

WORD PROCESSING: PART 1

Industry has attempted to increase the productivity of its blue collar employees through such steps as the use of capital equipment, automation of certain processes, and methods-time measurement studies. However, it has done comparatively little to achieve similar productivity advances for its white collar workers. The office looks pretty much as it did 60 years ago when the typewriter was introduced. The inefficient, yet sacred, one-for-one manager-secretary working relationship has remained unchanged. Now, a revolution is occurring in the office, thanks to the computerization of the typewriter. It is known as *word processing* and it promises to have a dramatic effect not only upon secretaries and their managers but also upon all white collar workers. The subject is a large one so we will discuss it in two parts. In this report, we will give an overview of word processing, its history, its products, and its services. Next month we will discuss ways of successfully implementing a word processing operation. Data processing management should begin looking at the ramifications of word processing and how it will relate to data processing in the future.

Coast Federal Savings is a large savings and loan organization with headquarters in Los Angeles, California. It has assets of \$1.7 billion and employs some 700 people. There are 35 branch offices of Coast Federal throughout California.

In January 1974 a team of Coast Federal and IBM people performed a survey of Coast Federal's paperwork flow with an eye toward setting up a word processing center to handle the typing needs. The team's recommendation was that a center equipped with three IBM MAG I machines (magnetic card/selectric typewriters) and two MAG II machines (also MC/STs) plus a central dial dictation system would improve the quality and timeliness of Coast Federal's correspondence. They estimated that, with a staff of three correspondence secretaries and one supervisor, the center would break even the first year. Coast Federal management accepted the recommendation and a secretary from the training department was

chosen as the word processing center supervisor.

She first attended a one-week IBM supervisor school in Dallas. She then returned to Coast Federal to write the procedures for the center, create the user manuals, arrange for user dictation training, choose the staff, and arrange for their training.

In April 1974 the center began operation by handling all savings correspondence. Once this workload was being handled with the expected turnaround, the loan department correspondence was added. One by one various departments and applications have been added to the center's workload. The people in the center now type most company dictation (which is about 1000 pages a month) and most correspondence for the savings, loan, Insiders Club, audit, marketing, and personnel departments. They type all data processing documentation and specifications. They prepare training manuals, statistical reports, and

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company policies and procedures, which are frequently updated. And they do promotional mailings for the branch offices, which were not feasible before the center opened. A copy of each stored document is filed with its mag card at the center for easy reference.

In the first year of operation, when they had expected costs and savings to break even, they figure they actually saved a net of about \$77,000.

A typical application at Coast Federal is a promotional mailing encouraging people to open savings accounts with them. The names and addresses for this mailing, plus other variable information such as their nearest Coast Federal branch office, are typed on the MAG I typewriter. This machine records the information on a magnetic card as it types it on paper. Corrections to the card are made by back-spacing and retyping over the error. A card can hold up to 25 names and addresses. The names and addresses are then played back and typed on the continuous form envelopes. These envelopes are proofed during playback, not only for typographical errors but also to check the operation of the switch codes that input the variable information in the correct places. When correct, the letters are printed out at night on the MAG II in unattended mode using continuous form letterhead paper. Since these MAG IIS use a selectric print mechanism, these letters look like personalized letters hand typed on an electric typewriter. The people at Coast Federal are concerned that their correspondence appears personal and has a high quality of print.

By 1976 the center had expanded to six MAG IIS and three MAG IS, with six full-time and two part-time correspondence secretaries. These secretaries had previously been keypunch operators, typists, or private secretaries.

The routine in the center is varied to keep the work interesting. All of the secretaries do the various types of work. This makes working in the center like taking a crash course in the savings and loan industry, the supervisor pointed out to us. Trainees work on the MAG IS and senior secretaries use the MAG IIS. Dictation received by 1:00 p.m. will be returned to the author the same day. Dictation received after 1:00 p.m. will be returned by noon the next day. One day a week each secretary is given a day off from transcribing dictation to work on other projects. The secretaries take turns delivering the finished work. Deliveries

are made at 10 a.m., 12 noon, 2 p.m., and 4 p.m.

Personnel turnover in the center is almost nonexistent, except when a secretary leaves to become the center supervisor for another firm. Morale in the center is good because the work is varied, because the secretaries deliver their work which gives them a chance to meet other people in the company, and because the supervisor spends a large portion of her time anticipating rush situations and keeping the secretaries motivated.

The people at Coast Federal believe their word processing center has been successful for several reasons. They have had top management commitment from the start; everyone, including the president, has been encouraged to use the center. The supervisor has been selective in accepting only work that will utilize the equipment effectively, so the feeling in the company is that use of the center is a privilege. The correspondence secretaries have been involved in designing their work environment. And dictation has become a part of the way of doing business, which has increased the productivity of principals at Coast Federal Savings.

(As an aside, an *author*, *word originator* or *principal* in WP terminology is any person in the office who initiates written business communications. This can be the president issuing a memo, an accountant updating a financial statement, a policeman writing an incident report, or a personnel department clerk issuing an insurance claim.)

Longview Police Department

The Longview, Texas, police department has 100 people on its staff, including 83 commissioned officers. It serves the City of Longview which has a population of about 52,000 residents and covers 34 square miles. The staff works eight-hour shifts that start at 7 a.m., 3 p.m., and 11 p.m.

The problem the police department was having, as described by Police Chief Stone (Reference 1), was that his patrolmen were spending from 30 minutes to 2½ hours per day laboriously typing their reports on violations and offenses. To solve this problem, the department introduced a WP system, using an IBM mag card typewriter and an IBM dictation system.

Now, instead of typing, a patrolman dictates his reports. For short reports, he can stop off at, say, a nearby fire substation and use their tele-

phone to call headquarters and dictate his report. For longer reports, a patrolman can use an input microphone at the station or a portable input unit. These devices allow him to back up, replay, and correct dictated information. The dictated information is recorded on reusable magnetic belts. Dictation can be made at any time of the day.

At headquarters, there is one operator on each of the day shifts who transcribes the dictation and creates rough drafts. In addition to the typed copy, the rough drafts are also recorded on reusable magnetic cards. Later, the patrolmen review the rough drafts of their reports and indicate any corrections. The operators make the corrections on the mag cards and then have the final reports automatically typed. The operators can handle about 50 reports a day.

Every police department strives to have each officer in the field as much as possible. Chief Roy Stone stated that this system of reporting enables his officers to spend from one-half to an hour more in the field, rather than in the police station writing reports. This department has 83 commissioned officers, and approximately 64 commissioned officers are on duty in a twenty-four hour period. Chief Stone estimates this system allows 49 more patrol hours in a twenty-four hour period, or would be the same as hiring six (6) more officers for this same period.

Most Longview detectives use the system also, sometimes dictating on a portable unit at the scene of the crime as they inspect it or when they are interrogating witnesses. The reports of detectives are more detailed than those of patrolmen. These reports previously required up to one full day to prepare and type. Chief Stone estimates that he now has 25% more detectives in the field through their use of the new system.

The Longview police department is pleased with its system, because it has made all of their reports more complete and accurate. And they are free of spelling and punctuation errors, strikeouts and erasures. The system has also improved their operators' efficiency.

Union Oil Company

Union Oil Company is involved in the exploration, refining and distribution of petroleum products. Their headquarters are in Los Angeles, California, and they have approximately 15,000

employees at some 250 locations throughout the world. Union Oil has three major operating divisions: the oil and gas division, the corporate division, and the 76 division. We talked with people in the corporate information services department (cis). Their department handles computer services, telecommunications, applications programming, administrative services, and management sciences for the corporate division. The other two major divisions either provide these services through their own organizational structure or use the cis services.

In early 1975 the people in cis decided to investigate word processing by undertaking a pilot study using an available on-line system. Since they wanted this to be a small research-oriented study, they decided to use an outside time-sharing word processing service. After investigation of several such services, they chose Proprietary Computer Systems and its PCS/TEXT word processing software system.

During 1975 Union Oil converted from IBM 370 os to mvs. The changeover came rapidly, and it meant that their 800-page data processing standards manual had to be completely redone. Cis offers timesharing services to users throughout the company, and this manual is the basic technical link to the system for these users. So it must be kept up-to-date, without typing errors.

Normally, Union Oil would have hired contract typists to do such a large typing project. In this case, however, they contracted with PCS to do the typing, using PCS/TEXT interactive terminals connected to the PCS computer. The text could then be accessed and edited from terminals at Union Oil headquarters.

In June 1975 a word processing operator was chosen. She was to become the word processing co-ordinator as the operation grew. She used a Trendata 400 terminal connected to the PCS computer, located some 30 miles away. She began by working on the data processing standards manual.

Since this beginning, the word processing pilot study has grown to include four operators and one co-ordinator. They operate four hardcopy terminals and are experimenting with full screen display terminals and stand-alone equipment. For the first six months or so, the main use of PCS/TEXT was inputting original material, mainly manuals. Now 70% of their work is making revisions to

these stored manuals. Without word processing, Union Oil would have parcelled out this revision work to the department secretaries, creating serious workload problems.

The word processing operators now use General Computer (GenCom) typewriter terminals to communicate with PCS. After investigating many terminals, the people at cis chose to standardize on GenCom, not only for their word processing operations but also for their field operations. By locating terminals in their field offices, cis plans to provide a variety of services, including word processing, engineering computations, plotting, etc.

The people in cis have been pleased with the editing features of PCS/TEXT, because it allows them to create new versions of their documents easily. When changes are needed, the word processing operator dials PCS, logs on the system, and then begins making the changes in an interactive mode. By referring to the numbered lines on the marked-up hardcopy draft, she enters the line number and the change to be made. For example, to delete a number of lines, she need only enter the beginning line number, the ending line number, and the command to delete lines.

Other commands work as easily. For each change requested, PCS/TEXT acknowledges that the change has been made correctly by giving a response to the operator. When all of the needed changes have been made and acknowledged, the operator requests to have the appropriate pages printed on the high speed printer at PCS. The printed copy is delivered to Union Oil the next morning.

Union Oil is also using the PCS project accounting package to measure the work done on each document. The package records the amount of connect time spent entering or revising the material as well as the number of computer processing units used for each job.

The workload in the cis word processing center is now 50% production and 50% research. They could have a much larger center, we were told, but have resisted the temptation to grow quickly. Instead, they are concentrating on the research aspect and are developing guidelines and personnel who can help other departments within the corporate division develop their own word processing capabilities. They have been satisfied with the PCS system because it has extensive edit-

ing capabilities and because it has allowed their use to grow gradually.

The people in cis feel that their pilot study approach has proven very useful in making plans for cost-effective growth. They are now in the process of converting to an in-house system, using a Hewlett-Packard 3000 Series II computer which was installed in November. The software and procedures which cis is developing are being tested in the cis word processing center. When the system is fully operational, users in other departments and divisions will have access to the system through interactive terminals in their own offices.

Corporate management recently approved the formation of a cis research group to investigate other new technologies that may be used in the automated office of the future. They have studied micrographics, and they are now doing some production computer-to-microfilm (COM) work. And they have some 90 facsimile transmission terminals throughout the company.

Cis now wants to set up pilot studies on electronic mail, computerized phototypesetting, electronic information storage and retrieval systems, centralized dictation systems, and graphics. They want to centralize the research on these diverse areas to create company standards and to develop guidelines and personnel capable of implementing the systems that seem most applicable to their company.

An introduction to word processing

It has been said that data processing is the manipulation of numbers and word processing is the manipulation of words, sentences and paragraphs. Perhaps a more accurate definition is given by Richard Eichhorn of CPT Corporation (Reference 2a) who says that word processing (WP) is handling the workflow in an office in the most efficient and economical way. The objective of WP is to improve the efficiency of business communications through the proper system design of people, procedures and equipment.

Business communications go through a number of processes: origination, transcription, editing, duplication, distribution, and filing. Word processing attempts to deal with all of these processes.

In 1965 the cost of the average business letter was about \$2.74. Today it is at least \$3.80, and by 1985 it will be \$6.40, according to Robert La Due

of IBM, Reference 3. (Other people estimate current costs at between \$6 and \$8.) In the past the most expensive part has been the secretary's time; by 1985 the author's time will be the most expensive element, La Due says.

Alan Purchase of Stanford Research Institute (Reference 4) reports that while office costs used to be 20-30% of the total costs in a company, they are now 40-50%. Companies are realizing that they have to identify and control the cost of handling paperwork. In a recent study by Quantum Science Corporation (Reference 4) nearly one-fifth of all the offices surveyed and 39% of the larger ones either planned or had recently added automatic typewriters. Purchase says that factories achieve cost savings by investing capital to replace labor in production. This has not been done in offices. The average investment in capital equipment per office worker is about \$2000, as compared to \$25,000 per manufacturing employee. He predicts that by 1985 this expenditure will grow to \$10,000 per office employee.

The reason that WP has not spread faster is that in order to fully utilize the more expensive WP equipment, it must be used as many hours as possible. Since the traditional private secretary only spends 20% of her time typing, according to Swett (Reference 2b), the WP solution has been to divide her job into two specialized functions. One is the *correspondence secretarial position* and the other is the *administrative secretarial position*. The correspondence secretary becomes knowledgeable in operating WP equipment. She is usually transferred to a WP center and spends most of her time typing. The administrative secretary is normally left in the operating division to serve a number of principals. Her duties include everything except typing, such as filing, making travel and meeting arrangements, answering the telephone, proofing correspondence, opening mail, and doing basic fact finding. In this purest form, WP is actually two functions, word processing and administrative support, often written as WP/AS. Companies may or may not aim for this clearcut division of secretarial work, as we shall discuss next month.

In this purest form, WP is difficult to sell because of its enormous "upheaval factor." Some secretaries are transferred to the WP center, the other secretaries lose their typewriters and feel they now have a poorly defined job. Further,

managers lose their private secretaries who have been their status symbols and their "office wives." The fear of all this change causes great resistance on all sides. It is the willingness or unwillingness of office workers to make this change that is the main factor in determining how quickly word processing will catch on.

But there is another side of the story—WP can bring many benefits. For example, under the traditional secretarial system, Information Management Corporation (Reference 5) reports that in one company only 25% of a staff of 800 was receiving a good level of secretarial support. The most support was at the highest management levels, with middle management getting only marginal support. IMC feels this is not uncommon. WP attempts to give good secretarial support to every principal, no matter what his or her position is in the company. This is, in fact, what happens once a WP center is opened. Work that no one has done before suddenly appears.

WP also makes secretaries more efficient. Swett points out that in the traditional setting, secretaries are only 35-40% efficient in their typing because of the frequent interruptions and distractions that occur. With WP, business communications become more standardized and are more easily and quickly updated or revised. WP/AS gives administrative secretaries the time to be of more assistance to their bosses—time that used to be filled up with taking dictation, typing and revision typing. Because secretaries can take over certain jobs such as basic fact finding or drafting answers to correspondence, they can give principals more time to perform more important functions. So there are numerous benefits to be had by using word processing. The problem is achieving these benefits with the least possible upheaval.

History of word processing

We base our discussion of WP history and text editing equipment on several sources, particularly Wohl (Reference 6), Haider (Reference 7) and Datapro (Reference 8). For a listing of the WP equipment and services that we came across in our research, see Reference 14.

Word processing began in 1964 with the introduction of the IBM MT/ST (magnetic tape/selectric typewriter). This typewriter records text on a magnetic tape cartridge as the typist types. These tape cartridges come in 50, 100 and 200

feet rolls, where a 100 foot roll stores ten typed pages of text. Typographical errors can be corrected on the tape by backspacing and retyping the characters. Once an error-free tape has been created, any number of error-free "originals" can be automatically typed at the rate of 150 words per minute.

According to La Due (Reference 3), IBM envisioned the MT/ST market to be automatic letter-writing. Then from Germany came the idea of centralizing these machines and feeding them with a central dictation system. The Germans called this concept "textverarbeitung." Translating this into English, IBM called it "word processing." So WP originated with the concept of centralizing specialized typists who operate more sophisticated equipment, rather than have secretaries spend a portion of their time typing.

Another version of the editing typewriter uses a magnetic card as storage. The card holds 5000 characters, or approximately 1¼ pages of text.

There are two claimed benefits that these editing typewriters have over electric typewriters: first, that they allow the typist to type at rough draft speed (55-65 wpm) rather than at a more cautious speed, and second, that only changes need to be retyped and reproofed after the text has been entered on the mag card or tape. In reality, these two benefits are not really achieved. Editing typewriters require the typist to enter editing codes along with the text. This cuts down on the typing speed, so the typist is not able to type at true rough draft speeds. And the only real revisions possible on editing typewriters are correcting typographical errors and one-word changes.

Wohl points out that the first WP machines have had a number of limitations. They have very few editing commands—deleting characters and words, and line search. Inserting new lines of text that are longer than the number of deleted lines means retyping entire portions of text. And when the typewriter is typing out a final copy, the typist cannot use the machine to enter new information. These machines are most cost effective for typing letters and short documents. They cost today about \$8000.

Since the late 1960s, over one dozen companies have enhanced the editing typewriter, including A.B. Dick, IBM, Olivetti, Redactron, Royal, and Wang. (For a listing of suppliers, see Reference

14.) A major enhancement is the addition of a second storage device for input and output. These are called dual media machines, and they allow either dual tapes, dual cards or card plus tape. This second storage device greatly increases the text editing capabilities of the machines, because it allows the typist to merge information from two sources, such as merging a list of names and addresses stored on a tape cassette with a form letter stored on a mag card. Wohl points out that inserting new lines of text is easier, because the machine can merge the changes with the original text on the second storage media; however, this procedure is not very efficient for very long editing jobs.

Another enhancement is the addition of a buffer, which is typically about 8000 characters in size. In WP terminology, this buffer is known as memory. Text in memory can be edited and then output to the storage media.

The ability to send and receive over communication lines has also been added, thus turning the editing typewriter into a limited computer terminal, typically used for sending documents point to point.

These enhanced editing typewriters, however, still have some limitations. The major limitation is that while the typewriter is automatically printing, the typist cannot use it to enter new information. Haider states that these typewriters are best used for typing letters, small documents and large documents with little editing and no retention required. These enhanced editing typewriters cost from \$8000 to \$12,000.

A device called a 'baseplate attachment' was also introduced in the late 1960s. It can be attached to the bottom of a standard electric typewriter, turning it into an editing typewriter. The baseplate connects the typewriter to a desktop device that contains editing features and storage. These units sell for about \$5000.

In the 1970s the second generation of WP equipment was introduced—the computerized word processing system. Haider gives a good discussion of four types of computerized systems now available: stand-alone display text editors, shared-logic systems, timeshared in-house systems, and timesharing word processing services.

Haider points out that several features distinguish first and second generation WP equipment. While the first generation allowed only one

operation to occur at one time, second generation equipment allows at least two operations to occur at once. The printer may be printing while the typist is either editing stored text or entering new text. Second generation systems have more powerful editing capabilities performed by the system logic. The typist is not required to enter codes as she types the text. There is less training needed to operate these machines. And in second generation systems, the typewriter is most often replaced by video display and electronic keyboard for input and editing of text. We shall discuss each of the four types of second generation systems.

Stand-alone display text editors

The first stand-alone display text editor was introduced in late 1972 by Lexitron. A typical display system consists of a CRT, a keyboard, a printer, a small minicomputer or microcomputer, memory, and storage media (usually floppy disk or tape cassette). Some companies now offering stand-alone displays are Lexitron, Vydec, Linolex, Wang, Redactron, and Norelco.

One advantage of the display text editor over the editing typewriter is that it allows the typist to more easily find the text that needs to be changed, by viewing the screen. And it allows the typist to immediately see the effect of the editing changes on the screen.

Display text editors also have greater editing capabilities than first generation systems. Standard editing functions, such as delete, insert, move, etc., are usually initiated by pushing specific function keys found alongside the standard keyboard. For less commonly used editing functions, some systems have a generalized function key that is pushed in conjunction with any number of pre-coded typewriter keys. For example, the letter "q" may also be the "superscript" key when pushed in conjunction with the generalized function key. A less typical situation is a system that provides editing capabilities by still requiring input codes typed by the secretary.

Following are the capabilities found in display text editors on the market today:

DISPLAY TEXT EDITOR CAPABILITIES

1. Insert/delete: characters, words, lines, sentences, paragraphs, pages, stored documents, formatted material
2. Move: lines, paragraphs, pages
3. Automatic: pagination, carriage return, column align-

- ment, right-justification (for proportionally-spaced characters)
4. Partially automatic hyphenation
5. Search by page, index, or character string
6. Horizontal/vertical scrolling of text on the display
7. Variable line spacing
8. Subscripts/superscripts
9. Variable type pitch: pica (10 pitch), elite (12 pitch), proportional
10. Forms generation and fill-in
11. Boilerplate library
12. Input from magnetic tape cassettes, cartridges, floppy disks, ocr, or communication lines
13. Output to magnetic media, high speed printer, paper tape (for input to phototypesetter), communication lines (telephone, Telex, Twx)

This listing is not hard and fast. Many of the systems do not have all of these capabilities, and some of the newer, programmable systems can have additional capabilities. Or they may be tailored to work efficiently in very specialized editing areas.

Haider states that stand-alone display text editors are cost effective for most applications, all the way from merging names and addresses with form letters to documents over ten pages in length that require maximum editing and retention. They can handle all but very large or specialized applications. He says they are not cost effective for *only* creating one-time, non-revision letters and documents under ten pages in length; he would recommend first generation equipment for these two applications. Currently, display text editors cost from \$12,000 to \$20,000; and we expect to see lower-priced systems in the not-distant future.

Shared-logic systems

In the early 1970s the shared-logic systems became available. Such systems have a larger dedicated minicomputer and its associated tape/disk storage connected to a number of peripherals—typewriters, video displays, and possibly an optical character recognition (OCR) unit for input; and high speed printers, photocomposition interface units, and possibly computer output microfilm (COM) units for output. These systems are currently offered by Daconics, Base Information Systems, ICS-Astrocomp, LCS and others. At the time of our research they cost from \$25,000 on up, but we expect to see lower-priced systems available in the near future.

Several authors point out that shared-logic systems offer price advantages over stand-alone display units for larger installations. Some shared-logic systems today allow up to 32 key stations. Haider states that in early 1975 it was more cost effective to have a four-station shared-logic systems than four stand-alone units. With the field changing so rapidly in this area, he said that these tradeoff figures could change.

Shared-logic systems also have many of the advantages that we have seen in the data entry field, such as key-to-tape and key-to-disk systems have over keypunch equipment. We discussed these advantages in our September and October 1971 issues. Shared-logic systems allow large amounts of text, as found in reports, manuals, and legal briefs, to be entered, accessed, edited, and merged by a number of typists at one time using one central storage unit. Text is not stored on discrete media, such as cards, tapes or floppy disks, but rather on regular disks.

Shared-logic systems can offer a wider variety of input-output options, because they can handle larger volumes of work—that is, options not economically feasible with stand-alone equipment. One interesting possibility described by Baty (Reference 13) is the use of an OCR input machine. Documents typed on OCR font-equipped standard typewriters can be read into the editing system via an optical character reader. Secretaries at the system displays can then edit the material. Baty states that several shared-logic systems offer an OCR input option, and even a few stand-alone text editors allow this option. But he says these companies are not likely to push this option, or even mention it, because it will reduce the number of text editors or key stations needed.

Shared-logic systems provide broad editing capabilities, notably global editing. With global editing one command can initiate repetitive editing throughout an entire document. For example, all occurrences of specific words can be replaced or expanded. These systems allow having a shorthand dictionary of specific company terms, so that the typist merely types in the shorthand version and the system automatically inputs the expanded terminology. Shared-logic systems have hyphenation dictionaries for automatic hyphenation, and they allow automatic centering, margin adjustment, indentation, underlining, and tabbing.

Haider recommends shared logic systems for all applications except letters and documents under ten pages in length. He distinguishes their applicability from the stand-alone displays by the input volume. For a volume of 500-2000 net input pages for a month (or the equivalent in input and correction pages) of documents longer than ten pages, he would recommend one or two stand-alone terminals. For a volume of 2000-4500 net pages a month of long documents he says it is a toss-up between three to five stand-alone stations or a three to five station shared-logic system. For net input of 5000-9000 pages of long documents, he would recommend six to ten stations on a shared-logic system. Above that size, he would recommend use of a larger timeshared system.

Initially, shared-logic systems were dedicated to word processing. They were designed for the word processing field. Recently, we have seen the appearance of hybrid systems that do both word processing and data processing. The shared-logic systems offer basic software packages, such as data retrieval, general accounting, list processing, inventory control, and time accounting (useful to accounting and law firms).

From the other direction, small business computers designed for the data processing field are now offering optional word processing capabilities. Examples of these systems are the IBM System/32 and the Digital Equipment Corporation System 310. Both of these systems are single-station units. At least one supplier offers a multi-station DP/WP system and we expect to see more of these.

Timeshared in-house systems

The first timeshared text editing system offered for use on an in-house system was the IBM Administrative Terminal System (ATS). It allowed connection of typewriter terminals. The more recent IBM offering, ATMS, allows connection of display terminals. Other mainframe manufacturers, such as Honeywell, DEC, and CDC, also have offered text editing software for several years. Currently, though, computer manufacturers appear to be concentrating on stand-alone or shared-logic systems.

Haider stresses that there are four main considerations one should make before adding a timeshared word processing system to an in-house computer. First, it will require additional com-

puter equipment, such as disks, core memory, transmission control units, and printers with upper/lower case capabilities. Second, the computer operation staff will have additional work. They will need to monitor the printout quality and to mount correct paper stock when needed. Third, additional programming effort will be required to install and maintain the word processing programs. And fourth, agreement must be reached between the word processing and data processing groups as to the hours during which the system will be available. In most cases, word processing will require full access to the computer during normal working hours. This would probably aggravate current peak load periods.

Haider recommends considering an in-house system only when the volume of documents over ten pages in length reaches say, 7000 or 8000 net input pages a month. He does not recommend justifying such a system for letters, small documents or form letter generation.

Timesharing word processing services

Most timesharing services available today are derivatives of IBM's ATs. Service bureaus offering WP services may also offer OCR and photocomposition services. They offer extensive text editing capabilities in an interactive mode, using typewriter or display terminals. A photocomposition typesetting service may be offered as well. The codes for running the computer composition program may have been created on their system or by some other compatible text editing system.

Haider recommends such services for voluminous text editing applications, particularly if a photocomposition interface is required. The ability to go into photocomposition typesetting directly from final copy (without the need to manually re-enter the text) often justifies the installation of a timesharing terminal.

Along with these advancements in the text editing portion of WP, improvements have been made in the input and output sides of WP, namely in dictation equipment and word processing printers. We will discuss both of these developments.

Dictation equipment

A total dictation system has several parts. For the author, there is a microphone for voice input, a speaker for playback, control buttons, and the recording media. For the transcriber (the person

who types out the recording) there are earphones and foot controls. Municucci (Reference 9) and Datapro (Reference 8) provide good discussions and comparisons of available equipment. Our discussion is based on these references.

There are four types of dictation equipment available. The smallest is the portable unit. It is battery run and has removable recording media (cassettes or belts). These units are useful for recording dictation away from the office, and the recordings can be mailed to the office for transcription.

The second type is the desk top unit. This device allows for both dictation and transcription. Some newer units come in pairs of dictation and transcription machines and have dual cassettes that allow dictation and transcription to occur simultaneously, and for transcription to begin almost immediately after dictation starts. Some units allow attachment to the telephone for recording telephone calls.

The third type is the central removable-media system. A central system has dictation stations in offices throughout a company, either hardwired to the central site or wired into the company internal-external telephone system. This system is connected to the recording media located in the WP center. An author either uses a handset or a telephone to contact the WP center, to record the message and to control the recording. At the WP center, it is possible to record long sessions of, say, 100 minutes on a number of cassettes and then distribute these to many transcribers for rapid transcription.

The fourth type is the central "tank" or endless-loop system. This system differs from the central removable-media system only in the storage media. The recording "tank" is not removable. It is an endless loop, controlled by the supervisor's console, which has computerized controls that distribute the dictation workload among the active transcription machines based upon the typists' speeds.

Following are the capabilities found in various dictation systems on the market:

DICTATION SYSTEM CAPABILITIES

1. Dictate from telephones located inside or outside the company
2. Can use system as an intercom, telephone message taker, or conference recorder
3. Operates in an unattended mode at night
4. Simultaneous dictation/transcription

5. Cueing for end-of-letter and special instructions indexing
6. Automatic rewind, speed control, backspace, volume control
7. Automatic distribution of dictation workload among transcribers
8. Automatic accounting of use of system
9. Voice buffers that eliminate clipping of syllables and gaps in recording
10. Partitioning of recording media between priority and normal recordings

Dictation equipment is an integral part of most WP operations because it is the fastest method of capturing ideas. Information Management Corporation (Reference 5) states that people think at the rate of 250 words per minute. When they write down their thoughts in longhand, this speed drops to 15 wpm. When written in shorthand this increases to 30 wpm, but when spoken the speed is 60 wpm. Dictation systems are convenient and they can be used at any time in many places. They do not tie up a secretary for two transcription processes, first in shorthand and then typing.

Milner of Lanier Business Products (Reference 4) estimate that only 26% of the people who should use a dictating machine actually use one. There are any number of reasons for this. Dictation does take some getting used to. The author must have his or her ideas organized before beginning to dictate. The author must learn dictation etiquette, such as not chewing gum, flipping pages or coughing into the microphone. Many people, we are told, freeze up when confronted with a dictating machine. Others fear that they will appear to be talking to themselves, and still others believe that the transcriber (a stranger) will laugh at their poor grammar. One WP supervisor told us that not all people should dictate, particularly those who have heavy accents or who have problems enunciating their words. So getting dictation widely used in a company definitely is one hurdle for the WP program to overcome.

Word processing printers

In WP, print quality is important. Many WP supervisors are very conscious of how the products look that leave their centers. They expect electric-typewriter quality print; another term for this is correspondence quality print. It is this print quality that differentiates computer printers from WP printers. The last thing a correspondence secretary wants to do is turn out letters that look like they have been printed by a computer.

Since print quality is so important, WP supervisors have relied mainly on typewriter-like devices for their printing. The IBM Selectric typewriter, operating at up to 15 characters per second, is widely used. Daisy wheel printers, such as the Xerox Diablo printer, operate at speeds in the 30 to 55 cps range. At a WP conference we recently attended, there seemed to be much interest in the newly announced IBM ink jet printer that operates at speeds of up to 92 cps. This particular printer produces almost-correspondence quality type. It reads mag cards as input and has programmable controls for altering typing pitch, altering tabs, margins, spacing, formatting, and merging of documents. We would expect this printer to be just the beginning of a whole line of higher speed correspondence quality printers.

The word processing industry

Gibson and Nolan (Reference 10) have described a useful pattern of evolution in computer usage. We shall paraphrase their stages of evolution, as applied to the use of new technology.

Early successes. The first stage is the beginning use of a new technology. While some stumbling occurs, successes also occur, and so the use of the technology continues.

Proliferation. Based upon the early successes, a rapid growth of interest in the new technology develops. New products and/or services based on the technology come to the marketplace. These are tried out in a variety of applications. This proliferation stage is the learning period for the field, both for uses and for new products and services.

Control of proliferation. A point is reached where it is apparent that control must be applied to the proliferation. Among users, costs of using the new technology get too high, in management's mind. Much waste is observed from using a variety of approaches. At the same time, the suppliers make efforts toward standardization.

Mature use. At this stage, the use of the particular new technology might be considered mature. The stage has been set for introducing still other new technology, wherein the pattern is repeated.

In what stage of evolution is the use of word processing today? We see it as being at the beginning of stage 2, the proliferation stage. Brennan (Reference 2c) estimates that in late 1974 there were 2500 WP centers in the United States. He

predicts that there will be 35,000 such centers by 1978. He also states that there were 150,000 text editing machines installed in 1973 and that there will be 500,000 such units in 1978. Purchase (Reference 4) estimates that there will be 910,000 such units by 1981. He states that sales are growing fastest in the stand-alone display market. Brennan concurs and states that the stand-alone text editor will be the major configuration for the next five years. Then in the early 1980s, he says, shared-logic systems will finally come into their own.

We recently attended a major wp conference and got a feeling for the status of this field. For one thing, we would agree with Wohl (Reference 6) who states that wp today is much like the computer industry of the early and mid 1960s. There are lots of cocktail parties, buzz words, not enough trained professionals and plenty of excitement, she says.

At this conference there were a number of new system announcements, and we got the impression that new equipment announcements and enhancements would be coming thick and fast for the next year or two. This appears to be particularly true in the shared-logic and small business system markets. We also discovered that in the past year, most of the U.S.-based computer mainframe manufacturers have entered the wp market. They have done this either by offering new products of their own, by acquiring wp equipment manufacturers, or by signing joint agreements with existing wp companies. In the 1975-76 period IBM, who has always been heavily involved in wp, announced the addition of wp capabilities to their System/32. Some analysts believe that IBM has at least as large a share of this market as they have in the mainframe computer market. Digital Equipment Corporation announced wp capabilities on their System 310. Burroughs acquired Redactron, one of the leaders in the editing typewriter field. Honeywell signed an agreement to support the Ultra Text system (of Base Information Systems) on their Level 6 mini-computer line. And other major corporations got into the field. Xerox introduced their Electronic Typing System, 3M acquired Linolex, and Exxon acquired Vydec.

Most wp equipment that we viewed at the conference was not compatible with other equipment. And we have heard of no standardization

attempts being made in the wp field. So we see wp as entering stage 2, the proliferation stage, a period of rapid growth in both the number of installations and in the number of available systems and services.

The question that may be of most interest to data processing management is: where is this all going to lead, and what will it have to do with my department?

Forerunner of the automated office

Word processing is viewed by many as the entrance of data processing into the office scene, and the forerunner of the automated office. Currently wp involves interrelating the use of dictation equipment, text editing displays, printers, and, in a few cases, communications devices.

Wp people we talked to are concentrating on producing *written* communications more efficiently. They are not yet doing much about using a wp typewriter for things other than automatic typing and text editing. But with the communications option that most of these systems offer, a wp typewriter could become an intelligent computer terminal capable of combining data received over the communications lines with text generated within the wp center. Once business communications are put into electronic form, as they are on wp equipment, they can be transmitted inside or outside a company in electronic rather than written form. This is a key element in "the office of the future."

For sending business communications between two sites, two new technologies appear to be shaping up—facsimile transmission and computer message systems.

Facsimile transmission is not new, but it is becoming increasingly powerful and more useful for general business communications. Gladstone (Reference 2d) reports that 50% of large offices were fax users in 1974, and the forecast is that this will increase to 65% by 1978. However, the vast majority of fax units will continue to be in small offices and dispersed plants where they tie into a central site. One new product is the Xerox plain paper Telecopier. It combines laser technology with xerography to send documents at the rate of two minutes per page. Features available on fax units include: automatic feed of multiple originals, unattended reception, single sheet or roll feed, full duplex transmission, automatic busy-

retry and polling, broadcasting, automatic communication line integrity verification, and call termination.

Gladstone states that the most significant factor influencing the future of fax communication is network capability. Recent communications offerings should significantly reduce long-haul transmission costs and subscriber companies may be able to use their unused capacity for fax transmission.

Computer message systems, as the name implies, transmit text rather than data over communication lines. Vezza and Broos (Reference 11) describe how one such system operates on the ARPA Net. At his convenience a person may view his display console to obtain a one-line summary of all messages received since he (or she) last checked his "mail box." He may then view any messages in their entirety, key in responses to them, or attach annotations and send them to colleagues. Vezza and Broos report that this typifies daily experiences of researchers in some 100 private and governmental organizations having access to ARPA Net. We shall be discussing computer message systems further in the April issue.

Word processing is already tying a number of other technologies together in interesting ways. On the input side we have already mentioned reading text into a WP system via OCR. And on the output side we have mentioned that some WP systems are connected to COM and photo-typesetting interfaces. Coggshall and Marchick (Reference 2e) state that as the quality of copier technology improves, copiers may replace mechanical printers in some machines for producing an original as well as additional copies. Copiers have possible speed and reliability advantages over present WP printers.

In addition, graphics capabilities will prove useful in WP systems for combining graphics with text and for producing illustrations for reports, manuals, etc.

In this future environment, the boundaries between data processing, word processing, reprographics, micrographics, phototypesetting, OCR, facsimile, and communications will become fuzzy indeed.

On the administrative support side of WP, secretaries will be able to store their principals' personal schedules, transmit business correspond-

ence and keep electronic files via a WP terminal. Brennan (Reference 2c) foresees low cost text editing units becoming available in the late 1970s. He says these will be more likely to be used in administrative support than in WP. And Vezza and Broos report that the message services developed on ARPA Net not only deliver messages but also provide computer services that automate the secretarial functions of memorandum writing, filing, indexing, retrieval, filtering, etc.

Principals themselves will be able to use communicating terminals to view draft work on joint authorship projects, send and receive electronic messages, and participate in tele-conferencing. Poppel (Reference 12) reports that 40% of a typical middle and upper level manager's time is spent on mail processing, telephone calls and business travel, while Haider estimates that 70% of a manager's time is spent on these activities. The automated office of the future will undoubtedly affect how these activities are conducted.

Although WP may seem of little interest to the data processing manager in its current form—as a generator of letters, memos and reports—it appears to be the beginning of an integration of the office and the data processing department. Once the communication facility of the WP typewriter is used to interface with data processing, then it will be of interest to the data processing manager. Most WP installations are not at this stage yet, so now is a good time for companies to look at the broader picture to decide upon possible future alternatives.

Conclusion

Within the past two years, word processing has become a "hot" field. New products and services have been appearing rapidly. With all of the excitement and enthusiasm generated by WP conferences, articles and vendors, it would be tempting to jump right in and replace typewriters with text editing equipment. The main sobering thought in the field is that many companies have had disastrous failures when first implementing word processing. WP is more than equipment: it requires reorganizing the office structure. The one-to-one manager-secretary working relationship must change.

Next month we shall discuss the steps that should be taken to successfully change the office structure and implement a word processing/administrative support operation.

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