

terminals where DEC has expertise."

Another one of the big three mini-computer makers, Hewlett-Packard Co., also is looking into WP. Paul C. Ely, Jr., who heads HP's Computer Group, says that he is not likely to make a large commitment to WP in the next

two years. But he adds that it is "unlikely, too, that we won't go to WP."

HP will announce in August a new version of its Model 2640 computer display terminal that, Ely says, "is like a WP unit without a typewriter." But it will be sold strictly as a computer ter-

terminal. HP is about to put the \$2,640 terminals in its sales office network where they will be used not only for orders but for electronic mail. Notes Ely: "There is no better way to learn about a market than to try it out in your own operations."



## The paths to the paperless office

Beating the 'paper nightmare' and boosting productivity are the main goals

Over the next decade, most corporate offices will still be geared to the movement of information on pieces of paper. Office automation will bring improvements in productivity through the use of automatic typewriters and other stand-alone equipment that crank out paper faster. Some inter-office information will move electronically, but what the manager reads and files will be printed on paper.

But during this period, a relatively small but fast-growing group of companies will have moved into the office-of-the-future environment. The leap forward will be led by the "papermakers"—those companies that are involved primarily in generating, modifying, or moving paper. These pioneers

will have hooked together word-processing equipment into office systems to transfer information electronically and to move it into and out of central electronic files. For them, it will be the start of the paperless office.

Productivity gains will rival those of today's factory and accounting departments. But the pacing factor will still be people, because the technology of the office of the future does not fit the structure of how things are traditionally done in the office.

Historically, the key stimulus in the application of any new technology has been the need to solve a current problem. And the "papermakers" now have an overpowering problem, one that is too big to be solved by today's word-

processing (WP) approach. The insurance business is a "paper nightmare," cries James S. Bolen, systems manager at Fireman's Fund American Insurance Co. WP is a "stopgap measure, just another way of pushing paper around," he says. "We should be looking at how to get rid of that paper." And that is what Fireman's Fund expects to do.

### Linking them together

Current WP products will move closer to integrated office systems this year, when several suppliers of text-editing typewriters introduce improvements that will turn their stand-alone units into communications terminals. International Business Machines Corp. has had an editing typewriter that "talks" to its own kind, but it "never took off because it was so slow," says Edward I. Rosen, marketing chief at Vydec Corp., which soon will add communications to its display text editor. Xerox Corp. will announce the same capability for its automatic typewriter, possibly later this year. And this month, Lexitron Corp. will add communications to its machine.

Electronic mail is another overpowering business need that should speed the move to integrated office systems. And the need grows stronger almost daily because of the deteriorating performance of the U. S. Postal Service and rapidly rising mail costs. "Mail service and costs are getting so bad that maybe techniques that we thought would be cost prohibitive won't be," declares George E. Pake, who heads Xerox' Palo Alto Research Center. "We also might be clever enough—by using data compression techniques—to send mail no matter what the communication costs are."

The combination of such new technology and worsening mail service virtually guarantees that electronic mail and internal document distribution will be a major job for future office systems. Harvey L. Pastan, an engineer for Arthur D. Little, Inc., a Postal Service consultant, says, "Other services will gradually replace the U. S. mail unless something is done." But postal officials show little inclination to set up elec-

tronic mail systems. Beyond Western Union's Mailgram, any system now envisioned by the Postal Service could not be fully operational for 10 years, if then, says John J. Wise, assistant postmaster general for R&D.

As word-processing terminals begin swapping electronic mail and reaching into central electronic files, the integrated office system will begin to look more and more like an electronic data processing system. "It is no secret that the EDP world and the WP world are converging," says William Bethke, IBM vice-president.

He maintains that word processing must take advantage of EDP power, but he says the question is how. "Will we depend on machines already in EDP centers, machines now doing accounting, financial, and inventory applications?" Observers are convinced that IBM's answer will be a resounding "Yes."

Says a top executive of one big IBM competitor: "There is no doubt in my mind that the next IBM word-processing product will access the computer. But is that really what our marketplace needs?" he asks. If history is any teacher the answer is probably "No."

#### The 'friendly' terminals

Despite the astounding growth of EDP in the past two decades, computers are still not serving the information needs of the office or of management. "Only a handful of computer specialists have the remotest idea of the information storage and retrieval problems in typical offices," says Evelyn Berezin, president of Redactron Corp. "The problem is that computer people know how to think numbers, but they do not know how to think words," she says.

Stuart E. Madnick, a professor of management at the Massachusetts Institute of Technology, acknowledges that the effective use of computers for large-scale information management rather than numerical computation is "still a largely unsolved problem."

It is in attacking this complex problem that efforts of word-processing equipment makers to develop easier-to-use "friendly" products will really begin to pay off. "Word processing has the potential of leading us to the management information system that EDP has talked about for 10 years or more and never delivered on," declares Alan Purchase, senior industrial economist at Stanford Research Institute. Management can better understand and relate to WP than it can to EDP, he says, and WP puts a computer capability into

each office in a form in which the secretary can use it.

In fact, there is a growing feeling among many people that WP systems will take over many of the jobs that small business computers are now beginning to do. "More and more, WP will be used for what was EDP in the office," predicts SRI's Purchase.

A key problem with the EDP display terminals used to communicate with a computer is the difficulty that the average office worker has in learning how to run them. People are forced to change their habits to fit the way the computer works. This "computer culture" is the source of many of the problems that word processing has run into, says William K. English, who heads the office communications group at Xerox' Palo Alto Research Center.

For this reason, much of the center's research in the past three years has been aimed at developing an office terminal that uses what English calls "the culture of people." By studying how an individual uses a terminal and how it affects his or her job, the center has come up with experimental terminals that are used very informally and do not demand new work structures. As a result, English now feels much more optimistic about building a system that can be operated easily and informally by office workers.

One of the new display terminals will be used by the research center's 40-odd administrative workers in a test this summer. The powerful experi-

mental office system is quite unlike any WP terminal on the market.

Calling up information from an electronic file is incredibly fast, and making changes in the wording of a document displayed on the TV screen is very easy. The user moves a hand-held movable controller (called a "mouse") over the desk top, and in response, an electronic pointer moves on the screen to the word or paragraph to be changed. Move the "mouse" left, and the electronic pointer moves left on the screen. Hit a button called "cut," and the word or paragraph disappears. Punch another button labeled "paste" and the paragraph or word is inserted into the text where the pointer is located.

Moving the electronic pointer to the "in-basket" heading on the screen produces a list of memos and letters on the display that have arrived from other office terminals. The user points to any letter that he wants to read. Then he can either file the letter away in his electronic filing cabinet or he can hit a button and a nearby printer or copier will produce a "hard copy."

English sees both managers and secretaries using the same terminal, and he believes that the TV-like display screen is the only way to go. "The typewriter word processor is much slower and much harder to learn," he says. Using the terminal could also change how a manager works. "There will be a long-term tendency for the professional to do his own typing and filing," predicts ADL's Giuliano.

Combining the experimental Xerox terminal with a nearby electronic filing cabinet and a copier-printer-facsimile system illustrates Xerox' distributed processing approach to the office of the future. Costs are too high now to build a commercial version of this system, but Xerox is betting on the continuing downward spiral in the cost of electronic circuitry.

The Xerox scenario for the manager is certainly different from the one that IBM envisions. One former IBMer says that the company plans to provide minimum hardware for the manager in his office and to use its big central computer systems. This approach, of course, preserves IBM's greatest asset.

The big computer maker is not talking about what it is planning, but a similar point of view keeps surfacing in talks with IBM executives. Says William F. Laughlin, vice-president: "I don't think the executive wants that maze of equipment on his desk. By 1985 you would more likely find a terminal on the secretary's desk." And Robert B. LaDue, marketing director for word-



Goldman: "The phone is the biggest time waster that I know of."

processing systems makes the point that, "It's awkward for a manager to tap the information in the office system of the future. How do you get him to use a terminal? There are a lot of fascinating developments in hardware that managers wouldn't touch with a 10-foot pole."

Almost all of an executive's interaction with machines is with audio devices, such as the telephone and dictation equipment. And that seems to be the way that IBM is going in developing something for the executive's desk.

The work is being done at IBM's San Jose (Calif.) labs, which this month be-

came part of IBM's new Communication Systems Div. "IBM-San Jose has done a good job of defining management costs, something that no one had tried to do before," says one IBM watcher.

#### The telephone terminal

Out of this research has come an experimental IBM system, he says, which integrates the Touchtone telephone with "damn near everything you do in the course of the day." The phone is connected to a central computer, as well as to a secretarial work station for dictation. The phone can also be used as a calculator, and it can automatically make a call for the executive at any preselected time.

A six-line or eight-line display is also attached to the phone terminal for use in querying a reference library "cheaper than you can put it in a file drawer," this observer notes.

Central to this product concept is IBM's private automatic branch exchange (PABX), which is being sold in Europe. IBM has not introduced it to the U. S. market, where its entry is clouded by regulatory and legal questions.

Xerox, on the other hand, is not thinking about telephones and verbal communications—at least not in the near term, says chief scientist Jack E. Goldman. "I personally don't want to use the phone for substantive content," says Goldman. "I send the information by Telecopier—that's the culture we live in now at Xerox. The phone is the biggest time waster I know of."

Some people would even use the new technology to eliminate the office for most executive work. Peter Goldmark, president of Goldmark Communications Corp. and former head of CBS Laboratories, is less concerned with the hardware of the office of the future than he is with the habitat. His latest idea is a series of satellite work centers located in the suburbs. Here executives could work when face-to-face contacts and trips to the city were unnecessary, and Goldmark figures that as much as 75% of all contacts are not really necessary. He is trying to get a group of companies together to participate in a satellite-office experiment. Such a work center would be equipped with facsimile, word-processing, and teleconferencing equipment.

Some researchers, however, are skeptical of such plans. Purchase of SRI says: "Too much of our work stimulant comes from interactions with other people. People still have to have an office to come to and interact with associates."

## Selling data to the office of the future

"Some companies are already into the office of the future, and they don't even know it," says Vincent Giuliano, senior staff member at Arthur D. Little, Inc.

The path of entry in these cases is not through word-processing systems but rather through the use of outside information services. By leasing a computer terminal from any of two dozen information services, a company can tap a large central memory bank for a dazzling array of data on subjects ranging from the stock market and general news to legal decisions.

But business has been slow for three of the most comprehensive services now offered. Salesmen blame the recession and the big price tags, but perhaps the main reason is that the local terminals change the way people work.

**Powerful systems.** Despite their initial lack of success, these systems are powerful tools. Bunker Ramo Corp., which teamed up with Dow Jones & Co. in 1971 to provide the financial community with a computerized data base, makes available abstracts of all news articles in Dow Jones publications for the most recent 90 days, as well as current stock trading reports and financial data on 7,000 companies.

For access to the system, a user punches a key on his local terminal to designate an industry, a company, or a government agency, and a list of headlines appears on the display screen. Then he can call up the abstract of the specific news story he wants to read. Robert Riley, a vice-president of corporate planning at Chase Manhattan Bank, finds the service invaluable for monitoring stock prices, mergers, and acquisitions. But he adds, "It has taken quite some promotion in the bank to get people used to it."

The *New York Times* information bank has a data base of nearly 1-billion abstracts of articles dating back to 1969 from its own pages and from 60 other publications. The newspaper, which has spent \$9-million since 1966 to

develop the system, says a typical client in the Midwest spends \$15,000 or more each year to run 150 searches a month, using the terminal and a printer that turns out "hard copies."

**Law searches.** Also expensive is Mead Data Central's Lexis system, which provides lawyers and accountants with instantaneous retrieval of the full text of various court rulings and the regulations of several government agencies. The customer pays \$2,500 to have the terminal installed and to learn how to use it, \$500 a month to lease it, and \$97 an hour for search time.

But Lexis can pay off handsomely, users say. "I needed some arcane tax documents that would have taken me an hour to find in our library," says one New York lawyer, "but with my terminal I had them in five minutes." Lexis has 200 customers, but it took six years and \$20-million to put it together.

The problem for Lexis, as for other systems, is in persuading customers to break old work patterns. "Getting lawyers to change their ways is more than just a challenge," laments Jerome Rubin, Mead Data president. And there is a fear, says Walter Davis, a marketing director for Bunker Ramo, "especially among junior executives, that maybe these machines can supplant them."

**Skill needed.** Clients also find the *New York Times* information bank difficult to use. "You spend too much time and money asking it questions, and answering its questions before you finally get a reply," says one major financial user. E. Holmes Bearden, public affairs manager at Mobil Oil Corp., finds that "many people are intimidated by it because it takes some skill to zero in on what you want."

But as the "friendly," easier-to-use word-processing terminals become available for such data-base systems, and as costs go down, such outside central information banks, immediately accessible from the user's own office, will become standard office fixtures.