMs	\$100,000 to \$250,000	419
	IDMS/R	Same systems	\$55,000	
Cytrol (612) 835-4884	CYX-DB	DEC PDP-11 DEC VAX	\$17,000 \$25,000	420
D&B Computing Svcs. (203) 762-2511	Nomad2	IBM under VM/CMS, or MVS/TSO	\$130,000	421
Database Syst. (602) 265-5968	Transact Facts	DEC VAX, Prime minis Prime minis	\$12,500 \$15,000	422

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cient, cost-effective productivity tools. From full-capability relational processing and elegant, uncomplicated screen painting to everyday English, menu-driven reporting, and micro-to-mainframe links, RAMIS II continues to stay ahead of the competition in quality, ease of use, and innovation.

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DBMS UPDATE

● A data-manipulation language (DML) that uses only four commands: select, update, delete, and modify.

● The highest degree of data independence, so that relational DBMSs are best for distributed databases and distributed data-processing systems and networks.

Until a few years ago, most organizations installed hierarchical and network DBMSs at considerable cost and with much difficulty. Most of those systems remain in place and will be used for years to come. A principal reason for this is IBM's intention to support its

dominant hierarchical DBMS—Information Management System (IMS)—with its new relational database, DB2, and its new version of its query language, SQL/DS.

Even though there are so many advantages to relational systems—so many that it would appear that they will quickly drive the other methods out—some vendors, analysts, and users disagree. They see fundamental disadvantages to the relational DBMS as well as reasons that the older DBMS systems will continue to be useful for years to come.

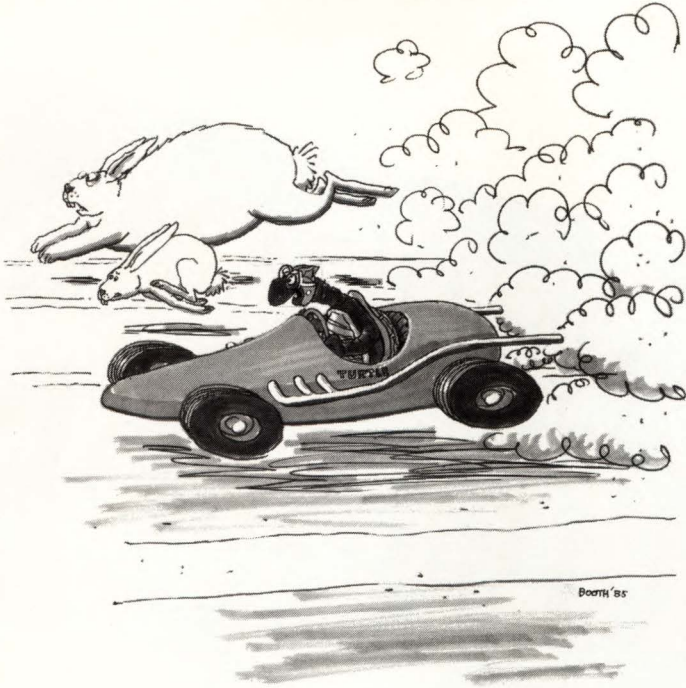
First and most important, almost 15,000 organizations already have IBM's IMS or similar hierarchical systems. Glen Noreen, a consultant with Input Inc., a market-research house based in Mountain View, CA, found in a recent study that "many knowledgeable executives want integration of applications to the databases they already have. There is very high resistance to changing to a new DBMS for applications. Companies with established DBMSs gave the impression that it does not matter to them whether the

(Continued on page 114)

DBMS SOFTWARE

Vendor	Package	Requirements	Price	Circle
Economic Sciences (415) 841-6869	EMS	IBM 43XX and up; and PCMs	\$50,000 to \$125,000	423
Exact Syst. & Programming (914) 273-8100	DNA-4	Data General under AOS/VS or AOS/RDOS	\$2,000 to \$63,000	424
Geisco (301) 340-4000	MIMS	IBM mainframes	\$80,000 to 130,000	425
Henco Software (617) 890-8670	Info	DEC VAX; Harris 1000; Honeywell DPS 6; Prime 50; IBM mainframes under VM/CMS	9,800 to \$30,000	426
Infodata Syst. (703) 578-3430	Inquire	IBM mainframes and PCMs under MVS, VS1, and VM/CMS	\$55,000 and up	427
Information Builders (212) 736-4433	Focus	IBM mainframes and PCMs under VM/CMS, MVS/TSO, and VS1	\$66,000	428
	PC/Focus	IBM PC XT and compatibles	\$1,595/unit	
Logica (212) 599-0828	Rapport	IBM mainframes under VM/ ®CMS Control Data Cyber; DEC VAX; and Prime minis	\$10,000 to \$25,000	430
Logical Software (617) 864f-0137	Logix	DEC PDP-11 and micros	\$3,000	431
Mgt.Decision Syst. (617) 890-1100	Express	IBM mainframes	\$65,000	432
Mathematica Products Grp. (609) 799-2600	Ramis II	IBM mainframes under MVS, VMS, DOS/VSE, OS, or VM/PC	\$45,000 to \$90,000	433
McDonnell Douglas Info. Svcs. Grp. (408) 446-6000	Magnum	DEC VAX-11/780 to /785 DEC VAX-11/730 to /725 DEC VAX-11/750	\$30,000 \$20,000 \$25,000	434
On-Line Software Int'l. (201) 592-0009	Freestyle	IBM mainframes and PCMs	\$30,000 \$20,000 2nd module ½ price	435
Oracle (415) 854-7350	Oracle	Many mainframes and minis	\$12,000 to \$96,000	436
Peregrine Syst. (714) 855-3923	Falcon	IBM under MVS Any Unix-based syst.	\$60,000 to \$90,000 \$15,000 to \$30,000	437

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*IBM Software Environment/CICS Marketplace Study, September 1984.

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DBMS UPDATE

(Continued from page 110)

DBMS is relational or hierarchical as long as it continues to get the job done at a reasonable price."

In addition, relational systems consume far more resources than older DBMS designs. User-friendly query languages and applications-development languages, to name a few, will force organizations to invest in much more hardware capacity than required by the old DBMSs. In fact, another Input consultant, Tom O'Flaherty, director of software programming, suggests that IBM's development of DB2 and its adoption of the Intellect fourth-generation language are calculated to sell more IBM "hardware."

Detractors also point to the difficulty in guaranteeing data integrity and se-

curity with relational DBMS. If any user with a modicum of training can gain access to the database, then procedures to protect the database must be that much stronger. Yet, many relational systems have weak security provisions, according to an evaluation of more than 100 relational DBMSs by George Koch, president of Koch Systems Corp., a software house based in San Francisco.

The relational DBMS may not be for everyone—at least not yet. In the short term, network and hierarchical systems may be most helpful when:

- Most of the workload requires an updating of data organized in standard formats.
- The relationships among records are predictable and unchanging, such as

those in a manufacturing system that link order entry, inventory, materials planning, assembly line, and similar functions.

- The MIS staff has experience in establishing and maintaining hierarchical and network DBMSs.

An organization may do best to consider a relational DBMS when:

- Ad hoc queries, not highly structured, repetitive programs, constitute most of the input and output to and from the database. This becomes especially important as managers demand micro-to-mainframe links.
- A corporation must overhaul its computer systems. It should consider switching to a relational system at the same time.

(Continued on page 116)

DBMS SOFTWARE

Vendor	Package	Requirements	Price	Circle
Pro-IV (617) 486-9621	PRO-IV	DEC VAX and Micro-VAX; PDP-11/24 to /70	\$10,000 to \$20,000	438
Relational Database Syst., (415) 424-1300	Informix	Many Unix-based systems	\$450 to \$1,695	439
Relational Tech. (415) 845-1700	Ingres	DEC VAX-11/730 DEC VAX-11/750 to /780	\$40,000 \$20,000	440
Rexcom (713) 464-8268	Rexcom D Rexcom E	Prime and Harris minis Same systems	\$34,000 \$18,000	441
SAS Inst. (919) 467-8000	System 2,000	IBM mainframes; Sperry 1000 series; Control Data Cyber and 6000	\$50,000 to \$165,000	442
Scientific Info. Retrieval (312) 475-2341	Sir/DBMS	Many mainframes and minis	\$6,000 to \$60,000	443
Signal Tech. (805) 683-3771	Omnibase	DEC VAX	\$17,000 to \$40,000	444
Software AG (703) 860-5050	Adabas Natural	IBM manframes and PCMs; DEC VAX	\$106,000 and up \$50,000 with Natural 4GL	445
Software House (617) 661-9440	System 1022 System 1032	DEC PDP-11, System 10 and 20 DEC VAX	\$22,500 to \$32,500 \$15,000 to \$40,000	446
Systemhouse (703) 276-0500	Minisis	HP 3000	\$50,000	447
Tominy (513) 568-2424	Data Base Plus	IBM mainframes with CICS IBM Series /1, System/34 and /36; DEC VAX; Perkin Elmer 732-832	\$25,000 to \$72,000 \$8,000 to \$29,000	448
United Software Syst. (213) 556-0664	Clio	IBM 370, 43XX, 30XX, and PCMs; DEC VAX	\$80,000/OS \$70,000/DOS	449

1985 National Database & 4th Generation Language Symposium

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Dr. George Schussel, *President, Digital Consulting Associates, Inc.*, is one of the best known and most widely respected lecturers on DBMS and 4th Generation Languages. Dr. Schussel will lead the Management Concepts Session on DAY 1 of the Symposium with the expertise and experience which prompted ICP INTERFACE MAGAZINE to call him the "Guru of Data Base Management".

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SOFTWARE PRODUCT PRESENTATIONS

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Applied Data Research	Linkware Corporation
Battelle	Logica Database Products
Burroughs Corp.	Mainstay Software
CGI Systems	Management Decision Systems
Cincom Systems	Mathematica Products Group
Cognos Corp.	McCormack & Dodge
Computer Associates	National Information Systems
Computer Corp. of America	Oracle Corp.
Computer Techniques	Perkin-Elmer
Comshare	Relational Database Systems
Contel Information Systems	Relational Technology
Cortex	Rexcom Systems Corp.
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Data Language Corporation	Signal Technology
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(Continued from page 114)

● User-friendliness is important so employees working in an information or applications-development center can quickly design or implement new applications.

● An organization wants to create one centralized database from which employees can obtain all or most of the information they need.

However, others believe the relational concept, joined with good fourth-generation languages, will reduce the backlog, develop an awareness of need, and uncover a latent demand for applications among end users. "During the next two to four years," says Andrew Abraham, vice president of marketing and development, D&B Computing Services, "the number of potential end users for DBMSs will continue to grow by leaps and bounds."

Such leaps are quite possible because the tabular relational model is so similar to the electronic spreadsheet's row-and-column format that three million managers with desk-top personal computers are accustomed to. These users can quickly adapt to the relational DBMS.

More important, senior management will recognize that the computer, once used to automate administrative and manual processes, will have its greatest potential as a strategic tool with the ability to apply automated techniques to improve overall corporate results and determine strategic directions. "The relational DBMS, with decision-

support applications, will become critical to an organization's success," says Management Decision Systems' Winemiller.

Such technological breakthroughs could come as early as this year, based on a multi-dimensional relational DBMS, which would have an impact on DMBS equivalent to the effect of electronic spreadsheets on microcomputers. Winemiller claims that this breakthrough will be based on his employer's Express DBMS and an integrated family of strategic applications. "Users will have one system for all their processing needs with a common syntax and interfaces," he asserts.

Many relational DBMS vendors, such as Computer Associates International, are moving toward common command structures built around fourth-generation languages.

But Winemiller and Gerrard may be somewhat optimistic. Although between three and five million micros will be on corporate desktops by the end of 1985, it is not at all clear that all or even a substantial part of them will ever be linked to a corporate DBMS. Recent studies by International Resource Development, a Norwalk, CT, research house, show that at most 30 percent of these micros will ever be linked to the corporate database.

As if the technical decisions inherent in choosing the type of system that will influence database management for years to come weren't enough, MIS directors often discover that the toughest

barriers to overcome are organizational in nature.

These organizational issues are essentially political. When an organization moves to a central DBMS, departments that used to control file-oriented systems have to share control of access to the central database and respond to company-wide requirements. Also, because of micro-to-mainframe links, users have all their data in their own machines, a circumstance which leads to a possible neglect of the database as well as a strong feeling among micro users that they own the data stored on their disks.

Then there's the problem of data integrity. Users are finding two solutions to the data-integrity problem. First, says Input's O'Flaherty, vendors, including IBM and Cullinet Software, are downloading data from the DBMS to a secondary file before a user can access or modify the information. This approach prevents direct access to the database and maintains the MIS/dp department's control over critical information. "The interests of IBM and MIS departments coincide on this issue," he notes.

MIS/dp will probably slowly gain control as variations of this scenario are played out in many organizations. "Different users will show up at meetings with different data taken from the same database," says O'Flaherty. "This will happen when they download the data and then massage it with their own soft-

(Continued on page 120)

DATABASE-MANAGEMENT MACHINES

Vendor	Package	Requirements	Price	Circle
Amperif (815) 998-7666	RDM 1100	Sperry 1100	\$280,000	450
Britton Lee (408) 378-7000	IDM 500/0	IBM mainframes under VM/CMS; DEC VAX and PDP-11; systems under Unix	\$45,000	451
	IDM 500/1 IDM 500/2	Same systems Same systems	\$59,500 \$99,500	
Harris Computer Syst. (305) 973-5125	Harris/Oracle Back End Server	Harris 60 supermini	\$15,000 to \$25,000	452
Intel (512) 258-5171	iDIS 86/735	IBM, Control Data, and Sperry	\$19,500 to \$40,000	453
	iDIS/715	Same systems	\$20,240	
Teradata (213) 827-8777	DBC/1012	IBM mainframes under VMS and VM/CMS	\$454,000 and up	454



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#2 Fourth Generation Application Development

The perfect complement to our relational data management technology is our industry acclaimed 4th Generation application development system, MANTIS™. In more than 1,500 complex production environments, MANTIS is dramatically reducing the application backlog through its powerful ability to "prototype", refine and commit the application to production in one interactive sitting.

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The New Cincom's family of information management solutions comprises five integrated software mainframes for environments from the micro to the mainframe.

- Relational Data Management
- Application Development
- Business Control Applications
- Decision Support
- Network Management

The foundation of our product line is the Nucleus relational data management system. It provides a logical view of data that insulates programs from the DBMS, data structures, accessing and navigation strategies, and physical environment.

CRICKET™ is our MANTIS 4th Generation technology applied to the IBM PC/XT/370 environment. It provides the same powerful

performance and high performance needed for today's production environments. Nucleus provides both true data structure independence and the high performance needed for today's production environments.

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Application Development

The perfect complement to our relational data management technology is our industry acclaimed, 4th Generation application development system, MANTIS™. A major breakthrough in software technology, MANTIS is the only system available that provides complete, beginning-to-end, on-line application development—all in one sitting. By using highly effective methodologies such as prototyping, MANTIS helps you dramatically reduce and even eliminate your application

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BUSINESS CONTROL APPLICATIONS

RELATIONAL DATA MANAGEMENT

DECISION SUPPORT

developmental tools as MANTIS for your personal computer. And when combined with PC CONTACT™, our integrated micro-mainframe link, you can use CRICKET to interact directly with the mainframe.

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Also integrated with our data base technology and used in both IBM and DEC VAX environments is CONTROL™: MRPS.

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A high priority in our needs management solutions for the business community is the personal/local mainframe and micro environments. To meet the needs of organizations in which end-users interact in a terminal-mainframe environment, we offer the MANAGE USER SERIES™. Using the power and the accessibility of the mainframe, the graphics, spreadsheet, text processing, and 4th Generation application development capabilities to provide PC-like capability while ensuring DP control.

For the end-user in a micro environment we offer SeriesOnePlus™, our comprehensive package of integrated programs that satisfies a variety of end-user information-handling

needs, including: writing reports, analyzing data, and compiling and analyzing data. And when combined with PC CONTACT™, your SeriesOnePlus programs can incorporate both mainframe and personal data.

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Network Management

NETMASTER™ is the foundation of our network management technology. It's a comprehensive approach to managing computer networks, distributed data, and distributed processing. NETMASTER is an advanced network management application program that lets your company realize the full potential of its multiple-terminal, multiple-application, and multiple-CPU investment.

Another primary component in our network management technology is PC CONTACT™. It's our link that completes the information loop in your company.

The New Cincom: Excellence in Software Technology

The balance of this brochure provides a more detailed overview of our five integrated software technologies. Look closely at what Cincom Systems has to offer. We believe that our new product line (every product either begun or completed in the 1980's) provides the highest degree of reliability, integration, and performance in the industry.

When you see for yourself what The New Cincom Systems is all about, you'll understand why the words "Excellence in Software Technology" fit so well.

reasons why we're endor you'll ever need.

with our relational data management technology. A complete closed-loop system, MRPS is improving the productivity and profitability of over 125 IBM and DEC VAX manufacturing environments around the world.

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NET/MASTER™ is one of the most recent additions to the TIS family of integrated products. Very simply, **NET/MASTER** is an advanced network management system that takes the complexity out of managing a sophisticated IBM computer network and lays the groundwork for distributed data base processing.

#6 The Interactive Mainframe—Micro Link

Further expanding the capabilities of our software information network is **PC CONTACT™**, our mainframe-micro link which enables users to interactively upload/download data between the mainframe and IBM PC's. **PC CONTACT** gives the PC user the ability to

access multiple file types stored in the corporate data base for Decision Support manipulation.

#7 Micro Decision Support Software

For comprehensive micro-level Decision Support we offer **SeriesOnePlus™***. **SeriesOnePlus** includes file management, spreadsheet, graphics, reporting and word processing components that are all integrated through a unique "BUS" architecture. Because the system is designed exclusively for business situations, **SeriesOnePlus** complements any mainframe-micro network strategy.

#8 Mainframe Decision Support Software

The recently introduced **MANAGE USER SERIES™** provides powerful Decision Support capabilities for the mainframe user. The **MANAGE USER SERIES** combines graphics, text processing and application development tools to enhance the use and display of corporate data.

#9 Client Support

The one thing that isn't new about Cincom is our unrivaled commitment to service, support and user education. When you choose Cincom you can be assured of the highest caliber of support.

#10 Software Excellence

Why the New Cincom? Well, we like to think of ourselves as the New Cincom because every product in our TIS family of

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LBMS UPDATE

(Continued from page 116)

ware. The result will be a new set of numbers with no controls. Today's DBMSs either do not address or do not solve this problem."

Of course, at the DBMS crossroads, only one vendor has the directional signal—IBM. IBM's delivery of DB2 (Database 2) and the related query-management facility (QMF) and Data Extract (DXT) late last year signalled its standard for relational DBMSs. Overlooked in IBM's move to relational DBMS is its commitment to support and enhance IMS for production environments that require rapid response

times and large data-handling volumes. DB2 is targeted at interactive, low-volume environments.

Paul R. Hessinger of Computer Task Group Inc., Buffalo, NY, has found DB2 wanting in many respects. Most notably, DB2 does not address the PC or desk-top mainframe—the XT/370—environment, or include an integrated applications-development system, such as ADR's data dictionary.

But Hessinger emphasizes that the parallel IMS/DB2 architecture is a compelling, pragmatic, and acceptable alternative to completely changing database vendors. IBM designed DB2 to

hold onto its Fortune 1,000 customers with a no-muss/no-fuss relational DBMS, says Hessinger.

DB2 can also be seen as IBM's first salvo in the relational database/fourth-generation-language wars. O'Flaherty maintains that IBM plans four strategic eras for its software development. The current period is the SNA/ddp (System Network Architecture/distributed data processing) era in which IBM is emphasizing its VM and MVS operating systems along with its DBMS, large host processors, and large central databases. The implementation of DB2 confirms that we are in this era. (Continued)

DATABASE-MANAGEMENT AIDS

Vendor	Package	Requirements	Price	Circle
Advanced Data Mgt. (609) 799-4600	DRS/Graph	DRS DBMS for DEC VAX under VMS	\$4,500	455
Boole & Babbage (408) 735-9550	CMF/PDS	IBM mainframes under OS	\$50,700	456
D&B Computing (203) 762-2511	Nomad2 SQL/DS Interface	IBM mainframes under VM/CMS or MVS/TSO	\$10,000	457
	Final Data Dictionary	Same systems	\$5,000	
	Beamit micro to mainframe	Same systems	\$5,000	
	IMS Interface	Same systems	\$5,000	
Database Design (313) 971-5363	Information Planner	IBM mainframes under MVS/TSO, VM/CMS; DEC VAX under VMS	\$40,000	458
	Data Designer	IBM running IMS DBDC and ADR/DB data dictionary	\$35,000	
DBMS (312) 961-5700	Developer Tool Kit	IBM OS/VSE or DOS/VSE running Cullinet's IDMS and IDD	\$12,500 to \$14,900	460
Mathematica Products Grp. (609) 799-2600	RO System report generator English	Systems running Ramis II	\$27,000 to \$54,000	461
		Same systems	\$13,500 to \$27,000	
	Relate	Same systems	\$7,875 to \$15,750	
On-Line Software Int'l.	Executrieve	IBM S/34, /36, /38; Datapoint	\$8,500	462
	Datavantage	IBM running IMS/DBDC or CICS-DL/1	\$25,000	
Pansophic Syst. (312) 789-5132	Easytrieve Plus-IDMS Interface	IBM systems under DOS or OS running Cullinet's IDMS 5.7 and IDD 2.0	\$5,000 to \$8,500	463
Software AG (703) 860-5050	Adabas/VSAM Bridge	IBM systems under OS and DOS/VSE	\$10,000	464
TSI International (203) 853-2884	Facets	IBM 43XX and up	\$15,000 to \$30,000	465
Value Computing (609) 482-2500	Data Center Distribution System (DCDS)	IBM mainframes under MVS, TSO, BTAM, VTAM, VM/CMS or CICS running Cullinet's IDMS	\$32,000	466

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(Continued from page 120)

The electronic office will be the focus of the second era, probably between 1990 to 1995. The integration of decision-support systems and specialized applications packages with large office systems is the focus of this era. Between 1995 to 2000 will be the office expert-system era. The post-2000 era will be dedicated to custom products merging hardware, software, and expert systems tailored to the individual.

In addition to DB2, IBM's direct link of its PC to the mainframe for database access is a strong indication of these directions. Says O'Flaherty: "For all its drive into software, IBM will remain a hardware vendor for years to come. In the long-term, DB2 will fit to one side of the main thrust. In the short term, fourth-generation languages are a boost to mainframe sales because they sacrifice machine efficiency for human efficiency. Higher resource usage will lead to more IBM mainframes."

Independent DBMS vendors are responding to DB2 in a variety of ways. Facing the inevitable will likely be the most promising method. For example, D&B Computing Services plans to provide interfaces and links to DB2 through its new SQL/DS-Nomad2. "The opportunity exists to work with and add value to DB2 and SQL," says Abrahams. "We would find it impossible to compete head-on, so we are looking for ways to complement IBM."

To the benefit of—and at the demand of—end users, similar links, interfaces, and bridges among various DBMSs, hardware systems (both mainframes and minicomputers), and applications packages signal a major trend.

For minicomputers, the trend is divided among several segments: A) traditional, network-based or hybrid network-relational DBMSs; B) Unix-based relational DBMSs with integrated application-development tools like Informix from Relational Data Base Systems; C) Relational DBMSs, such as Scien-

tification Retrieval's SIR/DBMS; and D) DBMSs from minicomputer manufacturers, such as Image from Hewlett-Packard Co., Palo Alto, CA, and Rdb from Maynard, MA-based Digital Equipment Corp. (DEC).

The trend for minicomputer DBMSs last year was migration—both upward to mainframe DBMSs and downward to microcomputers, particularly Motorola 68000-based micros and the IBM PC XT. This year, the trend will probably be links between minicomputer DBMSs and mainframes. The mainframe-DBMS vendors appear to be leading the way. For example, Relational Data Base Systems' Informix is compatible with more than 60 Unix-based machines because it is written in portable C language and uses the C-ISAM access method. However, it does not migrate to the IBM 370 level. Cullinet has announced an agreement with DEC to integrate its Information Database with DEC VAX systems to create "settings where DEC and IBM systems coexist."

The near future might bring the concept of a database machine. Tim Shetler, a product manager at Hewlett-Packard's Data Management Group, forecasts that large organizations will locate dedicated database machines or minicomputers operating as database machines near major applications to reduce costs. Shetler isolates two primary costs: communication lines linking micros, terminals, and mainframes; and the cost of adding mainframe and storage to handle the high overhead demanded by relational DBMSs. Opposed to this view is the likelihood that micros far more powerful than today's will act as desk-top database processors.

Another major trend in database management systems is the development of product families by DBMS vendors. Leading the way are Cullinet, Management Decision Systems, Cincom Systems, and Computer Associ-

ates, each of which is adding applications packages to DBMS bases. These vendors, particularly Cullinet, may be in for rough sledding if Noreen's study of the integration of applications packages and DBMSs is accurate. "The study had a narrow focus on DBMS and applications vendors and the trend toward one-stop shopping," says Input's Glen Noreen. "The users say overwhelmingly that they do not care about one-stop shopping. They want to buy applications packages from applications developers. This preference was almost without exception."

Essentially, users are demanding a means to maintain established databases. If they change at all, many corporations prefer to migrate from one DBMS to another—rather than start from scratch. Yet, two years ago, migration tools were unknown. Today they have become one of the two fastest growing categories of DBMS aids.

Migration software attracts users because it protects the sizable investment in both an old DBMS and an existing applications portfolio; a chance to make a smoother transition between the old and the new; and a chance to save money and effort.

Another major force, distributed database management, is also gathering momentum. Every major vendor endorses the distributed-database concept and believes it will become predominant during the next five years. Jim O'Leary, a product marketing specialist at Software AG, describes how his employer will react: "All of our current enhancements," he says, "will provide transparency between user programs and our Adabas DBMS nucleus residing anywhere in the network. Ultimately, in any mix of IBM mainframes and DEC minis, any user will be able to gain access to any Adabas data transparently."

Transparency is a buzzword for which no standard exists. As defined by Software AG and some other vendors, it operates at two levels:

- Independent support for network software that is invisible to the user.
- Support for logical implementation of DBMS records and files independent of the physical implementation.

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"There is some contention over which type of DBMS will best serve the objectives of user organizations."



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lead to *distributed transaction processing*, a branch of the distributed database tree. For example, Software AG's Jim O'Leary says that in the future, the goal is for a user to issue one "read" statement. The network software will then locate the data, treat disparate data as one logical record, and bring them into the DBMS for processing without the user's intervention. The first step toward this goal is to enable network software to issue two read statements at once and transparently locate many files.

However, serious problems handicap the move toward distributed databases, not the least of which are the conversions, protocol, and character sets between IBM mainframes and DEC minis. IBM, of course, follows EBCDIC (Extended Binary Coded Decimal Interchange Code) and DEC follows ASCII, which was developed by American National Standards Institute. In any transaction between IBM and DEC machines, the translations for data, characters, and higher-order processes, such as floating point numbers, are difficult.

A directly related trend is micro-to-mainframe communications. Micros have given distributed databases and distributed processing new leases on life after the two concepts faltered during the late 1970s. Along separate, although converging lines, the information-center concept is helping push not only data access, but also program development to the end-user level. MIS directors appear to be as concerned about control over user programming as user access to DBMS data.

According to Mark Wasilko, marketing vice president for Computer Associates, micros will rapidly be turned into systems-development tools for programmers and users to take advantage of the big potential savings. These tools include report and form managers and dialog-development facilities. Second, the micro facilities will require the same tools at the mainframe level and vice versa. Thus, systems like the IBM XT/370 will be followed by more sophisticated transparent machines and software tools.

The need for tools common to both the micro and the mainframe may also

strengthen the use of portable and compatible DBMSs, such as Oracle, written in the C language with identical functionality across all machines.

Kenneth Cohen, Oracle's director of marketing, notes that this year his employer will emphasize link-level compatibility in all environments, and develop Oraclenet so that applications run on one machine can access records and files on other Oracle databases. Thus, he notes, users with different DEC VAXs, IBM mainframes, and personal computers in networks could use a forms manager or report writer to consolidate information from databases stored on different machines. Beyond that, Oracle is also developing a distributed database based on the IBM R*Star distributed-database research project. Under R*Star, scattered DBMSs will allow multiple, transparent transactions on multiple machines.

Another DBMS trend that gained ground last year was the fourth-generation language. With the widespread and successful implementations of ADR's Ideal, Software AG's Natural, and IBM's offering of Intellect from Artificial Intelligence Corp., Waltham, MA, fourth-generation languages have become the most essential adjuncts to the DBMS.

Now, the key trend is adding support tools, according to Jim O'Leary. These tools include: a general multiple-criteria selection feature; an ability to make logical connections, with a tight coupling of support among the data dictionary, the DBMS, and the fourth-generation language; and the ability to invoke file retrieval, modifications, and relational operations. Oracle's Cohen points to other improvements in fourth-generation lan-

guage. "We are trying to migrate toward very graphic interfaces, such as icons, to reduce application-development time from a year to a few weeks. We want to use intuitive interfaces and self-explanations so the development staff as well as the end user will see the benefits."

Many organizations using fourth-generation languages report dramatic improvements in programmer productivity, but the new perception is that even these languages and the shift to end-user programming and information centers aren't enough to slow the growth of the applications-development backlogs in most organizations.

Corporate users have been waiting more than five years for database machines—special-purpose back-end processors designed specifically to handle relational-database applications offloaded from the mainframe—to fulfill their potential. Britton Lee has had the most success with its relatively small and inexpensive IDM series. It has sold more than 250 systems to a broad range of organizations. Most of these, however, have been limited-purpose DBMS applications.

A new vendor, Teradata Corp., has introduced a much larger and faster database machine that promises to be the first true back-end processor for large mainframes. Teradata uses parallel processing with many microprocessors filing and sorting far greater quantities of data than the Britton Lee machines. The Teradata DBC/1012 is connected to IBM mainframes running the VMS or VM/CMS operating systems and uses the mainframe for all terminal handling and data pass-through. The DBC/1012 does all computations and end-user manipulations.

The Teradata DBC/1012 comes with 474 megabytes of disk storage, but it can handle up to 1,024 parallel CPUs and 400 megabytes of RAM and many hundreds of megabytes more of disk storage—a total capacity of billions of characters. Teradata also provides a useful fourth-generation language, Tequel, which is similar to SQL and is as easily learned as Focus or Nomad2.

DEC and IBM, among many others,

"Antagonists also point to the difficulty of guaranteeing data integrity and security with relational DBMS."

are said to be developing database machines, and it appears it will be 1986 before any major company jumps into the fray. Intel Corp. has introduced several models of its 8086-based database machine. The latest model handles a maximum of nine users, a very small departmental-database processor at best.

The choice of a DBMS is not only complicated by database machines, but also by new software techniques that apply flexible DBMS techniques within applications packages. The most prominent and advanced of these techniques is On-Line Software International's Content Address Method (CAM). CAM is not a DBMS, but a method of addressing stored data within an applications framework. It is a technique that establishes its own path to data without changing their structure, order, or location. The method depends on the content of a record, not the data structure. With CAM, information is analyzed and indexed once, and each field is assigned a mathematical value based on content to set a unique identity for each field's data. On-Line Software claims CAM increases the size of data storage by a maximum of only 25 percent compared to the 100 percent increase in overhead for DBMS with similar performance.

CAM is contained only in On-Line's Freestyle applications product family and works only on IBM mainframes under VSAM, ISAM, or BDAM. Whether CAM is a fluke only time will tell. No major surge in this direction was apparent late last year.

The essential drive during the next two to three years will be to create transparent networks among mainframes, minis, and micros so end users can obtain data without knowing where they reside. Tremendous strides in this area are planned for this year. The distinction between DBMS tools and products for micros and mainframes will disappear as all micros become as powerful as IBM 370s. □

Robert L. Perry is a market-research consultant for International Resource Development, a market-research house in Norwalk, CT.

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OPTIONS FOR TAX SAVINGS

How successfully a corporation slaps the federal hand that impedes it depends on good counsel and an understanding of the law.

by Charles Davenport

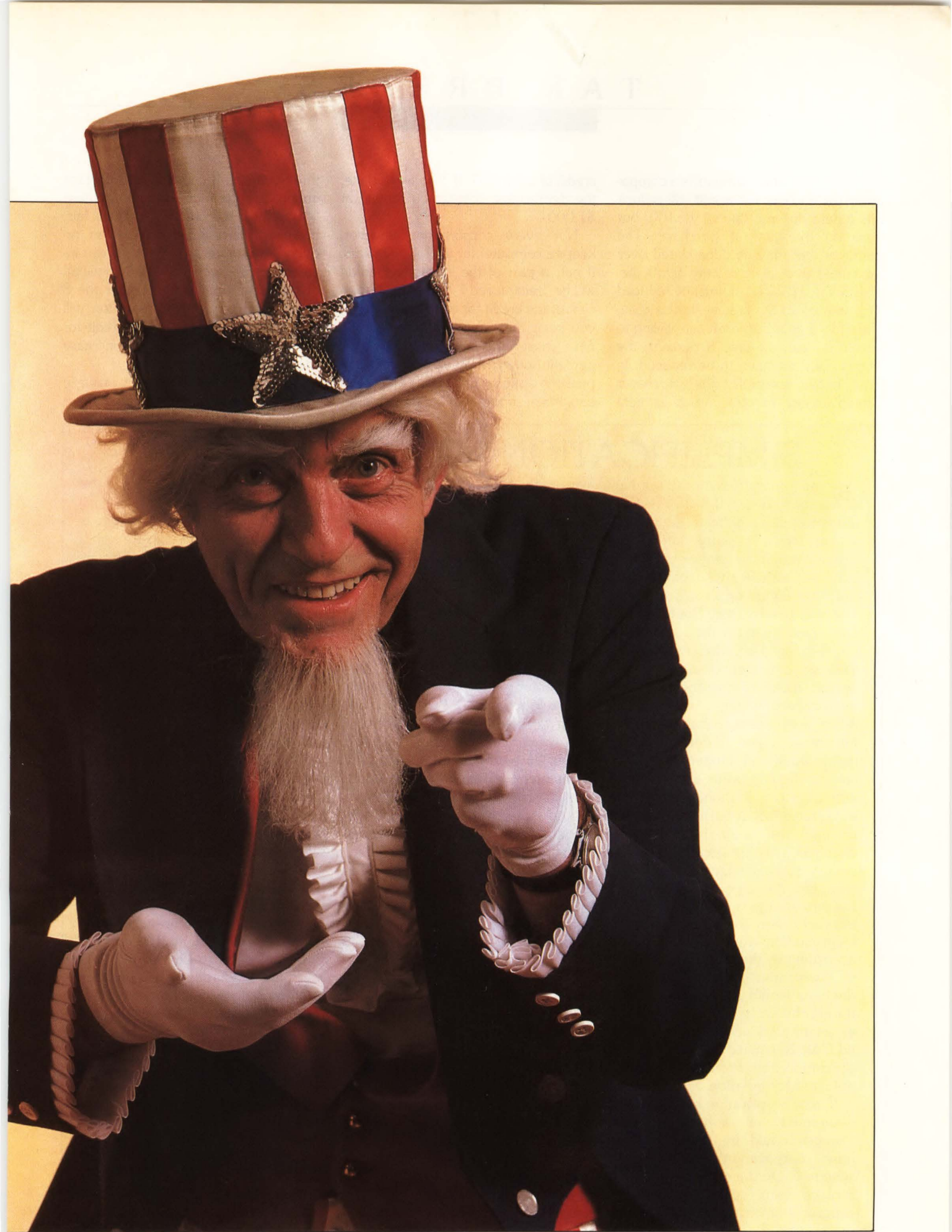
The courts, the Congress, and the Internal Revenue Service (IRS) shower a lot of attention on federal income-tax law, but they don't seem very satisfied with their collective efforts. From year to year, each modifies the law with a frequency that indicates that results are never certain. Uncertainty generates further change. Thus, the tax law is in a constant state of flux and presents difficulty for MIS/dp executives who must deal with its impact on the cost of computers, office-automation equipment, and software.

Despite fluctuations in the law, the federal tax rules for computer hardware are fairly certain. Although the depreciable life of some equipment seems unrealistically long, there is little reason to expect significant changes in the near future. Except for personal computers used at home as well as at work, the last major tax change for hardware costs was enacted in 1981. That change, the Accelerated Cost Recovery System, defines computer hardware—the computer, peripherals,

and physical tangible property—as five-year property. Accordingly, hardware costs can be depreciated over a five-year period, with 15 percent of the cost deductible in the first year, 22 percent in the second year, and 21 percent in each of the last three years. The owner, however, may choose a slower depreciation schedule, over five, 12, or 25 years.

The hardware cost also qualifies for the investment tax credit, meaning that 10 percent of the cost may be taken as a credit against federal taxes for the year in which the computer is purchased. The amount of the credit taken, however, may not exceed \$25,000 plus 85 percent of the tax liability over \$25,000 for the year. If the credit is more than the tax bill or the above limitation, the credit can be applied against back taxes, producing a refund, or against future taxes.

For the purpose of depreciation, the law requires that the cost of property be reduced by one-half of the amount of the investment credit. For example,



TAX BREAKS

if your corporation purchases a component for \$1,000, the credit will reduce its federal income taxes by \$100, but only in the year of purchase. The amount that may be depreciated over the next five years is only \$950, because the \$1,000 cost must be reduced by one-half of the credit—in this case, by \$50. If your corporation is willing to claim a credit of only 8 percent, the basis does not have to be reduced. In the above example, the purchaser could choose to claim an investment

credit of only \$80. If that were done, the depreciable cost would remain at \$1,000.

Not every corporation, however, keeps a computer for the full five years. If not, a part of the investment credit will be "recaptured." You earn 20 percent of the credit for each full year that you keep the computer, whether you have chosen the 8 percent or the 10 percent option. Suppose that your corporation disposes of the \$1,000 piece of equipment in the above example after

three years. If it chose the 10 percent option, it must repay the government \$40 of the \$100 credit. The law is fair, however. Since your corporation reduced the depreciable basis, it can increase the depreciable basis by one-half of the recaptured credit. Under the 8 percent option, your corporation will also earn 20 percent of the credit for each full year, but it cannot increase the depreciable basis.

There is another option, usually called "expensing," for figuring taxes

SIMPLIFICATION: TAXING EXERCISE?

Aimed at redressing the tax balance between the old rustbowl industries and high tech, the recently released Treasury tax-reform proposals would change every principal tax feature applicable to computer hardware and software. Secretary of the Treasury Donald Regan told us what the proposals owed to high tech when he said that they were written on a word processor, meaning that they had not been carved in stone.

- The investment credit would be eliminated. The federal government would no longer share the cost of the computer and software with your corporation.

- Depreciation of both the computer and the software would be changed. The Accelerated Cost Recovery System, which sets the arbitrary life of five years and specifies the percentage of cost to be deducted each year, would be repealed. Depreciation would be determined according to the true economic life of the property. Depreciation deductions would not be accelerated during the early life of the computer, as they are under the Accelerated Cost Recovery System. The depreciation deduction would also be adjusted for inflation.

If your corporation has long-lived equipment or software, these changes could be detrimental to your corporation's depreciation schedule. On the other hand, if you replace your dp equipment and programs in less than five years,

you might be better off. Most importantly, however, you would have to prove what your depreciation is, perhaps by referring to prior experience. You can almost count on a challenge to whatever depreciation schedule you choose.

Also, your depreciation deduction would increase each year in accordance with inflation. For example, if your deduction were \$1,000, ten percent inflation would change that deduction to \$1,100. If there were ten percent inflation again in the next year, your deduction would be \$1,210 without any new investment. Remember, though, that these depreciation changes would have no effect on most self-developed software, because those costs are deducted as incurred, rather than depreciated over its life.

- The R&D credit discussed in the accompanying article would be "rationalized" and called a "research and experimentation" credit. Rationalization seems to mean that the Treasury would institute the changes listed in the accompanying article. Unless the expenditures were likely to lead to technological innovations, the credit would not be allowed.

- The proposals are ambiguous, but the special deductions for R&D expenses will probably be repealed. Those deductions would have to qualify as business expenses. The provision that permits R&D expensing for a business that a corpo-

ration has yet to start would be repealed.

- The tradeoff for these changes is a big decrease in the tax rate applicable to corporations, from 46 percent to 33 percent.

These changes could have a major impact on the after-tax cost of your corporation's dp equipment and software. But that's just what they are supposed to do. They're intended to raise taxes on capital-intensive industries and to lower taxes on those corporations that do not employ as much capital.

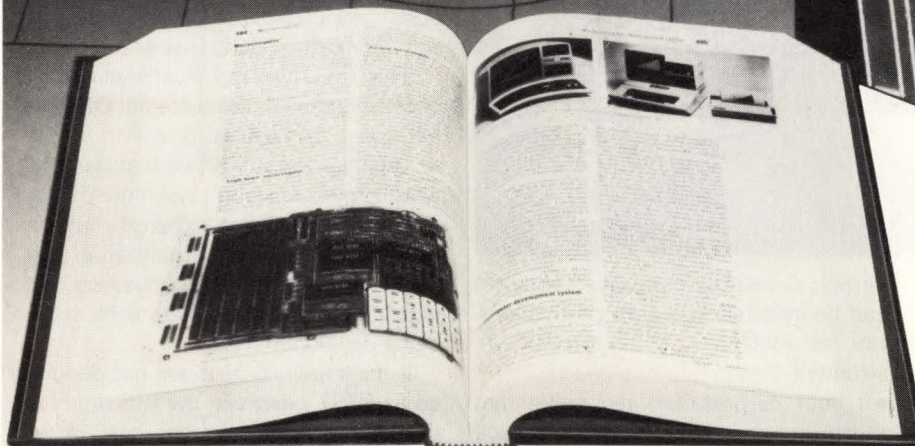
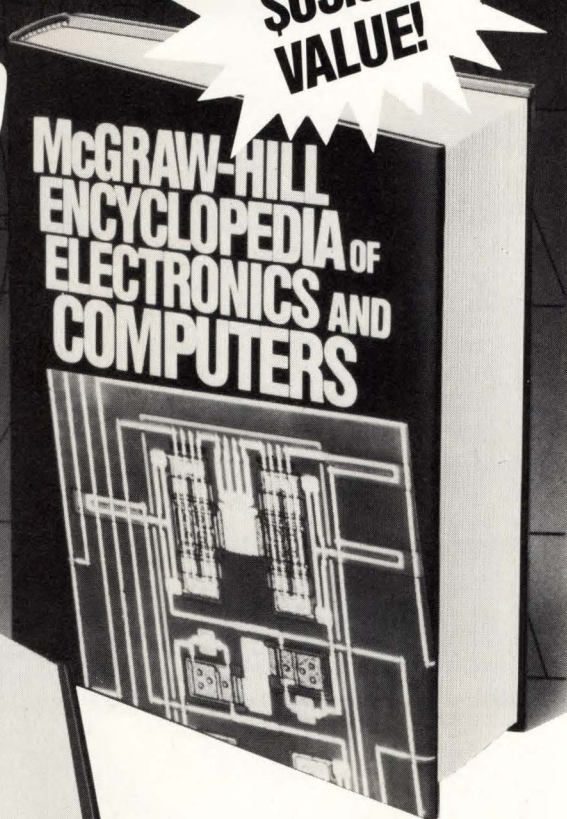
These proposals have been orphaned. The Treasury said that it wrote them on a word processor and seems quite willing to have almost anyone sit at the keyboard to rewrite them. The President has said nothing. Chairman Dan Rostenkowski (D-IL) of the House Ways and Means Committee is opposed to any tax reform that does not raise revenue, and Chairman Bob Packwood (R-OR) of the Senate Finance Committee, a believer in tilting the tax law in favor of certain groups, is philosophically out of tune with them. Most Republicans welcomed the proposals coolly, and the Democrats, who are waiting for some leadership, are certainly not going to grab. Except to a few ideological Democrats, these proposals seem to have all the appeal of wet garbage mouldering at the curb. So the inside money bets that not much will happen—but don't count on it.

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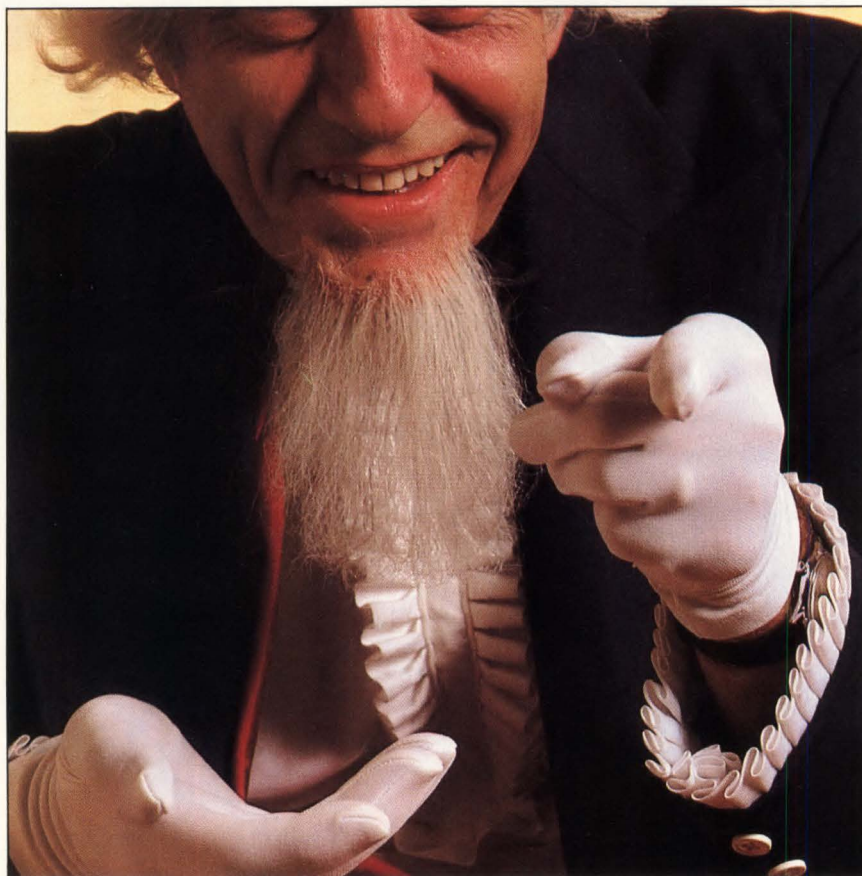
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Computer Decisions 2/12/85

TAX BREAKS



on hardware spending. Accordingly, up to \$5,000 of tangible property purchases may be deducted in the year of purchase. If this expensing option is chosen, the deducted portion of the cost may not be depreciated, and the investment tax credit will not be allowed on it. Although this \$5,000 limit was scheduled to increase to \$7,500 last year, the Deficit Reduction Act of 1984 postponed the increase until 1988.

Obviously, the counsel of a corporate tax adviser is called for here. The advantages of each option vary with your income-tax rate in the year of purchase and the amount that your corporation can make on alternative uses of the money. But there are a few general rules:

- If your corporation's tax rate is under 30 percent, claim the full investment credit and reduce the depreciable basis of the property by one-half of the credit.
- If your corporation's tax rate is between 30 percent and 40 percent, the same alternative will generally be fa-

vorable unless the cash saved on taxes can be invested in a very profitable—say as much as 12½ percent—instrument.

- If your corporation can make that much on tax savings, consider deducting the first \$5,000 of the property and claiming the full 10 percent investment credit on the balance.
- If your corporation's tax rate is between 40 percent and the full statutory rate of 45 percent on corporations (50 percent for individuals), and if your corporation can save only a moderate amount on taxes, then the 10 percent credit with the basis reduction for one-half of the credit will probably be best.
- If you can get a high return on tax savings, you should use the expensing

option for the first \$5,000, with the 10 percent credit and the basis reduction for the balance.

In contrast to the fairly stable rules for hardware costs, ambiguity and controversy still surround some aspects of the tax treatment for software costs. As yet, the rules seem likely to remain unstable until settled by the courts or the Congress. The IRS, however, has already given some indication of the direction it would like the law to take.

Because the needs of corporations are so different, operating systems are far less standardized than the machines they direct. Some corporations have responded by developing their own programs. Very early, the IRS recognized that self-developed programs are similar to research and development in other industries. In 1969, it ruled that costs associated with self-developed software can be deducted as R&D.

This R&D writeoff is advantageous because software costs are not deductible under the general provision unless an organization can prove that the software in question won't last more than a year. Also, an R&D expense may be deducted even if an organization has not yet started a new business for which the operating-system software is being developed.

If the software costs are not deducted as R&D expenses, the IRS requires the software-development cost to be capitalized and amortized in equal annual deductions over the useful life of the software, not to exceed five years.

Your organization must be fairly certain when choosing between an R&D deduction or capitalization and depreciation. Once this decision is made, you cannot switch to the other method without obtaining the consent of the Commissioner of Internal Revenue—a burdensome task, and one that might not have a successful outcome.

Although R&D deductions do not

“10 percent of the hardware cost may be taken as a credit against federal taxes for the year in which the computer is purchased.”

TAX BREAKS

qualify for the investment tax credit, they may qualify for the special R&D credit that was enacted in 1981 in an effort to increase spending on R&D. Like the investment tax credit, which may be deducted directly from the annual tax bill, in any year the R&D credit amounts to 25 percent of the increase in qualified R&D expenditures over prior years' R&D expenses. That credit, however, is expected to be repealed soon, as Congress and the Reagan administration take up the issue of tax simplification. (See accompanying story.)

In addition, recently the U.S. Department of the Treasury indicated that it intends to change its position with respect to the application of the R&D credit to software costs. Both a statement by Assistant Secretary (Tax Policy) Ronald A. Pearlman and proposed regulations issued by the IRS distinguish between software with few innovations or improvements to existing programs and high-risk, innovative programs. Both statements indicate that high-risk software will be eligible for the R&D credit, but that low-risk software will not. Subsequently, the IRS indicated it would ease these tough standards but that it would not back down from the proposition that some software-development costs do not qualify for the R&D credit.

These changes have not been enacted, but they are likely to be. When they are, programs for the manipulation of financial records probably will not qualify for the R&D credit, while those that operate on scientific data apparently will, unless they represent only slight improvements to existing programs. The rules will be the same whether the software was developed internally or farmed out, with user specifications, to an independent contractor.

The Treasury has indicated that even if this change is made for purposes of the R&D credit, it will not make the same change for the R&D deduction. It will continue to treat all software-development costs as R&D expenses for the deduction. Ironically, the statutory language defining the R&D deduction is the same as that defining the R&D credit.

The tax treatment of purchased soft-

ware also involves some uncertainties. "Bundled" programs, those offered as a part of the price of the computer without any separate price allocated to them, are treated as a part of the computer. As such their cost can be depreciated, can earn an investment credit, or can be available for the expensing

option like hardware costs.

If the software is separately purchased, the IRS usually will take the position that its cost should not be deducted at the time of purchase. To argue against this position, your organization must demonstrate that the software will

(Continued on page 134)

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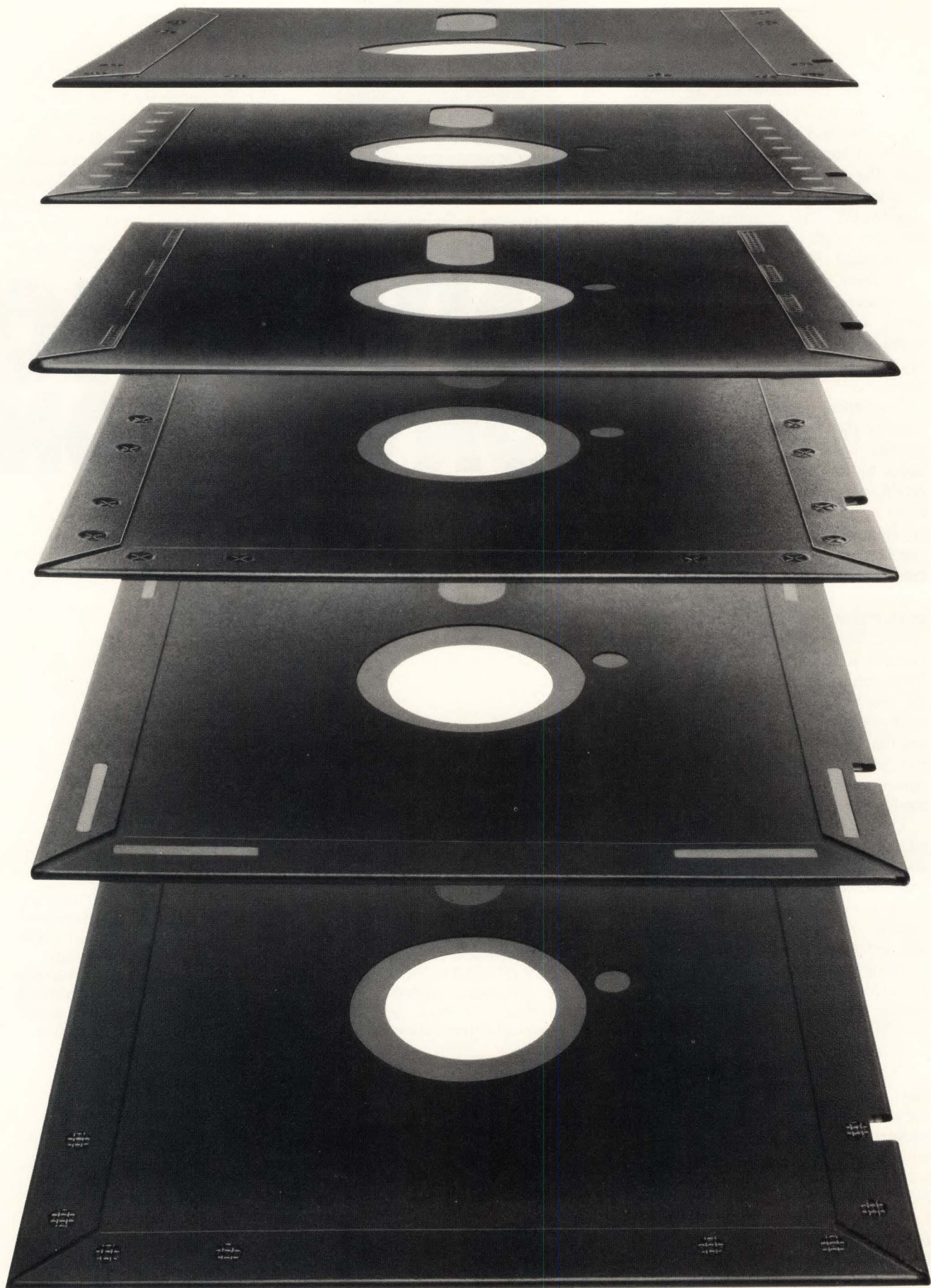
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(Continued from page 131)

not last longer than a year. If you can make this argument, the cost would be currently deductible; if you cannot, the cost must be amortized in equal annual deductions over the life of the software, not in excess of five years.

The IRS claims that software is intangible property and will not permit it to be depreciated. The same reason is given to deny an investment credit and the expensing option for software costs. This position, however, may not be sustained by courts. Several years ago, a court allowed the investment credit to be applied to the cost of collecting seismic information and data stored on tapes and films. Later, in a case involving the Walt Disney studios, the court rejected the IRS argument and allowed the investment-tax credit on the production costs of a movie.

While these cases are good authority for claiming accelerated cost recovery, the expensing option, and the investment credit on software costs, the IRS does not agree. It can be expected to argue that the cost of disks, but not the cost attributable to the programs on the disks, qualify for the credit. In short, the IRS maintains that disks are simply containers for intangible property and as such are ineligible for accelerated cost recovery, the expensing option, and the investment credit. There doesn't seem to be any way to resolve this dispute without litigation or legislation, and litigation will surely ensue if legislation is not forthcoming.

Shortly after the Disney case, a legislative solution was found for allowing the investment tax credit on films. Under the compromise, which was enacted into law by the Congress, one-half of the production costs of films qualify for the investment credit, but eligibility for accelerated cost recovery and the expensing option was not addressed. The Congress specifically stated that this compromise was not to have any impact on related cases.

"Ambiguity and controversy still surround some aspects of the tax treatment for software costs."

The right to use software is sometimes acquired under what the developer calls a "license." Licenses are designed to limit the use of software. Despite their name, licenses are not always treated as licenses for tax purposes. Rather, they are treated as sales when all of the economic rights of ownership pass to the user under the license. When that occurs, the considerations discussed above about purchases are relevant.

On the other hand, if the software is truly licensed, there will usually be an annual or monthly payment, which may be deducted. If, however, a lump sum is paid for the right to use the software over a stipulated period, that sum will have to be prorated over the period of use that it bought.

For investment tax credit purposes a license is treated as a lease, and the owner of the licensed software is entitled to the credit. The licensor has the option of passing the credit to the user, if it is allowable with respect to software costs. In that case the lessee may take a full 10 percent investment credit or claim an investment credit of only 8 percent. If the full investment credit is claimed, the user of the program will have to increase its income by one-half of the credit. This amount is included in income for a period equal to the depreciation period of the licensor. If the 8 percent credit is chosen, the user does not have to include any amount in income. The decision between these al-

ternatives depends on the same factors that apply to hardware purchases.

However, claim the investment credit at your own risk. IRS maintains that the investment credit is not permitted because the program is intangible property. A claim of the credit is almost sure to generate contention with the IRS.

If the lessor agrees to pass the credit to the user, and if the user does not use the property for the full five years, the credit will be recaptured just as it would have been if the software were purchased and sold before the full five years elapsed. When the credit is recaptured, one-half of the recaptured amount will be allowed as a deduction.

Finally, software is sometimes treated as tangible personal property for both state sales and property tax laws. The rules differ from state to state, but such treatment will probably cause the sales price of software to be subject to the sales tax and its value to be subject to the annual property taxes. In some states, these taxes are also imposed on intangibles. It would be wise to have your corporate counsel ascertain whether either of these taxes raises a problem.

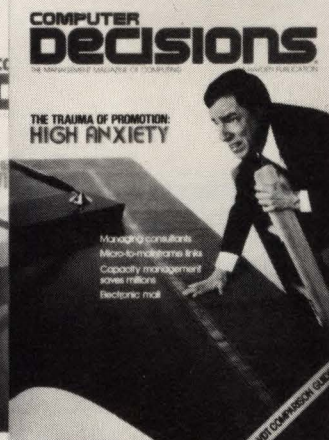
There is no reason to think that all of these difficulties will be authoritatively resolved in the near future. There is some prospect that the Treasury will soon publish some answers to the questions concerning the R&D credit. Ironically, however, these new rules may not resolve the questions because it seems likely that they will define R&D expenses only as they pertain to the R&D deduction. Perhaps the Treasury has the power to apply such inconsistent definitions even though the statutory language is the same. But then, it may not. Until the courts decide whether that power exists, the applicable rule will be uncertain.

Obviously, tax benefits have a large impact on the cost of software, and that cost will change as the tax rules change. It will be uncertain so long as the applicable tax rules remain uncertain. □

"The IRS claims software is intangible property and will not permit accelerated cost recovery."

Charles Davenport is Professor of Law and S.I. Newhouse Scholar at Rutgers University—Newark (NJ).

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PACIFYING HIGH-LEVEL RESISTERS

If OA plans turn middle managers into corporate guerrillas, you may win a few battles, but you'll lose the war.

by Jennifer E. Beaver, Southwestern Editor

What's the fastest way to turn an old-boy network into a resistance movement? Try implementing an office-automation system for managers. Taken literally, the term "OA" has the power to evoke images of offices running by themselves, free of managerial intervention or, as the case may be, interference. Behind such fantasies, however, lies a powerful political truth: Exclusion breeds opposition. It may appear in the form of a Silicon Valley administrative assistant, who, threatened by the unfamiliar terminal on her desk, doused the machine with coffee. Or take the manager, who, faced with the prospect of seeing his or her power redistributed, sandbags an OA project that would change the status quo. Whatever the result, "the politics of data"—a phrase coined by M. Lynne Markus, assistant professor of management at the University of Cali-

fornia, Los Angeles, to describe the competition for access to and control of information—delimits the two camps of the latest OA battle zone: implementers vs. managerial users.

Not all managers and professionals are modern-day Luddites, but this group is in a position to resist change far more effectively than the lower-level clerical workers whose jobs were automated long ago. "Managerial users have the power to fight back through inter-departmental politics, the major obstacle to successful OA implementation," says N. Dean Meyer, a Ridgefield, NJ-based specialist on the human side of office automation. The opposition is two-sided. On one front, according to Meyer, department managers, possessive of OA tools such as personal computers, telecommunications lines to outside databases, and software packages that are part of their



Illustration by Ned Butterfield



turf, will resist sharing the wealth of their fiefdoms with the rest of the corporation unless they receive something in return. On the other front, managers whose departments are targeted for automation may fear that unfamiliar technology will undermine their authority.

At the managerial level, fighting OA rarely means an outright act of sabotage. Far more common are managers who publicly extol an office system's virtues but privately ignore its implementation. Robert L. Williams, a Philadelphia-based consultant with Arthur Andersen & Co., New York, considers this form of resistance more dangerous than sabotage. "Managers who are complacent make projects die," he says. "Because these managers don't express outright displeasure, the damage they cause is insidious. If they don't use the equipment, they can't grow."

Even managers who clamor for the latest devices may subtly resist the overall thrust of an automation plan and, in effect, defeat its purpose. "A micro used as an expensive calculator will not enhance a corporation's returns," says Meyer. Do managers really limit their use of office workstations to simple calculations? Yes, if the tools and applications provided by the corporate OA program fail to meet basic needs. In this sense, managers who resist OA are sending a message to the OA implementer. The message reads, "You have failed."

Managers charged with implementing OA systems can avoid failure and the risk of alienating important business contacts by handling initiatives with kid gloves. "You can't force OA down a manager's throat," says Randy Eliassen, a vice president at Security Pacific National Bank in Los Angeles who recently gathered 40 branch managers together for a gentle weekend introduction to personal computers. The three-day session turned many of the doubting managers into supporters. "Many of them feared automation because

they thought their subordinates would know more than they did," says Eliassen. "The introduction provided these managers with the familiarity and confidence they needed to continue to lead."

When time and geographical limitations prevent OA implementers from conducting group training sessions, there is another possibility. At CIT Financial in Livingston, NJ, Alan Kitchener, director of operations research, chose to automate three of his employer's 40 branch offices as a representative sample. According to Kitchener, the small size of his pilot project allowed him to ask the managers directly about their needs, a luxury he would not have had with a larger sample. "I recommend sitting down with the managers you're serving to make sure you're providing the tools they need and will benefit from," advises Kitchener. "It's not realistic to expect novices to enthusiastically accept and use equipment just because it's been delivered to them."

Kitchener's study revealed that users of the corporation's IBM Personal Computers needed word-processing, specialized-billing, and computational packages. How did he then go about training them to use these packages? First, he taught two branch managers who were particularly enthusiastic about the project how to use the packages. Then he let these managers train the remaining branch managers, who instructed their staffs.

What is significant about CIT Financial's method of implementation and training is its degree of self-reliance: The corporation uses its own managers rather than outside consultants as its chief resource. This strategy bespeaks an organization's confidence in its managers' ability to assimilate and communicate ideas effectively. It also bears out the old advertising adage that support from "opinion leaders" goes a long way in selling a project to a particular audience. Robert Williams of Arthur An-

dersen suggests that these key people can make or break a pilot program. "Look for vocal, results-oriented professionals to sell the OA system," he says. "Other users will follow the lead."

If users' level of expertise and needs are similar throughout an organization, pilot projects can reliably predict the best way to implement OA as well as help define and refine the applications and tools for the group as a whole. However, a system that is not customized to the special requirements of its users will not always fit. At CIT Financial, users who require software for figuring out loan rates for industrial equipment are provided with special setups designed for this application. The key to success in that case is flexibility. An approach that is intrusive or that forces an inappropriate solution on a manager can't work, despite the best intentions of its implementers.

At one eastern bank, according to N. Dean Meyer, best intentions interfered with best judgment. Unlike most organizations, which engage systems houses to design their OA systems, the bank's OA implementers took an extreme approach: They developed an OA concept, then sought out a computer manufacturer to build the hardware. So pleased was the bank's planning team with the final product—an executive workstation—that it decided to distribute two dozen of the machines to the bank's department managers free of charge. When it turned out that the workstations were not designed to perform even the most basic financial applications, the managers returned all 24 machines to the OA planners posthaste.

Although a disaster of this nature is related more to planner myopia than to managerial opposition, it underscores the limitations of coercion—be it brute force or messianic zeal—as an implementation strategy. It should also suggest that managerial users who are skeptical of claims that OA is a panacea may not be far off. Managerial users' wariness can be allayed, however, if OA implementation and user involvement progress gradually. At Kitchens of Sara Lee in Deerfield, IL, Paul Naslund, MIS director, sees the

Managers, far more than lower-level clerical workers, are in the position to resist OA.

transition into an automated office as an evolutionary process propelled by the needs of business. "Our users proceed at their own pace and are free to investigate any technical matter they wish," says Naslund. "The MIS department is here to guide users, not make demands of them. That's helped us avoid a lot of mistakes."

Perhaps the biggest mistake and the main cause of resistance is a lack of empathy on the part of OA implementers. To predict how managers will respond to an automation plan, an implementer must first understand what managers do. If managers perceive a change as not being in their best interest, stresses Meyer, they'll resist. "The benefits to the corporation may be a lower headcount or greater access to data," says Meyer. "But managers may fear the loss of their jobs or their private information, which can be the source of political power. The corporate brass may want faster communications. But managers may see this as an intrusion on their productive thinking time." David Bradford, professor of organizational behavior at Stanford University's Graduate School of Business, concurs. "People will resist change if it threatens their competency, sphere of influence, or friendship network," he says. "Office automation generally does all three."

To deal more effectively with resistance prompted by these concerns, an OA strategist may require the help of specialists skilled in understanding people. When Bob Woog, district manager for the engineering design-lab group at AT&T, set up his high-level OA "swat team" to develop pilot projects in the communication giant's Basking Ridge, NJ, major offices, he included a staff sociologist, Rob Epstein, and a staff psychologist, Diana Kramer. Epstein interviewed department members and conducted work-flow analyses, then reported his findings to the rest of the team. "Epstein's research helped us understand our users' reasons for re-

sisting OA," says Woog. "By better understanding their motivations, we identified potential trouble spots. In one case, we found out that users resented OA because their boss was using it to get more work out of them on week-ends. He then used his staff's increased productivity to make himself look better to upper management."

Similar boss-subordinate conflicts abound. Ava Schnidman of Deltech Consultants in Simsbury, CT, is trying to help the members of a big New England law firm adjust to their new OA system. According to Schnidman, the senior partners are pleased with the computer system because it generates data on what the associate attorneys are working on. The associates, indignant at being "spied on," won't use the computers. Because the firm won't commit the necessary funds to change the system to moderate the advantage it gives the senior partners, Schnidman is trying to turn the tide by emphasizing the benefits that the system holds for the junior lawyers.

For these lawyers, the imposition of an OA system did not change the power structure of their firm; rather, it highlighted existing conditions. More often than not, the introduction or redistribution of OA technologies affects the balance of power, if not by shaking up the hierarchy itself then by disturbing managers' perceptions of their places in the hierarchy. In her book, *Systems in Organizations: Bugs + Features* (Pitman Publishing, \$22.95), M. Lynne Markus describes the struggle for power in large corporations: "People and organizational subunits may differ in the extent to which they actively seek to gain power, but it is unlikely that they will voluntarily give it up. . . . In general, neither would one expect people whose power is lessened by a system to accept it . . . nor those who gain power to resist."

Middle managers in particular may feel hard-pressed by the threat OA

Pilot projects can reliably predict the best way to implement OA.

poses to their jobs. "In some organizations, an OA system might allow top management to go directly to a source of information below with no need of an intermediary," says T.J. Springer, an OA consultant based in St. Charles, IL. "Unless the bypassed manager uses the technology to carve a new niche, he or she will probably be more of a hindrance than a help."

Ironic as it may seem, OA strategists themselves have as much to lose as middle managers when they introduce a system. An OA implementer who disturbs the balance of power can easily be fired by a superior with more clout. It is to the implementer's advantage, Meyer points out, to work closely with managerial users to minimize misconceptions and conflict and to make computers less threatening. This may involve proving to novices that they are, indeed, smart enough to use computers, or that under normal conditions they cannot break equipment or irrevocably damage data. Los Angeles-based consultant Vicki McConnell suggests that OA implementers set up hands-on demonstrations to familiarize users with a new system or software. She also notes that managers afraid of appearing unknowledgeable will respond better to this approach if demonstrations are held separately from those of their subordinates.

If OA strategists adopt these measures, will they be able to eradicate managers' resistance? Of course not. But their projects will be more successful if they recognize resistance as an almost instinctual human reaction to change and take the time to listen to managers' complaints rather than back away from them. "People who resist generally do it for a good reason," says David Bradford of Stanford University. "There's usually an element of truth to their defiance. If you harness it, you can use it to your advantage." □

Users' wariness can be allayed if OA implementation and user involvement progress gradually.

A day in the life

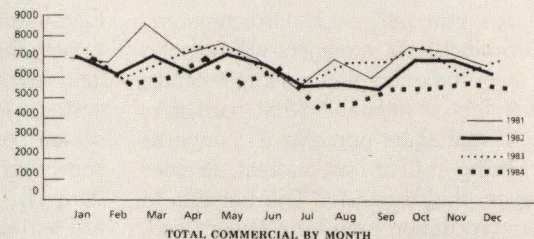
Outlook Report, June 1986

(Note: Insert line chart here with Total US Commercial By Month data.)

is mixed for the near-term. However, there could be an upswing in the price if the oversold condition is corrected in the next 6-8 weeks. Due to the biological and seasonal factors, the size of the November-December unit crop is historically smaller than the preceding August-September crops. This could tend to adjust the condition of the market during the specified time frame. So even though unit levels are above those of a year ago, a projected, but a seasonal month-to-month decline should afford a unit price rally during the next two months.

Let us here provide some background that will serve to more accurately explain the situation. The largest number of units are produced in the corn belt, (Note: Figure 4 should be inserted as close to this sentence as possible.) due to the easy availability of corn. Due to northern weather conditions, the optimum time for units to be produced is in the fall so that a weather factor can favor the new methods of production capabilities. This could also mean that, in addition, available time is a critical factor that will require precise definition - both risks and opportunities. This time factor also gives producers ample leeway in attending to their production operations since major work has not begun as yet. Since it takes approximately six months for new units to be produced, the spring market - the largest of the year - generally needs to be defined during the fall of any given year. Since producers appeared to be somewhat late in expansion practices last year, some analysts assumed that market conditions are on a downswing; i.e., history repeating itself with a worsening factor included. Market and production analysis, however, indicates the opposite could be true in 1986. If one considers the long-range trend, it is apparent that increased proficiencies in production coupled with the current positive crop status would clearly point to an upswing in output and marketability.

Outlook Report, June 1986



TOTAL COMMERCIAL BY MONTH

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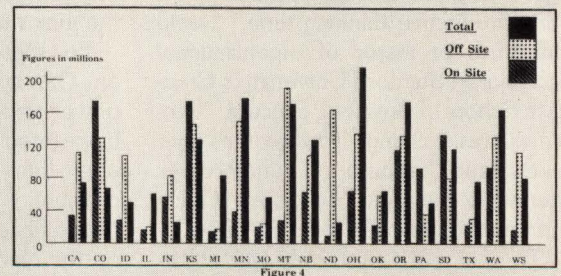
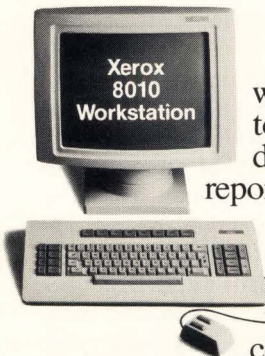


Figure 4

Los Angeles, Monday, 8:00 A.M. PST. Text of document is created on Xerox 860 Information Processor and communicated on Ethernet network to Chicago.

Chicago, Monday, 11:00 A.M. CST. Graphics created and integrated with received text on Xerox 8010 Professional Workstation and electronically mailed to New York office.



Remarkable, isn't it? The weeks it would have once taken to prepare, translate, print and distribute a complex, illustrated report such as the example above can now be compressed into the span of a single business day.

What makes this feat possible is an extraordinary computer from Xerox called the 8010 Star Professional Workstation.

Star possesses exceptional capabilities—in document preparation, graphics and information process-

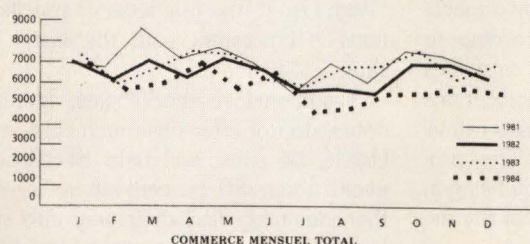
ing. Incredibly versatile, Star combines text and graphics in any number of ways within the same document—without changing software. It gives you superlative ease of use through such Xerox innovations as the mouse, icons, windows and property sheets.

Naturally, what you see pictured here is only one example of Star's powers. It's the only workstation that can create and print documents in more than a dozen languages. That includes Russian and Japanese (Kanji, as well as Katakana and Hiragana). This eliminates the need to have separate machines and printers for each language. Which is particu-

XEROX

of a document.

Perspectives jusqu'en juin 1986



COMMERCE MENSUEL TOTAL

est mitigé en courte période. Cependant, on pourrait assister à une hausse de prix si la situation d'excédent est corrigée dans les 6 à 8 prochaines semaines. Du fait des facteurs biologiques et saisonniers, la récolte de novembre-décembre est toujours inférieure à celle qui la précède en août-septembre. C'est pourquoi il est possible que le marché s'équilibre au cours de la période considérée. Ainsi, bien que les niveaux unitaires soient supérieurs à ceux de l'an dernier, une baisse mensuelle projetée mais saisonnière pourrait perm-

ettre une hausse éventuelle de prix unitaire au cours des deux prochains mois.

Afin de mieux comprendre la situation, il serait peut-être bon d'en rappeler les circonstances. Le plus grand nombre d'unités est produit dans la région du « corn belt », où le maïs est plus abondant. Du fait des conditions climatiques des régions plus au nord, l'automne représente la période optimale de production, car le facteur climat peut alors favoriser les nouvelles méthodes de

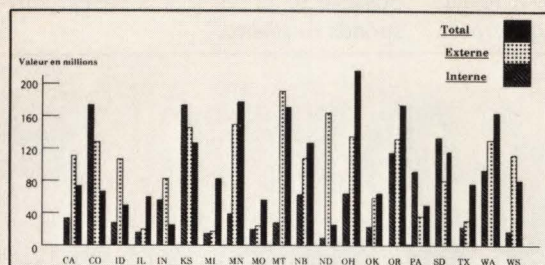


Figure 4

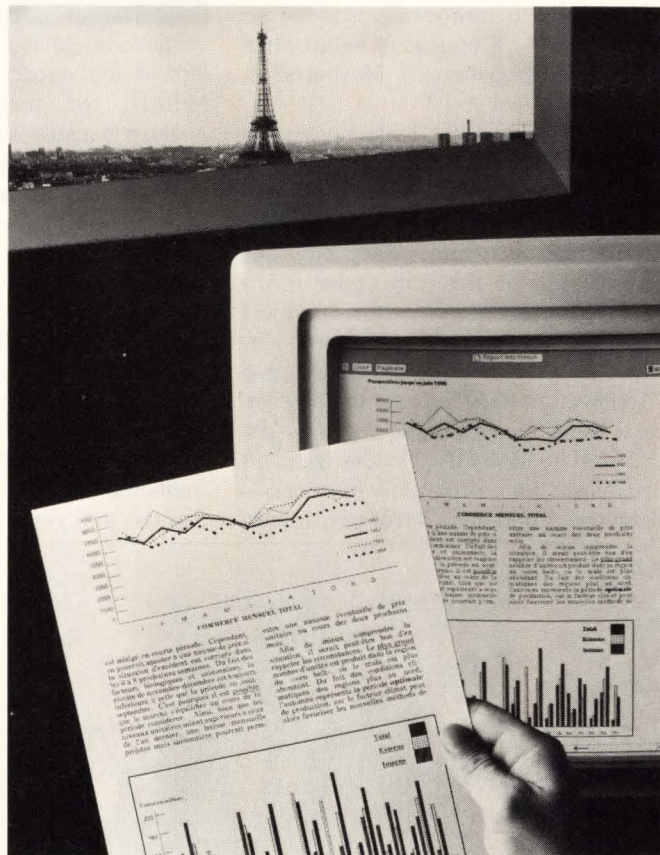
New York, Monday, 4:00 P.M. EST. Entire document has been translated into French and entered on the 8010, then sent through Ethernet to Paris.

larly valuable to international companies that create documents that require quick translations and, very frequently, worldwide distribution.

Star and Ethernet

Star is a key element in Xerox's local area network, a system of integrated office machines designed to work together for increased office productivity.

As part of the Ethernet Network System, Star shares information and electronic mail with the Xerox 16/8 Personal Computer, our 860 Information Processor, other Stars—even IBM PC's. All of these workstations also connect with our file servers



Paris, Tuesday, 9:00 A.M. Document has been received on Xerox 8010; electronic printer prints exactly as transmitted.

for organizing and storing data. Our communications servers for reaching into your mini computer or mainframe anywhere in the world. And our electronic printers for the highest quality output available today.

Team Xerox

Star is also part of Team Xerox—a wide array of products, people and services designed to meet your information needs.

Just call your local office systems sales representative for more details on how Star and the Ethernet Network System can make every day of your working life more productive.

(Continued from page 48)

er of information systems at Southern California Edison Co. (Rosemead), beyond having to learn PSL/PSA's syntax, novices must also develop a feel for how much detail to include when they design a system. A designer can easily waste time refining a model beyond the point where improvements in design lead to improvements in the actual system. "If you don't know when to stop adding details," Mushet says, "PSL won't tell you."

Mushet recommends that designers choose a subset of the PSL modeling tool that fits the type of application they need to develop. At Southern California Edison, which mostly develops online systems that run under IBM's CICS teleprocessing monitor, designers use PSL/PSA to build systems models, then execute them under Generalized Architecture (GA), a programming system developed in-house and now distributed by IBM. GA provides standard modules for program functions—inquiries, updates, error messages,

The newest design tools automatically translate design specifications into executable code.

validations—that are constant regardless of the application. According to Mushet, the architecture simplifies analysis because system specifications refer to these standard functions rather than their own definitions. The programmer builds the system by filling in a table that evokes the code for the desired function.

For projects that require high reliability, Use.It from Higher Order Software takes a different approach to systems design. Based on complex mathematical formulas, Use.It is touted as providing specifications that are mathematically provable. As a result, asserts the vendor, code generated

from these specifications is free of errors in logic.

At General Electric's Space Systems Division in Valley Forge, PA, Jerome Heitner, manager of software methodologies, has been examining Use.It's potential for rapid development of all types of systems, including those for business. According to Heitner, Use.It's underlying mathematics are correct. "With Use.It, the first level of specifications is consistent with the last," he says.

Traditional methodologies, Heitner notes, do not offer this much certainty. Use.It, he says, will help developers avoid about 80 percent of the errors that inevitably find their way into systems. However, a guarantee of system-wide consistency—undeniably a great advantage—is no guarantee that the specified system will do the job it is supposed to. "Saying a program developed with Use.It is provable may be misleading," Heitner says. "It's just not possible to prove that a design corresponds to reality." □

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LETTERS

CDS TAKES ISSUE

In the November 15 special issue of *Computer Decisions*, you published an overview article on intelligent modems — "Making Micro Messages Fly" by Robert A. Moskowitz. Unfortunately, there were serious misconceptions and errors in the article.

The most obvious misstatements regarded the development and availability of full-duplex 2400-bps (baud is not technically correct) dial-line (also referred to as "PSTN" for Public Switched Telephone Network) modems. Mr. McMillan of Visionary Electronics was quoted as saying "European manufacturers have already developed a way to send information reliably at 2400 baud [sic]; it will take us another year or two to do the same."

The truth is that U.S. companies pioneered, and now dominate, the domestic and international market for 2400-bps modems. The market leader, both domestically and internationally, is Concord Data Systems (CDS). CDS has shipped tens of thousands of these products, beginning in 1982. The astute reader would have seen the CDS advertisement for the CDS 224 (TM) and the CDS V.22 BIS on page four of that same issue. Other U.S.-based modem companies with established market presence at 2400 bps include Codex, Rixon, Vadec, and Micom. There are a number of other U.S. and foreign modem companies that have recently announced their intention to serve this growing market. So, 2400-bps modems are not just "now beginning to appear."

Another statement that is misleading is "if you travel far enough, you're bound to reach territory where the Bell-system standards do not apply and your built-in modem is useless." Anytime you leave the U.S. the Bell-system standards and FCC approval no longer have any significance.



Therefore, a U.S.-manufactured modem cannot be legally attached to the PSTN in any country except the U.S. unless the modem manufacturer has been certified by that country's approval agencies. This is not to say that the modem would not work on that country's phone system—it just would not be legal.

On the matter of higher-speed dial-line modems, your readers should be aware of the CCITT Recommendation V.32, a fairly recent document that defines the characteristics of a family of full-duplex 4800-bps and 9600-bps modems for use on the PSTN. These modems will probably be available in 1985 and will, undoubtedly, achieve widespread popularity for certain applications. However, the needs of many of your users will be well served by the current generation of V.22 Bis-compatible modems.

Finally, it was not made clear that "super-intelligent" modems are not always necessary when a user owns a personal computer and sophisticated communications software. For many users the super-intelligent modem would be a duplication of hardware and software already present in the personal computer. They would be better served at less expense by an intelligent modem that supports simple autodialing.

I am sure that Mr. Moskowitz had good intentions for this article. Unfortunately, the effort shows little research. At best, this article was erroneous and disappointing. Not one of the modem vendors cited has any significant experience in the international marketplace, nor do they have reputations as being industry leaders. I believe a more accurate presentation of the medium-speed and high-speed dial-line modem market would be a great service to your readers. CDS would be pleased to participate in your research for a future article.

Theresa A. Noble
Sales Support
Concord Data Systems
Waltham, MA

Editor's response:

I am very grateful to Theresa Noble for the time and effort, as well as the detailed information, she put into her letter. High-speed-modem communications is an area that is experiencing tremendous development. I apologize for any factual errors, omissions, or confusion in my article.

Robert A. Moskowitz

Address letters to the editor to *Computer Decisions*, 10 Mulholland Dr., Hasbrouck Heights, NJ 07604.

PRODUCTS / MICROS PLUS

DESIGN PROGRAM

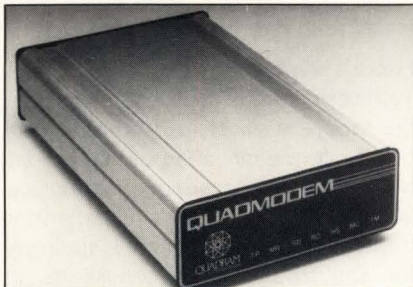


The MGI/Schematic Drafter, which operates directly from an IBM PC or Tandy 2000 keyboard without accessory input devices, places symbols into squares of a grid on the screen with one keystroke. Price: \$3,900. It produces schematic drawings and diagrams via template guide and permits rotating or mirroring of symbols, panning, zooming, and scaling. Blocks of a schematic may be moved for revision or saved.

Microcomputer Graphics Inc., 13468 Washington Blvd., Marina del Rey, CA 90292.
(213) 822-5258.

Circle 246

IBM PC ENHANCEMENTS



The Quad3278 board emulates an IBM 3278 Information Display Station, linking PCs or compatibles to an IBM mainframe. It gives the micro access to databases and mainframe-based networks. Price: \$1,195. A line of modems transforms Apples, IBMs,

and other micros into telecommunications workstations. A stand-alone Quad modem is \$695; an integral modem for the IBM PC is \$595. Amberchrome is a monochrome monitor designed to make viewing easier for IBM PC users. It produces a resolution of 720 dots by 350 lines and makes full use of a 12-inch display. Price: \$250. Quadnets give IBM PC users a choice of several levels of local-area networks. It includes a low-range system connecting up to 32 PCs, a mid-range network, and a high-range network that connects up to 255 PCs. Only one software disk is required. Prices range from \$995 to \$2,295 for the master kit, and from \$395 to \$795 for the user kit.

Quadram Corp., 4355 International Blvd., Norcross, GA 30093.
(404) 923-6666.

Circle 247

IBM PC TEST SYSTEM

Cross-Chex, a software-test system for the IBM PC and compatibles, requires 128 Kbytes of RAM and two disk drives. Priced at \$99, the system checks the performance levels of floppy-disk drives, validates sectors on Winchester disks, certifies main and video memory, and tests keyboards and printers.

Award Software Inc., 236 N. Santa Cruz Ave., Los Gatos, CA 95030.
(408) 395-2773.

Circle 248

ATTENDANCE SYSTEM

TASS, a time-and-attendance system running on the IBM PC, automatically records hours worked, calculates overtime and fringe benefits, and provides data to a variety of payroll systems. Price: \$11,000 to \$11,500, in-

cluding controlled-access system software, TASS software, and software to interface the PC to the payroll system. Reports on overtime and absence can be generated at any time.

Computer Application Systems Inc., 1340 Neptune Drive, Boynton Beach, FL 33435.

(305) 736-3500.

Circle 249

OFFICE AUTOMATION

Samna? office-automation software for the IBM PC and most compatibles includes word processing and other integrated applications. Priced at \$695, it combines a text processor, an easy-to-use spreadsheet, and a word-base manager that allows users to store text randomly and retrieve an item in seconds. The Samna Word III word processor alone is \$550.

Samna, 2700 N.E. Expressway, Atlanta, GA 30345.
(404) 321-5006.

Circle 250

TERMINAL EMULATOR

The Forte 3270PC package allows IBM PC, PC XT, or PC AT users to have the functionality of an IBM 3270 workstation. Price: \$1,495. Users can view up to seven interactive sessions, including four active-host sessions and one PC-DOS session. The package also supports Forte Ecomnet, a micro-to-mainframe communications link running under PC-DOS. Price \$1,495. When used with the Irma 3278/79 terminal emulator, Fortegraph allows an IBM PC, PC XT, or PC AT to act as an IBM 3279 Model S3G color-graphics terminal. Price: \$1,595.

Forte Data Systems, 2205 Fortune Dr., San Jose, CA 95131.

(408) 945-9111.

Circle 251

PC DBMS LANGUAGE

The 10-Base program for the IBM PC implements the Sequel fourth-generation relational database-management programming language for IBM mainframes. Priced at \$495, it features English-like commands, easy menu access, a forms manager for custom-designing data entry and inquiry screen forms, simultaneous access to multiple files and records for creating new files, multiple-user support, and password protection. 10-Base is compatible with the 10-Net LAN System, a kit that includes hardware, software, and utilities to link individual IBM PCs or compatibles into a local-area network. Price: \$695. The 10-Net system requires no central file server and provides record locking at the network level to prevent data collisions. Utilities include calendar and electronic mail.

Fox Research Inc., 7005 Corporate Way, Dayton, OH 45459.
(513) 433-2238. **Circle 252**

WORD/IMAGE PROCESSING

Datacopy's Model 700 Word Image Processing System (WIPS), based on flatbed scanner technology, uses Datacopy's WIPS software and works with most word-processing and database-management software for the IBM PC XT and PC AT. The system, priced at under \$4,000, includes an image scanner, imaging interface, and WIPS software. The system can be used to create complex documents and databases by integrating images, text, and numbers. Character Image Recognition, optional software for the WIPS system, converts document text to standard ASCII code and processes coded text using standard word-

processing software. Version CIR-1, with two typewriter fonts, costs \$695; Version CIR-2, with two fonts and an interactive-learning feature that recognizes any font or letter pattern, costs \$1,995.

Datacopy Corp., 1215 Terra Bella Ave., Mountain View, CA 94043.
(415) 965-7900. **Circle 253**

FACILITY MANAGEMENT

CADG+FM, a facility-management system, provides decision support for all aspects of facility management. Price: about \$20,000. The system operates with a series of interactive modules that includes a system coordinator, inventory manager, requirements programmer, location and layout planner, master planner, and drafting coordinator. CADG+FM is a menu-driven program that runs on IBM 3270 terminals linked to an IBM 4300 or 30XX computer under either MVS/TSO or VM/CMS, as well as DEC VT100 or VT200 terminals linked to a VAX computer under VAX/VMS.

Computer-Aided Design Group, 2407 Main St., Santa Monica, CA 90405.
(213) 392-4183. **Circle 254**

PORTABLE PRINTERS

Inforunner has introduced a line of portable printers that fit into a standard-sized briefcase. The Riteman Plus dot-matrix printer (\$399) prints at 120 characters per second (cps). The Riteman Blue Plus dot-matrix printer (\$499) features a speed of 140 cps, 128 character modes, logic-seeking graphics, a quad-density graphics mode, and nine international character sets. The Riteman II professional-

quality dot-matrix printer (\$549 to \$599) features 160-cps print speed, 256 programmable characters, 128 character modes, and 2 Kbytes to 8 Kbytes of RAM. The Riteman 15 dot-matrix printer (\$799 to \$849), which has a print speed of 160 cps and offers 136-column printing, features 2 Kbytes to 8 Kbytes of RAM, 256 programmable characters, and six graphics modes. The Riteman LQ (\$299), a letter-quality printer, features a 96-character ASCII set, 12-cps print speed, and bidirectional printing. The Blue Mac dot-matrix printer (\$549 to \$599) works with Macintosh and Apple IIc micros and has a print speed of 120 to 140 cps.

Inforunner Corp., Airport Business Center, 431 N. Oak St., Inglewood, CA 90302.
(213) 453-6688. **Circle 267**

DATABASE SYSTEM

Cornerstone, a full-featured relational database system that runs on the IBM PC, PC XT, PC AT, and compatibles, helps novice programmers solve data-management problems. Priced at \$495, the package can be used with Lotus 1-2-3, Wordstar, Mailmerge, and other popular business programs. A conversion feature lets dBase II and PFS! File users transfer existing files into the system.

Infocom Inc., 55 Wheeler St., Cambridge, MA 02138.
(617) 492-1031. **Circle 268**

Report writer for HP 3000: The Expert, from Cognos of Dallas, allows users with little or no computer experience to organize, format, and produce professional-looking reports. It can also be used as a prototyping tool.

Circle 269

**A PC is a terrible
thing to waste!**



Is your PC being used productively? Or are you using it for non-processing tasks? Techtran's new 990 Disk Recorder, featuring IBM PC* compatibility, is a stand alone data recorder/terminal which allows your PC to do what it does best... **COMPUTING!**

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Z-DOS is a registered trademark of Zenith Data Systems.
MS-DOS is a registered trademark of Microsoft Corporation.

CIRCLE 64

PRODUCTS

FAULT-TOLERANT SYSTEM

Sequoia Systems' 32-bit, fault-tolerant computer is suited for online transaction processing. Price: \$290,000. Tightly coupled architecture allows 64 processor elements and 128 memory and I/O elements to be interconnected in almost any combination through dual, high-speed system buses. The computer runs under Bell Labs' Unix, is compatible with the Berkeley 4.2 and the AT&T System V, and supports IBM SNA terminal emulators and Ethernet's local-area network interface.

Sequoia Systems, Boston Park West, Marlborough, MA 01752.
(617) 480-0800.

Circle 233

UNIX SUPERMINIS

System8000 Series Two superminis offer high-performance 16-bit processors. The three models in the series run on Bell Labs' Unix operating system and have 32-Kbyte cache memories. Models 32 and 22, which can support up to 40 users, have a base price of \$29,950 and \$23,950, respectively. Model 12 can support up to 16 users and has a base price of \$19,950. Model 32 includes a 168-Mbyte modular disk drive and a Unix license for eight users. Models 22 and 12 feature a 52-Mbyte Winchester-disk drive.

Zilog Inc., 1315 Dell Ave., Campbell, CA 95008.
(408) 370-8000.

Circle 234

PRODUCT DESIGN

Sperry's Computer-Integrated Manufacturing/Mechanical Engineering (CIM/ME), a distributed system that handles all aspects of product design, integrates four CAD/CAM modules: design, engineering analysis, drafting, and numerical control. Price: \$400,000 to \$500,000. The modules

free the mainframe to support other business functions. CIM/ME uses a Sperry Series 1100 mainframe, which can be connected to more than 20 workstations. Each workstation includes a central processor, a graphics terminal, and a display processor.

Sperry Corp., P.O. Box 500, Blue Bell, PA 19424.
(215) 542-4213.

Circle 235

RELATIONAL DBMS

The Microdata 9208, a relational database management system, processes programs at twice the speed of the Microdata 9000. Priced at \$180,000, the system is compatible with the Reality operating system, has 6 Mbytes main memory and 2 gigabytes disk capacity, and supports over 200 terminals concurrently. It allows asynchronous communication lines to support bidirectional flow control and type-ahead features and uses multiple-bus architecture.

Microdata, 17481 Red Hill Ave., Irvine, CA 92714.
(714) 250-1000.

Circle 236

ENGINEERING SOFTWARE

The Symbolics 3640 system is a dedicated single-user workstation for software engineering. Price: \$69,000 for a standard configuration including 2 Mbytes of RAM and a 140-Mbyte Winchester disk. In addition, the Symbolics 3640 can be networked to a larger system.

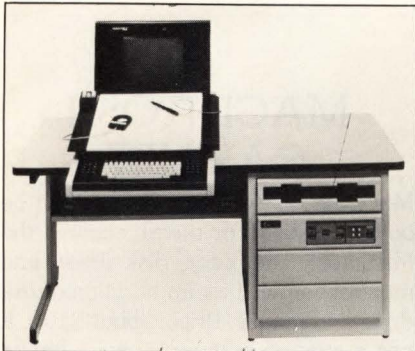
Symbolics Inc., 11 Cambridge Center, Cambridge, MA 02142.
(617) 577-7500.

Circle 237

DBS 16 supermicro upgraded: Espirit Computer Products' (Montgomeryville, PA) DBS 16 multi-user supermicro now has up to 105 Mbytes of Winchester-disk storage. Price: \$12,995.

Circle 238

DDP NETWORK PROCESSOR



The 8890/CP Information Processing System, a communications processor for distributed data processing, allows 8890/CP terminals to interact with remotest hosts and remote systems and to share data from a large database. Price: \$99,950. The system includes a Series 8890 Model 10 cpu with 1 Mbyte of main memory, four Model 8278 workstations, two 129-Mbyte hard disks, a 300-line-per-minute printer, a streaming-tape drive, four communications lines, the NIDOS/VSE operating system, and an NCOBOL compiler. Also available are four new Series 8890 cpus that range in price from \$28,750 to \$85,500. The new models provide from 1 Mbyte to 8 Mbytes of main memory and can support from 32 to 96 local or remote workstation.

Nixdorf Computer Corp., 300 Third Ave., Waltham, MA 02154.
(617) 890-3600. **Circle 239**

GRAPHICS PROCESSOR

Genigraphics' Model 100D-Plus graphics processing system has higher image resolution and greater speed and storage capacity than its forerunner, the Model 100D. Price: \$72,000. The Model 100D-Plus creates, manipulates, and stores high-quality, computer-generated visuals for production as 35mm color slides, viewgraphs, and transparencies. Features include a 16-million color palette with a working palette of 256 colors; a

31-Mbyte hard disk and two 5¼-inch floppy disks; and the DEC Micro-11/73 cpu. The system offers continuous control of hue, chroma, value, size, and position; automatic justification; continuous zoom; automatic data plotting for pie, line, bar, and area graphs; and file-management features for adding, reviewing, or copying records.

Genigraphics Corp., P.O. Box 591, Liverpool, NY 13088.
(315) 451-6600. **Circle 240**

ENTRY-LEVEL MINIS

Two entry-level minicomputers are designed for local transaction processing and remote-site job entry. Model SyFA 150 has a base price of \$9,950; model SyFA 170 has a base price of \$13,950. A typical configuration is priced at \$17,250 for the SyFA 150 and \$21,250 for the SyFA 170, including a 36-Mbyte 5¼-inch Winchester-disk drive, a 10-Mbyte streaming-tape drive, and eight asynchronous multiplexer ports.

Computer Automation Inc., 1800 Jay Ell Drive, Richardson, TX 75081.
(214) 783-0993. **Circle 241**

GRAPHICS SYSTEM



The Starburst Computer Graphics Presentation System offers 256 colors, 3-D charts, text formatting, and NTSC video output for videotape synchronization. Prices start at \$34,995. The system includes a 512-Kbyte cpu, a 10-Mbyte Winchester disk, a 5¼-inch floppy disk, a puck and digitizing tab-

let, a keyboard, software, a 12-inch monitor, and a video recorder.

AVL, 56 Park Rd., Tinton Falls, NJ 07724.

(201) 544-8700.

Circle 242

BUSINESS SUPERMINI

All Qantel systems can now be field-upgraded to the top-of-the-line System 264, which supports up to 200 users, is rated at 1.5 million instructions per second, and has a memory capacity of 16 Mbytes and a disk capacity of 2,400 bytes. A basic configuration costs \$105,000. A system that includes 2 Mbytes main memory, 300 Mbytes of disk storage, a streaming-tape drive, 12 workstations, four matrix printers, and a 1,000-line-per-minute line printer costs about \$270,000.

MDS Qantel Inc., 4142 Point Eden Way, Hayward, CA 94545.
(415) 887-7777. **Circle 243**

ECLIPSE TOOL

The Intrinsic Instruction Set (IIS), an enhancement to the Eclipse MV/10000 superminicomputer, reduces instruction execution times for commonly used trigonometric and algebraic functions. IIS increases computation performance from 2.5 million instructions per second (MIPS) to 2.95 MIPS. The enhancement costs \$225 for systems equipped with the Writeable Control Store option, which provides additional space for instructions and costs \$10,000.

Data General Corp., 4400 Computer Drive, Westboro, MA 01580.
(617) 366-8911. **Circle 244**

Unix directory: The Unix System Encyclopedia, published by Yates Ventures of Los Altos, CA, lists nearly 400 sources supplying products and services for Bell Labs' Unix operating system. **Circle 245**

PRODUCTS / SECURITY

FILE SCRAMBLER

Lock-up is a coded floppy disk that, when given a password by the user, scrambles any data file into unreadable form. Price: \$249. After Lock-up scrambles a data file, a second password is used to unscramble it. Lock-up runs on the IBM PC and compatibles and requires 256 Kbytes of RAM and one disk drive.

Datek Software Associates Inc., 245 Park Ave., New York, NY 10167.
(212) 682-3434. **Circle 255**

MICRO-DATA PROTECTION

Microlock, a hardware and software system that protects data and programs that run on microcomputers, is compatible with a wide range of systems with a RS-232 interface. Price is \$70 per installation. The software designer uses custom algorithms and permits some programs to run on all systems and some on a few systems, with overlapping and subgroups if desired.

Duracom Corp., 7300 N. Crescent Blvd., Pennsauken, NJ 08110.
(609) 662-7272. **Circle 256**

EQUIPMENT PROTECTION

With Microbug, up to five pieces of computer equipment can be protected from physical theft. Price: \$129. Motion-activated sensors attached to computers are at the end of five-foot-long cords (extensions available) plugged into Microbug. If a computer is moved or tampered with, an alarm sounds. Microbug, which can also be connected to a central security sys-



tem, plugs into any standard 120-volt outlet. An internal battery keeps Microbug activated for about 36 hours.

Microsense Inc., 628 S. Main St., Spring Valley, NY 10977.
(914) 425-3882. **Circle 257**

ACCESS-CONTROL SYSTEM

MAC 521 monitors nine access points and up to 36 alarm points. Nine doors can be controlled for under \$6,000. Features include individually encoded passcards, printouts, keyboard data



entry, and anti-passback. The MAC 521 accommodates 1,000 identity cards and 16 security-access levels.

Rusco Electronic Systems, 1840 Victory Blvd., P.O. Box 5005, Glendale, CA 91201.
(213) 240-2540. **Circle 258**

MACINTOSH CABINET

Mac-Safe, a steel cabinet that can be bolted to wood or metal, secures the Macintosh computer, disk drive, and monitor, as well as an additional disk drive and mouse. Price: about \$195. It has a storage compartment, a flip-up cover, and an eight-tumbler key lock.

Omni Tech Corp., 1455 N. Barker Rd., Brookfield, WI 53005.
(414) 784-4178. **Circle 259**

INTELLIGENT MODEM

The Cermetek Security Modem guards access to computers by asking the caller for a password and then dialing the number associated with that password. Price: \$695. Other security features include an audit trail of attempted access, dial-out password for outbound calls, and stickers to seal the modem against tampering.

Cermetek Microelectronics Inc., 1308 Borregas Ave., P.O. Box 3565, Sunnyvale, CA 94088.
(408) 752-5000. **Circle 260**

PC PROTECTION

Cylock, priced at \$449, prevents unauthorized access to IBM PC XT's. It also protects software, and produces a security audit trail. Users must present both a personal password and an individual data key to get into the system. Files can be designated for private or shared use, and "use-only" or "read/write" privileges can be assigned to users. The device allows computer access to up to eight users or groups.

Cytrol Inc., 4620 W. 77th St., Edina, MN 55435.
(612) 835-4884. **Circle 261**

PRODUCTS / SECURITY

MEDIA SAFES

Sentry Supreme Models 5750 and 5760 media safes protect diskettes, cassettes, microfiche, and electronic tapes from fire, high temperature, and humidity. Price: about \$600 for Model 5750; about \$700 for Model 5760. Model 5750 can store up to 200 3¼-inch, 80 5½-inch, or 40 8-inch diskettes. Model 5760 can accommodate the same number of diskettes as Model 5750 and has a document-storage area.

John D. Brush & Co. Inc., 900 Linden Ave., Rochester, NY 14625.
(716) 381-4900. **Circle 262**

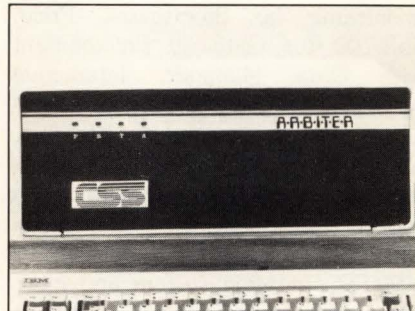
CARD ACCESS SYSTEM

MTX-II stand-alone system controls access of up to 8,000 people at two doors. Priced under \$2,300, it can be told which cards are valid for each door. Options include a printer to record all door activity, digital keypad, alarm monitoring, and anti-passback. Up to eight units can be linked to a master unit, providing control for 16 doors.

Matrix Electronics Inc., 3831 Horseblock Rd., Yaphank, NY 11980.
(516) 924-0160. **Circle 263**

DATA ENCRYPTION

Arbiter is a random-data encryption and terminal-authentication system that protects databases from burglary or sabotage, works in real time, and relies on hardware circuitry rather than programming. Price: \$2,000 to \$4,000, depending on the number of



systems desired. No software, locks, passwords, cards, or other accessories are required, and no two transmissions are alike, so scrambling patterns cannot be detected. Arbiter can detect intruders and break the connection, setting off an alarm.

CSS, One Huntington Quad, Melville, NY 11747.
(516) 752-7790. **Circle 264**

ENHANCED WATCHDOG

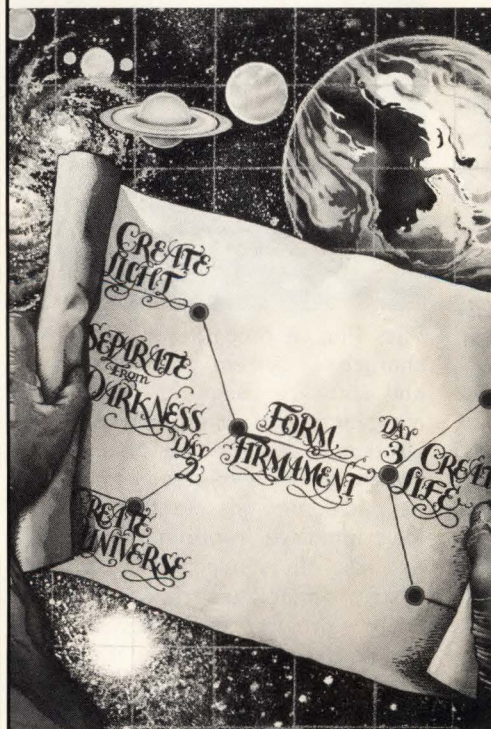
A new version of Watchdog security software includes revised screen design and new audit-trail programs. Price: \$295. The package is available for IBM PC XTs, PC ATs, and compatibles, as well as for IBM PCs.

Fischer-Innis, 4175 Merchantile Ave., Naples, FL 33942.
(818) 793-1500. **Circle 265**

Macintosh mass storage: Omnidrive, a 5¼-inch Winchester-disk system designed for the Macintosh is made by Corvus of San Jose, CA, and offers a capacity of 5,11,16, or 45 Mbytes.

Circle 266

PROJECT MANAGEMENT POWER



PMS-II® was the first serious project management software available for microcomputers. Today, a thousand industry and government users across 5 continents enjoy PMS-II, still the most complete project management software made for micros.

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CIRCLE 65

PRODUCTS / SOFTWARE

TERMINAL INTERFACE

Acces Virtual Terminal Service (VTS) provides a uniform terminal interface for multi-vendor networks. Source copies of Acces VTS, written in C, cost \$25,000. Acces VTS supports ASCII terminals under VAX/VMS or Bell Labs' Unix. Users of multi-vendor networks can access a VAX/VMS or Unix host using a VT100 terminal without having to use two different sets of control characters.

Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, CA 93101.
(805) 963-9431. **Circle 204**

mainframe by themselves. Price: \$53,100 for Gateway Environment with Data Manager. Interactive screens allow entry of budgets, schedules, forecasts, and other data files. Once data are stored in the mainframe, they can be manipulated with reporting and graphics prompts. The package runs under IBM's VM/SP operating system and interfaces with Focus, Ramis II, Tell-A-Graf, and SAS/Graph.

SCA Products and Services Inc., 353 Lexington Ave., New York, NY 10016.
(212) 532-2990. **Circle 206**

PRODUCTION PLANNING AID

Respond Manufacturing Management System, designed to aid manufacturers in production planning, runs on Tandem's Nonstop II and TXP computers. License fees range from \$45,000 to \$90,000 per module. The package features a manufacturing database and a manufacturing operations system, which includes modules for order management, shop-floor control, material and inventory control, purchasing, and accounting.

Oriole Software, 7801 York Rd., Towson, MD 21204.
(301) 823-0551. **Circle 208**

DBMS FOR VAX-11

Adabas and Natural offer database management and information processing to users of DEC's VAX-11 superminicomputers. Price: \$50,000 for the two packages. Adabas can process a high volume of transactions in large multi-user systems. It features automatic restart and recovery, restores data after a disk-head crash, and prevents deadlocks. Adabas also allows databases to be sorted across separate disk volumes. With Natural, users can create applications for information entry, retrieval, update, and report without having to program.

Software AG Systems Inc., 11800 Sunrise Valley Dr., Reston, VA 22091.
(703) 860-5050. **Circle 205**

SYSTEMS MANAGEMENT



Pacs Plus, a process accounting and chargeback system, tracks hardware and software usage for VAX/VMS computers. Price: \$3,900 and up. Users may examine, edit, and retrieve system data via on-screen forms and keypad commands. A report writer allows multilevel reporting. The package also offers selection of up to 30 system variables, such as node, account, project, user, session, and image. Pacs Plus runs under all VMS versions up to release 4.0.

Signal Technology Inc., 5951 Encina Rd., Goleta, CA 93117.
(805) 683-3771. **Circle 207**

DISOSS INTERFACE

Docupower allows users of non-IBM computers to interface with DISOSS, IBM's document library and distribution software. Initial host price: \$15,000. Docupower resides in an IBM host mainframe and is implemented under IBM's CICS/VS operating system. It supports SNA and bisynchronous protocols, and exchanges information with DISOSS via the Document Interchange Architecture (DIA). Docupower "interprets" documents from non-IBM equipment and delivers them to DISOSS.

Software Research Corp., One Natick Executive Park, Natick, MA 01760.
(617) 655-1133. **Circle 209**

MANAGER FILES TO MAINFRAMES

Data Manager, an enhancement to Gateway Environment, lets managers store business files on the corporate

TRS-80 upgrade: XCalibur, a 16-bit board from Micro Projects Engineering (Culver City, CA) runs under MS-DOS 2.11. It enhances the capabilities of TRS-80 Models I, III, 4, and 4P, and LNW Model II. **Circle 210**

PRODUCTS / SOFTWARE

DEBUGGING AID

Trace helps programmers debug a program and eases software audits by showing the step-by-step execution of a program. Price: \$2,500. The package runs on IBM computers under MVS, TSO, and VM/CMS.

AK Inc., 1671 McBain Ave., San Jose, CA 95125.

(408) 264-8015.

Circle 211

SYSTEM/ 38 PLUS

Productivity Plus features programming, analysis, debugging, and clean-up for the IBM System/38 minicom-

puter. The package of six modules—a program- and display-file compiler, a database-recreation procedure, a source member-object correlator, an object-source locator, a file-member maintenance option, and a source-copy utility—is available for \$500.

Advanced Systems Concepts, 1350 Remington Rd., Schaumburg, IL 60195.

(312) 310-1881.

Circle 212

MAINFRAME SPREADSHEET

Megacalc, a spreadsheet for IBM mainframes, can be operated independently or with uploaded microcomputer spreadsheets like Lotus 1-2-3, Visi-

calc, and Supercalc. Price: \$19,000 to \$24,000. Linked to Tell-A-Graf, a mainframe graphics application, it combines spreadsheet modeling features with high-quality graphics output. Megacalc operates on IBM 3270 and compatible terminals under MVS/TSO and VM/CMS.

Integrated Software Systems Corp., 10505 Sorrento Valley Rd., San Diego, CA 92121.

(619) 452-0170.

Circle 213

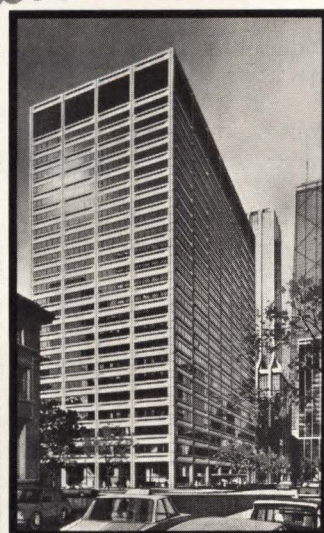
Apple emulates VT-100: VT-100 EM software enables the Apple IIe and II to emulate the DEC VT-100. Heyden & Sons of Philadelphia also has a text file-transfer facility. The Apple screen-handling routine has been rewritten to support 10.2-K baud.

Circle 214

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CIRCLE 66

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CIRCLE 67

PRODUCTS / PERIPHERALS

HANDWRITTEN DATA ENTRY



Inforite, a data-entry device that operates with a regular ball-point pen, can be used to enter data from business forms directly into a database, without keyboarding. Price: \$1,950. The device can accommodate three-part forms and recognizes alphanumeric characters and check marks. It can also capture handwritten notes, sketches, and signatures. Inforite features a 2-by-40-character LCD display and programmable calculator functions. An optional forms-definition system (\$450) permits the creation of forms for specific applications.

Inforite Corp., 1670 S. Amphlett Blvd., San Mateo, CA 94402.
(415) 571-8766. **Circle 223**

FAST, FLEXIBLE PLOTTER



The Numonics Model 5600 plotter automatically selects pens from a four-pen magazine to plot at up to 9.8 inches per second. Price: \$6,000. The Model 5600 handles paper or mylar from A through D sizes and can use ball-point, ink, or ceramic pens.

Numonics Corp., 418 Pierce St., Lansdale, PA 19446.
(215) 362-2766. **Circle 224**

REMOTE-PRINTER CONVERTER

The RPC 9135 remote-printer converter allows remote printers to function as local output devices without communications software. Prices start at \$4,400. It drives line printers at 1,200 lines per minute and is compatible with all industry-standard impact printers.

Southern Systems Inc., 2841 Cypress Creek Rd., Fort Lauderdale, FL 33309.
(305) 979-1000. **Circle 225**

LINK FOR IBM 3270

Matchmaker 2000 enables IBM 3270 users to access non-IBM hosts, such as DEC, Data General, and Hewlett-Packard, as well as microcomputers. Price: \$695. Matchmaker resides between the IBM 3178, 3179, 3180, 3278, or 3279 terminal and the IBM 3274 or 3276 cluster controller and requires a standard RS-232C interface. It supports either seven- or eight-bit ASCII character modes at speeds from 110 bits per second (bps) to 19.2 Kbps. Additional features of the Matchmaker 2000 include self-diagnostics, high-speed scrolling, and security provisions to prevent unauthorized access.

Manufacturing Technologies Inc., 6481 Global Dr., Cypress, CA 90630.
(714) 220-1004. **Circle 226**

BARCODE SCANNERS

The DBR 100 barcode reader, designed for light inventory control, is battery operated and has a palm-sized infrared wand. Price: \$175. The DBR 800 stationary barcode reader, designed for online industrial and business applications, has four types of wands and ranges from \$275 to \$475. The DBR 1000 has modular components, including an 8-Kbyte control unit, plug-in keypads, and memory modules. Prices for the DBR 1000 range from \$500 to \$1,100.

Databar Corp., 10202 Crosstown Circle, Eden Prairie, MN 55344.
(612) 944-5700. **Circle 227**

NEW ZENITH TERMINAL

Zenith's Z-22 terminal has full editing features and a host and printer port that can be set to different baud rates. Price: \$649. The terminal can communicate in both block and conversation mode and features automatic log-on, which permits users to program up to 10 different data-source passwords or phone numbers from the keyboard.

Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025.
(312) 391-8949. **Circle 228**

LOW-COST TERMINAL

With Term-Tronics' IBM 3178-compatible Miracle 178P terminal, an inexpensive ASCII asynchronous printer can emulate the more expensive IBM 3287 printer. Price: \$1,145. The Miracle 178P terminal can be used to place printers in remote workstations.

Term-Tronics Inc., 7408 Trade St., San Diego, CA 92121.
(619) 271-1770. **Circle 229**

PRODUCTS / PERIPHERALS

VAXSTATION I, LASER PRINTERS

VAXstation I, a 32-bit single-user workstation, incorporates the MicroVAX I and provides VAX/VMS features, including high-resolution graphics and multi-windowing capabilities. Price: from \$21,095. VAXstation I supports the Graphic Kernel System as its first graphics-application interface language. The workstation, which can be connected to DECnet/Ethernet computer networks, has a 19-inch screen display, shows full-page documents and multiple windows concurrently, and includes both DEC VT100 and Tektronix 4014 terminal emulation. Two new laser printers feature graphics output and variable-font text capabilities. Price: \$22,520 for Model LN01B; \$29,995 for Model LN01S.

Both printers are supported by the VAX/VMS operating system. Model LN01S is also supported by all PDP-11 operating systems.

Digital Equipment Corp., 146 Main St., Maynard, MA 01754.
(617) 897-5111.

Circle 230

HANDHELD TERMINAL

Priced at \$395, IXO's Model TC200 handheld terminal/modem can communicate either over the phone to a remote host, or locally via RS-232C interface and cable. The model, which has auto-dial and automatic log-on features, can receive, verify, and display messages from any host computer. Model TC200 connects to IXO's handheld 20-column printer, the



PR102 (\$200) and can be used offline, storing data for uploading.

IXO Inc., 5757 Uplander Way, Culver City, CA 90230.
(213) 417-8080.

Circle 231

High-capacity floppy: Memorex (Santa Clara, CA) offers a 5¼-inch floppy disk for the IBM PC AT. When formatted, it has a 1.2-Mbyte storage capacity.

Circle 232

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CIRCLE 69

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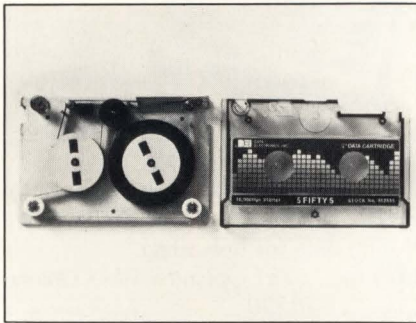
415/572-6600 (in California)

Nobody offers more.

CIRCLE 70

PRODUCTS / ACCESSORIES

IMPROVED CARTRIDGES



The Data Electronics 10,000-flux-transitions-per-inch ¼-inch data cartridges are designed to eliminate stresses transferred into the baseplate at higher speeds. Price: \$50 per cartridge. The cartridge has several features that make for closer tolerances and improved operation at higher den-

sity speeds. A new grade of lubricant improves tape stability and speed control and reduces friction.

Data Electronics Inc., 10150 Sorrento Valley Rd., San Diego, CA 92121. (619) 452-7840. **Circle 216**

DESKTOP STATIC PAD

A 9½-inch-by-23½-inch pad for movable keyboards and step-down areas of computer tables, First Touch Model 910 pad drains away static charge while protecting the operator from electrical shock. The non-skid, static-resistant First Touch Model 9210 pad costs \$40.

3M, P.O. Box 33600, St. Paul, MN 55133. (612) 733-1186. **Circle 217**

MINI DATA CARTRIDGE



The DC1000 Mini Data Cartridge stores 10 Mbytes of backup data for fixed-disk systems. It contains 185 feet of tape. Price: \$20.

3M, P.O. Box 33600, St. Paul, MN 55133. (612) 736-2355 **Circle 218**



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The MPL TQ5 power unit may also be used with Amdahl 580, NCR 8600 CDC, Univac and Cray 400 Hz computers.

MPL Power Systems plc
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Telephone (804) 2626068 Telex: 756842

CIRCLE 71

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CIRCLE 72

SOURCE: 004

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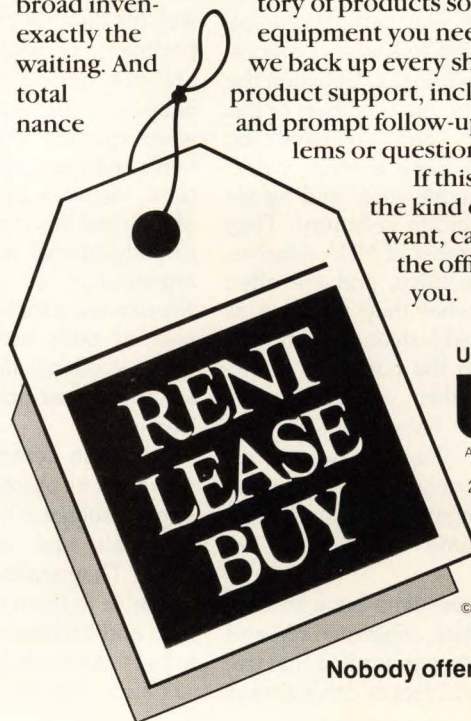


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CIRCLE 76

YOUR CAREER

by Marsha Sinetar, Guest Columnist



Photo by H. Armstrong Roberts

CARE AND FEEDING OF BABY-BOOMERS

A new generation of workers has entered corporate America and, like generations before it, is beginning to shape the workplace to fit its own ideas. Between the ages of 25 and 39, the members of this group—labelled “baby-boomers” by the media—are more diverse, better educated, and more vocal and aware than any other group in history. They hold a record number of MBA degrees, are highly competitive, and are often impatient with what they perceive as their seniors’ “old-fashioned,” unquestioning loyalty to the corporation. Acknowledged for their voting and consumer power, baby-boomers are challenging the values and work ethic of the previous generation, and in so doing, are causing many senior managers to reevaluate their styles of leadership.

Senior managers who have to deal with this articulate, opinionated, and sometimes irritating group find that traditional managerial tactics don’t always

work, in part, because baby-boomers stick together. When things don’t go well for them in an organization or department, or when they believe they are not getting what they deserve, baby-boomers speak up—and the word spreads. After all, this generation’s style and actions gave life to the term “networking,” referring to a web of informal ties that cuts across the status, educational, and political lines of an organization or community to bond like-minded people. As a result, a manager at odds with a younger staffer might suddenly find him- or herself in an adversarial position with an organized group.

Although networking isn’t exactly a new idea, its place in the corporate conscience suggests how savvy young professionals and executives have become. They are conscious that power is available to them because of their numbers and because they work collectively to achieve similar goals. These staffers also often have another advantage

over their seniors: They are computer-literate and expertly use and manipulate information as a political weapon.

Younger professionals’ vocalness and their awareness that information is power tell much about their attitudes toward superiors. Not only will they not support their bosses right or wrong, but they are not content to serve by standing and waiting. Working loyally for one corporation for 30 years only to receive a gold watch may have been desirable for the post-Depression generation, but it will not suffice for a generation raised on television and with a certain amount of affluence. The baby-boom generation is not willing to be treated as a disposable corporate resource. “We’re more than tools with which business can make money,” explains a young woman who feels her entire department it is being treated unfairly by an inept manager. “It’s not enough to say to us, ‘If you don’t like it here, leave.’ Why do we have to quit as an answer

(Continued on page 160)

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YOUR CAREER

(Continued from page 158)

to management practices that so many of us feel are blatantly unfair?"

This young professional and many like her hold high expectations of senior managers. They believe their superiors should be as skilled in dealing with people as they are at their work. This request may sound a bit idealistic, but it reflects the heavy demands baby-boomers place on themselves. These professionals believe they have investments in their careers and regard feedback from their bosses as interest or dividends. In return for commitment and dedication, they ask for democratic and enlightened management practices and personalized treatment from managers.

The baby-boom generation's *desire* to control its own destiny and to do satisfying and meaningful work isn't really much different from the desires of other generations of employees. However, today's young professionals differ from their elders in that they feel *entitled* to stimulating employment and, at the least, decent treatment. Security, the approval of others, and the attainment of status and power are by no means anachronisms, but they are subordinate to younger professionals' needs for self-expression and fulfillment.

Because baby-boomer professionals need to like their work, senior managers may have to adjust their management styles to keep subordinates happy and productive. In many cases, managers will have to allow subordinates to participate more in the decision-making process or risk losing the interest and commitment of the subordinates. In other organizations, opening up formal and informal lines of communication will go a long way in establishing work relationships based on trust and cooperation.

One way managers can start the ball rolling is by asking subordinates individually how they feel about their work and what they believe are their talents. In this discussion, managers should

offer their assessments of their subordinates' skills, which allows younger staffers to juxtapose their self-perceptions to their bosses' perspectives. Much less formal than an annual performance review, a discussion affords a manager the opportunity to correct a younger subordinate if need be, but in a way that encourages future effort. It can also be the time to make additional demands on individuals who are high achievers or creative thinkers or to offer guidance and direction, pointing out the necessary path to advancement.

However, dialogue should not begin and end on the informal level. Frequently held formal staff meetings structured to accommodate the needs of junior staffers provide another forum for discussion. The agenda should include time at the end of the meeting for open-ended questions—such as "Why didn't Project X work out?" A question that asks junior staffers to analyze a failure helps both managers and their subordinates develop a more constructive attitude about mistakes and may even elicit good ideas for the next project.

As soon as younger professionals realize their failures won't return to haunt them, they will be more open to thinking creatively and expressing their ideas. But it takes a savvy manager to understand the creative process and to devise situations that encourage creative thought. First, managers should encourage subordinates to make suggestions. In many organizations, nonconformist behavior and ideas are greeted with subtle criticism (We've never done that around here), outright rejection, or avoidance. If, however, managers reward their subordinates for new ideas, they will probably see an increase in staff participation as the result.

A second step might entail setting up problem-solving groups, which usually appeal to younger professionals because they make the decision-making process more accessible. Whatever the

format, if managers don't want to rattle their younger subordinates, they must make it clear that creative thinking is valued.

However, the chance to contribute creatively to decision-making is meaningless if staffers don't believe there is something worthwhile to work for. Whether it is to produce a quality product, to provide a needed service, or to satisfy themselves, baby-boomer professionals want to work toward goals they value. Because the goals they set for themselves transcend what they consider trivial, task-oriented objectives, they value jobs that allow them to realize their own goals.

This is not to suggest that young staffers should be coddled. On the contrary, baby-boomers say they are stimulated when demands are made of them and when they believe the goals toward which they work are worthy of their time and energy. Just as senior managers don't feel committed to trivial objectives, talented subordinates will not enthusiastically give their all to projects that do little to inspire them. As a result, senior managers must focus on quality work goals to keep their baby-boomers working up to speed.

What kind of manager does it take to fill the baby-boom generation's order? One who sees that the quality of work has everything to do with the quality of life. A highly regarded manager close to retirement explains why his relationships with young professionals have been so successful: "I ask them to delve deep into themselves to pull out something more for the corporation. That 'something more' is individual excellence, a type of thinking that always turned me on—and this generation is no different. To achieve individual excellence, each person has to set the highest personal standard and meet that goal. That approach stretches people, lets them grow, and serves the organization as well. Striving for excellence is a worthy and perhaps unreachable goal. All I know is that young professionals enjoy the striving and they enjoy their work too." □

"Baby-boomers challenge the values and work ethic of the previous generation."

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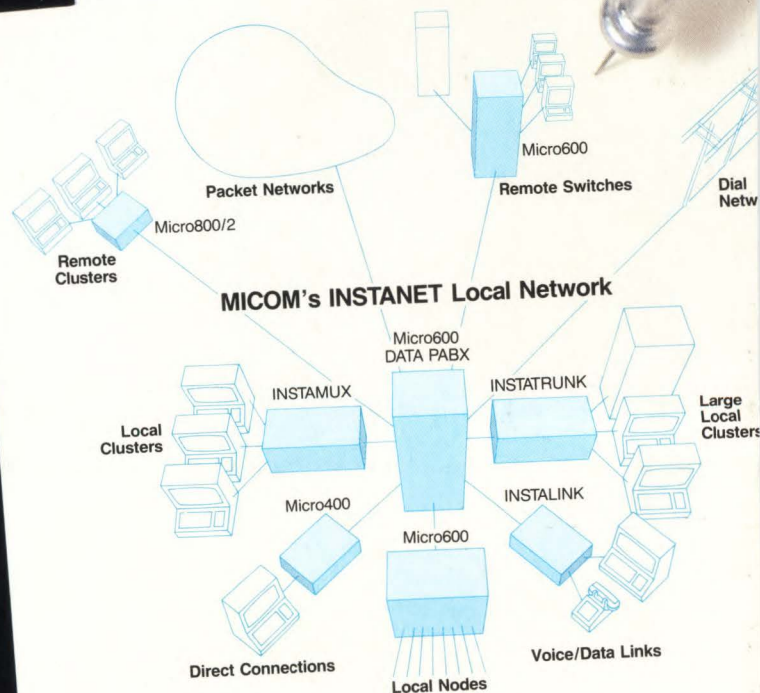
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