WORD PROCESSING

A Guide to
Typography,
Taste,
and In-house
Graphics

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Also by Rod van Uchelen:
Paste-up
Say it with Pictures

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Introduction

The term "word processing" originally referred to a single machine, but it now includes an extensive technology using many machines. This technology makes use of the computer and automates the handling and production of graphic material. Its functions include the scanning and digitizing of words and graphics; the storage, filing, and retrieval of information and the transfer of this information via electronic cable, satellite, or laser light; the use of computer technology; and the many devices that facilitate the electronic management of information.

Word processing is a system of producing graphics, yet it has evolved into a communication system that defines the purpose and use of the computer. As always, the production of graphic material utilizes the art of typography. This book is concerned with the art of word processing as it utilizes typography and is used to produce graphics.

Typography, like any art, cannot be automated. It can be systematized and reduced to a format, but even in this case taste makes the difference between the success and failure of the format and the 5

communication. Whatever information is handled must in the end be communicated. This book looks at word processing as an art in that it looks at the results of word processing—at typography, taste, and graphic product. It is not concerned with the technology of word processing apart from a sufficient understanding of the system to manage it. Word processing is analogous to data processing: the difference is that the data is the word.

To summarize, typography is the output of word processing; it is the words, the alphanumerics, the alphabet, numerals, and symbols of our graphic form of word communication. Taste is the sense of value applied to graphic and visual forms utilized for communication. It assists in producing attractive and professional graphics. In-house graphics are handled on the premises of the originator instead of by an outside typographer. The appearance, design, and production of the page are the in-house graphic function of word processing.

Word processing, then, is a unit that begins with the input of the originator, goes through the various computer-aided operations, and ends with the selection of type and design, the output of graphics. All functions except origination are automated, but the requirements and criteria of the automation are managed: you still have to drive the vehicle. The automation is easier and quicker and removes much of the labor, but design decisions are not automatic: you must direct the automation to achieve the result you want. This is the use of word processing: it is typography, taste, and in-house graphics.

I-2. The term "word processing" was first introduced with IBM's Magnetic Tape Selectric Composer (MTSC). The system included one or more Magnetic Tape Selectric Typewriters (MTSTs), seen in the background, for recording the keystrokes of the manuscript. The tape is transferred to the record-reading unit at the left of the composer and played out at fourteen characters per second, about one-hundred and fifty words per minute, to produce typesetting composition. The typeset configuration or format is entered on the console in the immediate foreground.
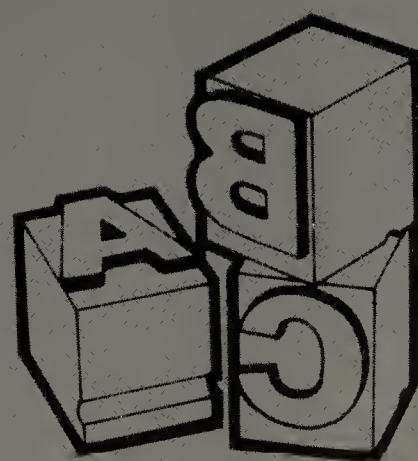
Word Processing

1.

The Machine

The word-processing machine is both a typewriter that records keystrokes and a system of information management that includes many machines. It depends upon how the function is viewed, the system that the machine itself is linked to, and the purpose that is served.

A word-processing machine looks somewhat like a typewriter. It has the familiar keyboard, and anyone who knows the keyboard can find the familiar keys for touch typing—but there are other unfamiliar keys used to operate the machine. The keystrokes are recorded and made available for processing in a variety of ways, depending on the machine: on a magnetic card, magnetic tape, paper tape, or some form of computer memory either in the machine or in a separate computer. The typewriter parts of the word-processing machine may make a typewritten record of what has been recorded, display the record on a video tube, provide only a limited display of the last few keystrokes, or have no display at all. The prime function of the word-processing machine is to capture the keystrokes; the keyboard is all that these machines have in common.

IBM introduced the term "word processing" with the Magnetic Tape Selectric Composer, or MTSC. In so doing word processing was immediately linked with typesetting, because a composer is a typewriterlike device that produces a type image by direct impression. The Varityper, developed in the 30s, was the original composer. The image it produces is like that of a carbon-ribbon typewriter but is actually that of a font of type. With a selection of interchangeable type fonts and the mechanical capability to adjust the machine for variables, type can be composed. IBM improved on mechanical typesetting with a small computer that controls the machine. The program for the typesetting configuration is added to produce the composition when the recorded keystrokes are played back. The original keystrokes can be recorded separately on a Magnetic Tape Selectric Typewriter, or MTST, and the tape transferred to the recording unit of the composer. In this way a number of MTSTs can feed one composer, the MTSC.

The typewritten record, or hardcopy, produced when the keystrokes are recorded, shows what is on the tape and can be proofread; corrections are

made simply by typing over the first record. By means of another tape insertions and updates can be merged into the first tape for continuous output. The fact that corrections are so easily made on tape by strikeover and that the appearance of the typewritten record is of no importance, because the output from the tape will produce a perfect typeset copy, provides a great deal of freedom and speed for the typist. The letter-perfect automatic output speed from the tape is more than three times that of the average typist. This feature alone is useful and is a reason for using recording typewriters, but the tape can also be filed for reuse with no need to retype.

This configuration is similar to that of many other typesetting systems. The fact that you cannot see what is on a tape or an electric record without the hardcopy made the video tube popular. The video tube can reproduce the recorded image almost instantaneously without having to play out each keystroke. It is in effect a "window" into the record. Since a paper hardcopy of the recording isn't necessary for processing, the video tube is useful for recording display as well as for looking into the record. It saves paper until it is used for the final output.

The keystroke record is interchangeable with any number of machines. As long as the machines use the same code, they can handle the information; there are also machines that change one code into another or change the recording vehicle, such as a magnetic-tape record into a paper-tape record. Still other machines correct, update, and reformat. Optical Character Recognition, or OCR, is a means of recording keystrokes. The configuration of a system depends on what is required of the records and where they will be moved. There are many machines produced by nearly a hundred different manufacturers, and, as the concept has grown, so have the variety and special design of the machines.

The word-processing machine, then, is simply a device to record keystrokes as a code of electronic signals. The system for moving this information can be as simple as a small computer in a typewriter for playback or as complicated as a computerized filing system that feeds a number of remote outlets information for typesetting, such as a news service

might use. The emphasis might be on rapid movement, as with a news service, or it might be on filing, as with medical abstracts. Photon, Inc. developed the initial quality phototypesetting machine for the MEDLARS program in Washington. The machine was the Photon 901 ZIP and was the needed composing device to produce the abstracts quickly in page form for printing.

With such flexibility in handling information, the emphasis is on the information-management system. Information management handles information, from input as recorded keystrokes to destination as output for communication.

1-1. The original Varityper, c. 1930, was the first typewriterlike composer. The keys are arranged like those of a typewriter but accommodate extra symbols for typesetting with a super shift, an extra shift above the capital letters. Later models provide variable spacing, pressure control for the many different sizes and weights of type fonts, and a rail shift for four different sizes, with adjustable linespacing in point sizes. The Varityper also provides type justification by means of a mechanical counter. These controls provide for type composition.

The Philosophy

The concept of information management has a profound significance. If knowledge is the use of information and communication is the movement of information, then knowledge plus communication gives us an information system. The word-processing machine is the "door" to this information system.

In the past our society has conceived of such functions as separate elements. Books have been a source of information, and a library stored this information in the form of books. The speed of mechanized typesetting with a linecaster made periodicals such as a daily newspaper possible, and the use of information was further enhanced. As with the invention of printing, our society was profoundly affected by this. With these functions integrated into a single system that for all practical purposes operates nearly instantaneously, the effect upon our society should be multiplied many times over.

As we know, books in a library are listed in a card file by title and author. It is customary to search out information by title as it relates to the subject of interest; the book can then be tracked down by its number and finally by alphabetization on the bookshelf. An information system operated by computer can do the same thing nearly as fast as you can hit the keys on the keyboard to designate the information, and it can do this over the phone to remote locations. Moreover, the electrically encoded information takes but a fraction of the usual physical space, and the information can be almost any record that is filed and retrieved.

At first, computers were used for computing—for example, to plot the calculus of a trajectory, such as that of a shell from a cannon. The navigation for the NASA moon shot would have been impossible without the use of computers. Then the computer was used for accounting and engineering. Now its use has broadened to information, both alphanumerics and graphics. This expands its applicability to most businesses if the use of this information is also considered as adaptable to the operation of machinery, which indeed it is. Phone switching is handled in this way, for instance.

Computerized machines are programmable; they can respond in language, repair themselves, and duplicate and automate human activity. They are free from human error; they even check themselves by a process known as parity. When there is an error, they shut down; then they fix themselves and continue. But they can only process information given to them, and they process anything. "GIGO" is a computer term that stands for garbage in, garbage out. Even the most sophisticated machine intelligence requires human intelligence to program it.

The development of word processing has been from the technical end towards the user end. The machines used for word processing developed from typesetting equipment. Computing, data processing, and automated typesetting have merged into word processing. Word-processing technology is so complex and involves so many specialist fields that it is doubtful whether anyone understands the entirety of it. Its integrated functions suggest the idea of systematic information management. Purpose guides process.

Word processing includes typesetting; the alphanumerics are one of its basic building blocks. Typesetting is the use of typography, and typography has always been an art. The art of typography cannot be systematized, but typesetting can. Therefore, since typography is used to complete the communication, and since typesetting is the ultimate destination of word processing, the use of word processing involves the user in the art of typography. Typesetting is the process; typography is the art.

As words are processed, they must be managed according to some system. We use systems all the time, but we often do not recognize the system we are using because our attention is on the purpose we wish to accomplish. We use words to communicate, and they too are used in a system of language, but we think more about what we want to say or the substance of what is being communicated. Word processing is a system of moving information mechanically in the form of language. Graphics can be included as a variation of the process. What makes it meaningful is communication, and for this there has to be human reception.

With the use of word processing in offices and

other environments, the user becomes involved in graphic production. This turns the office environment into an art department through the use of word processing and reprographics. It provides for information management and with this a host of other possibilities. Typography is the first building block of word processing in the information system.

The System

We use systems for many operations; once machines are involved, a system is necessary. Word processing involves the operation of a system, a system that is designed to accomplish a given purpose by means of a specific method. Word processing encodes words so that they can be handled by machine; then, moving and handling this information to meet a given purpose, it outputs the information as written language to complete the communication.

It is necessary to have an understanding of a given system along with the knowledge of how to operate the machine. Suppose, for example, the case of a newspaper. Because of the need for speed newspapers pioneered the use of automated typesetting and systems of information handling. The newspaper system starts with the originator of a news story. As the newspaper work flow has developed, the newswriter writes the story on a typewriter, then calls for the copy boy (girl), who delivers the story to the copy desk for editing. After editing and markup for inclusion in the makeup of the newspaper, the copy boy delivers the material to the composing room, where it is typeset and proofed. Now the typeset material is made up into the printing material for the newspaper page. The material is placed on the press and the newspaper printed.

The word-processing system begins at the point where the copy is written on the typewriter. The keystrokes are captured in some form for input into

1-2. The redesign of IBM's MTSC is the IBM Mag Card Composer. It is simpler and less expensive than the original MTSC Word Processing System, and undoubtedly the Mag Cards are easier to handle than tape reels and a more convenient recording medium for small units of information. IBM defines the primary use of the Mag Card Composer as the preparation of copy to be photographed and converted to offset-printing plates.

1-3. A United Press International newsman is using a Harris-Intertype editing terminal to send a story from a remote location to UPI's central computer in Manhattan, from which news stories flow to news outlets around the world. This is an example of the use of word processing for news coverage.

the system. The copy is reread and edited until the writer is satisfied with the display, then the story is transferred into the memory of the computer. The input machine is now free for the next story. The copy desk works from the memory on another terminal that can display the story for additional editing. The file of stories is retained in the computer. When a story is finished, it is put back into the memory for further processing. Before the story is typeset, it is proofread on another terminal. The composing room has access only to stories ready for typesetting.

The system of newspaper processing is basically the same, but the words are moved with a faster system that automatically keeps track of the material and reduces the labor involved. In addition to the physical handling of the material, which is electronic, composing and printing may be done at a distance from the editorial and publishing functions; some newspapers are printed far from editorial offices in places where shipping is more central. Word processing allows coordination of remote functions.

These functions are as simple in principle as described, but they also involve a complex range of subfunctions. The range of functions, subfunctions and overlaps is indeed complex. Systems of word processing used by large newspapers are very sophisticated. Consider that stories are phoned in, that input is connected to wire services and feature syndicates, that graphic material is sometimes included, that there may be remote editorial offices, and that in some cases printing is done simultaneously in a number of states, and you can see that the system and subsystems are highly complex. The word-processing system provides the

speed for this to be handled on a daily production basis and in reality brings print production up to the speed of broadcast production. The difference lies only in the means of delivery and viewer perception.

As newspapers have a range of functions in common, so do offices. Offices engage in correspondence, record keeping, filing, and various selling and communications functions. Word-processing machines are designed for these functions and are used according to the purposes of the activity.

It is quite challenging to look at something you have done instinctively over a period of time as a systematic operation or to analyze a systematic operation to include all the functions that need to be accomplished to fulfill the activity. It is much more difficult to see and understand how we do what we do than it is to do it. To do this is to design an information system.

Automation speeds laborious activity and provides more time for creative activity that cannot be systematized. The systems provided by manufacturers are designed with automation in mind. In many cases the systems are derived from graphic use, as in newspaper production, and applied to the office. From one point of view, this is how word processing becomes a universal term for the automated handling of information. The term "word processing" has grown in concept to include the many ways in which information is handled and is itself an extension of data processing.

The common denominator is the use of the computer and of computer systems. The computer has been part of the business environment for some time; word processing extends its use to communications systems.

2.

Interface with the Computer

Word processing is connected with the development of the computer because the computer is the means by which the machines and systems are operated. Automation is the result of the use of the computer. As with everything that is automated through the computer, the technology must be adapted to meet its requirements. Word processing is somewhat unique compared to other fields in that the use of the computer makes word processing possible.

Word processing uses computer technology for coding the word, the input; for handling the word in machine systems, the processing; and for alphanumerics, the output. The code is made up of electrical ON or OFF signals called bits; a group of bits representing a symbol is called a byte. There is a different code for each of the symbols used in alphanumerics. What is different about this system compared to those of the past is that the separate elements are integrated into a comprehensive system adaptable to any number of needs. This system also provides a speed many times that possible with the independent mechanized units of previous use. The computer makes possible the integration of function that automates word processing.

To take advantage of these features requires a certain amount of adaptation on the part of the individual to deal with the concept of systematization. The end product should be the use and benefit that the individual can derive from the technology. In concentrating on these new concepts it is a good idea to emphasize the relationship of the systems to their ultimate human use. This is different from thinking of a machine as a replacement for "old Dobbin," as was done with cars, for instance.

The purpose of word processing is to produce some kind of graphic communication. That it is automated and systematized saves the labor of further handling once the communication has been recorded, since other functions such as transport, filing, and typesetting are automated. The fact that these further functions can be handled very rapidly makes information or communication available, and the individual has ready access to more and better information.

Since computer technology is a requirement, it is useful to understand the general function of the computer. With an overview, analogous to using a map to see the lay of the land, one can then work with the systems provided by computer technology. Understanding the function of the machine reveals how the systems are developed.

NUMERALS AND PUNCTUATION

64 32 16 8 4 2 1

1 2 3 4 5 6 7 8 9 0   . , - ; ' ! : ' ( ) $

6 and 7 levels punched along with other character bits indicates numerals, beginning with the 2-level. The 1-level does not appear with numerals

FUNCTION CODES AND SPACES

64 32 16 8 4 2 1

CORRECT, SKIP TAPE, INNER, OUTER, DISC 1, DISC 2, DISC 3, DISC 4, DISC 5, J.W.S, TABULATE, NON-SPACE, MULTI-JUST, ACCEPT, REJECT, NON-JUST, LEADER INS, KERN, CUT-FILM, MONITOR, FIGURE SP, THIN SP, FIXED SP, EN SPACE, EM SPACE, 1/32 SP

POINT SIZES —10 PT. DISC | **EOL GROUP**

64 32 16 8 4 2 1 ½

5 5½ 6 6½ 7 7½ 8 8½ 9 10 11 12 14 16 18 20 24 30 36

8-5-4 levels punched followed by other punches indicates a point size. Adding binary values of levels punched gives the point size. The 1-bit level when punched indicates a 1/2 point size.

EOL CODE, Frac. Pts. L.F., PTS. Line Feed, J.W.S.s Used, PICLETS Rmg, PICAS Rmg.

LOWER CASE ALPHABET

64 32 16 8 4 2 1

a b c d e f g h i j k l m n o p q r s t u v w x y z . , ; :

6 bit added to regular character punch indicates a capital letter
7 bit added to regular character punch indicates, small cap, sort, ligature
6 & 7 bit added to regular character indicates figure, word space or lig.
8 bit punched with other bits signifies a command to photo-unit

The Computer

The basic idea for the computer was actually conceived in the 1800s. Charles Babbage, an English mathematician, developed an idea for an analytical engine that could perform any kind of computation automatically. In the 1880s Herman Hollerith, while working for the United States Census Office, devised electrical tabulating equipment that was used for the 1890 census. His method represented pieces of information by a series of punched holes in cards. The hole in the card completed an electrical circuit when it was passed under a wire, and the location of the hole under different wires indicated the information. Hollerith eventually left the Census Bureau and formed his own company. In time his company merged with others and resulted in the formation of IBM.

The 1940s saw the development of electronic accounting machines. In 1944 the Mark I was developed, which consisted of 78 devices linked by 500 miles of wiring and had 3304 electromechanical relays. It was controlled by a sequence of instructions punched into a roll of paper tape. In 1946 the ENIAC was developed; instead of electromechanical parts, vacuum tubes processed the information thousands of times faster.

John Von Neuman developed the concept that instructions constituting a program could be stored inside the computer, which laid the foundation for present-day computers. The program instructs the computer as to how to read data, process it, and produce the desired results. The first computer for business use that worked from a stored program came out in 1954 and was called the UNIVAC.

2-1. The computer operates from a byte of information. These Harris codes are an example of computer signals for the operation of typesetting. In addition to codes for a complete alphabet font there are codes for the Fototronic phototypesetting system. Notice the outer, inner, and disk codes under the panel labeled "function codes and spaces"; the discs are shown in 3-3.

The earliest computers would fill a good-size living room with tubes, wiring, and electrical parts. The progression from the first generation of computers, which used tubes, to the second generation, which used transistors, to the third generation, which used microelectronic circuits, reduced the size and weight and improved the performance. Size and weight were important to the use of the computer for space exploration and the NASA programs. Third-generation computers are those now in general use.

With further development the concept of the expensive monolithic computer has given way to that of a number of smaller computers that distribute the processing and to the minicomputer and still smaller microcomputer. The minicomputer is often built into and used to control machines and in situations where there is no requirement for great processing power, because it is less expensive. These smaller computers can in turn be linked to a larger computer.

The computer itself consists of areas for input, processing, and output. As explained, the information must be on the ON or OFF current for input. A series of bits is a code for a unit of information, and this coded information is moved into the processor and acted upon according to a program, which is a set of instructions. When the processor has completed its action, the information is moved to output, and the output is expressed in humanly readable information.

The processing unit consists of a number of elements. There is the Central Processing Unit, or CPU, which performs the processing; there is the program for processing, which is called the Supervisor or Monitor; there is the memory that retains the program. Another memory transports incoming and outgoing information. Each of these elements has additional parts and functions.

To illustrate the action, suppose that the Supervisor program for the CPU is an instruction to add. If the information or data input is 2 and 2, the CPU puts the first 2 from its memory into a register that holds a byte; it puts the next 2 into a second register. The program instruction adds the second 2 to the first 2 and places the sum in a third register. The exact process is more complex because the com-

puter works with binary numbers and mathematical processes. The CPU takes the amount in the third register and moves it to memory for output. Thus, 2 and 2 input, processed as ADD, outputs as 4.

The Supervisor is provided with a number of programs. It programs mathematical functions that add, multiply, subtract, divide, and performs other mathematical functions required by the application, such as square roots and percentages. The Supervisor may also have a library of other programs to which it can refer, such as search, alphabetize, or sort/merge. Each of these programs may consist of a number of separate instructions to produce the operation.

In addition, the Supervisor can be communicated with so that the operations in its library are called into play in sequence. In this fashion a complex mathematical problem can be computed by instructing the Supervisor which functions to perform next. This is an object program that can be planned and written to achieve an objective purpose. The object program can also be input into the computer memory and accessed by a single command that the Supervisor directs the CPU to follow when information requiring this objective is supplied. With different applications a library of object programs can be stored and accessed on demand.

To make communication with the computer easier, machine-code symbols are developed that correspond to our language. This vocabulary of symbols, with its program of instructions, can also be stored in the computer. In this manner the computer does the tedious work of coding, the program compiles the symbols into machine code, and the originator of an object program need only deal with the logical sequence of instructions. The Supervisor takes the input symbol to a compiler that translates it into machine language for processing; with instructions compiled, the Supervisor follows them, referring on command to its various libraries of instruction, and processes the information to its conclusion as output.

Compilers have been written for a number of computer languages. These languages are designed with a given application in mind. COBOL and FORTRAN are two popular computer languages for programming. COBOL stands for COm-

mon Business Oriented Language. FORTRAN is an acronym for FORmula TRANslator and, as the name implies, is particularly suited to writing programs that deal with formulas, such as those engineers might use.

One can see how programs that control computer processing are layered one over another in a hierarchy of control. The object program is translated by the compiler to activate the Supervisor programs. This is basic; there can be more layers that control the input and output operations and devices.

Through the acronyms that make up a programming language one can see the brewing of the alphabet soup that is associated with computer terminology. Computer terminology uses the generic form, while the language we are accustomed to using is more specific. Each application has its own special terminology.

This is also true as computers are applied to typesetting and to word processing. The additional keys on the keyboard call for computer functions. The QUAD CENTER key centers the line. To the computer it refers to a series of mathematical calculations that computes the difference in the field and divides by 2, with additional rules if the quotient has a remainder. Presumably, the program could be written as a mathematical formula and the Supervisor instructed in FORTRAN, but this is inconvenient in typesetting. The less one has to think about the method, the more one can focus on the objective of the desired result, so it is easier to use concepts and terms associated with typesetting.

The same approach would apply to office procedure and to the use of the computer for correspondence, for instance. Many of the applications deal with stored programs, and the user need only be concerned with the task, once the purposes of the programs are known. Normally, one will deal with the logic of the systems used in one's special field of application, not with the generic forms of computer logic.

The Computer System

The operation of a computer falls into two parts: the electrical function of the wiring, the memory, and registers; and the system of instructions and programming; these are the hardware and software, respectively. Following the description of the elements of a computer, the CPU is hardware and the Supervisor program is software. The hardware is the machine and various machine parts; the software is the programming and program libraries. While the programs must work in accordance with the circuitry and capacity of the machine, the software controls the operation and essentially comprises the system of operation.

2-2. The familiar typewriter keyboard is seen in the dark keys at the center of the Harris TxT UJ-6 Perforator keyboard often used for input to Harris equipment. Outside the lighter keys are for typesetting functions and codes. The Quad center mentioned in the text is on the right-hand side, middle row, second from the top. The keyboard, with its typesetting terminology, exemplifies the use of the computer in the context of task-oriented concepts.

It is convenient to think of the computer system as programming, even though this overlooks the obvious relationship of program to machine capability. In dealing with the computer system, one deals with the software, since it is through the programs and their operation that one gains one's objective in using the machine. One deals with the function of the machine rather than with its mechanics and therefore is free to concentrate on the purpose of the operation and to deal in terms of the subject matter. One does not have to become a computer programmer to use computerized equipment, because the programs take care of the necessity to relate to the machine and are designed to relate to the concepts that you are using.

COMPUTER SYSTEM

CPU   MEMORY   PROGRAMS

HARDWARE   SOFTWARE

INPUT   OUTPUT
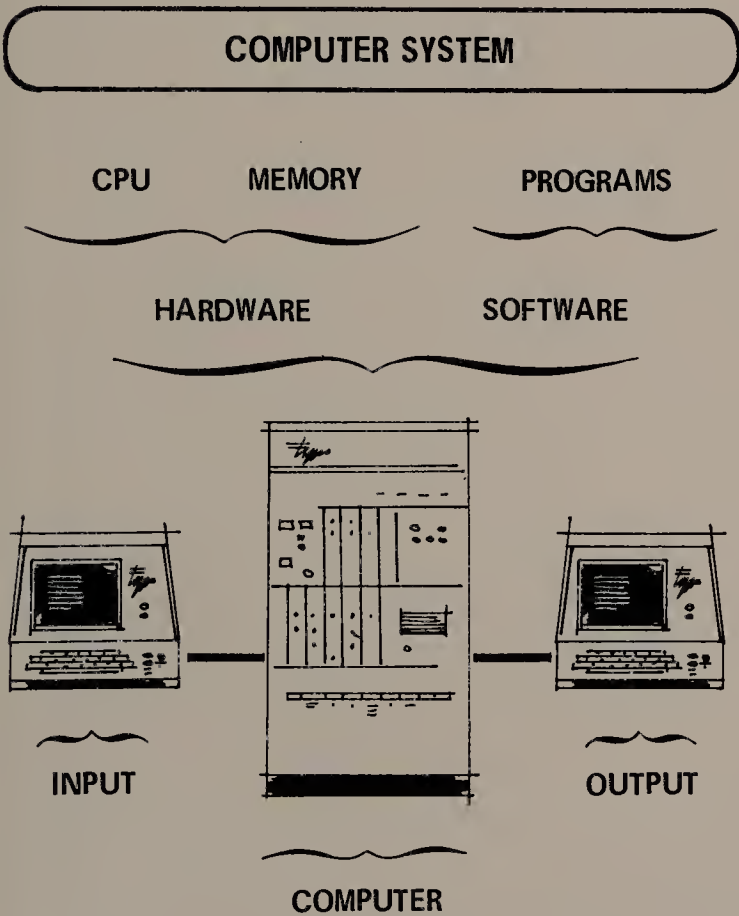
COMPUTER

2-3. The word diagram shows the relationships of parts of the computer system. A single terminal can function for both input and output; and, when either is an intelligent terminal, with its own small computer, it in turn will have the same internal elements as the central computer. The hardware and software will also be compatible with that of the central computer.

Word processing deals with the concepts of communication, with the movement and use of information. Word processing is itself a generic concept because it doesn't name the specific type and purpose of the information. Typesetting is a more specific application, though the purpose of typesetting might be anything. When we talk about a specific application, the use of the system comes into focus. The system, then, is a method used to gain the laborsaving advantages of automation.

The price we pay for the use of the system is the discipline of having to work within its limits. This is why it is important to understand how the system works and why it was designed that way. This understanding provides the user maximum flexibility in adapting the system to a given purpose. Every manufacturer presents a variation on the use of a computer system, and each machine has its own particular program. The machines have the computer system in common, but there are variations in software design and in system concept.

In the application of software to the computer system of word processing, the programs are often hardwired—that is, wired into the circuitry of the machine. A hardwired program, called firmware, is simply a program that was originally a software package but that is now packaged permanently in integrated circuit chips. The object programming function is taken care of in the operation of the machine. Communications decisions act as data to the program of the computer.

For word processing the data file of computer terminology is communications terminology. In the example of the newspaper system the user of a word processing machine feeds information to the load key, and the computer moves the data file from the word processor to a file in the central computer. The Supervisor program prevents the incoming file from going onto an existing file and may date, time, alphabetize, or handle it in whatever way the program has been written.

In some typesetting situations it is convenient for the operator to load a program, and some word processing machines provide for this. For instance, the work may require a complex specification to be inserted each time a group of special words appears in the manuscript; if the same group of   **17**

special words appears a number of times, the operator may load the words and their complex specification as a single program; every time they appear in the manuscript, the operator hits the key that calls out this program and with one keystroke produces the whole set of keystrokes. This same principle can be used for office work to provide standard response or form letters. There is enough repetitive typing work in most office situations to justify the use of word processing. The necessary human element of response is applied to the judgment as to what is repetitive and what is not.

Computers do what programmers tell them to do, and computer programmers can make mistakes. Sometimes the communication between programmer and task administrator fails to produce a workable program; but, once the program is designed and run, debugged and proven, it will always do the same thing. Unforeseen applications of the program that produce problems and current fluctuations that produce false codes in computer data are avoided by proving the operation first. Since the computer is designed to check its own operation and to shut down when there are malfunctions, there should be little chance for computer error. Typesetters know that, while it is next to impossible to keyboard a manuscript without making a mistake, once it is in machine language, the computer can handle it without errors.

3.

Communications Link

Word processing deals with typography for the graphic reproduction of the word, but in a larger sense all graphic communications deal with the word and involve word processing. The boundaries are indeed wide because graphic communication is an extension of communication in general. The difference in concept is the difference between the unit technology of different machines with singular functions and the integrated technology of word processing with its many machines and interactive functions.

It is this integration of system that is the communication link. The same software, together with the same hardware technology, can be adapted to many different uses. The range of application is extensive already and still not fully explored. Any number of programs can be written for a wide variety of applications. In that a program, or software, applies the technology to a given use, the software produces the communication link.

The concept of software is implied in the development of a machine to meet a purpose. Whatever the purpose of the machine as developed is implied in its operation. A linecaster, such as the

Linotype, was developed to mechanize and speed up the setting of individual characters of type. In contrast, with the introduction of computer software and computerized typesetting machines, a number of options are available. If the focus of this example is broadened to communication in general, of which typesetting is but one element, and if other machines are incorporated, the total system can function in many ways and represents a communication link. The way in which the total system operates is a result of its software design.

The design of a system and the development of software for its application are as complex as the development of machine technology. Success or failure of the application depends on the design of the software, even if the hardware technology employed is independently excellent. To deal with this, hardware manufacturers also design and market software packages for their products. The software is designed for particular functional applications and is sold together with the hardware so that the user need only determine the final specific application.

Naturally, the design and manufacture of soft- **19**

Keypunch	Processor	Terminal	OCR Scanner	Medium Translator	Code Translator

CRT Edit	Graphic Layout	Photocomposition	Graphic Scanner	Plotter	Printer
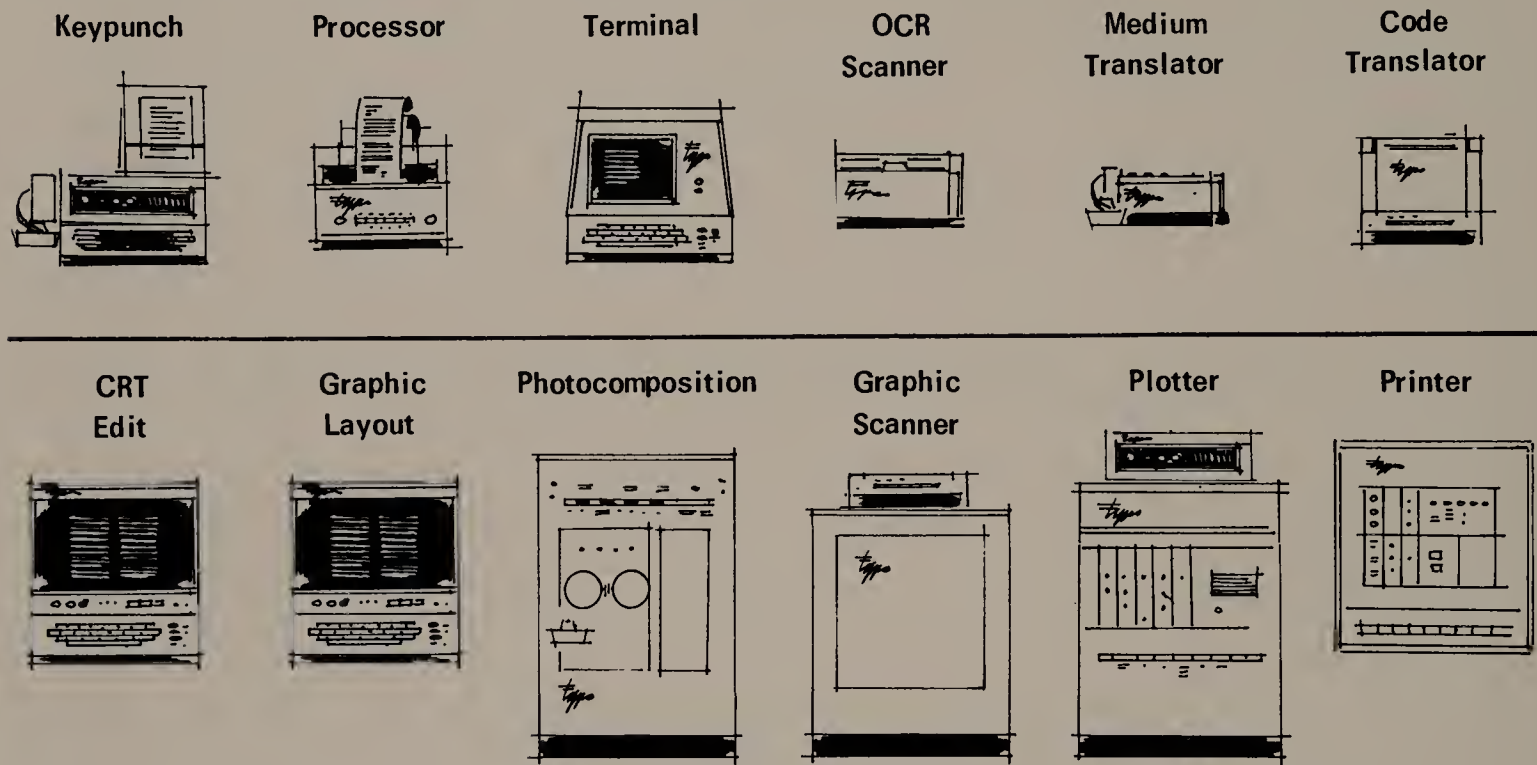
3-1. With more than a hundred different manufacturers, each with its own word-processing systems, there are a great many machines on the market. Of the many special kinds of machines, this diagram indicates the general areas developed for word processing. For instance, the keypunch has specific application to paper tape for typesetting and to punch cards for accounting. The CRT Edit is shown in connection with UPI (1-3)

ware and hardware for a given application involve the manufacturer in specific and practical merchandising endeavors. It behooves the manufacturer to select the broadest and best applications for hardware and software systems. IBM has been particularly successful in linking the hardware and the software package into a bundle and then merchandising this bundle for the intended application. In doing so the package is immediately applicable for the user's purpose with a minimum of further programming. There may also be a library of related software packages that extends the scope of application.

This works well because we are educated to think in terms of a unit technology and a product concept. If the product is a series of operations grouped into a system, we can still think of this in unit-technology terms. This is how word processing was first presented; but, because the range of applications is so broad in scope, the concept of word processing should be extended to that of a complex of communication systems. In turn the system generates new concepts and uses. When the system is unbundled, it can be extended. Though these systems may become very involved, the user can easily handle many operations by virtue of automation.

Front-end Control

All communication systems have in common front-end control: the entire operation of the system is controlled at one point. We have seen that automation increases speed and reduces labor; it also provides front-end control. The telephone system is an example: since automation removed the need for operator assistance, all operations are initiated by the immediate user.

Technology, as opposed to hand crafts, increases productivity and multiplies the action of

one individual. Computer systems extend this productivity further. It is theoretically possible for one individual to write, compose, assemble, typeset, and reproduce material without ever leaving his position at a terminal; automation can extend this function to printing, collating, and distribution. Practically, however, these operations are subdivided into a number of skills, and only segments are automated. The design of the system has to take into account a given use of technology, though the graphic industry has undergone significant changes, and many jobs have changed in nature or have been eliminated altogether. At each point greater front-end control has been given to certain key functions. It is not necessarily convenient to centralize this control at only one point, but the use of computer programs to automate functions can link the entire system.

Front-end control is important for communication, since it is initiated by one individual, the author.

3-2. Bell System's Picturephone® Meeting Service is depicted in this illustration. The Graphics Station is at the extreme left, the monitors next right, conference easel next, with the hand-operated camera above the group seated at the table. The man in the center of the group is operating the Master Control Unit, which gives one position at the table control of all the various capabilities of the room.

Much graphic communication works through a relay system, using professionals for execution; the author or initiator uses the skills of intermediaries. One weakness of automation is that it overlooks the contribution of these professionals. An example of this weakness is seen in the use of newspaper reporters to input keystrokes for typesetting, which bypasses the former channels of composing room and proofreading; the newspaper can contain many typos and typesetting errors, not because reporters are not professionals but because their concern is with the story.

Automation compensates for the loss of human skill by following a system of operation in which the decisions have been made beforehand. The product will exhibit as much quality as the system provides. That automation lacks artistic control should be obvious, and the systematically logical decisions of automation give a different character to their products. It should be obvious that decisions of craft and skill cannot be fully automated and that the use of a format will only produce a facsimile of craft or art.

Automation is very useful, however, for the direct front-end control that leads to immediate communication. The refinements given to the com-

munication by further processing will depend upon what is required of it. The speed and immediacy provided by computerization make possible operations that would not be possible without this kind of control. The Bell Telephone Picturephone Meeting Service is a good example of the integration of different operations into one useful communications package. The combined audio and video, plus automatic camera switching and other graphic aids, make it possible to have face-to-face meetings between groups in different cities. The various devices make possible the exchange of information and the recording and exchange of graphic documents.

The Picturephone employs a variety of technology, not all of it new and not all of it computerized. The transmission of a video image by coaxial cable has been standard practice for a number of years; the sound-operated switches were used by NASA to conserve power during space flight; the technology for obtaining hardcopy from a video image has also been available. The Picturephone integrates elements of video and audio transmission with voice-activated switching and a camera closeup of the person speaking. A graphics station that shows documents, slides, opaque artwork, transparencies, and viewgraphs is included, complemented by a hardcopy machine, which gives a paper copy of any picture on the incoming monitor. There are additional graphic refinements, and it is the systematic integration of these elements of technology that make the Picturephone business meeting a reality.

In a similar manner, the integration of various elements of graphic technology can also provide an immediate response to a specific purpose. Consider the example of the news service that puts its stories on a wire that makes them immediately available to hundreds of newspapers. Speed of performance is the important factor in communication here; the speed of computerized technology makes the application and the front-end control possible. This use of print is far from the original purpose of word processing, yet each uses the same technology.

The largest use of print is the business sector. Most systems and applications of word processing are designed with this market—approximately 13 million individual businesses—in mind. The office is the last corporate area to be automated. With a continued increase in the amount of paperwork and mounting costs, automation is expected to become more and more attractive. Most major office functions, including dictation, communications, information storage and retrieval, composing, typesetting, and reprographics, can be integrated into one system. Typesetting and composition, once the exclusive province of the printer, are now an integral part of word processing.

Communications Technology

The concept of word processing has developed from the technical production end toward the user front end. It is an outgrowth of computerized graphic technology. As more and more elements of graphic technology were mechanized, they were integrated by the use of computer technology into a unified automated system.

These developments centered around typesetting. The linecaster was introduced near the turn of the century, and it mechanized the composition of type. It was the production tool used by everyone in the graphics industry for typesetting. As automation was introduced to this field, the concept of typesetting went through a series of generations.

First-generation typesetters used film matrices instead of metal matrices and adapted the mechanized operation of the linecaster from metal typecasting to film-print typecasting. They were particularly useful because of concurrent developments in printing technology and the greater use of offset printing. Second-generation typesetters, such as the Photon phototypesetter mentioned previously, used film to produce the type image but also integrated the mechanism with the computer. A number of systems produced by different manufac-

3-3. These are the type-font disk wheels housed within the Harris Fototronic unit. The disks are slightly larger than the span of a man's hand and when in operation are kept at a constant 2400 rpm. The five disks contain two fonts each, which can be focused in a range of sizes. Lenses that focus the symbol image produced by the negative are arranged on a turret seen behind the disks at the lower left.

turers use film to provide the image and a strobo-scopic lamp to flash light through an optical system of lenses and prisms that adjusts the image to the desired position and size; the various operations are computer-controlled and are much faster than the mechanical system adapted from the line-caster. The third-generation typesetter uses the cathode-ray tube to generate the image for optical reproduction and is still faster.

The original linecaster was operated from a keyboard at the machine. It was found that the line-caster could be operated at maximum speed when the keyboard was automated to run from paper tape. The typesetting was produced in code on a paper tape by a perforating keyboard that was easier to operate and faster than that of the line-

caster. The tape-perforating keyboard can be oper-ated at about typing speed, which is more than double that of the automated linecaster. Two perfor-ators could feed several linecasters, thus the one-man-per-linecaster concept changed. The first-generation typesetter improved the speed of the linecaster, because the casting and handling of slugs made with molten metal was eliminated.

The second-generation typesetter, because it was computer-controlled, required a number of perforating keyboards to feed one typesetter. Its typesetting speed was triple and even quadruple typing speed. You may recall that the original word-processing machine, the MTSC, had two key-boards to prepare tape for printout on the compos-er. Graphic-quality phototypesetters are somewhat faster than the MTSC and automatically access different sizes and fonts of type. They are in general use for applications requiring quality typography.

Third-generation phototypesetters are used in volume applications. Their speed is no longer thought of or measured by the parameter of typing speed but in lines per minute; speed rates are more meaningful when translated into the time required to do a specific job. For example, a nine-column classified newspaper page can be completely set, including rules, in just over six minutes. Again, with an output speed of 300 8-point, 11-pica lines per minute the entire Bible can be set in less than one eight-hour shift; speeds go as high as 1000 lines per minute. A third-generation phototypesetter can handle most newspaper needs. The image is pro-duced by computer, replacing the film matrix of the second generation, and electronic speed replaces mechanical speed in accessing the letter matrix.

Magnetic tape is often preferred over paper tape, because it requires less storage space and be-cause electrical processing is faster. For example, with a tape translator the mechanical punch head sets an upper limit to the processing speed far be-low what the computer is capable of. However, electronic storage is faster and more convenient than handling tape; and, with less expensive com-puter storage, keyboard input directly into the com-puter or onto a disk is to be preferred.

Keystroke production, handling, and storage has moved from the linecaster to perforated paper tape,

magnetic tape, and finally disk or computer. These steps progressively integrate the function of typesetting systems. Developments arise in separate and independent areas as computer technology is applied and are then merged or integrated into automated segments of a production system. With automation control moves to the front end of the system, the user end.

Each succeeding generation is lower in cost than the preceding one. In the development of typesetting technology the speed and quality of work have to be balanced against the cost. Lower equipment costs expand use. Newspapers have spearheaded this development due to their greater financial resources and their need for technological speed. They have been followed by other publishers and commercial plants, and the business office is coming into the picture.

Use of the scanner to reproduce both letters and graphics has concurrently improved and proliferated; the high-speed-scan video tube has also developed. Symbols and images have been related. Symbols require a code for computerization, as we have seen. Graphics can be scanned in a field of lines across the face of the image, similar to the resolution lines on a TV tube; the density of tone is registered in numbers at points along each line. This digitizes and in effect codes the graphic image so that it can be handled by computer. If the rate of scan is speeded up, successive pictures produce the illusion of movement.

Television in the United States uses a scan of 525 lines to the picture frame; each line has 525 points of value. The difference between graphic scanning and broadcast TV lies in the number of points used. Most graphics need finer scanning resolution because the printed surface does not have the fluorescence of a TV tube. A 4-x-5-inch printed picture usually has slightly more points than a TV picture, regardless of the tube size. With graphic reproduction time is not a factor, so less expensive equipment can handle the scanning at a slower rate. To create the illusion of movement on TV, 30 frames per second are needed: 525 x 525 x 30 equals 8,268,750 points per second, which requires more power to handle. It can be seen, however, that there is strong similarity between communication technologies. With advancing automation and computerization these technologies will appear to merge, and their systems will interface. Special applications use graphic scanning technology already developed for space exploration.

Word processing is either a part of this communications complex or a term for the whole, depending on how the concept is looked at. The present use of technology by different elements of the graphic industry conforms to their specific requirements and is influenced by the necessary use of traditional industry skills. The business office participates through its use of reprography and information processing.

4.

Graphic Presentation

Graphic presentation is the result of adaptations of technology to specific needs. It is a changing pattern, as both technology and purpose develop continuously. The fact that development is more rapid on the technical end than on the user end has made for some uncomfortable transition.

Technical developments arise as a result of a need for something better, or so historians tell us. In the case of word processing it may seem that some developments, many borrowed from space technology, have been thrust upon us even before the need arises. But there is always room for improvement, and decision makers have sought greater productivity at a lower cost, even at the price of a lower-quality result. This has been difficult for the graphic industry, which is geared to ever-increasing quality.

Concepts of graphic presentation are therefore undergoing worldwide change, and the pressure for change has accelerated. Graphic skills were once developed over a lifetime, but changing technologies make some skills obsolete even as they are developing, and they need to be redirected as concepts of the craft change. We can profitably comprehend our role in product formation, whatever skills we employ, and conceive of this function in more fluid terms as a contribution of understanding in the fabrication crafts.

Word processing affects all the graphic arts; because of the continued use of traditional procedures the immediate effect may be indirect. In like manner it affects office work and practice. The requirements and graphic products of both are quite dissimilar, yet word processing in its larger sense unites the two at a functional level. The word-processing technology is the same. This implies new concepts of communication, and the possibilities are fascinating indeed. But since the concepts of graphic production and officework are different, there is a traditional gap between the two. There is also a gap in terms of product needs. Both do, however, use alphanumerics and produce typesetting as a consequence of handling information.

With mechanization, individual craftsmanship became less important. As the assembly-line technique developed, though it provided more goods and services, it reduced the scope of individual contribution. Chaplin's film *Modern Times* was

probably more prophetic than funny. Automation, on the other hand, reverses this development and extends the individual contribution because of front-end control. We have come full circle and must now realize that the understanding of the individual is more important than the function of the machine; it is the individual who fashions the product.

One must go back to the bookkeeper scribes of Charles Dickens to find a unity of craft, art, and office procedures. As the linecaster mechanized the typesetting function for graphic arts, the typewriter did the same for the office. For all the type—typewriting and typesetting—one wonders if any less handwriting is done. Certainly not calligraphy, but the chances are good that handwriting is used even more than ever. The number of writing instruments—ballpoint pens, markers, calligraphic pens, drafting pens, and pencils of all materials and colors—produced by 175 manufacturers, keeps increasing year after year. It is axiomatic that improved production methods spread product use, and this is the case with the computer.

4-1. With hand-set type, the oldest method, each letter or symbol in the individual compartments of the type case is picked up by hand and placed one at a time in the composing stick shown at the center of the drawer. In comparison to the film fonts of photocomposition a drawer is needed for each size and design, and there is always the possibility of running out of a particular symbol, in which case the typographer is said to be out of sorts. The hand-set method is still used to set refined display type.

Office System

The office uses a work system, if you apply the system think of computerization. Word-processing systems have been developed in accordance with systematic procedures that are universal to all offices.

IBM describes the concept of word processing as a new way of thinking about the efficiency and effectiveness of business communications and analyzes it into computerlike segments of input, output, and throughput. In each area equipment is available to automate or at least mechanize the handling of communications. Output performance receives the most help, and throughput is adaptable to many standards and goals, as it must be to serve the needs of many different business requirements. Information-processing equipment is geared to integrate the functions of data processing and printing but not at a level of graphic quality.

The larger concept of word processing is as a system of information handling or communication that can be adapted in innumerable ways. With so many manufacturers competing for the market, there are many varieties of equipment and systems to choose from. Offered with this equipment is the concept of redesigning the office environment with modular systems of furniture. The redesign can include adapting the functional structure of office work flow to meet the requirements of systematization.

Efficient use of word-processing equipment can entail a restructuring of administrative and editorial functions. The secretarial position is subdivided and regrouped. As administrative and editorial functions are grouped, they in turn need managers, and a new, more efficient hierarchy is formed, which gives each level the ability to function without work-time dependency on the other. Executive in-

BUSINESS SYSTEM

EXECUTIVE ORIGINATOR

KEYSTROKE RECORD

TYPING PRINTOUT

ASSEMBLY & ART

REPROGRAPHICS & COPIES

DISTRIBUTION & MAILING
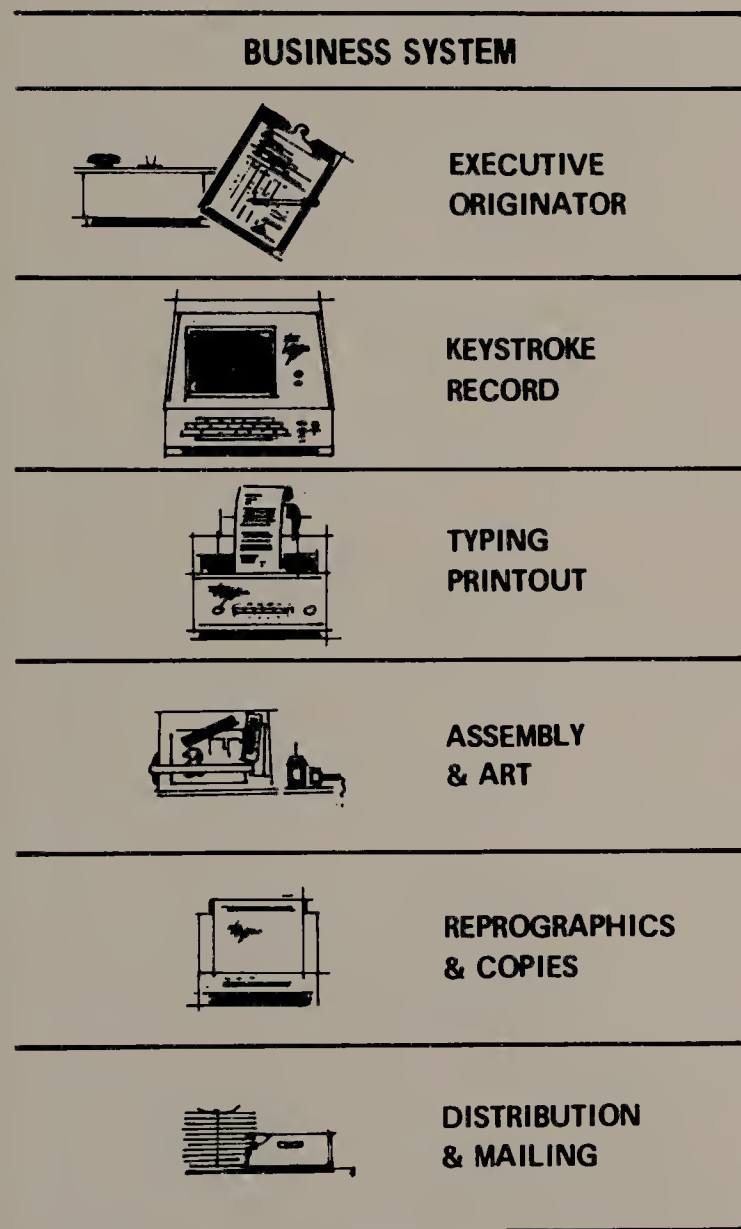
4-2. The schematic of a business system represents the essentials that lead the art function into the office. If a composer is used, the resulting type composition can be assembled into a paste-up to produce graphic material by reprographic processes such as instant printing.

put time is the greatest cost factor. The graphics expert will recognize how closely this system patterns the traditions of the graphic industry.

For efficiency the traditional 8½-x-11-inch stationery and notepaper size is used throughout, which facilitates the printing, copying, collating, and binding of office reprography. It is obviously cheaper to have machines that handle only one size than to introduce the craftwork of varying sizes. As with any system, however, there are options, and much equipment also handles the 8½-x-14-inch legal size and the 17-x-11-inch double-notepaper size. No matter what the style of the information, it must be made to fit this system to gain the advantages of uniformity for handling and storage.

In spite of a paper proliferation, information in graphic form has certain advantages: its universality in a literate society, the ease and speed with which information may be reviewed for analysis compared to forms requiring a set duration of time to view, its accuracy in documenting specific information, and the ability to organize and reorganize its form. Though paperwork is not cheap, it is the least expensive form of handling information. With greater volume word processing becomes essential.

The systems available for handling information in the office closely follow traditional organizational form and extend it toward automation. The door is open to more extensive automation. With more sophisticated equipment greater skill is required of the staff; not until procedures can be broken into smaller increments can less experienced staff be used. The price for this is the use of a system to integrate the increments. The reward is speed, productivity, and savings.

Conversely, word processing can be used to restructure a centralized concept into an individualized concept, in which, with enhanced skills, technology can be used to communicate with and to serve remote locations without losing speed of service or the advantages of centralized functions.

Because it is available, more offices are setting type for information brochures, house organs, and other graphics. Typesetting is used instead of the typewriter because it is more expressive and it

looks better. With increasing amounts of information it is also important that typesetting in conventional sizes take approximately 40% less space than the same information in typewriter type. As the editorial functions of the office are expanded, typesetting becomes more important.

Graphic System

Graphic presentation systems are a mixture of the new and the traditional. This is partly the result of the great variety of work that the graphic arts encompass and partly of the fundamentally craft-oriented concept of graphic-arts skills. Graphic-arts producers must be able to produce any kind of work; and, as this considerable range of skills is extended still further by a developing technology, there is a greater tendency to specialize and com-partmentalize. The specialization becomes still finer when special kinds of work are involved. In terms of lithography printing typesetting is not included, and typesetting and printing are distinctly separate graphic-arts specialties. Both graphic-arts func-tions are further subdivided into specialists for job work and specialists for publishing, since there is a considerable difference in the requirements and equipment for volume. Job typesetting requires more display faces and handles a large number of individual jobs; publishing typesetting handles a much larger volume of text.

The volume of work and the size of the job pro-duce economies in the graphic-arts system: as the volume goes up, the cost per unit goes down. This contrasts with office procedure, with its relatively small volume: here the uniformity of the system compensates for the small volume. Graphic-arts equipment and skills produce much finer work; and, while they are geared to a craft concept, they are used to produce greater volume.

4-3. The graphics system schematically shown refines the business system. The equipment is designed to provide econo-mical reproduction beyond the capabilities of reprographics for larger quantities. The key to economies lies in the quantity of re-production. The use of film to make the printing plate permits high-er quality and manipulation of the image.

GRAPHICS SYSTEM

EDITORIAL DESIGN

KEYSTROKE RECORD

TYPESET PRINTOUT

ASSEMBLY & PASTE-UP

REPRODUCTION CAMERA

PRINTING PLATE

PRINT REPRODUCTION

DISTRIBUTION & SALES
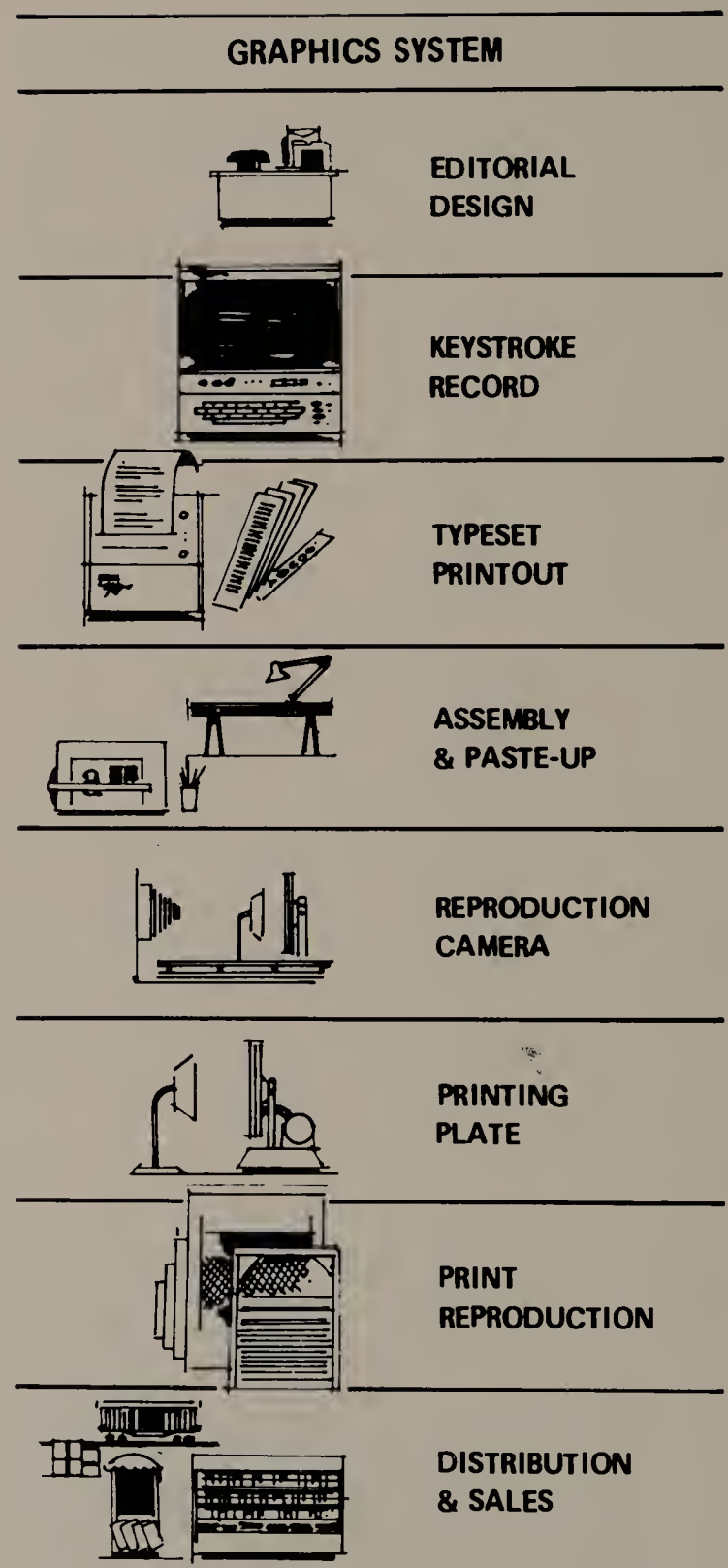
The use of word processing links the two systems, the graphic system and the art system, by similar automation technology, and some functions can overlap. Since graphic arts adopts technology primarily on the basis of economics and new methods are merged with old to produce the product, there is every reason to expect that office procedures will do the same. Typesetting is one of these automated areas, and it leads to others. The difference between graphic-arts skills and office skills then becomes the obvious factor.

Statistics show an accelerating movement of capital investment in the new technologies for graphic-arts use. The investment is high, but with succeeding generations the price lowers: the price for second-generation typesetting equipment a decade later is approximately 10% of its initial price. Only the original IBM word-processing equipment has maintained its price, and used machines are in short supply. Part of the reason for this can be attributed to the location of its design concept midway between office procedure and graphic-arts requirements.

The graphic-arts system whose volume is above office requirements but below commercial job requirements can utilize the specialty of instant printing. It combines the systematized format of reprography with job-printing functions and in a way pioneers the linkage of both systems. Graphic arts, instant printing, and office procedure have distinctly separate yet similar systems. The automation of word processing as a communications concept can link the three.

Automation unifies the various systems of production into the larger concept of communications. As each area is automated separately, the systems can be expected to merge. Automation requires a certain production volume because of the costs.

The system must be planned, the equipment installed, and the entire production effort regrouped and geared to the requirements of the system. This often involves personnel relocation, training, and new personnel with skills in short supply; working with automation is an ongoing effort.

This process has been underway in the graphic arts for some time. Rising costs have forced some producers into automation to stay competitive. Others have sought a competitive advantage. These same factors have also increased the use of in-house typesetting in cases where the volume of production could justify the cost. The change to in-house typesetting does not immediately result in automation, but the change to word processing does and links immediately with typesetting because of the use of recorded keystrokes. The labor-intensive element of typesetting, the keyboarding, is distributed throughout the production environment. This does reduce costs, since it cuts keyboarding duplication. The expertise of the typographer combines with the data of recorded keystrokes to produce typesetting.

With in-house typesetting graphic material can be produced for lithography by the paste-up method. What is needed is artistic skill, and so the line between the office and the art studio, between duplication and graphics, is obscured. The office environment can provide material for a graphics department.

The front-end control of automation provides means but not skills, systems but not applications. If the functions of the traditional office and the graphic arts are integrated, there is an opportunity for further communication products, and the use of the system by the individual can provide for this. It can also provide for greater productivity of the work unit.

5.

Economic Justification

Economic justification is often construed to mean only vendor or producer profit, and corporate profit can serve as a rationale for evils projected on society. In the framework of a true capitalistic rather than a monopolistic system economic improvements and greater productivity would be welcomed by all. By this reasoning every corporate profit would be the result of consumer acceptance, and such profit advance would afford better conditions and a wide order of social improvement. Automation could bring such improvement if corporate decisions were so idealistic.

As it is, changes to automation are progressive if not so encompassing and humane. Automation is seldom implemented as a total environment, though such an environment must be envisioned and planned for to coordinate the development of related segments that will merge into an automated environment. There can be little doubt that the motivating factor in the adoption of automated techniques is cost reduction, and surveys bear this out. But savings in costs can be achieved in so many different ways that the gross image of corporate profit is lost. Labor cost can be saved by greater

productivity and by reducing the number of steps in the operation. Costs can also be lowered by reducing errors and increasing quality control. Improvement of customer service through better quality and greater speed also affects costs of doing business. While costs are the overriding motivation for using automation, because businesses are customarily assessed by their financial statements, this goal can be approached in many ways.

The need for a humane approach is ameliorated to some extent by the requirement for training and schooling equipment operators. Personnel can benefit from a change to automation by expanding their skills, productivity, and earning power, as well as by taking pleasure in the larger scope of their work. The shift to automation can also be accompanied by job teaming, work grouping, greater independence, and a wider variety of work. These changes would depend on whether work is handled in a batch mode or as an on-line stream, but there is opportunity to improve mechanization conditions by a shift to automation.

Automation can do away with the one-function assembly-line technique and bring personnel clos-
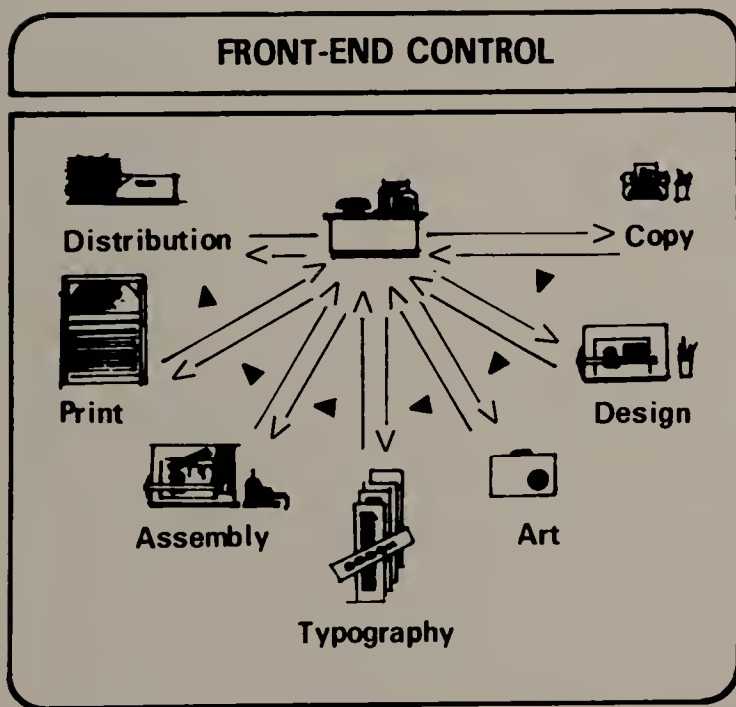
er to the achievement satisfaction of handling an entire operation. The greater speed of automation can allow for more horizontal organization as opposed to a finely compartmentalized vertical specialist hierarchy. There are a number of possibilities for organizational restructuring, and it is to be hoped that management would attempt to integrate the present hierarchy with the new organizational effort. The structuring of automation organization so as to not put the hierarchical structure of the union in shambles is one of the more difficult problems. Enlightened management tactics could prevent the expensive strikes and long hours of negotiation that have confronted the introduction of automation at every step in the graphic-arts unions around the world. In some instances, particularly those involving newspapers, this has been done fairly successfully.

Changing market and economic conditions must provoke business to shift to automation in the first place, for no manager wants to change a successful package, and these conditions do not invalidate the understanding obtained through experience, or the manager himself would be obsolete. Conversely, production skills must constantly meet new market conditions in a changing society; and, as conditions change, so should skills. Automation is expansive, and almost everyone wants to make progress.

The traditions of private enterprise center around profit, but even this is changing with social pressures, and an economic justification is not considered by all as progress. If business must function according to profit and loss, the consumer should have the last word in a democratic forum by his vote in the marketplace. The powerful persuasion of low prices is running into the counterargument of what society has to pay for these low prices. Do people like or accept automation? So far it would appear that, to the degree that society is aware of automation, they do like it. The social value of automation is its front-end control, its opportunities for greater individual expression, and its speed, which allow greater information and communication.

Communication Needs

Sometimes it seems as if business and government are run by paperwork. With the rate of growth of paperwork one wonders if all this information is really necessary. Yet, if some kind of information is vital to your own objective, then the question looks different. The user of information gains an entirely different perspective: if you need school records to qualify for some special opportunity, if you need work records to obtain Social Security, if you need market data to find buyers, even if you only need an airplane ticket—there is a long list of individual needs that require paperwork. Word processing is designed to speed and simplify the formation and recall of written information.

The Hollerith cards developed for the 1890 census met the requirement to formulate and handle the millions of records taken in a census. Since 1890 the census has continued to grow, and the job becomes more and more herculean. Why do we need a census? For one reason, to implement a representative form of government. Continued

FRONT-END CONTROL

Distribution — Copy — Print — Design — Assembly — Art — Typography

5-1. The theoretical front-end control possible with automation is subject to communication needs and to the purpose served. The range of skills traditionally employed for reproduction graphics is extensive. After decades of specialization these skills produce the refinement expected in graphic material; and, while automation can place control directly in the hands of the communicator, few have the requisite skills.

growth in government services and in the interaction between government and business mandated by law force more and more records to be kept. The taxation system requires records; Social Security requires records; insurance; and so on.

Word processing is a means of handling these requirements more efficiently. But the fact that through the use of word processing and computer techniques one can find one record among millions almost on demand provides more than greater availability of information for each of us: it also makes new services possible, such as immediate access to one's bank balance, and it allows a single person to handle your request for information without interfering with others engaged in the same activity. The records are not taken, merely reproduced.

The need for record handling has forced large organizations to institute computerized records. With further development of word processing the same techniques can be applied to smaller installations. If nothing else, this will enable the small business to survive the deluge of paper requirements imposed by the government; many small businesses actually need more staff for paperwork than for productive work, thus forcing them out of existence. Word processing will help to maintain a balance. Continuing legislation and growth of government will mandate some form of administrative implementation.

Over and above forming, filing, and retrieving information, important as they are, word processing can handle information as communication. The individuality of the communication and the communicator is not lost by using word processing, but the information is speeded to its destination. Graphic output is not lost in machine code: it is restored to humanly readable alphanumerics. With records the emphasis is on utility, and clarity is of primary importance; with communication, on the other hand, something more is required of the alphanumerics. The mechanical monotony of computer printouts is not really designed for extended reading, derived as it was from engineering and accounting. Communication arts provide a different background.

It is surprising how few people involved in commercial graphics for the office know anything about the art of typography. We accept that the typewriter looks better than handwriting; certainly it takes less space and is neater and more readable. But this description only takes into account the mechanical utility of communication: it leaves out the aesthetic factors that are so essential to conveying meaning with graphic communication. It is a graphic monotone, with no voice inflections other than those of punctuation.

Technological improvements and the use of different type fonts make the typewriter more amenable to aesthetic expression. An increasing awareness of what is called an image draws more attention to the graphic product of a business, whether seen in correspondence or in circulars, and increasing importance is given to the appearance of the graphic product. This draws the attention of many to the historical origins and appearance of correspondence and stimulates an interest in calligraphy. No one is taught penmanship in school any longer; and when the individual understands the aesthetic possibilities, there is an immediate extension of self-expression and thus better communication. Calligraphy is the ultimate, freest use of alphanumerics, but it is the slowest.

Word processing extends the possibilities of type from the typewriter to the most complex professional typesetting. In using word processing to communicate it is technically possible, if not aesthetically necessary, to use typesetting as a means for graphic communication. The means available start with an exchangeable type font on the typewriter to a proportional spacing typewriter to a composer to actual typesetting to automated typesetting. At each stage there is an increase in the range of expression available. Typesetting is the next best thing to calligraphy, and it can be done so beautifully as to be a work of art.

5-2. Harris Total Copy Processing System is represented by Central Processing, CRT Typesetting, Video Layout System, and Editorial Processing System. A capable secretary can set type with an hour's training and the aid of an automated format. But if there is no format or a format change, the expertise of the experienced typographer would probably be needed to formulate and design the format.

Toward Better Communication

The uses of automation as a tool for communication are impressive, to say the least. Its use in word processing and typesetting is a progressive contribution to social needs; but, if its use in graphics is a substitute for the art of communication, the results cannot be nearly so satisfactory. Communication involves much more than mere typesetting.

The art of typography is to make the symbols of language at once clear, expressive, and beautiful. Aesthetics are useful to the purpose, at least, if not required by the needs of communication, and typographic design works toward a better communication. Since automation does not make decisions for us but rather presents us with a choice of system, we should exercise taste in its use so that our choices are appropriate to the purpose of the communication.

Trained as we are to the discipline of mechanization, we must recognize system in order to choose and manage it. This is different from the use of a single system, whose existence we may hardly recognize. The use of a typewriter illustrates a mechanized system: the striking of a key makes an image and occupies a space of one unit; there are no choices of spacing or typeface. A typewriter is not recognized as a system, because there are no choices, only the mechanization of one system. If you have a choice of size, a choice of space, a choice of type, even a choice of machines, since
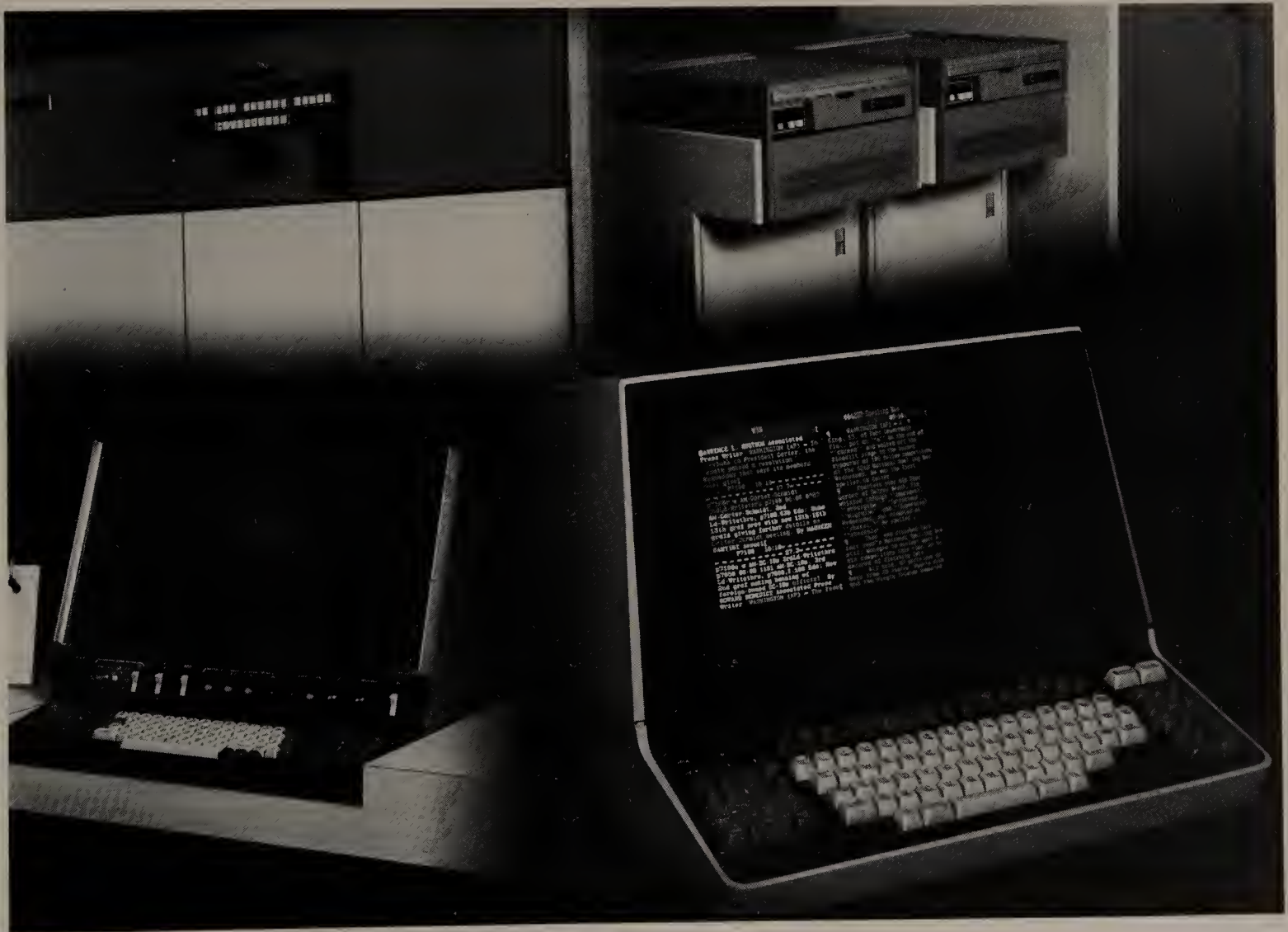
the recording medium of word processing can be moved from machine to machine, then the choice of system is part of the communication. Any number of systems can be chosen to produce the type image. This removes the limits imposed by a single system but requires a recognition of the use of system. This is the system think of automation: it is the recognition of system formulation and use.

To deal with the choices automation can provide, one must discern and appreciate the graphic architecture of typography; this is the fundamental of graphic communication as we use it. To be sure

COMPARISON OF SPACING

One Unit Spacing

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
aaa
iii
mmm
aim

Proportional Spacing

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
aaa
iii
mmm
aim

5-3. Typography differs from typing in the unit space of the letters. The "aim" of typography is to arrive at a pleasing composition, given the variation of space in individual letters and individual communications. The graphic form of the communication can be as meaningful as the symbols used to present the concept. As the refinement of the machine allows control of spacing, the refinement of the message can be enhanced, and the design of the communication can be raised to the art form traditional with the use of typography.

graphics uses images and pictures as communication symbols but we are all trained to use language. The use of pictures requires more training and is not so universal. This distinction is traditional in graphic design; while the use of type is an art form, design with type and pictures is more so. As we move toward better communication through automation, it can be expected that pictures will be used more often; but the use of alphanumerics alone is simpler to automate. It is more economical than the picture image, which requires more variable scanning; the need must justify the costs. Automation allows the use of typography to provide the subjective image for the communication.

In terms of traditional typography typesetting is a craft. It was far more expensive than the typewriter. Automation lowers the cost by reducing the labor; it does not lower the craft requirement. Craft skills can be simplified for office use, though they need not be; office skills can expand to include typography. This is accomplished by specialization in the same manner as is traditional in graphic arts, and the use of automation favors some degree of specialization to take advantage of its systems. If the graphic-communication needs of a business justify the economics of word processing, then typesetting can be used. The degree of automation determines the degree of typesetting.

With typesetting business practice moves into the area of graphic specialization, and reprography is extended to a full-scale art department. Given the same equipment, the difference lies in the skill in which it is used. This leads to graphic-arts specialists who are business-oriented rather than art-oriented. This is an in-house art department.

Communications specialists are traditionally graphic artists. The changes brought about by automation, which bring computerized equipment into the office environment, require graphic skills and may also bring the specialists into the office environment.
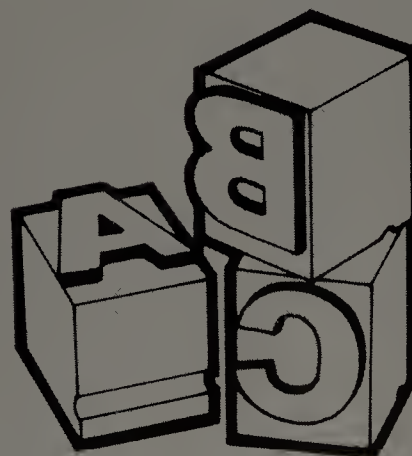
Typography

6.

The Art of Typography

Art goes beyond the object that expresses it. Art is often defined as excellence; it is the natural expression of beauty. The art of typography usually involves the use of a machine or a number of machines. A machine cannot produce art; art depends on the way in which the machine is used.

The imitative and deceptive sense of art—for example, the fact that the written word imitates the spoken word—is necessary: graphic communication must take a different form from audible communication. Graphic communication is an art in itself that expresses an idea. As a form of expression for communication, however, graphics has its counterpart in visual symbol, such as the use of punctuation to indicate rhythm and pace. Though the symbol is used in a different way, the end purpose must remain the same: graphic image or symbol is used to express the full range of contrast, color, movement, and like qualities to achieve communication.

The art of typography is produced with a machine, unlike calligraphy, where the symbols are produced by hand. The craft is different, but many of the values and decisions are the same. The relationship exists because typographical symbols and systems derive from calligraphy. The purpose of each is the same: it displays, embellishes, emphasizes, decorates, tones, and expands the message within the structure of the written-language system. The mechanization of typography extends its use to composition; the automation of word processing extends its use one more step. With automation and the improvements in composition machines the plasticity of design becomes freer, and the art of typography draws closer to the human skill required by calligraphy.

Craft is the skill required to produce the intended result. The graphic industry traditionally distinguishes between graphic crafts and graphic arts. Graphic art is the delineation, the design; graphic craft is the object, the production. Hence, as applied to type composition, typography relates to art and design, while typesetting relates to the production process. As tradition has it, a typesetter becomes a typographer with experience and skill. This view conforms to the primary definition of art as skill in performance acquired by experience or study. Therefore art is defined as excellence.

ABCDEFGHIJKLMNOPQRSTUV WXYZ 1234567890

abcdefghijklmnopqrstuv wxyz ?!""$& 1234567890

ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz :;?!$& 1234567890

6-1. Roman, Uncial, and Old English are three distinct letterforms mentioned in the text. Letters representing roman are actually a design known as Hadriano Stone Cut, which is patterned on a much admired example of roman letterform. Each form reflects the influence of tools and craft practices.

Excellence in typography, along with the skills required to operate the machines and to deal with the systems, is measured against the purpose, which is communication. A purely practical view of how typography achieves its purpose of communication dissolves much of the ambiguity of aesthetic abstraction. The qualities of excellence that produce art are easily seen in the typographic product. Anyone who can read can relate to the communication and immediately respond to its excellence or lack of it, to its artistry or lack of it. Greater understanding enhances the appreciation and perception of art and the nuances encompassed by typography.

History

An important factor often overlooked in historical discussion is the point of view. Depending on the point of view, different import will be attached to the significance of an event. A historical view is helpful in understanding the development of typography for word processing. Where did alphanumerics come from? How did typography arise? Each question provides a point of view in which certain events become relevant to the answer.

Typography concerns the origin and design of symbols in order to know how to work with them in the graphic design of a composition. The development of technique is also important, since the craft is influenced by technology, and the development of technology is significant to form and design. Because typography functions as a medium for communication, it is necessarily entwined with social and cultural development; for, as the tools shape the product, so attitudes and thoughts shape the tools. Such an investigation is extensive, so this abbreviated discussion is concerned only with historical events as they orient us to the structure of the forms we are working with.

It is believed that the idea for our alphabet developed from pictographs—Egyptian hieroglyphics (4000 B.C.) were derived from pictographs. The symbol of an object, the hieroglyph, became associated with the sound of the word. As this sound-symbol relationship developed, so did the alphabet.

The symbols were gradually simplified and were used by priests about 2500 B.C. in what is known as hieratic writing. The Phoenicians developed the phonetic alphabet as we know it today, with a single symbol standing for a single sound, by about 1000 B.C. The Greeks used and developed the Phoenician alphabet. As time passed, the characters were altered: vowels were added, and the alphabet was designed to read from left to right instead of from right to left. In working with a wax tablet, as the Greeks did, it is logical for a right-handed writer not to place the hand over the written character. The Romans adopted the Greek alphabet, and by the early Christian era it began to resemble the form we use today.

The Roman lapidary capitals inscribed in stone are much admired. The Roman letters contained finishing cuts, or serifs, at the ends of the letterforms. The work of early scribes reproduces the Roman characters in manuscripts, but by the 400s their character was changing to facilitate use of reed and quill pens and to speed and ease copying. Rustic or simplified forms were used in contrast to the chiseled Roman letters. The unical letterform can be seen as a simplification of the Roman capital.

It is thought that lowercase letterforms developed from business records; by the early 700s the Anglo-Saxon roundhand emerged in secular writings. These letterforms also found their way into church manuscripts. In 789 Charlemagne, King of the Franks, decreed the use of a standardized copying style. The design was developed at the Carolingian abbey of St. Martin at Tours and became known as Carolingian minuscule; it used both capital and lowercase forms, known as majuscules and minuscules, respectively.

By the 1100s the Carolingian manuscript hand had been adopted in other parts of Europe, and regional modifications developed. In Germany the Gothic character was heavier, more angular, and more condensed, perhaps to utilize a given space more efficiently. The style became important because it served as the model for the first movable printing type. Today this letterform style is known as Old English.

Johann Gutenberg is generally credited with the invention of movable type for printing; his famous Bible appeared around 1450. Later discoveries give reason to believe that Laurens Coster of Holland printed with movable type before Gutenberg.

6-2. These designs are considered major developments in type letterform. They depart from the scribe's letterform and flow more directly from the roman precedent. Smaller changes mark a century of development as compared to calligraphy. Clarendon, developed in the mid-1800s, is similar to Egyptian except for the rounded fillets at the serifs and had a revival in the 1900s. It has been said that the possible variations of letterforms were completed with Bodoni. But linecaster mechanization was yet to come at the end of the 1800s. Further developments of phototypesetting, word processing, and printing tend to influence the concept of letterform and provide the basis for continued variations.

As so often happens, it is more than slightly possible that other people had the same idea. The work of Gutenberg at Mainz, Germany had further import, however, in that printers from Mainz went to Subiaco, Italy and cut type in the Roman letterform. Nicolas Jenson, an engraver at Tours, was sent to Mainz by King Charles VII. He later went to Venice, Italy, where his engraver's skill was applied to type design. His typeface design can be seen today as Cloister Old Style.

Other scholars and artists were attracted to book design and printing. By 1550 there were type designs for capitals, lowercase, italics, and small capitals. The letterform first taken from a variation of the Carolingian manuscript, the Gothic letter, was given a more even weight by Jenson and developed further with Garamond's thick and thin strokes and crisp serifs. By the 1700s Caslon designed type for greater readability. Baskerville presented the so-called modern-style type design with symmetrical mechanical serifs; serifs are a result of the use of the quill pen. Type cuts had no mechanical need for serifs other than to identify the letterform. In Giambattista Bodoni's design, introduced in 1788, serifs were just thin lines. William Caslon IV designed a typeface called "sans syruphs," which had no serifs at all. This "sans syruph" design soon came to be called "grotesque" because of its strange appearance, which indicates how firmly established was the concept of the "correct" letterform.

Through the 1800s type design expanded with the expansion of printing and industrialization. It now sought to be different to stand out, to suit advertising purposes. Played against the established letterform were all kinds of distortions: heavier, lighter, emblazoned, decorated, shadowed. But these letterforms were primarily distorted from an established norm to gain attention, leading to the distinction between display type for advertising and book type for reading. Significant in this development are combined design forms, exhibiting the single weight of grotesque and the straight-line serifs of Bodoni, such as Egyptian. Popular writing instruments such as steel pen and pencil yielded a line of singular thickness that may have accustomed the eye to the single-weight design of letterforms with slab serifs.

This letterform provided the basis for typewriter type. It had the readability and the mechanical functionality to justify the character space for each letter to one unit of width, to produce a readable image by impact, and to maintain readability on carbon copies. The typewriter, first invented in the early 1700s, was becoming more popular in the late 1800s and early 1900s. Pica type, so close to the Egyptian design, became the standard and remains so today.

With the turn of the century came an art revolution: the traditions of art were being overturned by the Impressionists, the Fauvists, and the Cubists. The German Bauhaus school fused industrial society and art: form follows function. On this basis the architecture of the practical was to overtake the traditional. As it moved from Germany to the United States, the Bauhaus, which literally means "all

JENSON – 1400s   GARAMOND – 1500s   CASLON – 1600s   BODONI – 1700s   CLARENDON – 1800s   FUTURA – 1900s

under one roof," included nations, art, architecture, and type design. The grotesque sans-serif type design became the focus. The Berthold foundry design called Akzidenz Grotesk, first cut in 1898, was imported to the United States and became the standard for newspaper headlines because of its readability; in the U.S. it became known as Standard. Futura followed; it was much used by the Bauhaus. The Swiss designs of Helvetica and Univers came later.

Egyptian

Typewriter

6-3. Egyptian and typewriter type show many similarities. This example of typewriter type is actually a phototypesetting typeface that exhibits better spacing than the typewriter could produce. With many special names applied to typewriter typeface designs, the most popular exhibit the square serifs shown here and the extension of these serifs on the i and l to fill the single space unit common to all letters.

Standard Bold Condensed

Futura Medium

Helvetica Medium

Univers 57

With the development of sans-serif styles came the concept of a family of type, designed in different weights, some for display, some for text readability, spanning the range of type use. Univers was conceived in an extended range of weights and widths that provided a letterform for every use, with a choice of 1440 different characters in a font size. Does this sound like mass production with options? It certainly presents a type design that allows mechanized selection of form to suit the need for design effect. But techniques of printing also changed, and for purity of design and readability Helvetica, a somewhat rounded design, survived the changes and has become the single most popular typeface.

It can be argued that the reason for Helvetica's popularity is its utility. The open letter survives photographic processes and poor reproduction and is readable on a television screen and slide projection, even in smaller than normal sizes, due to its large body size. The frequent use of small blocks of copy in relation to a picture, where readability is of primary importance, relegates the decorative or connotative use of letterform to a secondary role. In such usage, if the type-family design of Helvetica connotes anything, it connotes utility and a bland affinity to things mechanical; the design does not call attention to itself but blends into the mechanistic environment.

In this historical overview of the letterform it is easy to see the influence of technology upon the design of the symbol; for, while letter design is immediately imitative of the previous method, as it must be to function as a readable symbol, the logic of the technology eventually asserts itself in the form of the design. Reed- and quill-pen strokes

6-4. Common versions of the familiar typefaces noted in the text are shown here. Each design is presented in a variety of configurations known as a type family.

dominated the letterform after the development of the phonetic alphabet. If the wax-tablet writing of the Greeks made the letterform into a single-width incised stroke, the Roman design followed the chisel point, swelling and thinning into a form that became the model for parchment manuscripts. The technology of craftwork, owing to human nature, rusticated and eventually compounded the design that was patterned by cut type. The inflexibility of punch-cut type design, compared to the possible variations of calligraphy, further compounded type design with variation of size and letterform. With assimilation and standardization of concept and refinements in mechanical technology, design in the 1800s exploded into variations subject only to the limits imposed by technology.

Increasing mechanization of craft methods imposed stricter limits, such as the need for the letter design of a typewriter to conform to an equal unit of space. Again to achieve flexibility, the concept of letterform was extended to type families with a range of configurations. If the letterform initially provides only capital letters, as did the first Roman lapidary capitals, the early typewriters, teletype, and early automated computer printout, this simplification is immediately expanded to gain flexibility for finer and more precise expression of communication. The present use of computerized phototypesetting provides fewer mechanical restrictions than before and allows for variations in space, weight, and size; and the third-generation, electronically manipulated grid of the CRT phototypesetter expands this manipulation to the design image itself so that automated mechanization approaches the flexibility of pure calligraphy. Perhaps because of this or because of the prevalence of the graphic communication of the written word, letterform design exploded into a variety in the late 1900s that had not been equalled in the eclecticism of the late 1800s.

It can be concluded that letterform design is in transition in response to communication needs. We have not yet seen the influence of word processing. Typography today can be seen as expansively individualized and more widely utilized than ever before. The inference is that the art of typography is alive and well.

Typography and the Typographist

The increasing development of word processing and the refinements of mechanization due to automation expand the use of typography to in-house graphics in addition to professional typographers.

The systematization and automation of the office environment and the use of word-processing machines, which divide office work flow into administrative and editorial functions, produce a role for the in-office editorial specialist. This specialist function is not that of the typographer; and, with typesetting involved to an increasing extent, it is not that of the typist. The term "typographist" has been suggested to straddle these positions. The work is more than typing and less than typography in the context of the many skills and crafts included in the traditional concept of typesetting. But the typographist does set type.
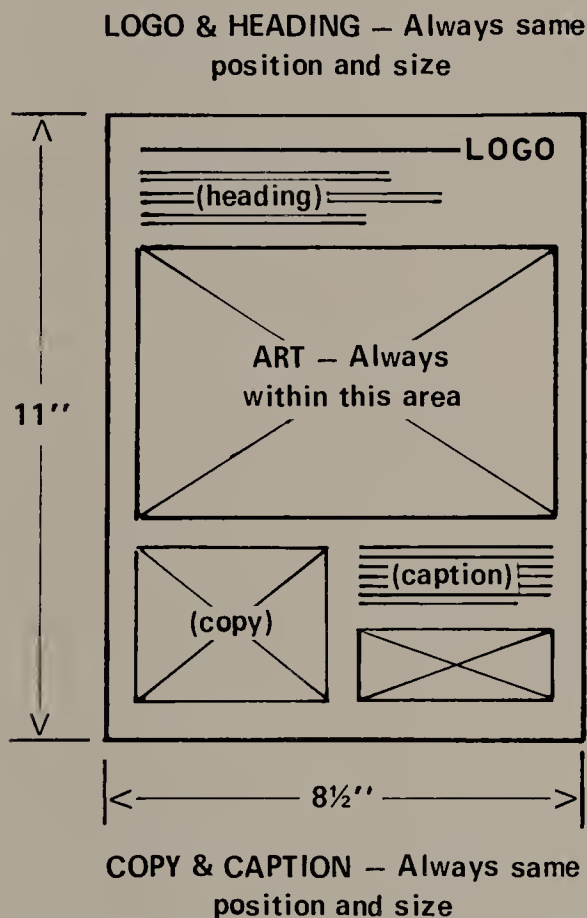
The difference, of course, derives from the fact that automation can provide front-end control of a number of functions. That these functions of the traditional typesetter are no longer a craft but are automated allows the skills of the typist to be directed to the function of typesetting. The typographist, through the use of automation to provide typesetting formats, can produce typesetting. Formats are necessarily simpler than the full range that typographic design can provide.

The extent to which formats are used is governed by the skill of the user and the technology of the machine. Format typesetting produced by automation can be circumvented to the extent that the automation is overridden and an operator decision is made in lieu of an automated function. Such technology is used in specialized typesetting, and the simpler operation of a word-processing machine actually involves more complex automation. The use of word processing, then, immediately involves the use of typesetting, and the typographist can be seen in the traditional role of the typesetter, whose product becomes typography through the application of design. The design of the automation system and the range of typographic options provided by the technology of the machine have a decided bearing on the product: they in effect design the typography through format control. The range of choice is expanded from the selection of a type font

for a typewriter to the selection of a format for typographic design. The interaction of system design, machine capability, and selection has its effect on the art of typography.

FORMAT

LOGO & HEADING — Always same position and size

ART — Always within this area

11″

LOGO

(heading)

(copy)

(caption)

8½″

COPY & CAPTION — Always same position and size

The proportions of this extension can be seen through a statistical comparison of approximately 50 thousand graphic-arts specialist firms that set type with typographic equipment with the 13 million businesses that could do typesetting in-house with word processing equipment and a typographist.

The concept employed by the typographer and the typographist is similar, differing only in degree of specialization and range of choices and skills. It is not surprising, when this similarity is seen, that, with a sufficient volume of communication, many businesses support their own typesetting operations and specialist graphic-communications departments. Larger businesses with a network of computerized communications find it necessary to hire an information-management executive to control costs and to direct, organize, and integrate communications. The typographist is the bridging skill, as business communications and office practices are automated through the use of word processing.

6-5. Formats are made up in a great variety of ways: the element of format is the rule of repetition and consequent sameness of repeated variations of the design. The format provides rules for the design-making process. This example might be typical of a catalog sheet or brochure. The subject material is slotted into the space provided, and type designs and sizes are always the same. The format design, in order to work, must be flexible enough to accept some variation in the nature and length of the subject material while at the same time presenting a pleasing appearance.

7.

The Word

The word is the basic unit of written communication; it stands for a thing or idea. Though the phonetic alphabet symbols are used to build the word, the word is the more inclusive, as it can stand for an abstract idea that cannot be pictured.

The graphic representation of the word in alphabet symbols stands for the spoken word; and, because most of us are taught to read and write from the oral standpoint, the written word is the surrogate of the spoken. This viewpoint tends to inhibit typography; if the written word were considered equal but different, typography could be more expressive and the visual effect would not be limited to the imitation of sound.

Word processing is a way of assembling the phonetic alphabet symbols into words. Choosing from thousands of alphabet letter designs to create a graphic representation is typesetting. The choice and use of different designs and sizes contribute to the meaning. The typographic word is a design consisting of the image and the space around the image, for the spaces around and between the letters also contribute to the meaning.

Our system of written communication is dependent on spacing and sequence, which become part of typographic composition. We assume the sequence of letters and the graphic rule of reading from left to right for English and other western languages. This rule can be broken only if the sequence is maintained in some other way, such as

7-1. Scrambled letters may be effective for a one-word poster: most of us can unscramble the word EXHIBITION to understand its meaning. If so, the design is interesting and lends a level of graphic impact as well as a symbolic use of letterform. But the puzzle should never be so difficult as to defeat the purpose of communication.

by reading from top to bottom: the use of typography must always work in terms of the necessary letter-symbol sequence for meaning. Though letters may be stacked, tangled, and overlapped and some typographic designs do this for effect, their sequence must be understood for the word to have meaning; because, as there is a "correct" letterform for designs to play with, so there is a "correct" spelling of a word to provide meaning.

There is great latitude in the use of letter symbols. Because we have a mindset of what is "correct," typography can add differences that give meaning to the design in addition to the word meaning. In contrast to our mindset a graphic image may have such connotations as heavy or light, brash or reserved, informal or dignified, or other qualities according to the design.

```
abcdefghijklmnopqrstuvwxyz
 abcdefghijklmnopqrstuvwxy
  abcdefghijklmnopqrstuvwx
   abcdefghijklmnopqrstuvw
    abcdefghijklmnopqrstuv
     abcdefghijklmnopqrstu
      abcdefghijklmnopqrst
       abcdefghijklmnopqrs
        abcdefghijklmnopqr
         abcdefghijklmnopq
          abcdefghijklmnop
           abcdefghijklmno
            abcdefghijklmn
             abcdefghijklm
              abcdefghijkl
               abcdefghijk
                abcdefghij
                 abcdefghi
                  abcdefgh
                   abcdefg
                    abcdef
                     abcde
                      abcd
                       abc
                        ab
                         a
```

Symbols and Pictures

The symbols used by typography, as we know, came from pictures of things. These symbols combined with the spoken word to make a word image. The word image is taught as a visual symbol and associated with an image of the thing it stands for: this visual association was thought to synchronize the visual act of reading with the meaning of the words. The difficulty with this view is that the word has its origin in its sound in our learning experience; we learn to speak by imitating what we hear. The letter image of a word is therefore a symbolic abstraction.

The graphic letter symbols used for the word are now abstract; and, while the act of reading them is a visual experience, it is also abstract. Typography deals with this abstraction in terms of the quality attached to it. We must always translate the symbolic meaning, with the meaning shaded by use of symbol. The graphic image of an object, on the other hand, is direct, as can be observed from the fact that it can be read and understood in any language and its meaning is conveyed without the use of symbolic language. Typography deals with the meaning of language by relating the quality of the idea with the quality of the design of the letter symbols. The present convention of identifying a company by using both letter and picture symbols in its logo to present the same idea is a development of this.

The "correct" use of typography is in accordance with the system of language, where words stand for abstract ideas. There is, however, some variation due to the fact that written and spoken language are quite different. The sounds and gesticulations that make a meaning clear when spoken have to be handled differently in graphic form to give the same meaning. The greater the freedom in use of visual symbol for language and the greater the choices in relation to the system of language, the easier it is to express meaning.

7-2. *Disappearing Alphabet* is the title. As an oft-seen child's play on the typewriter, like the predecessors of Dada art, the poetry lies in clever conception rather than execution. Claus Bremer had the wit to put it in the context of poetry, where it borrows all kinds of associated meanings. It especially demonstrates the conceptual difference between metal typesetting and word processing with phototypesetting.

It is often necessary to underline a word in written communication to make a point or to clarify a meaning. The typewriter can underscore a word if capital letters are not strong enough; typography can italicize the word or set it in boldface type. A special spacing or size can also be used, though this tends to disrupt the convention of systematic spacing. With so much typographic power, a temporary emphasis in the visual sequence of reading can disrupt the flow completely.

Typographic symbols are used in relation to the conventions of the language system. An extraordinary use would appropriately be reserved for an extraordinary application. In this sense typography is both point and counterpoint: the point is the convention; the counterpoint is the degree of divergence allowable. For word processing we would need to add to this the capacity of machine and automation to express variation.

Letterspacing

The sequence of letters used to build words is usually an evenly spaced fabric. If there is a variation, with letters suddenly s p a c e d   o u t, it interrupts the flow of the reading. In the established conventional system the spaces between letters are equalized and maintained in subsequent words. This would be easy to do if all letters had the same shape; it is necessary to equalize different shapes of space between different varieties of letterform in order to gain the regularity that provides for easiest reading.

The typewriter has the simplest system of letterspace: one equal unit for each letter. The problem with this, of course, is that the letter i doesn't need the same amount of space as the letter M. With one equal unit of space some combinations of letters are crowded and some are open. To compensate, the letterform can be redesigned and distorted to fit the width. The success of the distortion depends on the letterform; one can immediately see that the square serifs of Egyptian type lend themselves to a more effective compromise in that the serif on the i and other narrow letterforms is extended to fill the unit of space. This and the mechanical uniformity of thickness undoubtedly account for the popularity of pica type.

To arrive at a better fit or a better letterform requires variations in which each letter is given the space it needs. Thinking about letterspacing in terms of the typewriter draws us away from the ideal of beauty and spacing established by the classical letterform. The restrictions of mechanics and materials introduce another element, that of compromise with the excellence of beauty and epitome of utility. Perhaps there can be craft and skill in reconciling conflicting factors in the execution of a particular work.

As typography was first produced, letterform was established when it was cut. The appearance of uniform space obtained as each letterform fit snugly alongside the one next to it. Word processing and computerized typography treat letterform as an image structured to fit the grid of a mechanical system. This approach makes a comparison of typography and the typewriter more appropriate because all systems of computer-aided typography work from the image space and not from the actual form of a physical object. One can easily visualize this difference by considering that it is possible to strike one letter over another on the typewriter but impossible to place one molded letter inside the other. The use of the photographic medium for typesetting also allows the physical space to be occupied by more than one letterform.

The letterspacing system is different for typesetting than for typewriting. While they both have a mechanical system, typesetting uses finer divisions of space to improve letterform design and spacing. The space used by the mechanical grid is based on the letter M, the widest letterform in the classical alphabet. As with traditional typesetting, phototypesetting divides the grid into units of space: the letter M, the largest unit, is called an em quad; the en quad is half the em quad. The number of units the M or em quad is divided into provides the mechanics of the grid system. These unit divisions of the M are also used on some typewriters and composers: the single unit common to most typewriters is expanded to five divisions on the IBM Executive Typewriter, to nine on the IBM composer, and to eighteen, thirty-two, or more units on phototypesetting machines.

The increase of unit divisions of the em allows **45**

increasingly finer interpretations of the letterform and also of the space around each letterform. The unit divisions relative to the em size are maintained regardless of the size of the type. With smaller sizes of type a thirty-two-unit division of em space is very fine indeed, yet it is possible for the unaided eye to see differences of spacing easily in reader-size type fonts. The eye is so sensitive to spacing that differences as small as one-hundredth inch are readily apparent, and typographers speak of the control of letterspacing as colorspacing, with close spacing appearing darker and wider spacing appearing lighter.

For word processing and phototypesetting systems the computer controls the assigned space of each letter by calculating the assigned unit value of

TRADITIONAL EM DIVISION

Foundry Letter EM

EM QUAD

EN QUAD

7-3. The em quad is a unit of space that varies with the size of type. The classic M would fit inside the space, and it is shown here only as a comparison with the space occupied. The foundry letter M shown alongside makes it clear why metal letters cannot be placed on top of one another.

UNIT LETTER SPACE

LETTER SPACING Letter Spacing
LETTER SPACING Letter Spacing
LETTER SPACING Letter Spacing   **normal**
LETTER SPACING Letter Spacing

7-4. Systems of typesetting that produce only the image and maintain position relative to unit space can arbitrarily be closed up or expanded by subtracting from or adding to the normal space units. The change of spacing also affects the color of the type.

the letter as it is printed. The unit value of the printed letter is added to the adjacent letter, and the mechanism assumes the position for the next letter by moving the required number of units. The unit value of the space system is a mathematical addition for the computer, and the space is maintained as a mathematical calculation. These calculations are produced with the speed of electricity, which means that the spacing is controlled seemingly instantaneously. The more mechanization, the slower the response, for mechanical tools are inherently slower than electronics. When the input is handled on the CRT display tube, a number of other computing functions are also handled at the same time.

With traditional typesetting the color of type space was controlled primarily by adding space between letters, since fitting them into one another required cutting. The largest open space between letters was the basic space, and all the other letters were spaced to match this color. Bringing two letters closer together to make a ligature of connected letters or to reduce space was called kerning. Kerning with phototypesetting involves subtracting units of em width from the grid to bring the letters into a tighter space. Subtracting for the computer is as easy as adding, and most phototypesetting systems permit kerning. Adding and subtracting from the letter grid adds or decreases space, respectively, and some phototypesetting systems provide for this kind of programming.

Text is usually set with a uniform module of space, while finer spacing control is reserved for heading treatment. Certain combinations of letters inevitably produce a problem in respect of openness; letter combinations such as "AWAY" appear very open when compared to others that have verticals next to each other. For fine spacing control traditional typesetting would add space between the other letters in a heading so that they corresponded to the openness of the letters "AWAY." Phototypesetting can kern the letters to bring their colorspacing into agreement with the normal space. It can also alter the normal space relationship for effect; the letterform space can be reduced to the point where letters touch each other if desirable. The most desirable space effect usually requires both addition and subtraction, and the space is "massaged" by

computer to obtain the optimum. A word such as "AIRWAY" has both open and close letter combinations; space can be taken out and added to produce pleasing spacing.

The control of letterspacing is dependent upon what is possible with the grid system and program capabilities of the machine. As one moves from the unit control of the typewriter toward the finer control of a phototypesetting system, the options are increased, and the keyboard reflects this with various controls. A number of typesetting systems provide a programming capacity in which the calculations of unit space for certain awkward combinations of letters can be kerned as these combinations of letters appear. Once programmed, the computer handles this automatically, and the program would apply equally to text and to headings. Because of these features one can see that various typesetting systems are not interchangeable, as each produces different spacing and provides different letterform. The more expensive systems produce very fine letterspacing and operate at very high speed.

Typesetting requires letterspacing to reflect the artistry of typography, especially in the larger type sizes used for headings. It must also include individualized wordspacing, margin justification, linespacing, and copyfitting. The word itself is composed into the sentence, which represents a complete thought; typography next deals with the line formed by successive words.

KERNING

AWAY   0 Units

AWAY   Kern 2 Units

AWAY   Kern 4 Units

7-5. Reducing space between letters is called kerning, after the cutting off of metal on foundry type. Certain combinations of letters, when set with normal spacing, appear too open, and normal regularity is achieved by kerning.

LETTER SPACING

Spaced

AIRWAYS

Closed-up
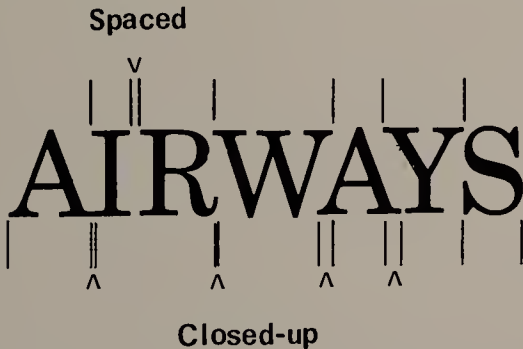
7-6. Both addition and subtraction of space are needed to make this word appear evenly spaced: addition between vertical forms and subtraction between angled forms is indicated above and below the word, respectively.

DISTRIBUTION OF LETTERS FOR IBM PRESS ROMAN (9 unit)

3 units	4 units	5 units	6 units	7 units	8 units	9 units
i	f	a	b P	B	w V	m
j	r	c	d S	C	A X	M
l	s	e	h *	E	D Y	W
.	t	g	k †	F	G &	
,	I	v	n $	L	H %	
;	:	z	o +	T	K @	
,	)	J	p =	Z	N —	
'	(	?	q]		O ¾	
-	!	]	u		Q ½	
	/		x		R ¼	
			y		U	
			All numbers			

7-7. The units of space occupied by alphabet symbols are shown for the nine-unit system of the IBM composer. (Courtesy of IBM.) Systems with the more common eighteen-unit division used by phototypesetting will have a different distribution and consequently a different letter formation.

8.

The Line

After letters and letterspacing produce the word, words and wordspacing produce the line, the next logical step in producing typography. Line length is one of the first decisions to be made; it relates to other factors in composition, which in turn relate to the starting point of typeface and letterform.

In comparing typewriting to typesetting, in the former the line usually runs the full width of the sheet, while typeset lines are shorter. This is due in part to the mechanical operation of the typewriter. The typist in making a decision about line length will choose a width that is greater or lesser according to the amount of information and the number of lines that are estimated to be required. However, this length of line is somewhat long in relation to the ideal of what is easiest for reading. As a general guide, a line length of about forty characters is most readable. Extensive studies have provided this generalization, but it is fairly obvious and easy enough for anyone to confirm. This general guide is affected by every other spacing factor in composition, but consider the extremes.

Consider a contract in which the lines run to more than one hundred characters; have you ever seen a lawyer trying to read such a contract and using a blank piece of paper to cover the line below the one being read to find the beginning of the next line when the eye must return to the left-hand margin? If there are other factors such as small type printed in light-colored ink, one could gain the impression that the contract was intentionally difficult to read. And consider the other extreme: a newspaper column with an eighteen-character line, where it is difficult to keep continuity to the end of a sentence. With other factors, such as neighboring advertising, one could again gain the impression that the typesetting just filled space. In comparison to both these examples, consider that broadcast manuscripts are commonly typed to about forty-five character lines for greatest readability.

In ordinary typewriter use the left-hand margin is maintained, while the line-ending, right-hand margin is ragged. Typesetting very often justifies all the lines to an equal length. This makes both a left- and a right-hand margin, presents a cleaner, more attractive appearance, and uses the space more efficiently. In order to make every line the same length, the spaces between words are adjusted

and long words falling at the end of the line are hyphenated. Word breaks may also be used in normal typing procedure to keep a line from running too long, but line justification is seldom practiced. The typewriter can be used to produce justified material, but it requires two typings: the first typing places the words, determines the word breaks, and counts the line; the second typing places the characters and words in their justified position.

Mechanically operated composers, such as the Varityper, work on a similar basis, with one typing for the mechanically operated counter and with the operator making the line-ending decision and a second runthrough to place the characters. A mechanical system, such as a Linotype, needs a line-ending decision but only one runthrough, since the physical space occupied by the letter matrices can be adjusted before the line is formed.

Word processing and computer-assisted composers record the first runthrough and use the recording for the output. Depending on the type of machine, the keystroke record may be duplicated or massaged to any desired line length and the line spaced by the computer for output. Some computer-assisted composition systems permit operator line-ending decisions; others are programmed to automate this function and permit the operator to build up speed by treating the manuscript as one long line of copy. The computer program then breaks the line according to the format instructions that it is given.

The decision-making process is critical to good appearance. Whether decisions are operator decisions or are automated decisions has a bearing on the quality of work. It is very difficult or next to impossible for a computer program to handle word meanings; with so many nuances in words the list of possibilities, particularly with hyphenation, is too endless to program.

There is a contest of values, then, between art and the machine as to how typography will be done. Obviously, art is best achieved with the infinitely varying choices of human decision. The machine, multiplying, speeding, and reducing human effort for a lower cost, requires format consistency. In this contest the expert typographer must find the varying balance to suit the need as to

how and how much the machine is used. The microcosm of line-length determination by wordspacing and hyphenation symbolizes the macrocosm of the machine and the system developed around its use. In commercial applications it is not possible nor desirable to return to craft methods, nor is it desirable to slavishly accept what the system and the machine provide. The alternative is to learn to use the system and the machine in the best way.

Art and the Machine

Use of the machine to produce art presents a classic confrontation of values, that between stereotyping and duplicating and infinite variation. The art of machine typography must reconcile this opposition, and it does this by making many decisions as to how the systematic functions of the machine will be applied. Because these decisions involve subjective evaluation and artistic taste, they cannot be automated. The use of automation, or for that matter any mechanized system, involves a perception of its function in terms of all anticipated possibilities; and, to be workable, the system must include all possibilities. But this is not how we handle communication.

We rather devise a system for each specific communication and select particular machine functions that best achieve the desired result. It is a peculiar-

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UNIT WORD SPACE

WORD SPACING Word Spacing
WORD SPACING Word Spacing　　　　　　**normal**
WORD SPACING Word Spacing
WORD SPACING Word Spacing

8-1. The space between words should be large enough to comfortably separate them but not so large as to let the line fall apart. This allows some variation from the normal ideal, as words are spaced further apart to equalize the length of all the lines in a block of copy. The lines are said to be justified when space is added between words to equalize the line length. The alternative to justified typesetting is to bring all lines flush to the left-hand margin and to leave the right side ragged or to the right-hand margin with the left side ragged. Special cases, such as a menu, may center the lines, and again the lines may be placed randomly, as with some poetry. There are five possible configurations.

ity of communication that, if certain symbols are used consistently, they become recognizable. This is the difficulty in reading handwriting: if the symbols were consistently drawn, in spite of variations from the norm, they would be understandable. It is the inconsistencies that make handwriting unintelligible. We can continue this line of reasoning in regard to other elements used in typesetting, when the symbols are considered in relation to their purpose.

By shifting our attention from art and the machine to communication, we have a platform upon which to reconcile the apparent conflict of value between art and the machine. We also have applied art in linking art to communication values. But communication is highly subjective, and in reality it is also an art form unto itself: many will argue that art is communication in the subjective sense. Without getting into the pros and cons of this argument, we can immediately see from this view of art that the use of typography relates to the art of communication and its subjective values. This, then, introduces a set of subjective values to the context in which typesetting is done and to the way in which the symbols are presented and handled.

We apply, engineer, and invent art values for use with the machine within the context of our need for communication. To make these applications, we must know the limits of the machine system we are using in order to gauge the manner in which we shall use it. This is the purpose of gaining command of typesetting systems. By means of these systems—systems of spacing, for example—though they are limited and only somewhat flexible, we find ways to use them in an infinitely more flexible way. In the communication art guides the machine.

8-2. This example shows how line justification is done: the slashes count the number of spaces needed to fill the line. The second typing distributes these spaces between the words. Typesetting permits the distribution between each word to be equalized, whereas typewriting continues until the spaces are no longer needed, which results in different spacing between words in the same line. The margins are visually dominant, however, so the wordspacing is less noticeable than the margins.

COUNT   1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 20 1 2 3 4 5 6 7 8 9 30 1 2 3 4 5 6 7 8 9 40 1 2 3 4 5

```
Word breaks may also be used in normal typing
procedure to keep a line from running too////
long, but line justification is seldom done./
The typewriter can be used to produce justi-/
fied material, but it requires two typings://
the first typing places the words, determines
the word breaks, and counts the line; the////
second typing places the characters and words
in their justified position.
```

```
Word breaks may also be used in normal typing
procedure  to  keep  a  line from running too
long, but  line justification is seldom done.
The  typewriter can be used to produce justi-
fied  material, but  it requires two typings:
the first typing places the words, determines
the  word  breaks, and  counts  the line; the
second typing places the characters and words
in their justified position.
```

Decisions as to wordspacing are made in relation to the line length chosen for the space. The evaluation of line length is made in relation to readability and efficient use of the space. Wordspacing is the device by which lines are justified into clean columns of type that make the printed page appear orderly and easy to read. The line-ending decision determines how much space will be put between words. The necessity of breaking words adds to the complexity of the decision and is further compounded by inconsistencies and irregularities of spelling and punctuation. Then there are the additional subtleties of changes in meaning when line breaks influence the phrasing. The fact that wordspacing is used to equalize line length and that the line length is used to design the page show the relationship between technique and result. By means of wordspacing the design is structured and the objective of communication is achieved.

Wordspacing

In relation to typesetting wordspacing has greater significance than mere spaces between words. Considered as a static unit, ideal wordspacing can be compared to ideal type color and letterspacing.

A general rule of thumb for wordspacing is to allow between one-third and one-half em. Marginally less space is needed for a shorter line than for a longer line to provide readability. The design and form of the typeface also have a bearing on the ideal.

Ideal spacing in typesetting is influenced by many factors and represents a balance among them. In effect, each application has its own ideal; choosing it brings into play the art of typography. Wordspacing is relative to line length, type design, and the configuration of the communication.

With unjustified lines, the configuration commonly found in typewritten material, wordspacing has a static quality. For the typewriter the unit of space is the same as that occupied by each letter, because the mechanics of the typewriter dictate this unit. The exception is the proportional spacing typewriter, which has a finer module of unit division and allows a selection of units for wordspacing. However, with the line configuration flush left to a margin and ragged right, the selected wordspacing is always the same.

8-3. A typewriter ad from the turn of the century touted Visible Writing, Perfect Alignment, Automatic Action, and Ease of Operation. All the parts were exposed. A couple of decades later all the parts are enclosed, but viewing them and their action is made possible by the glass windows inset in the sides of the machine. It is quite a contrast to the black box of word processing.

Computer-aided typesetting accomplishes word-spacing by adding the specified number of units; when the maximum line length is reached, the line is broken and a new line started. The computer works quickly enough to tally the line count with each word before it is output. This is the opposite of the usual typing practice, where a minimum line length is established with a warning bell and the line is broken after the first word ending. Typesetting provides columns that fit a predetermined width, as opposed to typewritten material, which varies in line length by the number of characters in the line-ending word.

When type is justified, line length is inflexible and wordspacing is influenced by the space following the line-ending word. It is a simple matter to add space between words until the line is justified, but too much space causes the line to fall apart. This effect is produced by the spatial relationship between wordspacing and linespacing: when the words are further apart than the apparent space between lines, the eye loses the continuity of the line. Consecutive lines with too much space between words produce vertical rivers of white space that break up the horizontal linear flow of typeset material.

Lines of sufficient length to contain a dozen or more words help ameliorate the difficulty by providing more spaces to distribute the justification space remaining after the line-ending word. Unfortunately, a line with a dozen spaces is too long; figured on an average of five characters per word, multiplied by the thirteen words needed to produce twelve spaces, plus the twelve spaces, the line contains seventy-seven characters. If the manuscript tends to longer rather than shorter words, as can be the case with some technical subjects or with some authors, the necessary line length could be ninety or one hundred characters.

To work within a manageable line length with justified lines often requires words to be broken at line endings. While an operator can make artistic line-ending decisions as to whether to wordspace or break a word and where to break the word, it is difficult to program a computer to perform this task. The computer can be given a minimum wordspace but not a maximum. The typesetting will use whatever wordspace is required to justify the line. For better control the computer can be given a minimum and a maximum wordspace. Starting with the minimum wordspace, when the space required to justify the line falls over the maximum, the computer must hyphenate the word break. There must then be a program for word breaks.

In order to break a word, the computer is given rules. The program will break at a prefix or a suffix, retotal, and justify; failing this, it will break at a double consonant and justify. These rules hold most of the time for English but not every time, so a basic hyphenation program will result in a certain percentage of errors. The shorter the lines and the longer the words, the greater the percentage of error, because both cases require more hyphenation.

To improve this percentage, the hyphenation

WORD SPACING

This is a sample of bad word spac-ing. The words are too far apart. The lines are too close. The effect is to produce rivers of white space.

White Space Rivers

This is a sample of better word spacing, with two points of leading between the lines. The words become much easier to read. The lines are the preferred width for reading of one and a half alphabets. abcdefghijklmnopqrstuvwxyzabcdefghijklm

8-4. The contrast between too much wordspacing and the norm is seen here. The length of the lines is a factor and shorter lines are harder to justify, because they have fewer wordspaces in which to justify the line. The space between the words overpowers the space between the lines, and vertical rivers of white space appear in a block of text; the linear continuity is lost. The norm of linear continuity is better maintained in the copy block below, which ends on a line showing one and one-half alphabets, the preferred line length for text.

program can include an exception dictionary, a list of words that do not follow the rules given for hyphenation. The hyphenation program inspects the exception dictionary: if the word is found, the hyphenation is followed; if not, the rules are followed. The English language contains a great many exceptions; so, the larger the dictionary, the lower the error percentage. Technical material adds to the complexity. With an exception dictionary appropriate to the text material and a reasonable line length, it has been demonstrated that hyphenation program errors can be reduced to under one percent, which is probably as good as any typesetter can do. It is not as selectively artistic, however, since the parameters of aesthetic judgment are not included in an automated hyphenation program.

The elements of judgment for wordspacing, then, start with type design and extend through configuration to the nature of the text material in determining line length. For word processing used for typesetting the capacity of equipment programming is also a factor. Use of an inadequate exception dictionary or too narrow a line measure that provides too few wordspaces for the equipment should be avoided. Editorial standards for acceptable usage are also a factor, and what would be considered acceptable in newspaper typesetting might be undesirable for a more formal usage.

Newspaper word processing and automated typesetting can give an example of what happens in a narrow column when there is no maximum wordspace, with lines exceptionally loose because a word break could not be made. The maximum specification for wordspace is often left out because the machine would stop if the computer program could not solve the spacing problem. Since there is no one to edit the text, errors must be left until the proofreading stage, when a phrase can be transposed or a word added or deleted. For the finest typesetting there must be a certain amount of text management to provide for extremes, though a typographer can usually reconcile spacing by going back to the beginning of the paragraph and recasting the lines or by backing up a few lines.

Successive lines make up a paragraph, or group of related ideas that is distinguished within the flow of text. It is usually set off by altering the length of the first line. Following the use of wordspacing to complete the line, the paragraph is the next element of typesetting.

9.

The Paragraph

The paragraph is a distinct subdivision of text. From the typographic viewpoint it is a mark or stroke in the margin, and the Latin root of the word means "stroke." The paragraph mark delineates the subdivision of text. For typesetting an additional character such as ¶ or ℙ is required. With more modern typefaces this character is often omitted, since it is used mainly for formal typesetting. The more informal indent of the starting line is usually used to indicate the beginning of a paragraph. The white space of the indent acts as a starting point for the eye.

Another lesser used though not unpopular typographic paragraph indication is an additional linespace between paragraphs, in which case the indent may be omitted. The bullet (●), the ballot box (□), and the square (■) are also used at the beginning of the line to set off a paragraph. The hanging indent, in which the leading line starts farther into the margin, is rarer, because it requires more margin space.

It is not necessary to use more than one device to indicate paragraphs, though sometimes two are used for other reasons. One example may be the use of indentation as well as extra linespace in order to equalize columns of text in an area. Again, bullets may be used as well as indentation to set off related groups of paragraphs.

In all these cases it can be seen that the paragraph is indicated at its start, and its ending is left to fall on the line where it may. Logically, if a mark is used to indicate a paragraph instead of spacing, it is possible to fill every line and simply let the paragraph mark stand for the beginning and ending. While the paragraph mark is truly a special character, any special character, with repeated use as a paragraph break, can serve this function. Some more decorative typesetting uses ornaments instead of the actual paragraph character.

Publications have begun to make use of other special marks to guide the reader through interspersed advertising material. They may use conventional paragraph indents but also supply arrows or other symbols for continuation as well as ending insignia. The marks are decorative but also perform a useful function.

The first or beginning paragraph can also have a special treatment that leads the eye from the head-

ing to the start of the material. In the tradition of illuminated manuscripts the leading letter or initial is enlarged to fill two or three lines; or, if the design is appropriate, it stands above the line. Sometimes the initial is set in a contrasting typeface from that used for the text, and in some applications initials can be very decorative.

In special cases typographic designs are invented for a given application, but in every case

READER SERVICE
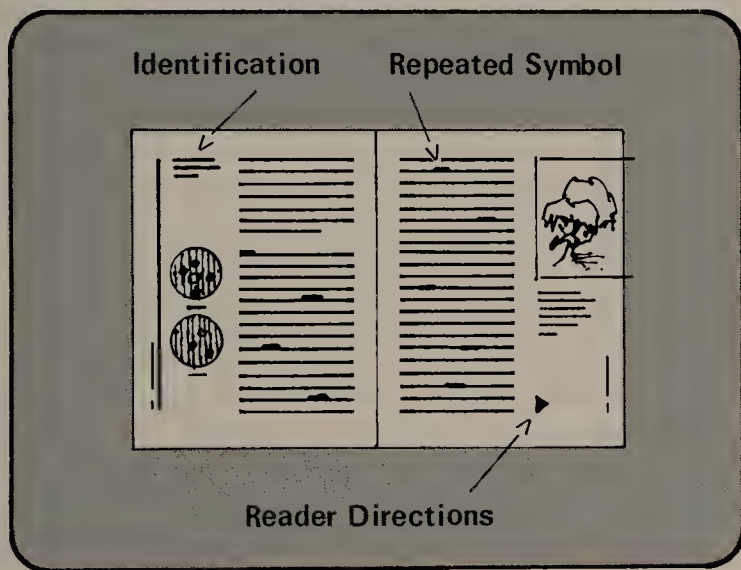
9-1. Periodicals use a variety of typographic symbols as a service to help guide the reader through editorial material interspersed with advertising. Most often an ending symbol is used, often unique to the publication, with continuation lines to begin the passage of editorial material. Repeated symbols or boldface lead-ins can be used instead of spacing to conserve space and yet maintain paragraph identity. Some phototypesetting fonts have "windows" into which the special sorts or symbols can be placed.

9-2. A typical steel rule used for designing typography has both picas and inches. Looking across the rule, one can see how closely six picas matches one inch. With the change to the metric system centimeters will replace the inch.

these designs must also be utilitarian—they must delineate the appropriate subdivisions and structure of the text. No matter how decorative the application, the essential purpose of typography is to serve the needs of communication.

Many varieties and forms of graphic structure can be used. The graphic structure, whether it features special characters or spacing, should strive to convey the text accurately. If the nature of the text is understood, symbols and spacing can be selected to perform their necessary function and also illuminate or enhance the meaning by harmonizing with the text.

Graphic Structure

Graphic structure refers to the arrangement of the text. While typography deals only with the way in which text is presented and not with the editorial content, the graphic structure deals with how the characters are placed rather than with the typographic symbols themselves.

In dealing with graphic space the typographer uses a pica rule, not inches or centimeters. There are almost exactly six picas to the inch, about two and one-half per centimeter. The pica is quite a fine unit of measurement, but for typographic work it is subdivided still more finely into points, with twelve points in each pica.

The typographer measures the width of a line in picas. Most machines used in typographic work use the printer's measure and are calibrated in picas and points to maintain consistency. This is especially important, since picas and inches do not exactly match. There are exceptions of course, when measurements are given in inches; the translation is made to the closest possible calibration.

The indents used to set apart a paragraph are calculated differently. The indent is scaled to the

type size and measured in em quads, which are related to type size. The indent most often used is one quad. An indent specification could conceivably be given in the unvarying point size, but the tradition stemming from use of the em-quad spacer in a stick of type has carried over to the machine.

It is interesting to observe that many of the measurement systems used in hand typography have been carried over into computer-operated typesetting systems even though there is no actual physical reason for their use. The consistency of new and old techniques does, however, permit mixing typesetting methods. In terms of graphic structure, such different frames of reference for each measurement may seem inconsistent and arbitrary. Width is measured in picas, paragraph breaks in quads, type size in points, and depth in lines. The truth is that the methods and terms have evolved with usage and have remained through tradition. It is only in the later context of computer-driven typesetting systems that the method of measurement can seem arbitrary, and this is because the reason for its development seems to be missing. For the present mix of typesetting processes it is almost a necessity to retain consistency. The relations between word processing and typography extend this theme.

The logic of the system of determining graphic structure is perhaps best seen through a specific application. The selection of typeface design, size, spacing, measure, indents, and depth flow in a natural sequence. One starts with the particular and works to the general pattern. The fact that each decision is taken in relation to all the other factors also bears on this pattern. To spell out a formula would belie the artistic judgment that is a fundamental ingredient. If one were to slavishly follow such a pattern, it could not account for the corrections and juggling of relationships that actually take place in practice.

Consider, for example, that the selection of type size in points affects the graphic structure and line count for a given space. This relates back to the choice of a typeface and the use and effect of space around the chosen design. Let us consider the use of linespace and in the sequence of elements complete the paragraph.

Linespacing

Linespacing is considered in relation to type design, letterspacing, line length, and point size. The point size is the minimum amount of linespace, the size at which any combination of characters will be separated from each other. Because photographic processes permit one character to be placed over another, it is possible to set type lines within each other at a minus spacing; with metal characters that occupy physical space this is impossible, even if it were actually desirable. The more usual choice is to add space between lines to strengthen the coherence of the linear graphic structure. A longer line tends to require more space; larger sizes of type correspondingly need more space between lines to preserve graphic proportions.

The normal reading type font is ten points. Smaller point sizes can be used to conserve space; larger, where there is ample space. Such a general axiom—that the ten-point size is the norm for the average reader—invites comparison, discussion, and even argument. The specific application for a particular type-font design will be open to different kinds of evaluation and opinion; judgments have to be modified in terms of how the size is used.

With this in mind, it is still very useful to start out from a particular ideal. It is consistent with the method of specifying typesetting in that it begins with the particular and provides a base from which to extend to the larger and more general design choices. It works from the internalized attitude of the "correct" character design to possible variations. The aesthetic ideal is in fact subjective and

UNIT LINE SPACE

LINE SPACING Line Spacing
LINE SPACING Line Spacing
LINE SPACING Line Spacing
LINE SPACING Line Spacing   **normal**
LINE SPACING Line Spacing

9-3. Normal linespacing allows room for the descenders below the base line of the capital letters: for example, ten points of space will accommodate a ten-point typeface. When more points of space are added, the type is said to be leaded (not spaced out) after the lead metal spacers used to add space between lines in traditional typesetting.

abstract, yet it simplifies the perception and evaluation of the many different sizes and designs of type. It can also account for the constant fluctuations and changes of fashion in the art of typography.

The simple truth is that the blackness of the printing ink and the whiteness of the paper, the ambient light and the contrast, make the type image easy or difficult to read. An eight-point type font, lightly inked, printed on off-white newsprint, and viewed without a reading light—say, on a moving bus—can be very difficult to read. With good lighting and excellent printing on a highly reflective, bright white paper, the same size can be comfortable to read.

To this mix of factors it should be added that the

COMPARATIVE SIZES

8 point Garamond

Printing Is a Craft Using Technical Skills and Moder n equipment. Without it much of the work of the civilized wo rld would be handicapped seriously. It offers a wealth of satis faction to craftsmen who develop an appreciation of its finer p oints. There are few trades or professions which give more opp

10 point Garamond

Printing Is a Craft Using Technical Skills and modern equipment. Without it much of the work of the civilized world would be handicapped seriously. It offers a wealth of satisfaction to craftsmen who develop an appreciation of its finer points. There are few trades or

12 point Garamond

Printing Is a Craft Using Technical Skills and modern equipment. Without it much of the work of the civilized world would be handicapped seriously. It offers a wealth of satisfaction to crafts men who develop an appreciation of its finer point

10 point Century Expanded

Printing Is a Craft Using Technical Skills and modern equipment. Without it much of the work of the civilized world would be handicappe

9-4. Type sizes appropriate to the paper and printing and also to the design of the type and typography are selected. Notice how different the ten-point size of Garamond and Century Expanded appears. Ten-point Century Expanded resembles twelve-point Garamond.

body size, defined as the lowercase x-height, varies for different type designs of identical point size. Thus a ten-point size in one design can look like a twelve-point size in another design. Other variables include line length, leading, or points of space between lines, heaviness, and eccentricity of a given design.

The typesetting novice is apt to find the complexity and ambiguity overwhelming. For this reason it is wise to adopt the apprentice method of using one excellent typeface design in a variety of conditions, then evaluating additional designs in terms of what one has learned. For instance, one can start with Garamond, which has a classic appearance and is very versatile. Another possible choice might be Helvetica or Univers. By comparing the differences among type designs one can more readily perceive the effect from different uses of space.

We may gather from the foregoing that there is no general rule for linespacing. This is true, yet a few guidelines have been implied. Certainly readability should be a prime consideration. More specifically, it has been suggested that more linespace is better than less, that it is usually desirable to add one or two points of space between lines.

As an example, one can observe that, if a ten-point font size exceeds a twenty-one-pica measure it will surely require two points of leading space between lines. The term "leading" derives from the lead blocks that were cut and fitted between each line in traditional typesetting; for computer-aided typesetting leading is the difference between the setting for linespace and the font size. A ten-point

LETTER SIZE

Em Quad
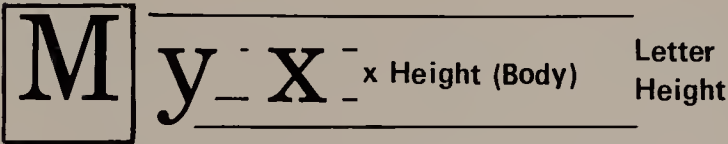
9-5. The x-height of letter designs varies, as does the size of ascenders and descenders, relative to the x-height. This makes a ten-point size of one design appear the same as a twelve-point version of another design. Longer ascenders and descenders provide the appearance of more linespace and also give the type a lighter feeling or color.

font with two points added for linespace is set on a twelve-point line and is called a ten/twelve setting— read as "ten on twelve."

COMPARATIVE LEADING

10 point Garamond

set solid

THE MAN WHO WOULD SUCCEED TODAY MUST BE ABLE TO USE HIS NATIVE TONGUE. IF HE CAN SPEAK OR WRITE SO THAT HIS WORDS will have upon those who listen or read the effect which he desires, he is master of one of the great sources of power. To realize this fact is to see that the art of expression is not

1 point leaded

THE MAN WHO WOULD SUCCEED TODAY MUST BE ABLE TO USE HIS NATIVE TONGUE. IF HE CAN SPEAK OR WRITE SO THAT HIS WORDS will have upon those who listen or read the effect which he desires, he is master of one of the great sources of power. To realize this fact is to see that the art of expression is not

2 point leaded

THE MAN WHO WOULD SUCCEED TODAY MUST BE ABLE TO USE HIS NATIVE TONGUE. IF HE CAN SPEAK OR WRITE SO THAT HIS WORDS will have upon those who listen or read the effect which he desires, he is master of one of the great sources of power. To realize this fact is to see that the art of expression is not

Since there are twelve points in a pica, one can easily determine the space that will be occupied by a paragraph by counting the lines. Each line uses one pica of space, and the space can be read as the number of picas on the pica rule: six lines would be six picas.

As paragraph succeeds paragraph, a column of type is formed. The depth of space can also be calculated by scaling with a pica rule. For example, a ten/twelve setting would give sixty lines in sixty picas. At approximately six picas to the inch, the column of type would be almost ten inches. Taking out one point of leading to give a ten/eleven setting would remove fifty-nine points, one point shy of five picas—the column of sixty lines would then be fifty-five picas deep, or a little over nine inches. Conversely, adding one point of leading to give a ten/thirteen setting would add five picas, or a little less than one inch, to the column.

Such reasoning is used in copyfitting, fitting the text to the space. Its requirements are again considered in relation to aesthetics and readability. This brings us to the final element of typography, the makeup of the page.

9-6. As space is added between lines, text gains a lighter appearance and is easier to read. In almost every application capital letters are harder to read than upper- and lowercase. In this example the one-point leading seems sufficient, but a larger area of text would probably be easier to read and look better with two points of leading.

10.

The Page

The page, however the type is set, is the final element in communication. The page represents the results of the technological systems employed in typography. From calligraphy to word processing, from craft to automation, the collective result of the various systems arrives at its final form in the graphic structure of the page: the word, the line, and the paragraph make up the page.

To make the page, we introduce the final elements of typography, the headings. Working with characters and spacing according to a system of communication, the headings set off the body of the text. From characters to words, from words to lines, from lines to paragraphs, from paragraphs to columns of text, the headings set off the various ideas of the communication. We learn the subject by reading the heading first.

Typographic headings are arranged in order of importance: heading, subheading, subsubheading. Headings are also spoken of as first-, second-, and third-level headings. There can be more levels, though head and subhead are most common. It would be unusual for a text to have no heading at all.

Other elements of typography are used as the need for them arises. With a graphic as opposed to calligraphic use of typography there is a need for picture captions. Footnotes and insets of explanatory material relating to but not part of the text may also be required; they are arranged on the page as they occur. Headings are usually larger than the text because of their importance, while explanatory material is usually smaller.

The heading, because of its prominence, requires special attention to typographic handling and spacing, which are carefully controlled for the best effect. Headings are spaced in relation to themselves, with more space around them than within them, so that they appear as a unit separate from the text. This same sense of spatial relationship would also apply to other typographic elements used on the page. While headings are centered at the top of the page in classical typography, in more modern usage they can be placed anywhere on the page. With art many unusual designs are possible and pleasing, though the heading must still function to introduce the text material.

Any method of typesetting can be used for the

heading. It may be done in an art technique, in metal typesetting, or in various phototypesetting techniques. Word processing relates to automated phototypesetting techniques most easily because of the use of the computer, though the computer and keypunch may be used to produce a paper tape that operates automated linecasters that produce metal typesetting. Each system has advantages and limitations. Phototypesetting machines can provide speed and automation but may impose size restrictions, depending on the mechanical limitations of the technique or system. Phototypesetting machines specifically designed for headings allow the greatest range in sizes. Some have keyboards, but others are hand-operated and require craftwork. Metal typesetting is commonly handset, sometimes from font cases and sometimes from Ludlow castings. Art can mean the use of transfer type, calligraphy, or the drawing of the letters as a design.

However type is set, the art of typography is seen in the finished result on the page. The purpose of the page is no different than it was for the craftwork of the monk scribes; the difference lies in the system used to produce the page and its effect on the final product. If we consider that the final product is communication and that the page produced by typography is the vehicle, then, even though automated word-processing and phototypesetting systems that use the computer speed and ease the task of graphic communication, they do not change its ultimate purpose.

As they are designed, graphic systems of word processing provide the means for greater communication power. They produce the page faster than speech; they produce the word, the line, and the paragraph faster than we can read. Artistry, now more available than when the systems were merely mechanical, is dependent on how the system is used.

10-1. A page from the famous Gutenberg Bible is more similar to the calligraphy of scribes than to the page of typography we are used to seeing today. The heading is in the same-size type as the text but in a color. Decoration is hand-painted on the page in every copy. This section shows the type in about the same size as the original. (Courtesy of the Huntington Library.)
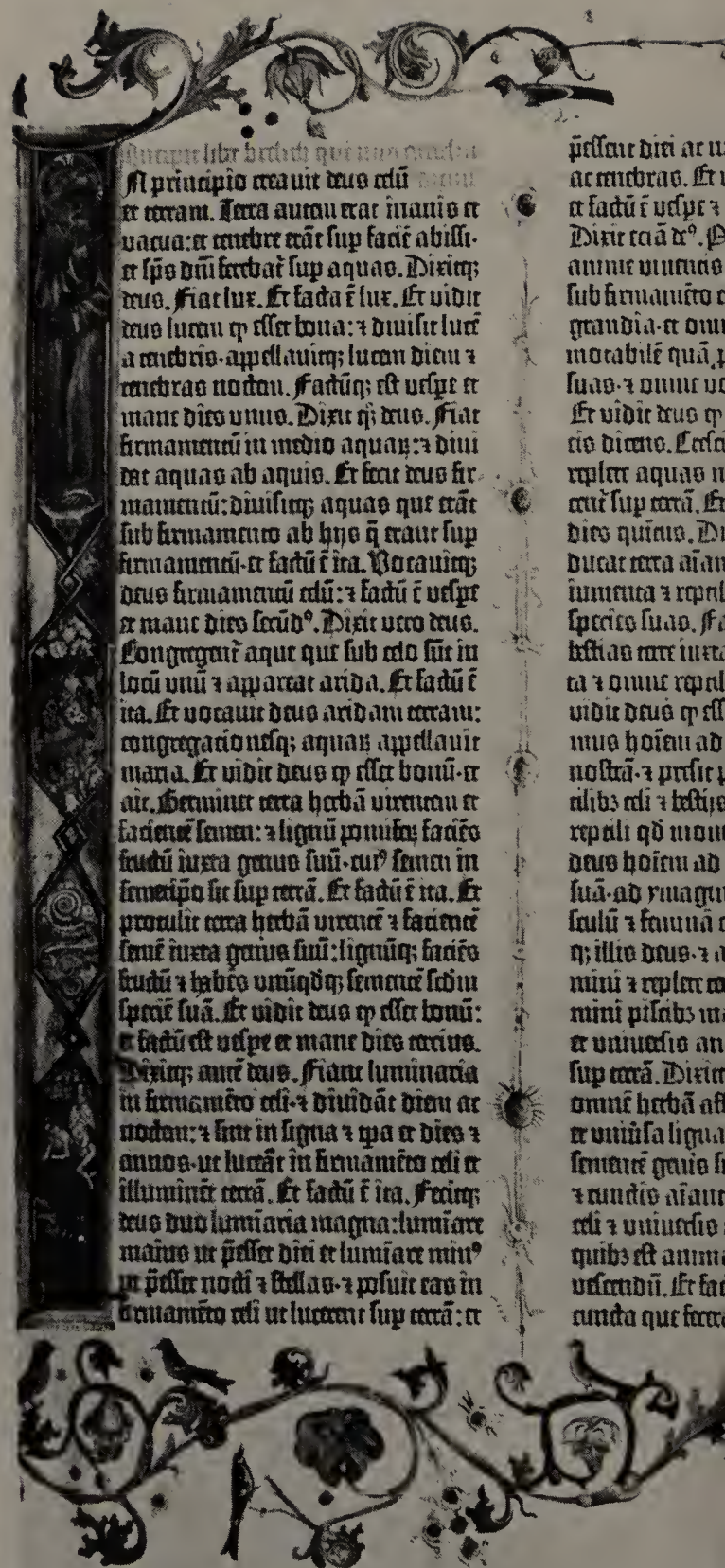
The arrangement of the page is referred to as its layout. It is the further arrangement of typographic symbols for the purpose of communication. Layout possibilities expanded as technology changed from letterpress printing to offset lithography, because the latter, with its use of photography, makes it easier to handle a wide variety of type and pictures. The symbols produced by phototypesetting through the use of word processing provide the image for offset printing, and the image is not limited to the mechanical requirements for engraved or etched metal. The system is limited only by the use of computer techniques to produce the graphic image.

In terms of design the image of the page can be thought of as a unit. This unit is the layout, or arrangement of the graphic elements, including pictures. Typography plays a dominant role due to our dependence on the spoken and written word. Greater technological freedom allows a freer use and arrangement of symbols for communication.

Layout

Layout is the architecture of the page. It is the arrangement of the elements of typography on the graphic space of the page. Typesetting is arranged with its headings and other typographic elements in a manner most suitable for its purpose of communication and most pleasing to the aesthetic sense. Because of the systems, techniques, and mechanics involved, there are many practical considerations as to how to best serve the requirements of communication and aesthetics.

One selects the character design, size, line length and spacing, and margins and placement and then fits the text, headings, and other typographic elements into the page structure. To fit the typesetting to the structure, one must be able to estimate the amount of space that will be occupied by it. The conventional method is to cast the type to fit the space and to fit specific elements in relation to the general idea of the communication; but, as is usual in design, there are other considerations beside the amount of space that will be occupied by the type. These considerations may be the aesthetics of text flow, its color relationships, or the dominance of certain special elements.

In order to cast the type, one must know the number of characters and spaces in the text; then, by translating this amount to the size of type to be used and the number of characters in a line, one can determine the number of lines that will be needed and hence the area of space that will be occupied by the type. It really is that simple. The problem starts in counting the characters in the manuscript. Unless they are counted literally one at a time, they must be approximated based on the average number of characters in each line of the manuscript multiplied by the number of lines. Because each character has a different width when typeset, the character count used to cast or project the amount of space that will be occupied by the type is an average of the width occupied by each character.

10-2. Euclid's *Geometry,* produced in Venice thirty years after the Gutenberg Bible, uses a type design more like the typefaces we know today. Headings are differentiated by color, and the predominant element on the page is decoration, followed by the large, decorative leading initial. The illustration and its caption are in a smaller size of type. (Courtesy of the Huntington Library.)
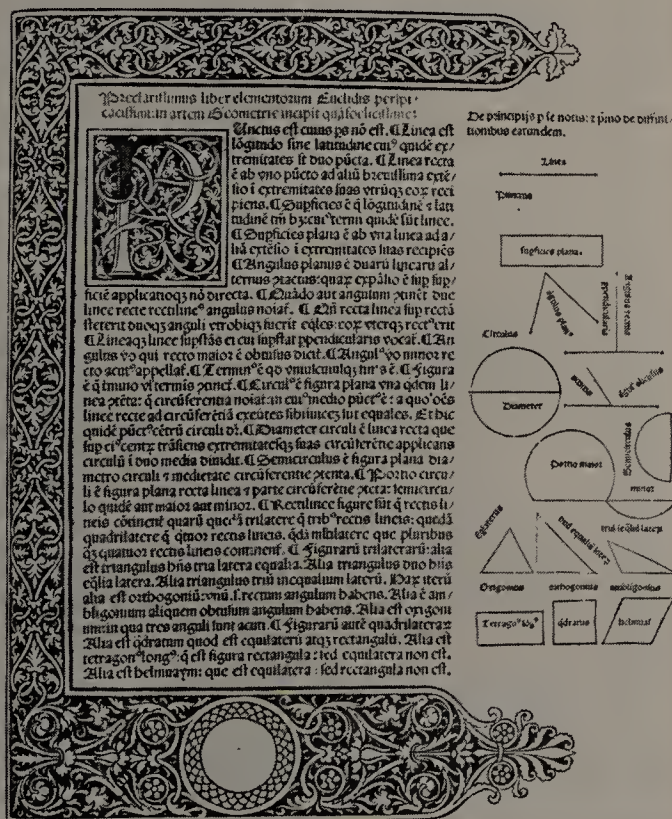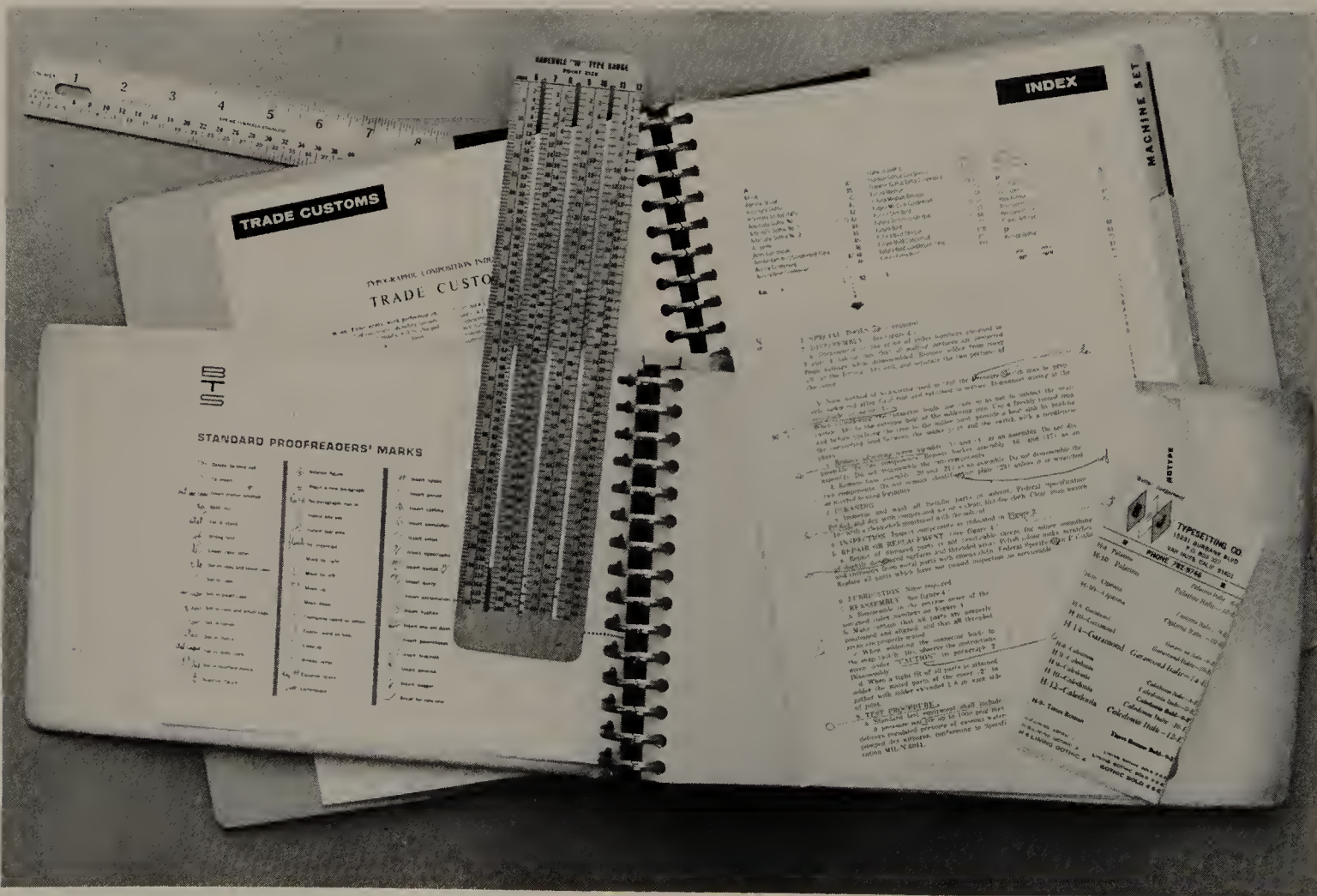
The result of two approximations leaves room for error, and typecasting cannot be done accurately without knowing the space of each character in the position it will occupy. It is sufficient to be accurate as to the number of lines that will be needed. When the type is actually set, the literal space is described accurately.

When one considers that the amount of space used is a variable based on wordspacing and hyphenation, one can see why typecasting is an art rather than a science. If the specifications of minor variations in line width and linespacing are included to adjust the typecasting to a particular space and takes into account how these subtle changes affect the appearance and aesthetics of the typesetting, then typecasting is even more an art.

With the computer and the video-display screen one can cast type accurately. The techniques of word processing allow the text to literally be set at computer speed and visualized on the display screen. Each character is in the position it will occupy, and its space is calculated by the computer. By seeing the visual display bad line breaks or other spacing defects can be corrected. If the fit is not exact, the specifications can be changed and the type can be recast at computer speed. It must be noticed, however, that even with computer-aided typecasting, which permits exact projection of the space, the method is cut-and-try, and the appearance of the character display is not that of the literal character that will be typeset; the aesthetics must still be visualized.

With practice and experience typecasting can be done expertly and with a high degree of accuracy. One learns the methods of adjusting spacing and their effect and how to weigh aesthetic considera-

tions against system mechanics to gain the best result. Finding a creative approach to a solution is very much part of the process, as factors of type size and line length may dictate a three-column format as opposed to a two-column format or vice versa; a particular type design may require more linespace rather than less and as a consequence work better in a smaller size, which in turn may require a narrower column, which in turn affects the margin. Again, an alternate idea for the display heading can use the space differently and compensate for the smaller text size.

The practice and experience of managing the interrelated facets of typesetting ultimately results in an aesthetically pleasing design. The number of columns of text used is a function of the type size and line length in characters. Spacing of columns and margin allowance are aesthetic considerations; they are also affected by the practical considerations of printing, binding, and trim requirements. Typographic elements should retain their unity in terms of spacing, but just how much space is required is affected by the relative type size. Type can be italicized or the font can be changed to a contrasting design, which would have additional effects on spacing requirements.

One works with character design, size, and spacing; with linespacing; with different methods of paragraphing and display appropriate to the message; and within the confines of the system and technique used to produce the typesetting. There is such a range of choice that it is doubtful that any two typographers would ever come up with exactly the same solution. It is interesting that so many possibilities can be found within such a simple system as our graphic language; yet maybe it is not a simple system at all. It is only perceived as simple when its potential is not recognized.

10-3. The indespensable type book, with its examples of typeface, size, and character count, is necessary to cast off the approximate size of the typesetting space. Along with the pica rule the Haberule is very useful in projecting the necessary space. Almost every type book furnished by suppliers of typesetting has information about type-casting techniques, proofreader's marks, and trade customs.

Presentation

Typesetting is so commonly used for printing that the two are often thought of interchangeably. Of course, they are entirely different processes. Printing duplicates the image produced by typesetting; printing is the process of duplicating the type image, and typesetting is the process of making the image. Lettering is a term that more accurately describes the drawn letterform as opposed to the calligraphic form of handwriting.

The reason that these terms seem to overlap is because the assembled typesetting was often used for printing. This is true of letterpress printing. Offset printing does not use the raised surface of the letterform for printing; it uses only its graphic image. Because offset printing constitutes an increasing majority of all printing and because it requires only the letter image, phototypesetting, which produces only the image, is increasing in use. Word processing provides the link that completes a communications system. With use of the computer for word processing the electrostatic and ink-jet printing of reprographics may be added.

Each method of printing presents a final image that has its own unique quality. Letterpress reproduction, using the rag-stock paper favored for its tooth, imparts an almost tactile visual quality through the impress of the image into the paper. The pressure required for letterpress printing spreads and thickens the image of the letterform slightly. Offset printing, on the other hand, favors the brilliantly reflecting surface of coated paper; even if textured stock is used, the rubber blanket adapts to the irregularities without thickening the letterform image. The smooth and more porous paper used for reprographics presents a bolder image of the letterform. Offset duplication taken from letterpress letterform can appear disagreeably light. Reprographics will reverse this tendency but with a loss of crispness. We should remember that the classic letterform was designed for letterpress duplication.

Current typesetting, no matter which method was used to produce it, is usually handled as an image on paper. The galleys of type are assembled into page form by the paste-up technique, in which the image is mounted into its position as it will appear

on the printing plate. This can be true even for letterpress printing if the plate is produced by engraving. The speed and flexibility of computerized word processing suggest handling the typeset image as paste-up.

Further photographic handling produces the printing plate. In special applications the type im-

10-4. Exact type casting is accomplished by the computer, which figures the size of each letter of each word in each line, then presents the type in position on the CRT. This particular system, now an orphan, presents the specifications of the format above the line. Through use of the computer's ability to calculate rapidly and exactly, typesetting may be cast accurately and edited right on the spot before it is set as an image to produce the printing plate.

age is produced directly on film and even directly on the printing element. Reprographic techniques do away with in-between handling and automate the printing process by producing the type image directly as printing; this kind of duplication has the potential to treat each sheet as an individual entity with whatever changes the computer is programmed to produce, though it cannot approach the quality and speed of commercial printing.

Computer technology has the capacity to do page layout and makeup. It would, however, have to be programmed for this task; and, since typesetting is still considered as a craft, programmed formats do not approach the requirement of uniqueness of design for each individual communication. Automated typesetting and duplication systems must be adapted to the individual requirements for the job. It is only in reprographics that a format is rigidly adhered to for the sake of simplifying production and duplication. While you can't run an odd-size sheet easily through most copiers, there is nothing to prevent adding craftwork and trimming the reproduced sheet to any size wanted.

Typesetting has a historical tradition that is still reflected today. In its contemporary form, though the process has changed, it is still an art. With the use of the computer the spacing of characters, words, and lines; and the architecture of paragraph, column, and page are easier to produce and allow greater flexibility. The purpose of communication is the same as it was, although its means have modified and expanded.

11.

Selectivity and Typographic Design

Taste is the jurisprudence of design. It is selectivity and judgment applied according to the perception. Applied to typography, taste is expressed in an aesthetic quality that matches the design to the application and the layout to the design by selecting from what is available what best expresses the communication.

If taste is selectivity applied to design, design itself is the process of conceptualization to which taste is applied. Taste is the judge and jury of existing design: it interprets how design can be applied to the particular case at hand. In order to exercise taste in the selection and application of typography, one begins with one's own concept of design. Without such a concept there would be no criterion on which to make aesthetic decisions.

Changes in design concepts are expressed in changing typographic fashions. With different influences and conditions concepts change and consequently judgments change. This is reflected in the materials chosen. This is true even when judgments are primarily intuitive selections of type and design concepts are not consciously understood. Like a jury of our peers, we deem certain particulars

VARIETY OF LETTER FORM
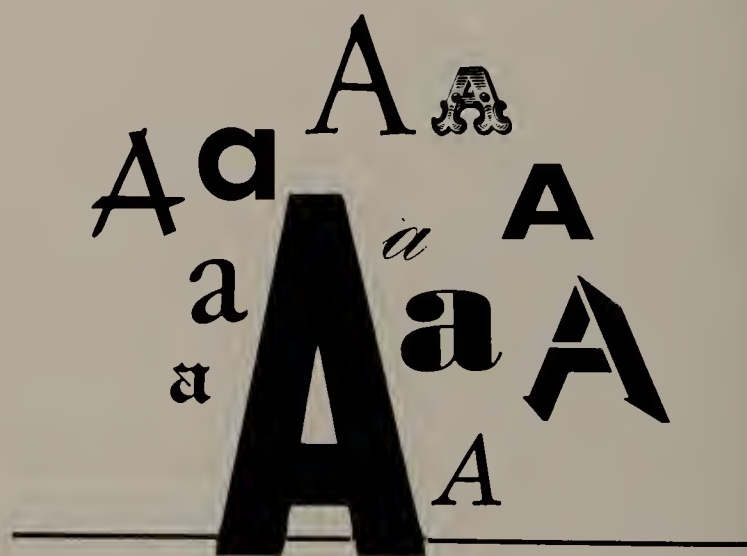
11-1. Existing designs of letterform argue for their selection in a given application. The great variety that presently exists offers a tremendous selection and a range of design for almost any taste, though more are being added.

appropriate. It is a sensitive indicator of attitude, hence it is the jurisprudence of design.

The typographer chooses different alphabet designs and effective combinations of these designs to communicate the message. As one's concepts of design change, the values of the designs change: this causes the typographer to cast a watchful eye on the moods and fashions of typography. With the increased use of phototypesetting, for which a variety of type designs are less expensive and readily available, use of the novel and unusual increased. Transfer type; very old, quaint type fonts; new variants; and entirely new designs for phototypesetting produced a wave of experimentation. Taste first ran to the exotic, the bizarre, then there was a gradual purist reaction.

The mood of typography changed with the availability of computerized phototypesetting. With the use of computer techniques, designers concentrated on approximating their previous tastes with the new methods. The systematization required by the computer led to an increased use of formats. A new concept of typographic design began to emerge with automation and word processing. The discipline imposed by system, for all its convenience, stereotyped design.

While there were more typographic designs to choose from than ever before, nonetheless the point of use of sans-serif styles, in particular Helvetica, became almost universal. In two out of three cases financial statements were composed in Helvetica, as though there were no other type fonts available. This is done with marvelous agreement, yet unknowingly. Subtle variations complement and individualize the message: differences of format, bold and medium weights, condensed and extended forms, and tones of black. Sizes vary from subtle to dramatic enlargements, with a contrasting font, used for display. If one design becomes so accepted and if business prefers the safe rather than the standout, typography will reflect the mood and fashion of the times.

The socialized uniformity of design is only temporary because, with type availability, there is always a competitive reaction and individuality reasserts itself in forms of communication. Word processing applied to typography permits great

variance in system, and computer-fed assembly lines can offer such a variety of models that no one unit need ever duplicate another and provide even finer control over the graphic communication product. Also, for the expert, there is the adaptation of various systems of typesetting, both old and new.

The gray-flannel suit of typography is made out of the cloth of concept, and the cloth can be anything that is suitable for the communication. We shall inevitably see more individualized typography. As design recognizes the potential for beauty in typography, the concept of word processing will expand.

11-2. Annual reports, with marvelous agreement in the use of Helvetica, present evidence of the fashions of typography.

Alphabets

There is an increasing number of alphabet designs. Even with the diversity previously available the range of choice is still expanding, yet the demand for new, innovative, and more appropriate alphabet designs continues. This is due to ever-changing fashions and a host of other factors such as the technical change to offset printing for reproduction and word processing for image production.

One manufacturer advertises over 2000 different type fonts. Though no one has counted the total number of alphabet designs, it has been estimated that there are over 10,000 different varieties available if one includes the variants of a given design offered by different manufacturers. With such variety it is helpful to classify type style similarities. Unfortunately, efforts at classification suffer from the usual problem of overlapping. But, allowing for this problem, it is very useful to generalize alphabet designs.

The most basic difference in type design is that between roman and italic type: roman is vertical and italic slants. We can assume that an alphabet design includes capitals, lowercase letters, and sometimes small capitals; it also includes numerals, punctuation marks, and sometimes ligatures or joined letters. Text alphabets may also include superior and inferior numbers, fractions, mathematical and other sets of technical symbols, special language accent marks, and symbols such as the dagger or copyright. In roman and italic designs these symbols are on a different axis.

Further breakdown of the roman classification concerns width and boldness. A design can be extracondensed, condensed, standard, extended, and extrawide; it can be light, standard, demibold, bold, extrabold, and black. Italic designs usually have fewer widths and weights, though not always, because they are usually used for text rather than for display, and consequently do not require such a variety.

Roman and italic can be further classified, black letter can be added to the roman family, while cursive can be added to the italic. Black letter imitates the original German script or gothic letterform first used in movable type by Gutenberg. Cursive imitates the handwritten letterform by connecting strokes between letters. Not all cursive designs with

CHARACTERS IN TYPE FONT

Typewriter

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ&

1234567890$*()?.,-:;_

¼½%@+±=

Typesetting

abcdefghijklmnopqrstuvwxyz *abcdefghijklmnopqrstuvwx*
ABCDEFGHIJKLMNOPQRSTUVWXYZ& *ABCDEFG*

1234567890$*"()?!,.-:;—fiflffffiffl *1234567890$*"()?!,.-:;—*

ABCDEFGHIJKLMNOPQRSTUVWXYZ& H[1234567890]* H[1234567890]

⅛ ¼ ⅜ ½ ⅝ ¾ ⅞ %   ⅛ ¼ ⅜ ½ ⅝ ¾ ⅞ %

⅛ ¼ ⅜ ½ ⅝ ¾ ⅞ %   *áçéíñóúüÁÇÉÍÓÜ*

⅛ ¼ ⅜ ½ ⅝ ¾ ⅞ %   áçéíñóúüÁÇÉÍÓÜ

11-3. The typewriter, with its forty-four character keys, limits the font, with secretary shift, to eighty-eight characters. Typesetting uses many more and has to have a range of special characters for a wider variety of application.

WEIGHT

Clarendon Regular
Clarendon Medium
Clarendon Semibold
Clarendon Bold

11-4. Phototypesetting fonts usually are designed in a variety of weights. This is an example of phototypesetting fonts of the Clarendon design from the 1800s (6-2).

connecting strokes use the slant axis of italics, however.

Under both roman and italic classifications is the sans-serif letterform previously discussed. Sans-serif alphabets include a large variety of letterform design and have a more modern appearance in keeping with mechanization. Sans-serif typefaces may also be called gothic because of weight or design, though, with their extensive use, the specific name is preferred.

The more alphabet classification concerns historical faces, the more gray areas. The original black letter is a gothic letterform in the sense of its origin; the gothic sans-serif may have been given its name because it appears rude or crude in relation to classical letterforms.

The terms "modern" and "classical" are also used for classification, but the dividing line between them is more difficult to determine. It is most often considered to be the Bodoni typeface, because its straight serif design was adapted to letterpress printing in contrast to the filleted serif design of Roman stone-cut alphabets. Giambattista Bodoni, the Italian punch cutter, type founder, and printer, completed the cycle of distinctly different book text types in the 18th century. Designs that followed are considered as modfications of the classical letterform. This classification does not take into account new applications of typography to display or new technology. In practice, modern seems to mean present use.

The distinction between a reader or text face and a display or heading face leads to more gray areas of classification. It is very appropriate to use classical typefaces primarily for text, but later designs, especially sans-serif designs, are used in either way. Novelty and eccentric designs, such as outlined letters, letters with a drop shadow, or letters that contain ornate designs can defy classification except as novelty styles. Drawn letters that form words into shapes, sometimes with symbolic value, might be classified as pop art or op art.

As type image began to be produced by photographic means, the use of novelty designs is greatly increased. The ease of printing such a design

WIDTH

Helvetica Condensed

Helvetica Normal

Helvetica Expanded

11-5. Some type fonts also provide variation in width from the normal or original design. The variations are often condensed and expanded.

VARIATION

Lydian Lydian Lydian

Roman   Italic   Cursive

11-6. The Lydian type design has a particularly nice cursive, perhaps because of the pronounced chisel formation of the design, and serves to distinguish these examples of roman, italic, and cursive.

NOVELTY

Helvetica Bold

Normal

Helvetica Bold

Outline

STYMIE OPEN

Drop Shadow

TROCADERO

Novelty

11-7. In comparison with the now familiar Helvetica Trocadero would classify as a novelty design.

photographically eliminates the need to consider the mechanics of letterpress and the pressure required. Phototypesetting was first most extensively used for display type in headings; text was not involved. With the introduction of the computer text began to be phototypeset. Computerized photocomposition specifically refers to both text and display, while photocomposition alone generally refers to display only.

With greater use of phototypesetting the number of typeface designs expanded. The reason is one of cost. If one considers that a case of one size of a metal type-font design cost in the region of $750, one can see that a range of display sizes in a particular font was an investment. Phototypesetting, on the other hand, permits all sizes to be created from one master negative by lens focus, and the negative itself costs less to produce than metal castings; some systems of hand-operated phototypesetting offer the negative for as little as $35. With this came the question of duplication of typeface designs— which were copyrighted—some manufacturers pirated the original designs with slight modifications and new names. This also vastly increased the number of typeface designs.

In using traditional designs with offset printing it became obvious that they should be redesigned for phototypesetting, because they did not receive the impress of letterpress and thus appeared too light. This led to a new concept of letterform designs for computer-aided phototypesetting, and a number of these were completely original display and text faces. Another quality of phototypesetting that came into play was its ability to overlap letters and in the process to produce ligatures or joined letters, which required special cutting for letterpress designs. The fashion moved to closer letterspacing. New phototypesetting alphabets were designed specifically for the purpose of creating ligatures for display typography and even programmed ligatures for computer-aided phototypesetting.

The basic distinction between roman and italic still applies to the new designs, as do condensed, expanded, light, and bold varieties, though the latter two can be produced electronically or photographically as variants from the standard matrix. Cursive has less relevance, though some designs

take this form. Serif and sans-serif designs are distinctly different, though gothic has become nebulous in the contemporary context, and future type classification may distinguish between letterpress designs and phototypesetting designs.

Word processing facilitates the use of computerized photocomposition, so typographic design should follow this path. Design is then evaluated in terms of effect, the manner in which it can be made to function for its intended purpose of display, subheadings, and text. These terms represent functions of graphic communication and not the traditional use of typography. They allow for undefined typographic design as it will be put to use with word processing for future graphic communications.

Effective Combinations

Alphabet designs are combined for aesthetic effect. The underlying principle is to create a contrast and by means of this contrast to achieve the desired emphasis and communication. Combinations have a similar function to the use of italics in contrast to roman to emphasize a word or phrase or capitals and larger sizes to set off a heading.

Classic typography achieved a beautiful effect with the same typeface throughout, and emphasis and delineation was achieved by manipulating space and size. In a more contemporary vein bolder faces and contrasting designs are also used. With a broad choice of alphabets and the capacity to space for effect as well as for fit, it is natural that contemporary typographic design offers more variety. Effective combinations are used, and the very contrast between typeface designs can add to the communication. It is in the selection that taste is exercised; type design is considered in terms of its character, color, and spacing and of the effect of the relationship.

Conventional typographic composition uses different typefaces for display headings and text. Compatible variations are used for subheadings. There is no rule, but it is logical to arrive at such a solution to provide a proportionate emphasis for each level of heading. Text designs are usually chosen for their efficiency or readability. Conventional typesetting divides text and display and uses mechanized methods for text and craft techniques

for the lesser volume of display.

We may compare typesetting to the typewriter. With the typewriter headings are usually in capitals; greater emphasis is achieved by spacing the capital letters one space apart; still more emphasis is achieved by underscoring; and yet more by spacing the heading apart from the text. Typography follows a similar pattern but with more tools at its command. Nothing could be easier than to simply use a larger size of type for heading display, and for some applications this may be the appropriate course.

Use of a single typeface is certainly harmonious in design, but it often lacks effect because there is no contrast, and a readable text type is not strong enough for display. The contrast of designs offers the possibility for a graphic statement on the feeling and nature of the content, but contrast requires only two designs: a multitude of different designs destroys its effect. If any rule can be offered, it is that simpler is better; the use of four different typefaces in a composition will very likely be too cluttered for the best effect. This rule can be modified to some extent by variants of one design, such as italic or lighter or bolder weights.

With the number of designs available, the exercise of taste and choice is formidable. With the selection of a supplier and a system the choice is reduced to some degree—perhaps among only a few hundred different designs. Further limits are imposed by mechanical features of the system being used. There may be sizes and combinations of fonts that can be used without slowing the machine operation to change fonts or lenses, and such considerations may suggest the use of a face that is most compatible with the facilities and least expensive. For a particular situation some designs will be obviously unsuitable, reducing the pool further. These are some of the factors in terms of which taste is exercised to achieve the best result.

Typographic composition consists of the selection of typeface designs, the manner in which designs contrast or relate, and how they are sized and spaced to achieve their purpose. Taste is exercised to achieve the most effective combinations within the range of choice available and in the context of the equipment's capabilities.

12.

Relationship and Contrast

The relationships of typographic design are seen in terms of their contrast. In the contrast of two or more styles they are revealed. The design is dependent for its existence on the relation of one quality to another. The design comes out of the quality derived from relationships that are made apparent by contrast.

When there is no contrast, we see design form as an abstraction. We relate to a concept model for a reference, for a contrast—hence the idea of a "correct" letterform. When there is little contrast, we unconsciously accept the symbol used for communication as conventional by relating to our concept model and proceed past the visual vehicle to the purpose of its use.

By considering the visual vehicle, the typography used for the communication, we can introduce relationships in terms of contrast. The quality derived from the relationship of contrasts seen in the letterform, size, space, and arrangement should at least support if not contribute to the meaning of the communication. The arrangement of the typography in this sense is the layout. One selects from the arsenal of means available a set of relationships that

appears tasteful and functions with the purpose of the communication.

Typographic layout is the tasteful organization of symbols used for graphic communication. One exercises taste by selecting and organizing the elements. The relationships established as a consequence form the design.

As one ranges further from the conventional concept of layout, one introduces the element of design. The exercise of design is more abstract and conceptual than the exercise of taste, since it requires formulating concepts of relationships and contrast. Taste, on the other hand, can be exercised solely in terms of selection without introducing anything into the layout other than conventional relationships. The conventional relationship serves the purpose of graphic communication in a functional way but not in any additional way; it does not make use of any special effects or contrast relationships beyond the usual English-language requirements of reading from left to right and from top to bottom of the page.

Typographic arrangement can depart from the conventional into graphic forms that are concepts

12-1. Posters, magazines, and art books suggest many uses of typography: the Picasso Fauvist poster underneath, the Dada design next, the Lautrec Impressionist poster, the Constructivist Mondrian painting, and the Bauhaus typographic design are examples of the many different schools of art and of attitudes toward typographic design.

in themselves, forms that serve as symbolic communication as much as the letterforms themselves. In the context of typographic design headings may appear anywhere on the page, words may be read vertically as well as horizontally, and the eye may be led to skip from copy block to copy block within a picture frame. But design also must be tasteful and related to the communication purpose. It can be described as the further use of the effect of contrast for communication.

Contrast relationships can be numerous; but, simply stated, they are the size relationships, the form relationships, and the color relationships or weights of the letterforms. Additional contrast relationships can be added—relationships of character, space, and texture. The use of positive and negative letterforms, tone, and ink colors add other graphic possibilities.

Still more abstract relationships can be developed as taste becomes design in the execution of the typographic layout. Relationships can be traditional or modern, contrasting or harmonious, humorous or formal. Choices can be made of styles or schools of design. For example, we can contrast classic design with Bauhaus design: the classic design is similar to early text setting, and Bauhaus design is a contemporary, functional design. Designs can follow a grid structure, as with the constructivist school of art, or a playful pattern, as with the dada school of art. As the elements and their contrast relationships become more abstract, typography and design become an art form.

The knowledge that typography can be used as an art form frees us from the concepts of system and convention that seem to be imposed by the use of word processing and computerization and presents a more variable and pliable form. Symbols produced as word processing gain even more flexibility with "instant replay" on the video screen; the forms and relationships can be revised instantaneously without "erasing." Handling the image as opposed to the metal sculpture used to produce the image also enhances freedom of design, and phototypesetting, with its flexibility of size and space, further contributes to the scope of design possibilities.

74 The application of taste can be difficult due to the variety offered. But tasteful design must be in context to its use for communication; taste is revealed in the excellence of the relationship between purpose and use.

Organization

The organization of typographic design should support its purpose. Conventional design serves the purpose of communication without calling attention to itself as the vehicle of the communication. Typewritten material is conventional in that it fulfills the requirement of legibility. Type that is as bland

12-2. This example of Dada design expresses playfulness and revolutionary abandon of every conceivable typographic rule, much like the Fauvist revolution against academic art.

as typewritten material becomes tasteless, however, because it fails to utilize the typographic tool for communication properly. It does not exercise its graphic potential.

Typography not only conserves space as compared to typewritten material, and this is a major advantage, but it also provides variation of symbol and additional symbols. Taste is exercised in the use of a variety of symbols and in the layout. The organization of the symbol sizes, forms, and weights should serve the purpose of communication by clarifying the meaning of the message. It should also add visual interest, a spice that makes the message not only legible but also readable.

We speak of a system as functional and of computer printout as the function of the computer system. We cannot, however, speak of the computer printout as a function of communication, since it serves a different function, the mechanical function. The function of communication is served by typographic design. The teletype communication "CONFIRMING START STOP GO AHEAD STOP START" left the recipient in a state of dynamic inaction, in confusion.

Typography is more than attractive; it is useful. The purpose of the message is the basis for its organization, and a design evolves from the requirements of the message. Conventional typographic layout follows the usual use of space and emphasis in ways appropriate to the message. With the great variety of choice available, stronger contrast or more unorthodox usage is possible. This tends to move typographic layout away from the conventional and further toward design than a use of typographic symbol in tasteful, conventional relationships.

Sizes, forms, and weights are organized by their relative contrast. Emphasis is achieved by using a relatively larger size, a relatively more active form, or a relatively heavier weight. The contrast established by such a change is managed by controlling its degree and maintaining the relationships in the context of the message. Taste is seen in the fitness of these relationships to the content of the message.

Typography should also relate to the environment for which it is intended: the smallest type should not

USE OF SPACE

Typing uses less space than handwriting, but the comparison of typesetting to typewriting is rather surprising because typesetting uses still less space. It is estimated that on the average typesetting uses 40% less space.

Typing uses less space than handwriting, but the comparison of typesetting to typewriting is rather surprising because typesetting uses still less space. It is estimated that on the average typesetting uses 40% less space.

12-3. It is always a little surprising to see how much space typesetting conserves while maintaining the same degree of readability.

RELATIONSHIPS OF CONTRAST

DESIGN DESIGN
Size

DESIGN DESIGN
Form

DESIGN DESIGN
Color

12-4. The graphic display of contrast helps to explain the elements of size, form, and color presented here as mainstays for typographic design. The list can be much longer as contrasts are developed for a particular application.

be too small, the forms chosen should be suitable for the meaning and message, and the weights should create a flowing contrast suitable to the display. The mechanical context should also be considered, and the relationships of paper, printing, and color contrast should be used in such a way that the effect of the typography is not lost in reproduction. All these factors are organized to serve the purpose of the message.

With the organization of the relationships within the typography, and the reproduction, the use of space on the page should also be managed. This is not only the space around and between the characters but also the space on the page. If a number of pages are involved, the opportunity of a change from page to page to provide continuity and contrast to continuity is provided. Typography should be viewed not only from the standpoint of the appearance of the page but also from the viewpoint of movement through the message as the line of thought is followed.

Space can be used for contrast as readily as size—if its rhythm is changed or contrasted. In conventional terms space is thought of as adequate for the typography and that typographic units exist in space according to their relative relationships. Space can also be thought of negatively in the sense that the space preceding or following a unit of typography provides an opening that emphasizes that unit. In this sense space can be organized for typographic design as well as serving as an element of tasteful display.

Direction and Emphasis

Typographic design is decidedly directional. It must provide a path for the eye to follow and create emphasis where required. Most design is directional in some degree, with a dominant focal point. Typography presents an overall texture and a pleasing sense of proportion and space on the page, but it must also work in terms of direction and emphasis.

A typewriter illustrates this quality in its function. Its very design is in relation to a concept of direction. It is constructed to space characters in a line, then return to the margin for the next line below the first. Emphasis is achieved by positioning, by capitalizing, by underscoring. It is theoretically possible to make two or more columns of text. While this would be easier to read, it is seldom done because of the need to reset margins or to tab to the following column and because it is difficult to estimate the maximum line lengths to achieve effective spacing.

For typography the page is planned with margins and columns of text. The relationships and positions of the separate elements—the headings, subheads, and text—are designed. The typewritten page tends to be used in its conventional function, but typography is free to be designed in many ways according to the conventions of direction and emphasis. Typographic design is more flexible.

Conventions of typography can be tastefully used in many ways that make it more readable and more attractive than typewritten material. Text may be organized to move across the page, up and down the page, or both, with the use of a device to make divisions. With the use of space, rules, subheadings, or a combination of all three, a sense of direction is maintained and proportionate emphasis given. The conventional newspaper page is an example of this, though it is doubtful that one has thought much about the devices used to maintain organization. In the conventional sense the devices used to achieve direction and emphasis are unobtrusive to the viewer or reader, and they provide organization and design.

With different purposes or needs for communication the use of typography is altered and the graphic space is organized differently. The smaller pages of a magazine are organized into one, two, three, or four columns of space according to the nature of the material to be presented. With different sheet sizes, type sizes, and methods of printing, books are also organized in different ways. We are all familiar with quite a variety of conventional typography.

With the use of design we can depart from conventions, provided that we maintain direction and emphasis. The direction and emphasis must be readable to serve its intended purpose, but through design the direction and emphasis may depart from the conventional. The convention of always placing the heading at the top of the page, for instance, may be altered in such a way as to enhance reada-

DIRECTION OF VISUAL MOVEMENT

12-5. Viewing typography from the standpoint of movement through the communication, we see that the eye naturally goes to the point of greatest contrast, the black circle, which could symbolize a heading, then to the small circle, which could symbolize an initial, and then in a linear direction throughout the page.

TONE OR COLOR VARIATION
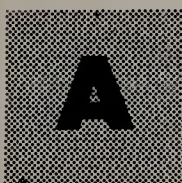
Tone   Color   Reverse

12-6. The effect of tone or color used in typographic design adds to the possible variations, as suggested here. The use of offset printing, as compared to letterpress printing, permits much simpler manipulation of tone and reverse for typographic design.

bility and communication—by moving it to the text area, for example. When art elements are added, variety is increased. Through design typography may be composed much as a picture is composed.

The more that one departs from the conventional, the more layout becomes a factor. If art is used, the assembly of typography or makeup becomes layout design. The artistic eye determines compositional values and manipulates the selection and spacing of text. Contemporary typography often includes art to help communication. The use of offset printing invites this because no engravings are necessary, and artistic skills become very desirable to effect the best composition.

The use of conventional typographic design provides something of a format framework or an architecture from which to work out the design. As elements of contrast are added, more relationships are produced, which must be tastefully controlled and designed in terms of their direction and emphasis, as required to make the message readable and succeed in its communication.

13.

Contrast of Size

By increasing the size of some letters or words in a message a contrast in size is achieved. This design device is perhaps the simplest and most obvious way to emphasize the important part of the message. In conventional terms the heading is enlarged relative to the text-type size. The comparative size change makes the heading stand apart from the text; and, if the size contrast is sufficient, the heading will be read first no matter where it is placed on the page.

The degree and application of contrast in size are a matter of taste. As in any design work, decisions must be made as to what is important, what will be contrasted, and how much. Such decisions can be seen as a matter of interpretation, as a matter of understanding the communication. The decisions are selective and emphasize the essentials of the message by simplifying and making it easier for the viewer to grasp, thus enhancing readability.

Bolder and simpler size contrast is more striking and easier to perceive than subtle contrast; two sizes are easier to handle than three; and so on. Too much variety disintegrates contrast and loses effectiveness. Giant size differences lose the con-

trast relationship if the reader cannot connect one to the other. Conventional typography uses both multiple sizes and size relationships within the bounds of taste. Yet extremes, used effectively, are refreshing and attractive. If there is a rule, it would be in terms of the measure of readability and communication power: as fashions change, rules change.

Larger-size type is a natural focal point of the typographic composition. If it is a heading, it should be the focal point because a heading is intended to be read first. But in the construction of some messages the conclusion is important; in others a series of ideas may be the focal point.

In setting up a size contrast additional meaning is sometimes given to the message by the relationship of the graphic symbols. And in the handling of phrasing and line breaks the meaning is also influenced. Consider, for example, the shadings of meaning and subtext that can be obtained by changing the word size in the heading phrase or sentence "THINK SMALL CAR." Depending on which word is made smallest or largest, the implication changes. How about "THINK SMALL car," or

13-1. This beautiful page is similar to the diagram in the previous chapter (12-5). The eye travels to the contrasting size of the initial placed against the texture of text type.

"THINK small car?"

Variations of symbol meaning that play against the message are possible through typographic composition. This is a more extreme use of design, as the symbols impart a meaning that goes beyond language. Conventional use of typography would not engage in unorthodox use of symbol; it would retain the same-size letters in the previous example, because any size change or break in phrasing would change the meaning.

The use of color or a second tone of a single color is a separate method of designing contrast, but it is so often used in connection with size contrast that it should be mentioned here. The most important point in connection with the use of a second color or tone, though not at first obvious, is that the size

contrast is visually apparent. When the degree of visual contrast is reduced with color or tone, the size contrast can be much larger to create the same apparent visual effect. The same is true of a reverse image of a white letterform against color or tone. The use of color or tone multiplies the ways in which size contrast can be used. It often accompanies extreme size contrast. It is a contemporary convention governing the use of size contrast in typographic composition.

The classical use of size contrast was more restricted because of mechanical limitations. The letterpress method requires that each casting used to produce the letter image on paper be mechanically positioned for duplication. Images cannot change size by photographic means.

Gutenberg cut his type in one size. To gain a contrast in size, he employed scribes to draw in the large initial at the beginning of the text. This was done by hand for each printed Bible. Word processing and phototypesetting allow greater flexibility in size. If type is assembled by the paste-up method of mounting type galleys into position, then a range of sizes presents no mechanical problems, and the photoprint of the type image is all that need be positioned. The different sizes are obtained with different settings of the machine.

Type Sizes

Type size is measured in points and picas. The fine divisions of point sizes allow very small size changes, yet two points make quite a difference in the visual appearance of smaller sizes of type. As the point size of type gets larger, the size changes also get larger.

The point-size designation of type measures its height: it includes ascenders and descenders. Ascenders are seen in the b, d, f, h, k, l, and t characters, capital letterforms, punctuation, and numbers; descenders are seen in the g, j, p, q, and y characters and old-style numerals. The point-size height may include a very small amount of space beyond the extensions of the characters but usually does not.

A range of workable text-type sizes runs from six to fourteen points. Display sizes for subheads and headings run from eighteen to seventy-two

TYPE SIZES

6 ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

7 ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuv

8 ABCDEFGHIJKLMNOPQRSTUVWabcdefghijklmnopqr

9 ABCDEFGHIJKLMNOPQRSTUabcdefghijklmnop

10 ABCDEFGHIJKLMNOPQRabcdefghijklmno

11 ABCDEFGHIJKLMNOPQabcdefghijklm

12 ABCDEFGHIJKLMNOPabcdefghijkl

14 ABCDEFGHIJKLMNabcdefghij

18 ABCDEFGHIJKabcdefg

24 ABCDEFGabcdef

30 ABCDEFabcd

36 ABCDEabc

42 ABCDabcd

48 ABCabc

60 ABCab

72 ABab

13-2. The type sizes mentioned in the text are displayed here. These sizes are traditional, and some phototypesetting systems provide additional sizes.

80

points; the latter is one inch or six picas. This is the conventional maximum size, but some phototypesetting systems continue up to one hundred forty-four points; headline type can run even larger. Photographic handling can further enlarge the typeset image.

The conventional sizes to seventy-two points are available with computer-controlled phototypesetting, in which the image master is sized optically. With metal type not all sizes were available in every face or design. However, by using the extra step of photoengraving, the metal type image could be made in any practical size. Using paste-up assembly techniques, the extra step is only to obtain a photostat of the type image at the desired size and to use it with the type assembly. It should be observed that photostats are sized by the image and that the type size specified in points is not the image size, because the former allows for ascenders and descenders: a one-inch size measured on the image of a capital letter, such as M, would be larger than a seventy-two-point typeset M.

Type sizes are explained in most dictionaries under the word "type." Examples are given with more definitive terminology, perhaps, than is now used with computer-aided phototypesetting and word processing. Phototypesetting follows traditional size parameters, but means and methods have changed so as to give new meanings to old words, because sizing is accomplished now with light, lens and negative, or electronics. Terminology concerns the image and the functions of the phototypesetting system.

Along with the ascenders and descenders of a typeface, the most important feature is the body size. Body size is the height of the letterform from which the ascenders and descenders project; it is the height of the a, c, e, i, m, n, o, r, s, u, v, w, x, and z characters, sometimes called the x-height. Different type designs have different proportions of body height to ascenders and descenders. The effect of this difference in proportion is that a design with a large relative body size at ten points can seem larger than a design with a small relative body size at twelve points. For example, ten-point Helvetica can seem larger than twelve-point Garamond. The apparent rather than the actual size should be

taken account of in relation to where and how it is to be used. Designs with a larger rather than a smaller body size are almost universally preferred for newspaper text setting. These designs accept the vagaries of high-speed news printing, retain readability better at a given size, and permit the greatest density of text in an area, because the ascenders and descenders require less line space.

Type size also affects type design. As metal type was increased from text to display sizes, each new size was recut with subtle variations to maintain apparent continuity of the design. If text size is photographically enlarged to display size, the slender portions and the serifs will appear proportionately heavier. Whether this is a problem depends on the nature of the design and the degree of enlargement. Heavier designs and designs with a more singular thickness are less affected. Helvetica can be enlarged more easily than Garamond, for example.

Determining which type size to use is a matter of both taste and readability. The trained typographer with eagle eyesight, who can spot a wrong font period at ten paces, can lose touch with the needs of average skills and eyesight. If one were to venture an opinion, it would be that text size should be comfortable and display size appropriate. While this is a matter of taste, it is important to ask questions about readability, comfort, and appropriateness when evaluating size for almost any context of typesetting.

Small type sizes set in all capitals appear larger and are therefore easier to read, though capitals are harder to read than lowercase letters and use more linespace. Capitals have built-in linespace because they have no descenders. Long lines are harder to read than short lines and require more linespacing to enable the eye to find the next line. A smaller size set with more space can be easier to read than the next larger size set close together. A short line or word by itself in white space is easier to read than a line surrounded by more text. Short blocks of text are easier to read than a page of text.

The context in which a message is to be presented often has a bearing on type size, as, for example, when all the information must appear on one sheet. There are almost always some mechanical requirements that compromise the ideal and demand the exercise of taste to balance the conflicting requirements. Computer forms that require more and more information in a given field of space are some of the worst offenders; when still more information is needed, photographic reduction is resorted to, which can make them unreadable. This may also be the excuse for using fine print on contracts; reading "the fine print" has become synonymous with reading a contract. Have you actually read the back of your credit cards, for instance? Five-, four-, and three-point type puts the message in the space but not in relation to an average of readability. The average of readability is very abstract. Of course, no one is average, and there should be some flexibility to meet mechanical requirements. Taste and acceptability must determine the extremes. You should ask yourself if you can read comfortably, if the size seems appropriate, and if it is in context with requirements. If so, then most people should be able to handle it.

TYPE SIZE

Em Quad

13-3. The relationship of letter size to type size is indicated by this diagram. The letter image may not always fill the type size. Many phototypesetting systems maintain base alignment of different font designs for mixing typefaces.

Machine Capability

Machine capability is greater with computer-aided phototypesetting and word-processing systems compared to metal typesetting. There are more sizes and more fonts of type, and portions of typesetting can be automated for increased speed. But systems in themselves impose limitations, which should be taken into account in any specification of typesetting. In comparison to metal typesetting, where almost any typographic design would be possible with enough craftwork, systema-

m

m|

m|

mi

mi|

mi
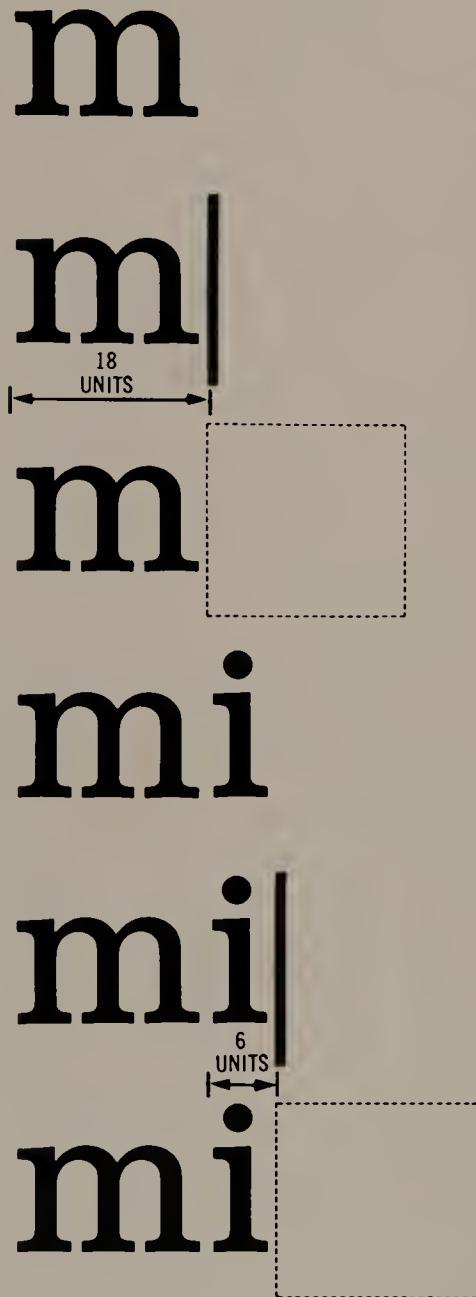
13-4. With some phototypesetting systems about sixty letters are printed in a second. The dotted line represents the eighteen-unit em-quad width and indicates the process. The letter occupies only the space required; and, after flashing, the field moves to the next letter as the units of space are calculated by computer. When one operation is completed, the computer follows its program to the next.

tic computer-aided typesetting makes the use of craftwork undesirable during the typesetting operation. Special applications requiring craftwork are now handled by an artist during paste-up when the typographic image is assembled for duplication.

The efficiency of computerized typesetting is most apparent when automation handles all the operations. If specifications in a particular instance conflict with the system in use, this efficiency is lost due to the manual operations required. This would happen, for example, if there are size or font changes that the system is not organized to handle in the flow of text. Not that they cannot be accomplished; but, if they require special handling, they lose the advantage of systematic efficiency.

The capabilities of the specific system in use must be studied. Some systems, for example, restrict size change in computer-controlled operation by requiring a different master for larger sizes; others, by requiring a manual lens change. The number and relationships of type-font designs on line and placed on the imaging device or in the computer memory in the case of electronic imaging and available under automation can vary. The idea is to maximize the degree of computer-controlled operation by working within the existing system and thereby to minimize the amount of manual operations and craft labor involved. Most computer-operated phototypesetting machines are designed to favor text typesetting, and their speed makes them useful for large volumes of material. Special display requirements are handled separately and the complete design assembled as paste-up. A repetition of special requirements may be programmed for the computer, but for only one use it is not economical to write a special program.

Conventional repeated design requirements, such as initials and runarounds—the initials at the beginning of the text and columns of type with an indented section to inset a picture or text heading, respectively—often have standing programs that can be adapted to a particular specification. By working within the system the entire typeset can be run by computer with everything positioned in the printout. But the system capability would have to be known before specifying in order to take advantage of this.

The nature of automated systems necessarily has an impact on typographic design. Photocomposition allows size contrast because of font availability. When restrictions are imposed by system, design options are limited. If the potential of the system is not known, most typographers will opt for a simpler design. The knowledge of system capabilities allows the designer to take full advantage of its potential, and some of the better examples of computer-aided typesetting present a full range of typographic options. There is always the safety net of paste-up to complete a design or to make any changes that appear necessary.

Just as metal type fonts had a definite size, phototypesetting machines present limits, though within a range of sizes. The range of most phototypesetting machines is quite extensive. Each specific machine and each supplier system will be different; some are display-oriented, some text-oriented. To use the system for best effect, one needs to work within its size and font availabilities, supplemented by additional craftwork if necessary.

SCHEMATIC OF PHOTOTYPESETTING MACHINE
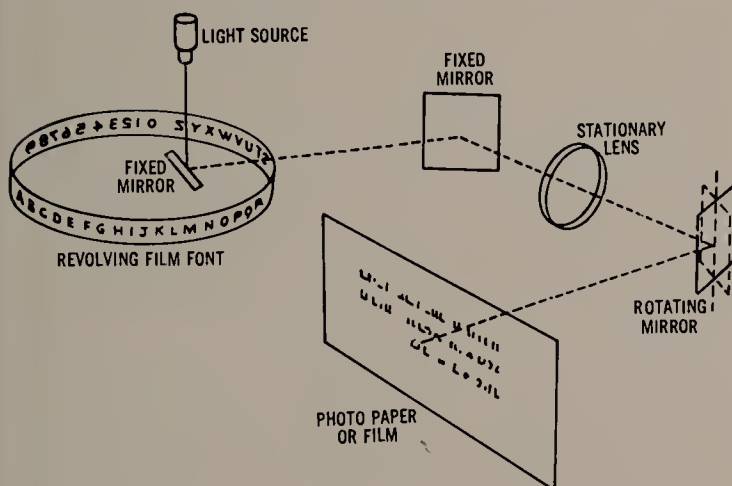
13-5. This schematic diagram is typical of a number of phototypesetting systems. The dotted line shows the path of light that exposes the letter image on the photosensitive surface.

14.

Contrast of Form

Letterform in reality refers to the graphic two-dimensional shape of the letter image. The traditional use of the term "form" undoubtedly has to do with the fact that letters were originally cut in three dimensions for letterpress printing. Now that letterform is carried as a film image or as code in computer memory, the concept is even more abstract. What we deal with here is the image, and for typographic design the contrast of the typographic form.

Contrast of form refers to the various shapes and qualities of the letterform. Typefaces are combined in ways that contrast the form of two letters. The secondary effect is the meaning arising from contrast. As capitals are contrasted to lowercase letters, as italic is contrasted to roman, as cursive is contrasted to roman, contrast creates emphasis and sets one letterform apart from the other.

Typographic composition relies heavily on contrast of form, and the contrast of one type design with another provides the means to produce dramatic and pleasing typographic design. The greater the contrast, the more dramatic the composition. The pleasing element is the suitability of the contrast to the application in terms of its aesthetic effect and its meaning to the message.

The contrast between large and small, capital and lowercase, cursive and Roman, wide and narrow, angular and rounded, thick and thin refers to the character of the form. The nature of one quality makes the other apparent. Together the forms can emphasize a quality that relates to the meaning of the message. In multiplied contrasts they create dramatic graphic interest. The height of the graphic contrast forms a focal point that attracts the eye to the message and involves the reader with the text flow.

Contrast of form in conjunction with difference in size are a means of creating a focal point in the typographic design, a place for the eye to land on the page. This is often the start of the message or the most important part. In terms of meaning there are two important places in the sequence of ideas, the beginning and the end. The beginning is usually the most important point. It is reserved for the heading, which usually dominates the design. But there is room for variation of this structure, and any structure appropriate to the message is acceptable.

Graphic art and symbols other than the alphabet expand the number of relationships in the design and allow still more invention.

Most often headings should contrast with the font chosen for the body type. An exception would be the formal kind of design. The many different relationships can be used to produce a mechanical, eccentric, casual, or any other effect useful to the needs of the message.

The greatest degree of form contrast is usually the most effective for typographic design. Merely changing the size of the same typeface provides only one dimension of contrast. While harmony is maintained and emphasis achieved, a contrast of type form in addition to size introduces a second dimension and is graphically more pleasing if the relationship between type forms is tastefully chosen. The relationships become so subtle in a specific application that a great number of possible choices can give uniqueness and individuality to the communication. Beauty is apparent in the appropriateness and effectiveness of the typographic design.

The layout is also of importance, and type should be arranged in a manner that complements the letterform. Examples can be found in the linear flow produced by wide letters or the use of a narrow letterform for a long line; tall letters can be used in a vertical space where the height is harmonious or where the height crowds the verticality, making the letters seem even taller. The relationships between letterform and layout are open to many interpretations that effectively utilize the different forms.

While extremes of contrast are usually more effective, the contrast is multiplied if more than two typefaces are used, and the subtle can be used with the extreme. For instance, the subheads can echo the heading in minor key, or contrast only slightly with the text, causing the heading to stand apart.

With the many eccentric typefaces available, there is a definite tendency to use type for its decorative value. The decoration, usually in a large size, draws the eye to the message. Some designs make the word message a cryptogram, a puzzle to solve, with meaning the reward. This would not be advocated as a general rule, because the ideal of

typography is clear communication. Yet in special instances it is very successful.

The use of embellishment, where the typographic form is extended with swashes or handwritten forms entwined with spaghettilike flourishes, is sometimes used for its ornate or regal quality. It is often seen on labels, sometimes with special names, and is usually associated with signatures. The saying "Put your John Hancock here" stands for signing your name and testifies to the man's bold signature.

Of the many qualities that type form can be used to portray, the element of time is one, and letterforms and layouts can be used to imitate the feeling of bygone periods or historical styles. Letterform can be used playfully in the appropriate applica-

TYPOGRAPHIC SURPRISE

14-1. Contrast of form can be carried further than the relation of one type design to another. The contrast or surprise here derives primarily from the graphic use of type symbols that are out of context with their conventional or "correct" use, and it serves to make a point about the many interpretations that effectively utilize differences of letterform.

tion. Popular word games show our tendency to supply missing letterforms. The unexpected is humorous in the right context. But the more overt use of letterform in games is not appropriate to the majority of messages, and type is still primarily a vehicle for conveying a message in the most tasteful fashion.

The qualities gained by contrasting letterforms are most tastefully used in relation to the normal function of typography, that of conveying a message. Contrasts of letterform introduce design and organization, and the relationships between the forms subtly impart meaning to the message. Imagine how wrong the Declaration of Independence would appear if it appeared in the letterform used for cartoon balloons, how strange a roadside direction sign would look in script, how inappropriate calligraphy would seem for a newspaper headline. We have developed many conventions for the use of letterforms.

The use of letterform often has obvious common-sense requirements, such as those of readability, formality, elegance, and clarity. Use of contrast should fall within the bounds of these requirements. Contrast should support the message and in the process enhance its meaning.

As one designs with type, one selects from the hundreds, even thousands, of typeface designs available the two or three most suitable to the message. With so many to choose from, one would think that there were many for a given task, but it appears that there is always a need for something new. We no sooner become accustomed to one letterform than we start looking for something new, a fresh way to present the communication.

Type Design

Form can be contrasted in terms of the different alphabet classifications. Roman, italic, and cursive contrast in structure. The character of the form also contrasts, as serif type contrasts with sans serif. The design of upper- and lowercase letters contrasts.

More subtle but no less dramatic are contrasts of width, angularity, and decoration. Novelty letters, such as outlines, stripes, or shadows, add to the array of contrasting designs. Other alphabets have special decorative features, such as flowers or inscribed flourishes. There are calligraphic letterforms as well as forms that seem to indicate nationalistic qualities. Finally, letterforms can be placed with decoration, such as illuminated initials. Beyond traditional varieties new letter designs imitate a look, such as neon signs or computer-readable, magnetic-ink letters.

Each type design has some purpose for its existence, and it was designed for a particular use, even though the purpose may now be dim. We normally look at type design in terms of the present context; and, whatever it was originally intended for, we are concerned with present needs. By looking beyond the original purpose of a design we can sometimes see new applications.

When we view the form of type design as a tool for typographic composition, we look at it abstractly. As most do, we look at it in terms of the apparent contrasts of the image form and mentally measure the effect of the contrast in terms of the purposes of the particular message we are dealing with. We should not consider a decorative form for a functional sign, for instance.

Of the array of contrasting letterforms selection is made from the appropriate faces available for the particular application. It is likely that one would start with the main part of the typographic composition: that is, if there were text, the choice of text type might well be the starting point. Next suitable contrasting forms would be selected for the display. Some newspapers design their own text typeface, giving them a unique and readable design. Display faces may be varied to suit the context of the material—the business section may differ from the sports section. The combination of contrasts and formats creates the look of the newspaper, and anyone can identify it without even reading the name.

Contrasts are selected and made in more than one dimension. For example, if the text type is a serif face, a conventional choice for the heading might well be a larger sans-serif design. Here the size and the construction contrast. Further contrasts might be added by use of italic or a narrower form. These contrasts are usual for newspapers.

The fundamentally different characters of roman, italic, and cursive contrast nicely. If other elements

are added, such as size and spacing, the contrast becomes still greater. Consider a text set in Helvetica, with headings in a brush-style letterform such as Dom Casual: the contrast is extreme; and, because of the casualness of the brush letterform, the mechanical nature of Helvetica is highlighted. The

overall effect might soften or give a lighter touch to a mechanical subject.

Letterform carries a connotation of meaning in its rendering. Contrasts in connotation should be used carefully in connection with the subject matter. Type forms can be made to seem fat or thin, for instance; and, if the subject were weight gaining or dieting, they would have to be appropriate. This does not mean that typographic composition would immediately seek to imitate the subject matter in

LETTER FORM INFLUENCED BY TOOL

aBC ⎯⎯⎯⎯⎯⎯ **Unical Letter— Reed Pen**

ABC ⎯⎯⎯⎯⎯⎯ **Black Letter— Quill Pen**

ABC ⎯⎯⎯⎯⎯⎯ **Script Letter— Steel Pen**

14-2. The relationship between letterform and tool and craft is implicit. One can use these for contrast and effect when choosing relationships between letter designs.

DOM CASUAL ALPHABET

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQR
STUVWXYZ ?!" " ‡ &
1234567890

14-3. The Dom casual letter, though originally cut for metal foundry type, was designed to produce an image that looks as if it were produced with a brush. As with all well-designed alphabets, a great deal of thought goes into the multirelationships between the letterforms and how they will appear in use. This alphabet was designed for ATF (American Type Founders) when copyright controls assured a lifetime of royalties for the designer and represents many hours of design and craftwork.

LIGATURES PRODUCED BY KERNING

fa fe ff fi fl fo fr fs ft fw fy f, f. f- ae oe If It Of ffa ffe ffi ffl ffo ffr ffs fft ffu ffy ff, ff. ff- af aff ef eff hf if iff kf lf mf nf of off pf rf sf tf uf uff yf F, F. P, P. T, T. V, V. W, W. Y, Y. FA PA TA VA WA YA AWAY FO PO TO VO YO Fa Fe Fi Fo Fr Fu Pa Pe Pi Po Pr Pu Py Ta Te Th Ti To Tr Tu Tw Ty Va Ve Vi Vo Wa We Wh Wi Wo Wr Wu Ya Ye Yi Yo Yu

14-4. The effectiveness of ligatures is more easily accomplished by kerning with phototypesetting, which handles only the image. These are examples of typical ligatures, which used to be cast as separate pieces for foundry type. These were produced by Merganthaler's popular VIP phototypesetter.

type form but that the type form should work with the message. A perfume ad may look very well in a contrasting angular, mechanical type design.

The way in which the type is laid out has much to do with a successful appearance. Because so many factors are involved in selecting typeface designs, contrasts, meanings and connotations, and the layout, a wealth of composition is possible. Even working with a standard set of typeface designs allows tremendous variation.

Phototypesetting permits variations of spacing and sizing with any given font. If the program permits, ligatures can be made, and display spacing can receive special attention. The spacing can extend to the layout of the words and page composition. These factors will also have a bearing on the effect of the type-form contrasts. As the type is closed up, the color becomes heavier. Rounded forms seem more so if they actually touch each other. Ligatures of roman type produce the effect of cursive type. The tendency to space letters more closely with phototype can be used to alter the contrast relationship of the letterforms, but this can be overdone if the touching and overlapping obliterate or distort it. One example of this is when the lowercase r touches the lowercase n so that the two together look like the letter m.

RECOGNITION FROM TOP OF LETTER

identification

identification

14-5. This demonstrates how letter "identification" is made from the top of the letter and how little of the top need be seen as compared to reading from the bottom of the letters. Knowing this helps prevent unrecognizable letter distortions by closing up type spacing.

Altering the letterform relationship shows us that we read letters from the top. This can be demonstrated by covering a line of type; expose from the bottom until the line is readable, then expose from the top. Notice how quickly the letter can be read if just a portion of the top is exposed, while a larger part of the letter must be exposed from the bottom before it is readable. Type design influences readability; some styles are more readable than others. Spacing also affects readability, as does layout; therefore such devices must be used tastefully.

Type-font Availability

Only certain type designs will be available for a specific case. With word processing designs will be on line for the system in use. Theoretically, with the wide market to choose from, there are thousands upon thousands of designs; but, once a supplier or system has been chosen, one must select what is available. Suppliers and systems are often selected on the basis of the designs they offer. Of course, the suppliers and manufacturers of systems know this, and they are sure to offer choices in all the categories that they handle. This does not mean that all suppliers and systems offer all type fonts but rather that they offer selections within different categories.

Working with one supplier or system places limits on type-font availability. One can cope with this more easily by thinking of type composition in terms of form contrasts. This enables one to work with categories of type design rather than specific preferred fonts. The resulting typography can be more successful: the element of taste becomes more important, because the composition is effected through a reliance on tasteful relationships rather than specific designs.

Type fonts are selected by suppliers and manufacturers of systems with a view to their applications to given kinds of typesetting. The selection for computer-operated systems is more crucial because

14-6. In this Alphatype type font the white squares indicate pi-windows into which may be placed sorts or special characters for unique or special typesetting purposes. Each typesetting system presents its own restrictions on or opportunities for design.

fewer fonts are on line, and the masters are designed to carry fonts that have wide appeal and applicability to a range of customer demands. Type fonts may be ordered from manufacturers by suppliers, but they are expensive and cannot be ordered with abandon. The fonts used in a system may be changed, of course, but they would not be changed back and forth during a single job, as this would be costly.

Different computer-operated typesetting systems have different amounts of type fonts on line. For example, the master fonts on the Harris Fototronic TXT (3-3) are arranged two to a disk; and with five disks this system offers ten fonts. Each font can also be used in various sizes. Naturally, the two fonts on a disk would typeset faster, and they are designed for this kind of compatibility.

Coping with font availability in a system is easier when there is flexibility in layout design. By altering the layout of the heading style the character and relationships of the typeface contrasts can be managed to produce the appropriate character for the composition.

The alternative to using available type fonts is to set headings separately and to purchase typesetting from various suppliers. Display headings are often done separately from text as hand-operated phototypesetting. For this reason the majority of suppliers offer various typesetting systems. Craftwork headings are necessarily more expensive than computer-operated typesetting, so they would not be contemplated for a great volume of material.

Galleys from the different forms of typesetting are assembled as paste-up. Spacing and adjustments can be made to enhance the typographic composition in paste-up. The finished work shows what the final product will look like. Extensive respacing would not be done as paste-up, however, because of the labor involved. Finely spaced small letters handled on paste-up give less than satisfactory results.

Use of typesetting systems results in a different approach to design compared to metal typesetting. The arrangement and positioning of complete elements in paste-up is easier than with metal, but the handling of the texture of linespace and of lines of type is more difficult. Just one effect of new methods is the use of greater contrasts of form.
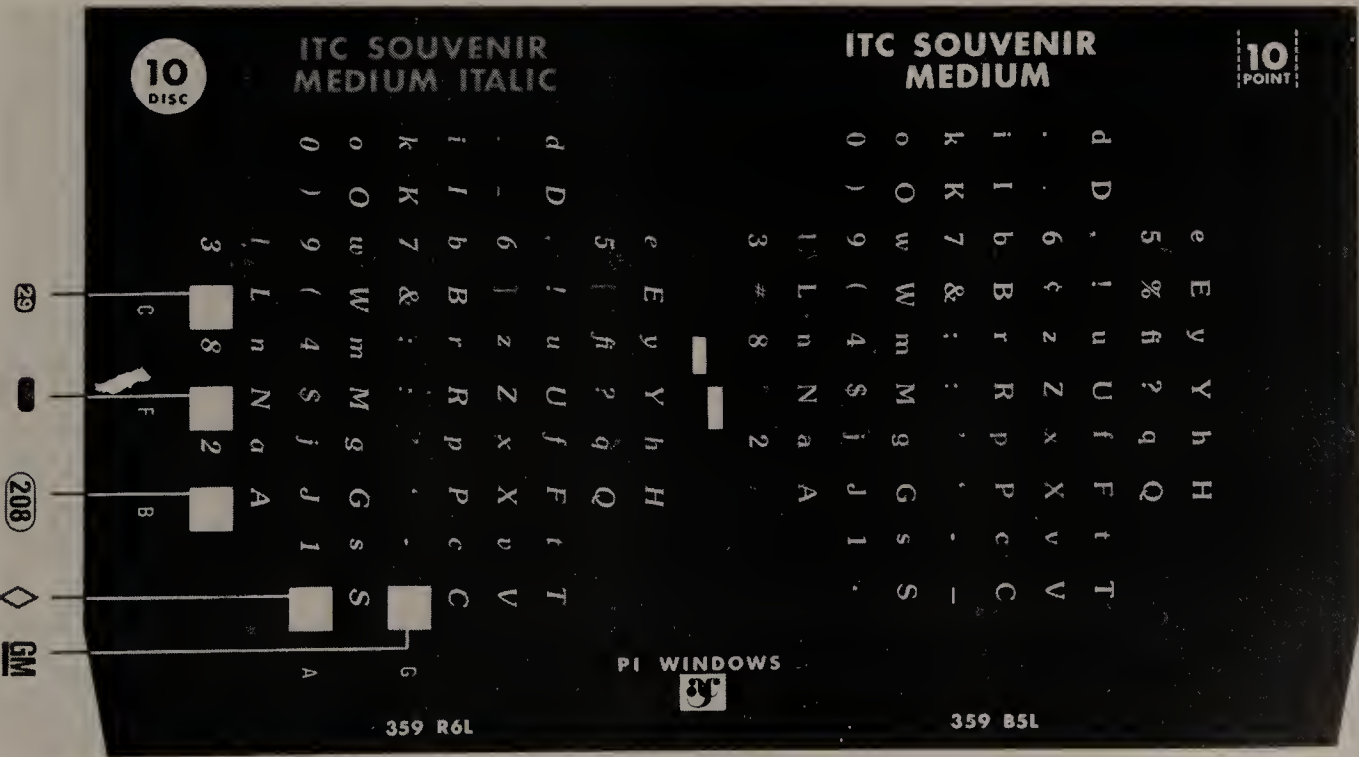
15.

Contrast of Weight

A contrast of weight is a contrast in the thickness of strokes that make up the letterform. Many type fonts are designed in a variety of thicknesses or weights to provide contrast between display and text. As the purposes of display and text composition differ, so do the requirements for letterforms differ. In a conventional sense the larger sizes used for display look better and work better in heavier weights, while the thinner weights most desirable for text are easier to read and allow more density, depending on the surface texture, surface contrast, and technique of printing.

A type font may be designed in one weight. The design is usually directed to a particular purpose, such as text typesetting. Further delineation would relate to a view of the ultimate objective of a particular style of composition. A design such as Helvetica can be aimed at a cool, functional approach to composition, while a design such as Souvenir, with its more rounded forms and serifs, can be aimed at a warmer, more decorative approach. Application of font design to text and heading benefits from a contrast in weight. While different fonts can be used for display and text, a conventional and common method of display, at least for subheadings, is to use a bolder weight of the text typeface. This requires at least two weights of a font design. Other uses, such as running the display in color, require additional weights.

In this way a popular font design begins to acquire many variations beyond its original purpose. Designs are often conceived of in a variety of weights for application to a style of typographic composition. Univers is an example of a design conceived in a variety of weights. Because of different conceptions of design the relations among the different weights also differ.

The selection of the weight contrast of a font design would vary with the application and with the taste of the typographer. The conventional use, aimed at facilitating communication by providing reading continuity, uses sufficient contrast to emphasize the meaning of the display in the context of the message but avoids such extreme contrast that the reader loses text-flow continuity. This concept considers the printed page as a directional composition that leads the reader through the message and is principally directed to a volume of text.

Smaller amounts of text, unique display conditions, and graphic art present other sets of requirements for weight contrast. The function of typographic composition for communication may also vary, especially in the context of the message, and here again the selection of weight in terms of readability would alter. It is convenient to think of conventional typesetting and composition in terms of readability and communication; it is also true that the application of typography to purpose can sway selection in favor of effect or decoration to better accomplish a purpose.

When such a purpose is undertaken, the concept of design is altered, from that of readability to that of effective communication. With this the criteria of design are no longer conventional in terms of typography but only in terms of the purpose of being under-stood. The composition, which may use size, form, and weight contrasts, should be evaluated as to how well it succeeds in its purpose of getting its message across in relation to the means used, including subjective qualities such as attractiveness, relationship of form to content, and comprehension of idea. This kind of composition is purely an art form and may develop its own relationships to conventional concepts and themes of typography. Such a use of typography may be only a spinoff from the conventional design, but in the hands of a typographic designer it can be an art form.

The use of different weights is often a preferred method for gaining contrasts. It is widely used in typographic design, conventional and otherwise. In conjunction with size and form contrasts it provides a spectrum of possibilities. To these possibilities can be added spacing and layout, making the form of typographic composition very elastic. Each of us has learned a concept of type design that we use as a basis for understanding the letterform we are reading. As we become accustomed to the style of a letterform, it is easier for us to adapt and maintain continuity with weight contrast of the same letter-form than to switch to a completely different style.

15-1. The very nice typographic design used on Webster's *Instant Word Guide* provides an example of weight contrast. It uses size and form contrast as well as the contrast between the two typefaces.

15-2. This is the Souvenier type design mentioned in the text. Some systems offer as many as five weights of the design. ITC stands for International Typeface Corporation, which markets and licenses use of its typeface designs.

ITC SOUVENIR LIGHT & BOLD

ABCDEFGHIJKLMN
OPQRSTUVWXYZ
abcdefghijklmn
opqrstuvwxyz
1234567890 &!?£$

ABCDEFGHIJKLMNO
PQRSTUVWXYZ
abcdefghijklmnop
qrstuvwxyz
1234567890&!?£$

Letter sizes that can be read across the room lose readability at arm's length, and even extreme weight contrasts maintain more continuity. These factors perhaps account for the preference of weight contrast in conventional typographic design.

However clever a typographic design, the recipient must always bring some understanding to it in order to interpret its meaning. The degree of departure from conventions, then, should be in the context of the relation of viewer to message. Signs requiring maximum clarity and comprehension are a good example of the wrong place for clever typographic design: advertising directed to a sophisticated audience in a technical journal might benefit from high design at the expense of clarity. Both examples would use contrasts of size, form, and weight but in a different way because of the different relationship of viewer to message.

The use of weight contrast as a primary contrast often also involves a further contrast of size and form. If we assume text as the primary type form, the size may change slightly for headings because of their layout; the letterform must almost necessarily change slightly because of the heavier strokes. In this sense even the most conventional and conservative typographic design makes .use of size, form, and weight contrasts. Contemporary use of computer-aided phototypesetting makes more use of contrasts than before because of their availability. Consider that original type fonts were cut in only one weight; type fonts designed for computer-aided phototypesetting most often have a number of weights and take advantage of automated font changes.

Type Families

All the weights and variations of a type-font design, taken collectively, constitute a family of type. These include capitals, small capitals, lowercase letters, numerals and punctuation marks, and all the various symbols that make up a complete font of type. There are at least fifty-two letterforms, plus numerals, more than a dozen punctuation marks and common symbols, and sometimes ligatures or variant letterforms, which collectively can number over one hundred different characters. The com-

mon concept or theme of the letterform unifies these characters into a font, and repetition of this theme in different weights and variant styles produces a type family.

The variant styles would include italics for any design intended for text use. Outline letters are now commonly available with phototypesetting fonts. Variant letterforms with swashes and ligatures can constitute another decorative alphabet style in addition to the basic form. Ultralight or ultraheavy letterforms may also distort the family theme into a variant style.

The type-family theme relates to a concept that often incorporates a design approach to typesetting composition. Because of this approach to composition the font concept may be that of a family of type for the style of typesetting envisioned. Yet

HAAS HELVETICA TYPE FAMILY

Helvetica Thin *with Italic*
Helvetica Light *with Italic*
Helvetica *with Italic*
Helvetica Bold *with Italic*
Helvetica Heavy *with Italic*
Helvetica Black *with Italic*
Helvetica Light Condensed *with Italic*
Helvetica Condensed *with Italic*
Helvetica Bold Condensed *with Italic*
Helvetica Black Condensed *with Italic*
Helvetica Extended Light
Helvetica Extended Roman
Helvetica Extended Bold
Helvetica Extended Black
Helvetica Compressed
Helvetica Extra Compressed
Helvetica Ultra Compressed
Helvetica Rounded Bold *with Italic*
Helvetica Rounded Black *with Italic*
Helvetica Rounded Bold Outline
Helvetica Bold Outline
Helvetica Bold Condensed Outline

15-3. The Haas typeface design of Helvetica is a complete family of type with many variations. This is the range marketed by Merganthaler.

other type families may have come about as printing and design requirements dictated new variations on the theme. Text type fonts designed specifically for use in phototypesetting are often presented as a type family. Fonts designed primarily for display phototypesetting will usually have fewer weights but more variants of letterforms.

The orientation of type families to text or display typesetting is seen in the emphasis of the theme, the design concept. It is true that any letterform can be used in any way, but it is also true that text faces are designed with the objective of readability and color rather than display. Some display fonts are initially presented only as capital letterforms.

An example of a typeface that grew into a family of type, starting with text type and developing additional variations, is Bodoni. An example of a display typeface is Avant Garde Gothic. An example of a text phototypesetting font presented as a family to include display is Bookman.

One difficulty with selecting examples is that different phototypesetting manufacturers offer variations of a type family under different names. When type designs were cast in metal, the typefounder retained control of the design. Now that a type design is an image easily produced from a negative, copyright control is more difficult, thus spawning a welter of design variations around a common theme. Type-design variations are produced for transfer type and display phototypesetting, which can be hand-operated, as well as for computer-operated phototypesetting.

There are small differences of letterform design and fit among similar type families. The technical aspect lies in the fit of letters in various combinations. The technical requirements for transfer type, display phototypesetters, and computer-operated phototypesetting also produce different designs.

ITC AVANT GARDE MEDIUM

15-4. This is an example of the Avant Garde face mentioned in the text. It offers a large variety of ligature designs for special display.

BOOKMAN BOLD ITALIC WITH SWASH CHARACTERS

15-5. Bookman, mentioned in the text, offers a number of alternate swash characters. They can be used to produce more decorative designs reminiscent of calligraphy.

ITC BOOKMAN TYPE FAMILY

ITC Bookman Light

ITC Bookman Light Italic

ITC Bookman Medium

ITC Bookman Medium Italic

ITC Bookman Demi

ITC Bookman Demi Italic

ITC Bookman Bold

ITC Bookman Bold Italic

15-6. The complete Bookman family marketed by ITC offers a range of weights. The lighter weights are for text typesetting.

Phototypesetting allows the possibilities of kerning and altering the space relationships of a font, which compounds the issue of fit, because letterspacing would usually be considered in the normal mode of letter space. The operation of the phototypesetting machine is also a factor, as is the photoprint or film output, which can make the image heavier or lighter with differing photographic development. Further, photographic platemaking and printing also affect the appearance of the image. All these factors bear upon the appearance of a typeface design.

The best possible image of a design is required for the art of typography in order that the relationships between weights of the font are maintained and that the color and character of the composition are at their best. The hairsplitting differences of weights and spacing may not seem so important to the larger picture until one realizes that a few split hairs laid side by side begin to add up to

COMPUGRAPHIC HELIOS (HELVETICA) FAMILY

Helios Thin
Helios Thin Italic
Helios Extralight
Helios Extralight Italic
Helios Light
Helios Light Italic
Helios
Helios Italic
Helios Condensed
Helios Condensed Italic
Helios Extended
Helios Bold
Helios Bold Italic
Helios Bold Condensed
Helios Bold Condensed Italic
Helios Bold Extended
Helios Semibold
Helios Semibold Italic
Helios Extrabold
Helios Extrabold Italic
Helios Extrabold Condensed
Helios Extrabold Extended

15-7. Helios is offered by Compugraphic. Compare it to the Helvetica offered by Merganthaler (15-3).

quite a distance, certainly a distance great enough to spoil the effect of a typographic composition.

Composition and the use of type families may be thought of in the context of a typographic system. It is the relationship and contrast between characters that must carry the weight of design. While good character design is certainly a primary factor and important for typographic composition, the specific application must succeed in terms of the particular relationships it presents.

System Design

A system combines various elements and pieces of equipment for word processing and phototypesetting to produce typesetting. It is a way of capturing keystrokes, handling them, and producing the output of typesetting. Typesetting has used elements of word processing for many years, such as recording manuscript keystrokes on paper tape; with the computer to handle keystrokes on video display as an edit terminal, it is the same process as word processing.

The design of a system corresponds to the nature of the material to be handled. The first task is to put the keystrokes into machine-readable form for further handling by automated processes. This is a labor-intensive task that usually requires re-keyboarding the manuscript unless it has been prepared in a form suitable for optical character recognition (OCR). OCR imposes additional requirements on the preparation of the manuscript so that it can be read by machine but saves further keyboarding.

With the manuscript in machine-readable form, it can be handled by machine. It can be placed into computer memory, into disk storage, onto magnetic tape, or onto paper tape for further processing. Computer memory may seem most desirable because of its speed and flexibility, but its ·cost can make other system designs more economic. Further handling may mean translating from one machine code into another or moving the manuscript through different processes to get it into its final form for typesetting. These processes and handling requirements involve a system design in which the material is processed. Further processes can be an edit terminal where the material is format-

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on the AM Varityper Scan Set.
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15-8. Addressograph Multigraph Corporation markets this system of optical character recognition (OCR). By means of a special ball font used on an IBM Selectric typewriter, the bar code below the letter is machine-readable as well as being easy to read and work with. The code at the beginning is for the hyphen mode or justified setting, ten-point size, twelve-pica measure, font one. The same code could also be inserted at other points in the system to allow straight editorial matter to be scanned.

ted or where machine codes are added for the typesetting operation.

As the material is processed, it arrives at the typesetting machine. If it has received no typesetting codes up to this point, they will now have to be added to drive the typesetting machine. It can be seen how convenient it is to move the material from the computer into a terminal for processing, then back into the computer for output as typesetting, but it takes only a little longer to physically move the same material on tape from one machine to another. The tape in this case functions as a memory. The material may be in manuscript sequence or it may be sequenced for the functions of the typesetter, depending on the requirements of the material and system design.

If output is sequenced and spaced properly, one can see that this will reduce the amount of assembly time and make composition easier. If it is not positioned in galleys, it will be pasted up for reproduction. Even if galleys are in position, there must still be handling to make-up press imposition.

A knowledge of the system in use will obviously make specification much easier, and, most importantly, it will allow use of specification to reduce special handling so that the majority of the processing is handled by machine. Costly elements of labor are involved with keyboard input, specifying, and output that require further handling as paste-up and makeup.

Many judgments must be made as to the requirements of the material in relation to the functions of the system. Pasting up one page is not the same as pasting up fifty pages, for instance, and placing headings in a space allowed for them is not as difficult as placing subheads as well as headings in a continuous galley. These evaluations play the quality of the finished product against the amount of labor involved and its costs in relation to the product being produced.

Typesetting machines are designed with such requirements in mind, and the majority if not all provide space for two fonts to run at the same time; some have more. This permits subheads to be set with running copy and allows for a number of other typographic refinements to be done by automation. The relationship of the fonts on line is chosen to

satisfy the largest number of users, and often these fonts contain two weights of the same typeface for use as contrasting body type and subheads. On balance, then, one selects typefaces in relation to the system to facilitate the typesetting. Headings may also be included, but for design effectiveness they are often handled separately, even on separate machines, because there are fewer of them and because they are less likely to be used in a way that requires fitting text type around them.

System design is constructed to anticipate typesetting requirements. A system designed for advertising would have the flexibility to handle a greater variety of display requirements than would a system designed for book typesetting. Conversely, books may require footnotes, for instance, or difficult mathematical typesetting, which would not be relevant to advertising. The different systems would concentrate on the special requirements of the products they were designed to produce. Since typesetting machines do the same job, differences of system reflect different requirements of taste for typographic design.
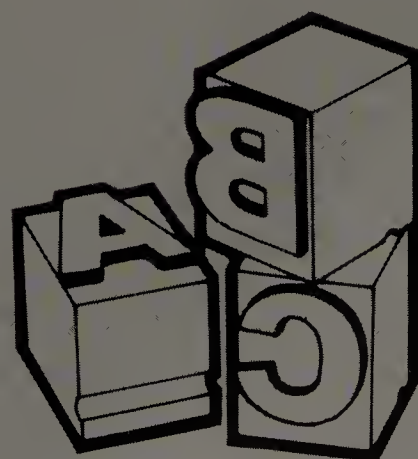
In-house
Graphics

16.

Capability

The capability to produce in-house graphics entails the capability to communicate graphically. An increasing amount of business communication must be put into graphic form. Intrabusiness memos and interbusiness letters, themselves an extension of verbal communication, are now being improved upon with an ever-expanding set of techniques for duplication and production. The channels of business communication include many techniques. The equipment is often expensive, but the exchange and gathering of information is necessary and cost-efficient.

The use of art or illustration clarifies communication, and specific technical information can almost require a drawing. With specific communication, the imprecise word is abandoned for explicit drawings, and language is used in relation to graphic symbol. Both graphic symbol and language become an art form to serve the idea that they are intended to communicate.

The specialized information and interrelated functions of most businesses produce an information gap. The expansion of techniques and the development of equipment, much of it computerized,

have begun to close this information gap. Numbers of service businesses have developed around the need for information. Most large businesses have developed in-house capabilities; indeed, the Fortune 500 have led the way in the development of graphic in-house capability. With the development of reprographics, smaller businesses have followed this trend. Work that was once orphaned or left to the advertising agency, if it was done at all, is now done in-house.

More than merely a technique for communication, the capability of generating graphic material is useful in formulating new ideas. It coordinates the interaction of various specialties and departments, and a better line of communication between interrelated functions provides greater productivity for the organization. In-house graphic capability generates ideas as well as expressing and communicating them.

Graphic specialists in-house have an intimate knowledge of the activities of the business, are versed in the concepts used by the business, and are required to have this background to their specialty. The occasional use of outside services can-

not compare to use of in-house specialists, and executives who use these services were quick to see this difference in knowledge and motivation.

As a business expands its communications, language communication expands into graphic communication. If a secretary's written communication is indispensable, the copier, word-processing equipment, and phone communications with the capability of transmitting and receiving graphics and linking information storage are also indispensable—the use of the graphic capability grows until it is a resource for the company. For the manufacturer this means providing information for clients rapidly; for the service business it means coordinating functions; for the business itself it means newsletters and a more immediate knowledge for company personnel of priorities and policies.

This produces a greater awareness of graphic communications in the company. Because word processing can be done as typesetting, the instances where a better appearance is an advantage will utilize typesetting. Use of graphic symbols with typesetting is a natural next step, in some cases a necessary one, and a business finds itself

GRAPHIC CAPABILITY

Conventional Graphic Procedure

| Concept | Copy | Design | Type | Assembly |

Word Processing Capability

| Administration | Processing | Type | Paste-up |

16-1. Business word-processing capability closely follows the pattern of conventional graphic procedure. The missing elements of copy and design are supplied by administration and through formatting. At the other end paste-up is a simpler procedure than assembly.

with an in-house graphic capability developed specifically to serve its needs.

The extension of type plus art makes possible an in-house art department, a department that makes the fullest use of equipment capabilities. Taken together in all its functions, the expanding use of communications equipment generates a communications department. This department provides the various functions of graphic communication and can include a total complex of communications services, with specialist support at various points as required by the needs of a particular business.

Complete System

The capability to handle information in various ways, to generate and produce, to transmit and receive, to file and retrieve, comprises a complete system. Graphic capability affects the production of communication; equipment and the course of business practice affect the transmission and reception of information; utilizing information requires management of its flow. The concept of communications as a complete system is wide-ranging and can include practices previously taken for granted. A system means that they are consciously utilized and designed for greatest effectiveness and lowest cost.

Increasing costs and expansion of communication have required in many instances a management executive, a communications director, to organize a system and to control costs. The position is often at the level of a vice president because of the scope of management. Beginning with telephone systems, lines, and services, communications can extend to information management and data links, word processing, reprographics, and graphic production. The functions can include both intrabusiness and interbusiness communications, such as company publications, public relations, advertising, and the personnel and purchasing of equipment for these activities. Research and analysis, of course, are part of the implementation of these functions.

Word processing is of particular interest, spanning as it does executive functions and corporate communications. The organization of these channels of communication, the acquisition of equip-

ment and personnel, affects the operation of the executive community and benefits from redesign of executive information flow. In essence this means the linkage and pooling of some executive communications functions for the sake of expanding their range and efficiency by creating a word-processing department on line with computer and
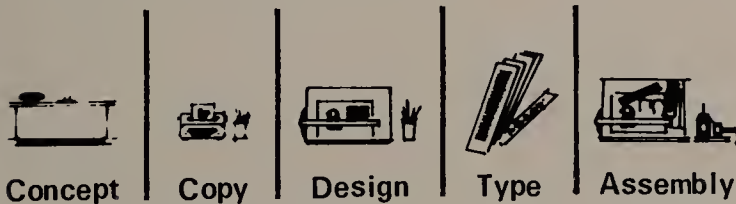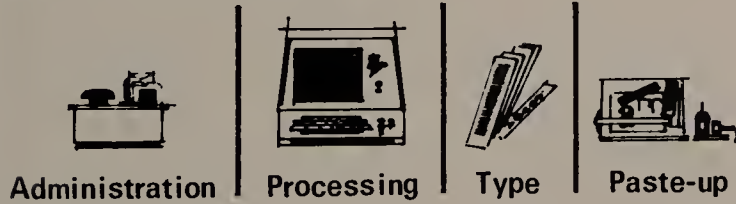
GRAPHIC SYSTEM

WORD PROCESSING

REPROGRAPHICS

GRAPHIC PRODUCTION
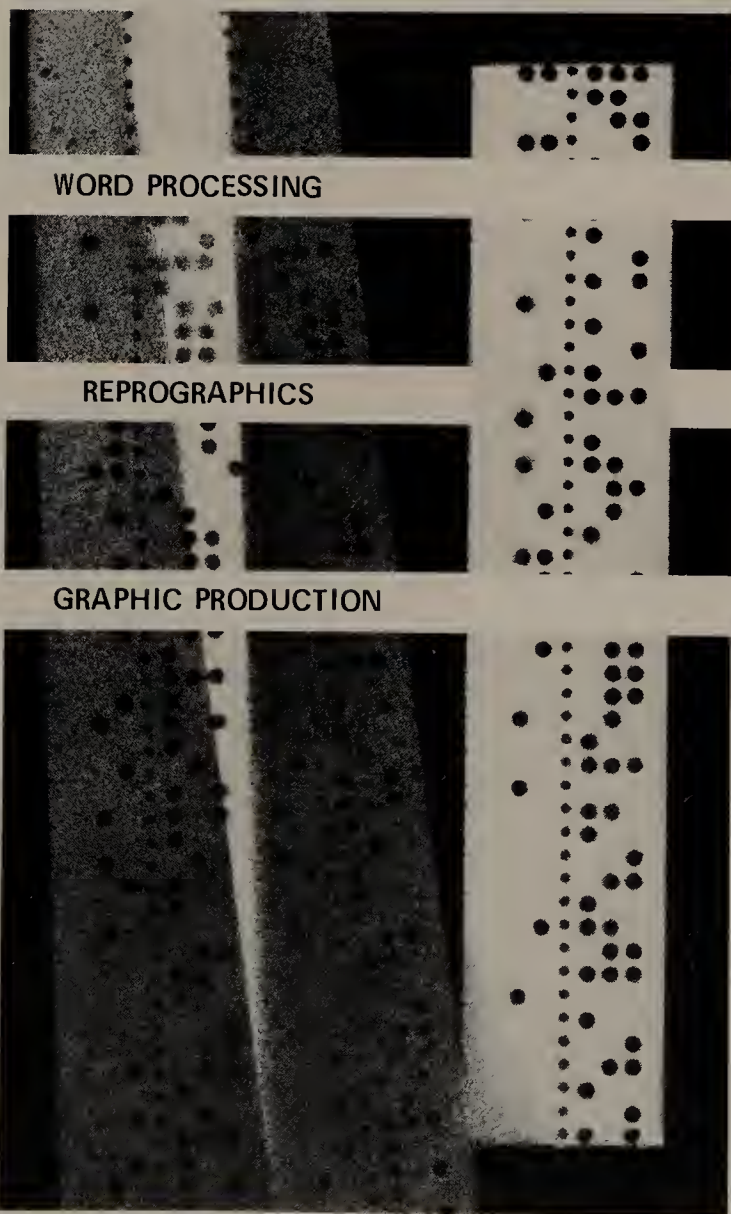
16-2. A complete system provides capability in these areas. The electronic links and computerized automation help to simplify the process of producing graphics when compared to traditional practices.

other intrabusiness links that provide information and extend the range of communications.

In the concept of a system communication becomes an integral function, with parts of the complex related to the whole. The pooling of information gives the greatest value to the information: linkage and interrelationships provide the greatest potential for communication. Pooling and linkage then provide the opportunity for specialist functions. Word processing, as a specialist function, provides for typesetting, and typesetting provides for graphic production. Such expansion is subject to business needs and effectiveness, but the relations of a communications complex immediately provide the channels for such development and for in-house graphics. These increase speed and effectiveness and reduce transportation needs.

Word processing is a key point for communications because, depending on how it is used, it provides the means for linkage with communications channels and the potential for graphic production. The complete system would include all graphic functions. This relationship of word processing to computer input and output can provide computer-managed filing and retrieval of information as well as linkage to a communications network. The amount of equipment and degree of linkage are matters of communications design and cost effectiveness.

Use of word processing does not eliminate the need for generating graphics nor for arriving at the ideas needed to produce graphic communication. It does not eliminate executive responsibility nor reduce management and executive function. A complete system for communications merely provides better tools, and the restructuring of communications functions can also provide specialist assistance for the development and expression of executive ideas if they are expanded into in-house graphic capability.

Use of the tools and elements, of portions of a communications system, opens the door to the development of a complete system. The effectiveness and laborsaving qualities of these tools can also be used to produce graphics together with specialist subcontractors. If used in a systematic relationship with subcontractors, these tools can effect substan-

tial savings, as when a keystroke tape of a manuscript is taken from a word processor and given to a typesetter, thus eliminating the need to re-keyboard the manuscript.

A complete system includes all the functions used for communication and a design that best relates them. The interrelationships of separate elements make up a communications complex, with separate and cross-related functions. It is designed according to the functions used in the specific business activity.

Functions

The complete communication system with its graphic capability functions as a tool for business. As well as being a tool it can help generate ideas, particularly for research, design, planning, and development. This is because formulating the expression or graphic representation of an idea often interacts with its development. The representation of the idea is communication's presentation.

The two aspects, formulation and representation, are really quite separate. To bridge the gap between the two, most of us require an objective view of the idea we are developing. This helps us evaluate it. Evaluation often occurs when all the parts are seen in their relationships in the presentation. Most executives are familiar with this phenomenon. The clearer the thinking in inception, the less the requirements for revision as some unexpected relationship is perceived. When graphic capability includes the visualizing process, its effectiveness is even more pronounced. Handling and developing visualizations utilize the abilities of the artist, and visualization helps to make the presentation even clearer to the executive function.

Graphic presentation is the legitimate function of graphic capability, even though it is also involved with development. The presentation functions as communication. It is the product-vehicle of a communications complex. The concept of communications presents an abstraction: the essential product of communications is information, which is also an abstraction. To think of the form of this information as it is presented is to focus on the product-vehicle instead of the information, but this is a natural tendency because we have always dealt with the

elements that make up communications capability as separate entities, as ends in themselves. In other words, the presentation has been the focal point instead of the information, and the function of communication with presentation has been assumed. With the concept of a communications complex, graphic capability, as part of the function of communication, takes on a different dimension.

The traditional use of graphics has been to produce a presentation vehicle for communication. The executive uses trained specialists to implement the production of this vehicle. The communications concept focuses on the abstraction of information instead of the vehicle, and the technology places the executive in direct contact with implementation without the assistance of specialists. Few executives are expert in the graphic production. The only exceptions might be executives who function in the area of graphic arts, though no one in graphic arts is a specialist in everything. By pooling the functions of the communications complex and by designing the system to include specialist functions, the executive is relieved of any necessity to be an all-round graphics expert, and he gains the assistance of specialist functions in-house. The executive can then approach the development of the communications product-vehicle in a more traditional manner.

With this interpretation, the functions of graphic capability resemble a traditional art department. The forms are not really traditional, though, because of the relationships, automation, and other functions of a communications complex. These new features lie in the functional control of specialists, and the executive, relieved of the necessity for dealing with the technical aspects, can work with the communications system according to his needs and uses. In a comparative sense the system of the graphic-arts industry has moved into the office to work alongside traffic, telephone contact, and management. Traditional skills are fused into relationship with new technology, though these skills incorporate so many new functional dimensions that they really can be characterized as new in themselves.

The traditional functions for dealing with the new technology of communications and in-house

graphics are the basic functions, the fundamentals, language skills, drawing and rendering, and the ability to formulate ideas and concepts. These skills and the communication environment are essentially traditional. The technical tools, relationships between them, and in-house application are new.

The functional transition of communications from an industry to a technological tool imposes changes in many relationships. New relationships in communications will affect the function of every level of executive. Those most affected will be those who deal in communications. Sales and distribution, marketing, public affairs, public relations, advertising, industrial relations, research and development, planning, organization, and traffic are some fields that are particularly involved with communications. A secondary effect would be felt by purchasing, personnel, and a number of other operating executive functions. It is also safe to say that the benefits of better communication, better information, and the resulting better coordination of products and services will be felt by everyone.

The functions of business communications in the context of a new technology can be expected to bring improvements. It does not take great intelligence to anticipate many improvements for business in the coordination and distribution of goods. Distribution of supply in the process of meeting demand has always been a difficult area. Anything that helps ameliorate this difficulty will prove beneficial, and anything that disseminates useful knowledge and information has already proved to be of value to society at large. Such fundamental benefits provide an almost irresistible motivation for the development and use of a communications complex with in-house graphic capability.

The expansion of business communications functions has inevitably led to more business opportunity. This in turn leads to growth and a greater profit potential. Interbusiness communications functions have traditionally received the greatest attention because presentation is believed to influence acceptance. With competitive motivation it may continue to lead in development of communications because of the traditions of public presentation. Intrabusiness communications, previously relegated to informal meetings, then to conventions and trade shows, now stand to improve from more immediate knowledge and elimination of overlapping effort. This will energize growth in real terms instead of paper growth of higher figures without substantial productivity increase.

The use of communications technology makes graphic capability more available to every business, large and small. The technology can be in-house or linked with that of subcontractors. It reduces the costs of graphics. It portends more use of communications and less use of transportation and with this a growing use of graphics.

16-3. NTIS stands for National Technical Information Service, which is part of the U.S. Department of Commerce. With the appropriate terminal, phone lines, and computer memory it is possible to plug in and work directly with the government's computer record of research abstracts. These abstracts are tabulated under twenty-six different fields. Think how much needless duplication of business research could be avoided and how much could be coordinated by having the information about who is doing what. This is a function of a communication system that assists with formulation preliminary to the development of graphic representation. Systems of word processing and typesetting are a part of the communication system.

17.

Use of Graphics

Graphics in the service of business is a vehicle of communication. That graphics is a form of art and useful for the practical development of business concerns is secondary to its use as a vehicle for information in the context of practical service. Just as intelligence is necessary for the use of logic, art is necessary for the use of graphic communication; the motive determines the relationship to the end result. It is in the development and use of graphics, the reprographics and communications system of word processing, that skills are applied and function as a resource. The many possible business uses are so diverse as to defy description, with the use of graphic products for specific communications designed to serve the purposes of the user.

The many communications products include memos and letters, certainly, but also extend to reports, presentations, news, information abstracts, brochures, catalogs, pamphlets, newsletters, bulletins, and mailers. These can also include visuals. The visuals—charts, technical drawings, photographs, and other illustrations—follow the channel of communications development through reprographics to their reproduction for distribution. They become communications products as such products have always been considered; the difference is that they are produced by a communications system through in-house graphics.

Displays, printed matter, and slide shows are all graphic products. These products are in common use for business communications and usually they are fabricated by specialists. Each area of graphics is a specialist area, as the technology has expanded to include more complexity. Use of such a large range of graphic product would be beyond the requirements of all but the largest business. Each specific business has its favorite vehicles for communications based on practical experience and information requirements.

The trend to increasing complexity is common to many industries, and it plus the specialization that it produces create the need for communication. Many projects require the combined efforts of a number of specialties. The use of graphics is a natural consequence. The use of different jargon in different fields of specialization and the need for very specific information and communication between them make it very effective to use visuals to

clarify meaning. The same is true in regard to business size, vertical specialization, and the increase in levels of management. The need for a particular kind of graphic product differs with industrial and service businesses, but the use of graphic product is common to all.

Use of in-house graphics by a business would concentrate on the same methods of communication as were used with previous channels of communication. A communications system can also expand the range of possibility. The exceptional use of special skills would be subcontracted as was formerly the case. With word processing and com-

17-1. Genigraphics® is a subsidiary of General Electric Company. Genigraphics develops art by computer. Above is an example of a color slide developed with the 1001 symbols in computer memory, a few of which are shown below. Genigraphics® presents computer speed and artistic creativity in developing graphics for slides, though it is applicable to any number of other uses. The original record of any slide may then be filed in computer memory for immediate duplication.

puter technology for management of information in-house graphic capability is linked to that of the specialist, at least as it applies to typesetting. Depending on in-house development of graphic capability, the communication is developed for distribution with in-house facilities or merged with that of a more specialized commercial graphic capability.

The channels of graphic product are based on previous development of the graphic-arts industry, and the use of word processing for in-house graphics simply follows in kind. Use of word processing patterned to follow office procedure differs only in degree from the same system extended to typesetting. The capacity to do word processing can immediately be adapted to graphic product. If a secretary uses this to design and print out a letter, this is only a different product application, because the same record can be used to design and print out a brochure or other product. It could be used to make any kind of suitable graphic product. If the immediate tools are not the same, the record can be transposed from one machine to another. In-house graphics derive from use of machine-readable information.

The greatest difference lies in the skills of the user as applied to output of machine-readable information and the use of a machine appropriate to the graphic product. Once typesetting is used, the line of production is such that any number of products are possible in-house. With greater skills in design and visuals in-house graphics becomes an art department that is part of a communications complex.

Art Skills

The use of word processing for in-house graphics implies the need for typographic or art skills to design and produce the graphic product. Certainly the same skills are required as for professional commercial graphic studios. Office skills do not include art skills, because the extent of office graphics has traditionally ended with the business letter. Word processing places the tools to produce graphics in the office and in the hands of the executive and office staff, and these hands have no skills in graphic production in the context of traditional office procedure.

Word processing and the use of typesetting extend the range of office activity and provide a first level of graphic production in-house, but not all secretaries have the interest or desire to extend their capabilities to graphic production even on the simplest level of formatted design. All that is required for the expanded functions of word processing is a division of functions according to aptitude and interest. With the concept of a communications complex, the divisions are more extensive and specialized, adding in-house graphics to the range of office practice.

The division of office practices into a new hierarchy presents the opportunity for new categories of job functions. The fast-disappearing secretary and jack-of-all-trades guy (girl) friday can be specialized into particular functions in a communications system. Many younger people prefer a specialized function with a future, and the systems design of office communications fits right in with the social philosophy and individuality of people coming into the job market.

As a communications system incorporates office graphics, the skills include language, keyboarding, a knowledge of the communications system, and a knowledge of related business concepts. The addition of typesetting adds the requirement of a knowledge of typography and of the aesthetics of type design and composition. The use of these graphic skills to create a product beyond the simplest formatting requires a knowledge of graphic product, graphic design, and at least the technical skills to assemble graphic material in relation to reprographics. The degree of complexity beyond merely typewritten material becomes apparent, and the job functions for specialists are therefore easy to justify. That these job functions can be extended to a complete in-house graphics system is fairly obvious, and such an extension is available as the situation warrants.

The design of graphic product and the inclusion of visual material are the point at which art skills become a necessary part of a communications complex. There is no automated substitute for art skills. The ability to visualize and to draw in relation to an individual and unpredictable need can never be automated. The closest automation can come is

storage of predesigned formats, a catalog of visuals, and the capacity to produce a chart from formatted statistical input. Here the problem of automation coincides with that of a communications system: there must be sufficient demand for automation or a format before it is economically justifiable. At present the cost curve determines the design and programming of automation and also of a communications system.

It is assumed that the programming and software for a communications system is that of the manufacturer and that the user takes software off the shelf, since the development of a system from scratch is a really sizable and costly undertaking appropriate only for the largest users. An example of one such undertaking is that of a very large aircraft manufacturer that developed a program for translating existing orthographic drawings into perspective drawings. It was felt that this would result in considerable savings on the thousands of drawings used in instruction manuals. The difficulty with this program is that the existing orthographic drawings are data and must be input by tracing

17-2. Alpha Comp teases and vaunts the simplicity of its photo-typesetting system in a series of ads that demonstrate how someone with only a few hours' training can operate the system.
Beyond the format the need for typographic design again arises. **105**

them with a stylus or wand in order for the program to produce the perspective drawing, though this requires less skill and is quicker than actually doing a perspective drawing.

The normal use of graphic product is extremely variable, and with such formlessness it is logical to use art skills rather than automation, with the added benefit of specialist support for visualization and the development of ideas. This means use of the design and visualizing ability of the artist or designer. With the expansion of communications needs more specialist functions can be added. These skills relate to graphic product just as they do in the graphic industry, which deals with custom communications problems not as an in-house system but as a system nonetheless. In-house skills are those of the graphic industry, art, copy, technical, and craft skills. Many large businesses, the Fortune 500, for example, already have such installations.

The capability to store and move graphic product electronically with automated equipment internalizes communications. Graphic services have always been used by business; but, as the use of these services increases and the ability to coordinate their function with other business activities becomes available, there is an advantage in cost, speed, and specific application in bringing them in-house. In doing so the expertise of communications specialists becomes support staff for business executives. The relations between executive and specialists remain just as they were before such a transition, but there is the added benefit of more specialist knowledge of business function. The specialists have a similar hierarchy to that of the graphic industry and the same job motivations, but again these will be applied to the interest of the particular company. As the size of the communications system increases, the levels of management also increase, which provides upward mobility and job motivation. Nor does their specialization crowd the executive.

The secretarial position is replaced by that of an administrative assistant, which is fast becoming more popular and not only for women. The small business without the staff for specialist functions must compensate by investing a single position

with a number of functions and relating the communications system to outside subcontractors. Word processing and editorial and typographic skills would be basic. Outside suppliers of typesetting, art, reprographics, technical and craft services, computer timesharing, and independent message lines can be used to fill in a communications-complex concept.

Different businesses provide a variety of resources for communications positions. The nature of the business and extent to which it deals with communications services provide the urgency for development of a communications system. The functions and job classifications, with their interests and motivations, also provide a resource for the development of a system. The equipment for in-house graphics does require investment and maintenance costs, but word processing can be as simple as a recording typewriter.

Resources

The resource of technology produces the opportunity for in-house graphics. It relates production functions, merges and integrates the requirements for manpower, and produces new channels for use of graphics. Each subsequent element can be used as a resource—system functions, personnel, and use of graphic capability.

Use of a recording typewriter that produces a machine-readable record puts the user on the way to use of graphics with a communications system because it provides the machine resource for typesetting. The work begun in-house can be translated from one machine-readable form into another for further development into typesetting and into graphic product. With this the use of graphic skills can be added to office skills by buying the skills from a subcontractor. This arrangement allows the use of traditional office methods and personnel up to the point of producing a graphic product. The graphics are provided by the graphic industry until expansion or development makes it desirable or economic to provide the resource in-house.

Finding people with expertise in the new technologies has been a difficult problem. That this technology is applied to graphic product should indicate a resource, the graphic industry itself,

where all skills are available except the necessarily new technological ones.

The expansion to in-house graphics from a minimal point of reprographics causes a problem for the user when the expertise of subcontractors is no longer available. To accomplish the same result, the expertise will have to be available in-house. The two methods for dealing with this problem are a continued expansion of the use of subcontractors until in-house graphic personnel can be hired or the use of simplified typesetting in predesigned formats that permit office skills to be adapted to typesetting. Advertising for communications equipment that claims that typesetting can be performed by a
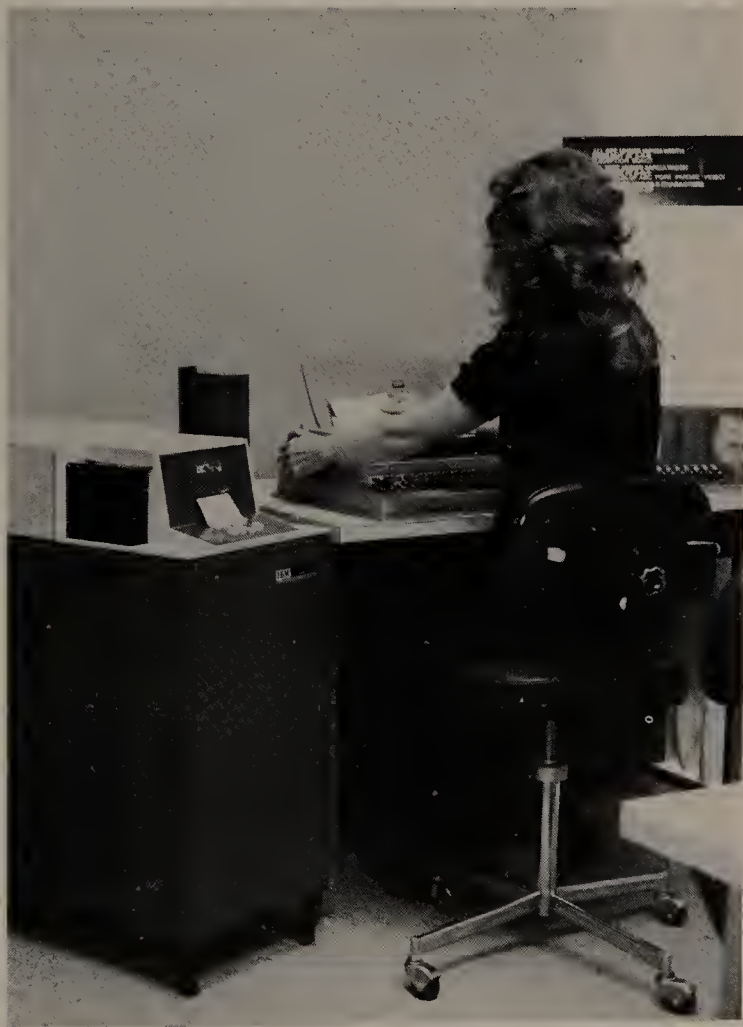
17-3. Training personnel is one way to find resources for word processing and typesetting. Women are now entering the field of typography. The traditional graphic market is another resource for word processing if the product is intended for production at graphic-quality levels.

secretary after two hours' training is accurate enough but overlooks the fact that the typesetting is formatted to simplify the design and selection process that must necessarily accompany its use.

The first solution is obvious enough; the second requires some development of format solutions appropriate to the application. With use of design formats, specialization and restructuring of office function are also beneficial to enhance the development of the skills required. It is a big jump from secretary-typist to typesetter in spite of the fact that a trained secretary has keyboard and language skills if you consider that traditionally it took five years to become a journeyman typesetter. The comparison of new graphic product with traditional is an instinctive comparison that everyone will make; and, while in-house graphics for business can be done at a utilitarian level, the use of typesetting implies a workable level of design quality for effective graphics.

The position of company art director is a traditional resource for bringing graphic product in-house. This is an art-oriented function with scope to coordinate, buy, and subcontract art and typesetting, also to produce and assemble it. This traditional position is more effective for some businesses than others, but it can work with in-house typesetting to provide a full range of graphic product for a communications system. Use of an in-house art director can become the basis of an in-house art department.

The development of in-house graphics from the starting point of typesetting would naturally turn to the graphic industry for resources of technology, technique, and personnel. The roles of graphic personnel require only some restructuring of office practice along the lines of graphic speciality. Graphic personnel are work-oriented specialists, not business-oriented specialists, and this gap of reference must be spanned. The disappearing position of linotype operators might provide a personnel resource with language skills and typesetting knowledge. The transition to business environment and technological change of machines and keyboards might be bridged by reorganization of office function along lines of graphic functions. The transition to new technology is new to everyone and

all personnel will require training in it, but the graphic skills are not new and subcontracted skills relate to in-house graphics.

Typesetting bridges the skills of the office and those of graphics. They are not the same, but new technology relates the functions. Whether graphic specialist or business specialist, all can now share a common environment. The in-house use of functions now related by technology is not traditional as to environment, but the functions are traditional in terms of the development of graphic product from entrepreneur through specialist to product. The in-house arrangement is economically functional; and, depending on the needs of a business activity, the new environment can be shared.

Communications technology is not uniform in its skill requirements, and it involves many machines. Word processing is the fundamental for handling graphics electronically, but beyond this base a system can be designed and developed in a variety of ways according to the flow of communications traffic. Similar machines perform the same functions but in a variety of ways. The functions of communications technologies offer different techniques for developing graphic product.

18.

Techniques

Word processing, used for a communications system and for typesetting to produce graphic product, provides a technology that can be operated upon in a variety of ways. There is an interaction of the conventional with the new, as technique is developed for a communications system and as graphic product is developed. The existing graphic traditions and practices provide a base for expansion, but new technology provides the opportunity for different application of technique.

In the early part of this century no one apparently considered the linecaster a suitable machine for a woman to use, with its molten lead, its font trays of forty to fifty pounds, and its industrial environment. Along with other machinework; as a result of traditional social concepts, typesetting was considered man's work. The change to electronic techniques now places the machines in the office environment, because they are smaller, lighter, and quieter, and in many instances no one must carry anything heavier than a piece of paper. Electronic coding and movement of the image by computer do all the heavy lifting and machinework. With changing social tradition, is typesetting only woman's work?

These changing techniques pose more questions than those of how the work should be done, for in the mix of technique and application questions of role and identification, of function and communication, of tradition and adaptation arise. They imply more than the transition of craft to new technology as publishers and businesses adapt to electronic techniques for cost-effectiveness. Existing craft unions and thousands of graphic workers the world over must accommodate to changing techniques. That these techniques function within the office environment, that they produce a new entity of the communications system, only extends the questions.

The variety of applications and uses of electronic technique are delineated to some extent by the purpose. The purposes of office word processing may not be the same as those of specialist typesetting, nor are the skills applied to these different purposes the same, though the techniques are similar. The techniques of word processing are adapted to the environment. Publishing more completely integrates the functions. That the business environment steadily increases its editorial and publishing func-

tion as part of its communications growth can be interpreted as a precursor of the ultimate merger of techniques.

The information revolution following the development of computer technology about thirty years ago is considered by many to be far bigger than the industrial revolution. A U.S. Government study shows that over half of America's wage dollars go to people working in information and communications. The techniques for handling this information are many and varied in particular application, but in common they are handled electronically.

Much information is processed as symbol, primarily the alphabet and human-readable word processing. As well as the individual handling of symbols the scanning technique is important for graphic reproduction and human communication of machine-readable information. Scanning can also handle language symbols, but it does this by scanning the image and handling the information as image instead of handling the language symbol directly as a unit. The advantage of scanning is that any version of graphic symbol can be handled as graphic image; the disadvantage is in the speed of handling or the quality of reproduction. Both techniques can transmit information, with additional techniques to reproduce it. The same information can also be stored and accessed electronically either as bits of code or as graphic image on film.

Among techniques for graphic reproduction the use of video is primary. Techniques for reproduction on paper are: photographic, as used in phototypesetting; electrostatic printing, as used in a Xerox copier; ink-jet printing, as used by IBM; and direct impression, as used in a computer printout or typewriter. Computer-controlled images can be reproduced on a video tube, then reproduced on paper by different photo techniques. The electrostatic technique of copying, most familiarly seen in a Xerox copier, can also be driven by computer image instead of graphic image to in effect print information developed by computer. The use of photographic technique for quantity reproduction processes is traditional, but both electrostatic and ink-jet printing are computerized developments that offer the possibility of altering the printing image during the printing run. Their use is restricted to

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18-1. The Xerox 9700 Electronic Printing System combines the functions of typesetting, graphic art, printout, assembly, and printing into one machine operation. Electronic forms, fonts, signatures and logos are digitally stored in memory within the 9700 for various formats. No one will complain about the printing noises or smells, because the printing sounds just the same as a normal Xerox copier. Quality judgments must remain subjective for each individual, but the resulting image is very nearly at a par with that of much instant printing.

DATA STORAGE

Ultramicrofiche

Ultrafiche

Microfiche

18-2. Systems for communication may also involve filing requirements. Microfiche is a graphic system for filing that can be managed by computer as COM. Ultrafiche and Ultramicrofiche are even smaller for greater storage density. Their use would depend on the requirements for image quality in reproduction.

utility quality, but both have the advantage that the printing element is manufactured electronically by computer. The finer applications of electrostatic printing are approximately equal to direct-exposure plates for offset printing.

Because of the large office market manufacturers have sought a high degree of automation to reduce the requirement for skills. At the same time the requirements for reproduction quality have been considered lower for the utility of business communications and to reduce costs for equipment. Phototypesetting techniques, first developed in the fifties and computer-driven in the sixties, have been refined rapidly, and the cost for equipment has dropped steadily. Graphic-quality, computer-driven phototypesetting machines are a fraction of their original cost after two decades of development, and lower-cost units are suitably priced for office application. The simplified techniques of typesetting for business use utilize a system of formats to lower the requirements for graphic-arts skills to a level suitable for business-office applications.

Systems and Formats

The system-think of computerization as applied to typesetting results in the design of a system of typesetting. It is similar to the more traditional format. In the context of machine function a system excludes certain functions in favor of programming those that apply to the desired format. In the context of design a system excludes a variety of possibilities in favor of automating the desired format. A system defines functions; a format defines design and application.

The adaptation of typesetting to the office environment creates the need for systems and formats to simplify typesetting practice. The conventional format is a repeated design of typography that conforms to certain particulars in every instance. The regularity of this conformation identifies the format, and formats have long been used to provide graphic identity for various advertising and public-relations activities. Because the format provides rigid guidelines for a specific style of typesetting, it is in effect a recipe for typographic design.

A typesetting format can be any kind of design,

and it can be made up of different kinds of particulars. Most commonly it consists of a particular typeface used in specific size relationships. Often two typefaces are used, one for headings and the other for text. The placement of headings in relation to the graphic space can also be specified. In view of these particulars it is easy to see the relationship of a format to the specifications for a form business letter and more specifically to the style of business letter used by a particular business. The style of a form business letter is a good example, because most often it is considered in relation to a letterhead design and is consciously chosen. With this example it is easy to visualize the extension to a format for the headings and text used in typesetting copy in relation to a letterhead or logo design.
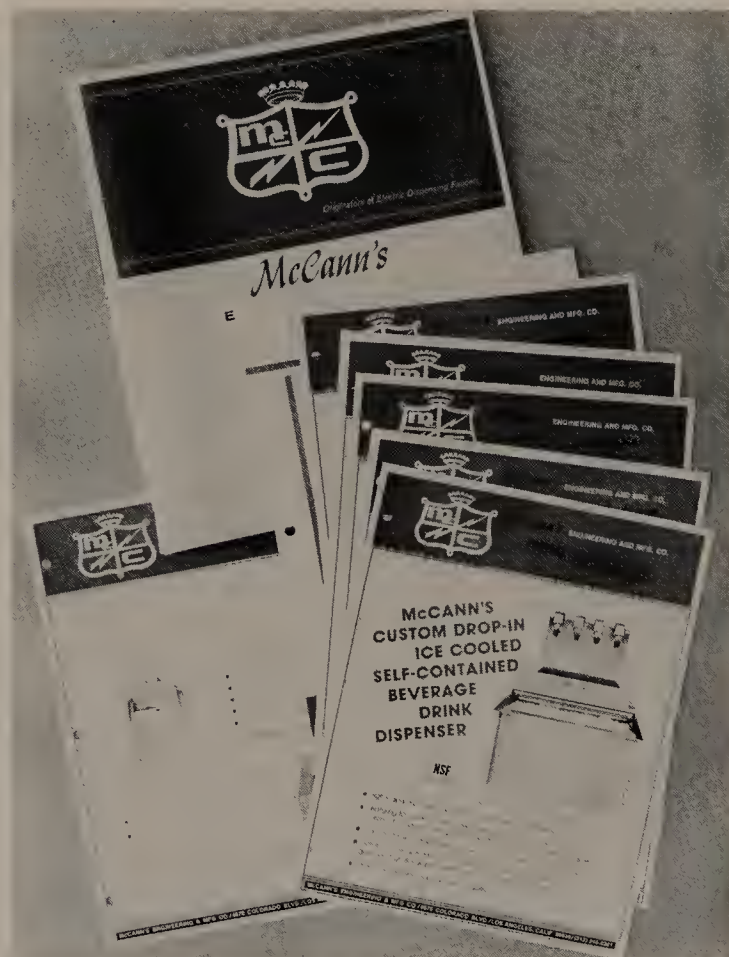
18-3. Here is a nice format design that works in various applications for McCann's products. The excellent use of the format with typewritten material and graphics, shown at the bottom, still does not compare in effectiveness with the use of the same format with typesetting.

Because the format is predetermined, the variety of choice is narrowed, and the aesthetic problem is thereby reduced to the range of the format, not the entire field of typography. If the format is well designed, this has two advantages: it makes typesetting easier and it allows systematizing the typesetting in conformity with format requirements. According to the design of the format, the resulting typesetting should also have an attractive appearance and maintain an aesthetic standard.

It should be easy to see that a great deal depends on the range, workability, and application of the format to various needs of a company graphic program. Naturally, the relation of graphic design to company identity would need to be considered, as would the appearance of the design in all its possible applications. The design of a format for a program of company graphics can be a sizable undertaking and require a high degree of skill as well as capital investment.

The relation of typesetting to an overall format design involves equipment with the necessary font designs and sizing capability and programs that automate the unchanging portions of the format. In its execution the format design becomes systematic, and the equipment integrates along the lines required by the format design. Since typesetting equipment is designed with many capabilities, its use in a format subtracts from its potential. It adapts the requirements for design skill and the potential of the equipment to the requirements of the format. The use of typesetting is then effectively systematized.

Future changes of format design or expansion of typesetting capability would only require the program to be changed to the extent that the format is programmed or the addition of typefaces and sizes. It is natural to make changes, and people like a degree of challenge in their work; beyond the aesthetics of format design the goal is to obtain the right balance between security and challenge.

As office functions are specialized, personnel expertise increases in a particular field. The greater the expertise, the less the need for extensive formatting and the greater the possibility for individualized design, with the inherent aesthetic advantage of adaptability to the needs of the reader

rather than those of the producer. The orderliness of tightly defined formats, which at first looks pleasing, begins to pall after awhile, especially as the user begins to wrestle his needs against the confinement imposed by it. Formats fortunately can be designed with varying degrees of flexibility, and experience shows that almost every corporate design undergoes a continuous growth or evolutionary change.

Experience with the use and advantages of in-house typesetting, the development of expertise and graphic capability, expands the uses. As the resources for communication are developed, the expertise should provide more flexibility and a better-designed product. It has been found that corporate identity can be maintained with devices other than a restrictive format that can hamper activity and discourage contribution from capable personnel. Increasing use of reprographics and the growth in communications bring considerable change to office practice in terms of the means of accomplishing its functions. The equipment itself goes through rapid changes in the interaction of needs and applications for technology.

Reprographics

Duplicating techniques make up the field of reprographics. As the need for records and other information has increased, the field of reprographics has developed with increasing speed. It consists of a number of processes, primarily to do with copying and printing.

Reprographics are difficult to place because they in many cases involve simplifications of commercial processes. They are simplified to make them cost-efficient for a smaller quantity and therefore applicable to in-house business use. The copier is at the low end, instant printing in between, and commercial job printing at the high end. Commercial printing is not usually included in reprographics for in-house business use, though it is most assuredly a reprographic process. It is not used in-house because of the need for specialist functions.

The processes of reprographics are changing continuously as they are developed. Lower-cost machines and the ability to produce better images change the valuation of copying and printing. For

example, as electrostatic copiers improve image production and add collating and automatic feed, it is natural for many to feel that this is a form of printing and it is. It differs in method from what we have called printing in the past, and its speed and use of material do not suit it to the kind of volume handled by commercial printing, but it has other advantages. One such advantage is its ability to produce an image directly from an electronic record.

The copier has found its way into almost every office. It is often preferred to carbon copies because it eliminates the need for error-free typing, since it is easier to correct only the original. When more than a few copies are needed, instant printing

18-4. The small A.B. Dick offset press is preferred by many for instant-printing techniques, and the same press can be used for straight offset printing with a different platemaking capacity. Instant printing has become one of the most popular of reprographic techniques.

is often used instead of the copier, depending on which is cheaper. The tendency is to save time and labor. Printing processes that require a master or printing element usually prepare the master photographically or with a scanner to reduce the element of labor.

Use of reprographics tends to involve the production of a graphic original, though there are other forms such as cutting stencils. This original is then used like a piece of art to make copies or to make the master for duplication. This line of thought closely parallels that in commercial art, and the original used for printing processes can be assembled as paste-up when the printing master is made by photography or scanning.

Electronic techniques produce the copy from a master in which the assembly is done electronically. Electronic records produce copies by printout. In this sense the original is the electronic record. The record can be in the form of a magnetic card, a magnetic tape, a paper tape, or storage in a computer or on a disk. In the sense that an electronic record is the original, this record must be produced originally as art is done, either on a keyboard or by scanning an original piece of art. The difference is that, once the image is electronically coded, it can be manipulated, assembled, or reassembled from the various records much as paste-up assembles various elements into a graphic image.

The computer printing offered by Xerox presents something new in the area of reprographics. It is new because it is a computer printout with graphic quality. It is not merely a copy but a print from a computer-generated image assembled from a library of graphic images in computer memory. It combines the features of word processing, typesetting, copying, and printing. The combination of these operations in a machine that produces a graphic image on paper and can run directly for a number of copies or be programmed to change each copy presents a new concept in printing. It is not merely word processing because the graphic image can be selected, nor is it typesetting because the image can be manipulated, nor is it copying because the computer generates the image to be copied, nor is it printing because the image is directly generated by computer. The pro-   **113**
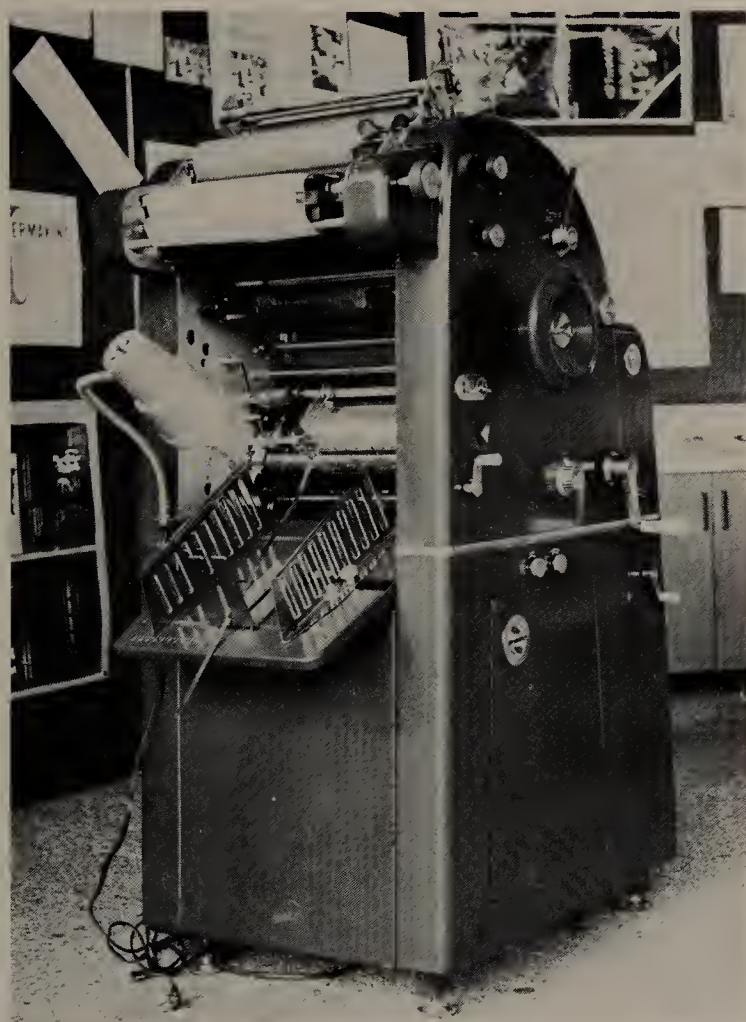
cesses are available separately, but the combination of these processes in electrostatic printing is unique. It is reprographics, and it is also printing.

Electronics have proved invaluable to miniaturize and store records. Not only does a miniaturized record use less space, but the electronic system allows rapid searching and retrieval. Graphic records are handled photographically as microfiche, and systems for electronic search and retrieval are handled by computer. Reprographics enters when a copy of the information is required.

There is a conceptual difference between copying from a graphic image as a master and copying from an electronic image as a master. The ability to print from an electronic image is useful for a number of applications such as business forms but has a higher cost in equipment time. Electronic records are printed out only once into graphic form, either by symbol printout or by scanning across a graphic field. Their purpose is to produce a human-readable image from the electronic record. Further duplication is handled as reprographics in the sense of working from a graphic original. Computer time is used for duplication, as labor cost outweighs machine cost.

The use of art for a master for duplication relates directly to an in-house art department. The development of art is what an art department is for, and the use of a master for reprographics coincides with use of artwork. The difference lies in the quality of the image. Reprographics refers to duplication processes used for business at a utilitarian level. The image from a copier does not have the quality of an image produced by commercial printing.

As reprographics have developed, quality has risen from a mere image that presents information to an image that duplicates the original. The more expensive electrostatic copiers begin to approach the printing quality and do a reasonable job of copying the continuous tone of a photograph and of responding to color. The addition of automatic feed and collating makes these copiers a printing process, though not designed for high-volume printing.

The difference between copying and printing lies in the economics of the process. While the result of copying approaches the quality of direct-plate offset printing or instant printing once the cost of making the printing plate is prorated in the quantity, the speed of printing and its use of materials make it less expensive for any quantity beyond a few. The advantage of copying is that it does not require a printing plate, that it makes the copy directly from the original without an in-between step of producing a printing element. The difference in the process, as the machines are presented, makes the difference in economics. The difference in concept is the difference between a few copies and the larger number of duplication.

Instant printing, with its direct and simplified platemaking process, is the in-between position between commercial printing and business printing. Duplication falls under the heading of reprographics as it is applied to business. Commercial printing also serves business but with the finesse of finer technique, more labor, and higher preparation prices that are prorated by runs of more units. Without the larger quantity commercial job printing would be too expensive. Instant printing fills the gap between a few copies and the quantity duplication of commercial printing.

As reprographics are involved in the production of a graphic image, they represent the use of art for duplication. The difference from the traditional use of art is one of degree in that reprographics are considered on a utility level. The lesser degree of quality produced with reprographic processes is steadily improving, and more and more art is copied in this way because the process is faithful to the original. As businesses produce more communications and editorial work, the need for quality increases, and the uses for an in-house art department become greater. The difference between the instant business letter and the printed circular can be interpreted as one of degree.

19.

Functions of the Graphics Department

The primary function of a graphics department is to generate graphics for communication. Such a broad view includes all techniques, means, and methods for producing graphic product. This view can apply to developing the graphic image for reprographic processes and for finer graphic processes, such as art for slides or printing plates. Such a wide view bridges a large variety of skills and degrees of professionalism. There are business needs for word processing, for typesetting, for reports and slick circulars, for reprographics and printing. Businesses require a range of graphic product that is used for communication in a variety of ways. The means are suited to the purpose.

Word processing that can develop typesetting leads to some form of graphic production, and the production of the graphic image provides the original for duplication. As the concept of duplication is elevated from reprographics to print, the range of graphic product available is increased. As skills and techniques are elevated, such as typesetting instead of typing or printing instead of reprographics, its quality improves. The difference between low and high quality is seen in the quality of the art image and in the reproduction techniques; the process of generating graphics for communication is similar though it may vary from typing to assembling art for a publication.

Traditionally there is a separation between professional graphics and reprographics because of the levels of skill and training involved. Professionals will be attracted to graphic production for communications systems. The formation of an in-house graphics department provides a base upon which such standards can be developed. It provides a structure for a range of skills and their contribution to a communication product applicable to a particular business need. The communications technologies may require some adaptation on the part of graphic-arts professionals. The range of communications systems is wider than traditional graphic-arts practice, and therefore the latter may be seen as contributing to communications in terms of in-house graphics.

In-house graphics and the functions of a graphics department can extend beyond developing art to include all the various forms of duplication, printing, and reproduction required by a busi-

ness. This would include the variety of skills and craft specialties required to operate and maintain the equipment. Large businesses or businesses that generate a continuous flow of graphic production have found it economical to develop in-house graphics departments that include reprographics and printing. In the unusual case some businesses even go so far as to include product resources for graphics, such as paper.

Traditionally there has been a separation between producing graphic product as art and producing graphic product as printing. The use of a printing press requires an environment suitable for its operation, an environment more industrial in nature because of the noise, chemicals, and sheer bulk of the equipment. A graphics department is more often made up of functions that develop the product up to the point of duplication. Publications have dealt with this requirement by separating the printing and the publishing operations and linking the two with communications technology. With the use of word processing and phototypesetting the

WORK FLOW

QUALITY SYSTEM

Initiate → Copy & Word Processing → Design → In-house Processing → Typography → In-house Paste-up → Printer

VOLUME SYSTEM

Initiate → Copy & Word Processing → In-house Format Typography → Assembly → Printer

SIMPLE SYSTEM WITH ART

Initiate, Copy & Art → In-house Format Typography → Assembly & Stripping → Printer

SIMPLE SYSTEM

Initiate & Dictate Copy → In-house Format Typography → In-house Reproduction

ONE MAN SYSTEM

Mailing, Copy, Printing, Design, Assembly, Typography, Art
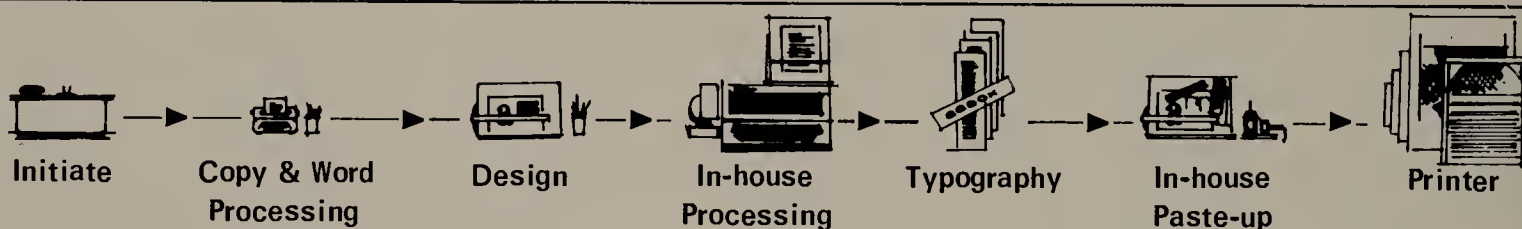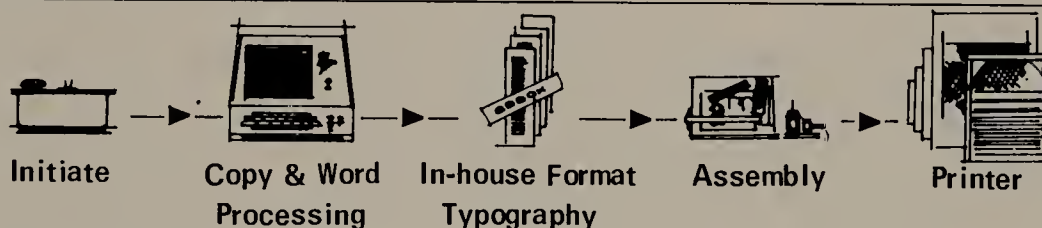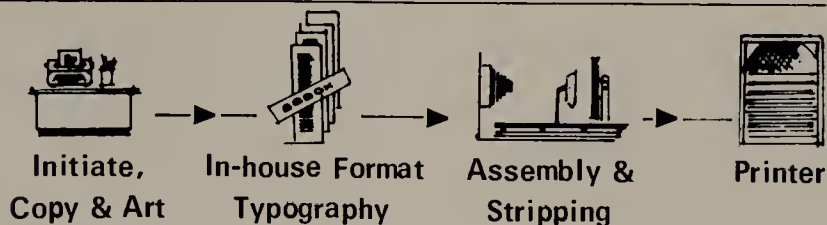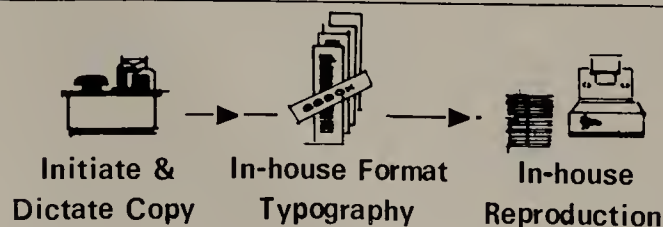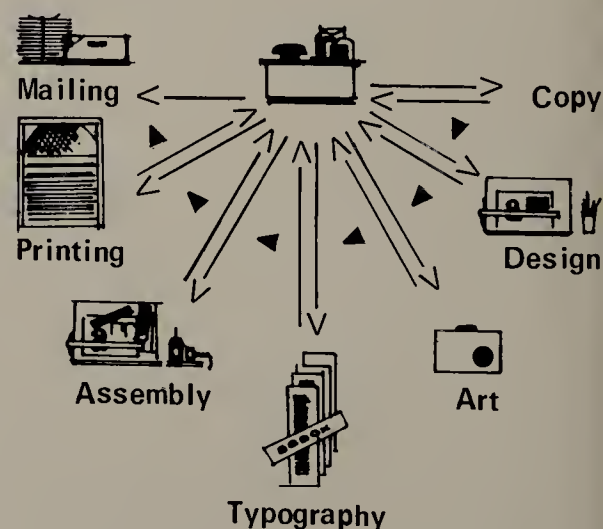
entire production phase of graphic art is suited to an office environment. It may be observed that the use of electrostatic printing is also suited to an office environment. Business response to these technological improvements has been a rapid increase in the development of in-house graphics departments.

A more subtle feature of in-house graphics, which is above and beyond producing graphics for communication, is the executive support a graphics department provides for the development of editorial content and graphic product. The more specialists and skills available, the more the support. This support can range from spelling accuracy to editorial assistance, from visualizing ideas to illustration, as ideas are developed for communication. The contribution from graphics-department functions can only enhance executive skills as these are used to achieve business objectives. Executive activity functions around communications in some degree, and support can be significant.

With expansion of graphics-department functions only the more specialized requirements need to be sent out or subcontracted. The traditional role of an in-house art director can act as a liaison between executive and subcontractor. The knowledge of specialist functions and processes in-house can be supportive.

Business specialties call for different kinds of graphic products, and along with them special skills. If such skills are combined with a useful knowledge of the special interests of the business, its objectives and policies, such a background makes explanation and delegation easier. An in-house graphics department, then, can also increase productivity and refinement of communication. The function of an in-house graphics department may be seen as beginning with the universal business letter and extending to a range of graphic product. The graphics progress through a variety of products and skills that fit the communication needs of the business.

19-1. Workflow systems for graphic production are subject to many variations of design. The quality system is the traditional system for graphic production, which now incorporates all the newest techniques of automation. Through formats, the elimination of art, and extended automation the system may be simplified.

Communications

The communication needs of a business were once served by the universal business letter. As time passed, this became the expensive business letter, so much so that on a cost basis a phone call was often cheaper, and it enhanced communication with a direct response. Yet the letter had its place because there are always situations requiring a written communication to document business transactions. Graphic communication is still an essential.

Increasing phone communications soon meant increasing costs, and means were sought to control these costs. More detailed graphic communications were developed as a substitute for long phone conversations, especially those that required a graphic explanation. The copier was pressed into service. The presentation of any new product meant at least one brochure or catalog sheet detailing its features. But costs for printing also increased as paper costs soared while mills rebuilt to clean up their environment. Again, the cost of postage also increased, and business continued looking for other cost-efficient ways to communicate. Various forms of leased phone lines became practical, and graphic communication translated into electronics then back into graphics after traveling over a phone line became a viable alternative for many applications.

As business conglomerated itself into a need for better organizational communications with its remote management, as the need for service communications increased, and as business sought to keep down costs, the technology of communications rapidly developed new methods, machines, and systems. The computer came into pervasive use. It was used for keeping track of phone calls, for coding information, for transmission, and for operating the many different kinds of communications machines.

The expensive business letter persisted, with apparently no way to automate it or to reduce its costs, as the need for business communications increased. With reduced costs for the computer as technology improved, it became economic to put a small computer in a typewriter, and robot or automated typing developed as word processing, in

turn borrowed from more expensive typesetting systems. The development of intelligent computer terminals also furthered the concept of word processing. With its illustrious ancestors, word processing relates to other processes of handling graphic communications. The expensive business letter began to be less expensive. With automation the greatest expense is the executive time needed to compose it.

In the crusade to reduce costs of doing business, correspondence and memos are the responsibility of administrative assistants acting under executive direction whenever possible. The secretarial function becomes that of an administrative assistant on the one hand and that of a communications technologist on the other. Word processing, the teletype, the Twix, Watts lines, and scanner transmission enter into the communications realm of the secretary. In spite of all efforts to simplify and automate and the maintenance of a uniform keyboard—at least as far as the alphabet is concerned—a considerable amount of skill is required to operate all the different equipment, with the differences between machines, manufacturers, and the applications to the business communications system. It becomes far more efficient to have specialists in the technical functions as the volume of

communications supports such positions.

Such specialization develops a communications department, and with it the advantages of expertise in communications equipment. It is far more than a derivative of a typing pool because of the skills required. The logical extension is a graphic department, where fullest use is made of graphic equipment to set type and with this art skills to compose the type into graphic products in-house. The shift to offset printing has educated most businesspeople to the fact that the customer must supply the image to be printed, not just the information.

Along with these changes comes an increasing awareness and appreciation of the skills required for producing the various graphic products. To their dismay many have discovered the need for screened halftone printing after trying to print a photo with instant printing. What devolves within the business-office environment is the same individualizing of skills and aptitudes for particular work that has taken place outside the office in the field of specialist professional skills. Not everyone can do everything well, and individual aptitudes draw the individual to different kinds of specialist work. Such aptitudes have long been understood in the traditional professional graphics field. As they surface in the business in-house graphics environment, similar relationships could well apply as business undertakes more specialist work as part of its necessary communications growth.

In many cases, just as with the business letter, the graphic product for business use has as its highest cost the executive time needed to produce it. It is likely that such is the case with the majority of catalog sheets, instruction sheets, and brochures used within business. In fact, only with large-quantity production of consumer-oriented graphics would the factor of executive time not be the largest cost. If such is the case or if such communications are so important as to warrant such an expenditure of time, it could well be cost-efficient for a business to employ editional specialists to reserve executive time for activities of policy or business development that could not be delegated. There is as yet no way to automate an executive. Dictaphones and recording equipment are developed with this purpose in mind.

19-2. The greatest cost of business letters and many graphic communications is that of the administrative function. At present the best way of automating the executive is through use of the dictating machine, which preserves his or her time and is available in pocket form for the flash of inspiration at odd moments. It links to the communication system and graphic production through word processing and specialist services.

As graphic technology used within a business becomes more integrated with an automated or semiautomated communications technology and as the graphic product is improved and refined, the functions of office personnel must become more specialized to keep pace with these changes. With these changes the distinction between repro-graphics and professional graphics becomes less defined, and the economics of quantity become a gray area balanced against other cost factors, such as delegating authority and liaison between executive and finished product. The effectiveness of communications becomes a cost factor in itself.

Throughout this development of communications, its technology and personnel, there is a shift of values. The shift is toward the need for information, toward ever wider markets, toward immediacy and being on line with customer service. Just as computerized inventory rapidly pays for itself with smaller maintainence, communication pays for itself with better coordination that leads to increased sales and lower cost for graphics. The different organizational structure appears as a logical and natural development of the transition to new technology. It compensates with increased personnel opportunity and satisfaction. The large range of graphic products used by business, so diverse that no two businesses would follow a similar pattern, are universally served by typesetting and word processing. The further development of graphic product as art for presentation would depend upon the special business situation.

Presentations

The presentation on paper is the graphic output of a business, and it represents the art product. Word processing developed as an electronic record is ultimately output onto paper, and the graphic product is the art. If the electronic record is output as typesetting, then the typesetting is the art. If typesetting is positioned in a page design, then the paste-up of the type image is the art. Pictures can also be included with the type as the process is extended to its full capability.

Intrabusiness communication is often handled informally, and the typewriter is sufficient for all practical purposes except those requiring visual in-formation. For interbusiness communication type-setting becomes an advantage. It provides a cleaner and more professional appearance; it uses less space and permits better communication. At the level of customer-service and public communication typesetting is demanded for graphic presentation to reflect the refinement of the product or service.

As the presentation is used more widely, the demand for graphic quality is increased. The use of typesetting requires a slick professional use of the graphic medium. It is at this point that professional skills become necessary. The wider applications of in-house typesetting for graphic product imply the use of professional skills to take fullest advantage of the in-house capability. To do this makes economic sense of the investment in equipment.

It is here that revision of functional alignment in business-office practice is indicated. According to business needs for graphic presentation, this restructuring may begin with the division of office practice into administrative and editorial functions. The editorial functions now relate to graphic product and the development of art. As these functions are extended into a graphics department with typesetting, professional skills become necessary. These skills are essentially the same as those used in the graphic industry. The business extension toward professional graphics at first deals with typesetting and follows with art production and paste-up, refined graphic design, and illustrative art, the range of functions that bring graphic product to the presentation stage of development. At this point the art can be duplicated and reproduced in a variety of ways.

In-house graphic skills follow this order of development. The practice of developing a graphic product, in contrast to functional capability, may start with design or by making an illustration; it depends on the graphic product being developed. In the absence of in-house skills subcontracting may be employed. The emphasis and development of in-house capability would relate to the special graphic requirements of a particular business. These could be proposals, presentations, catalogs, or brochures. The sequence in acquisition of skills suggested here is predicated on the usual needs

for product and their order of frequency. The special case could provide work immediately for the illustrator—an extensive product line that will be presented as art, for instance. Here the acquisition of illustration capability would precede the production capability of paste-up.

PASTE-UP

Inked Line Art

TYPE

Heading   Art

Art   Art   Copy
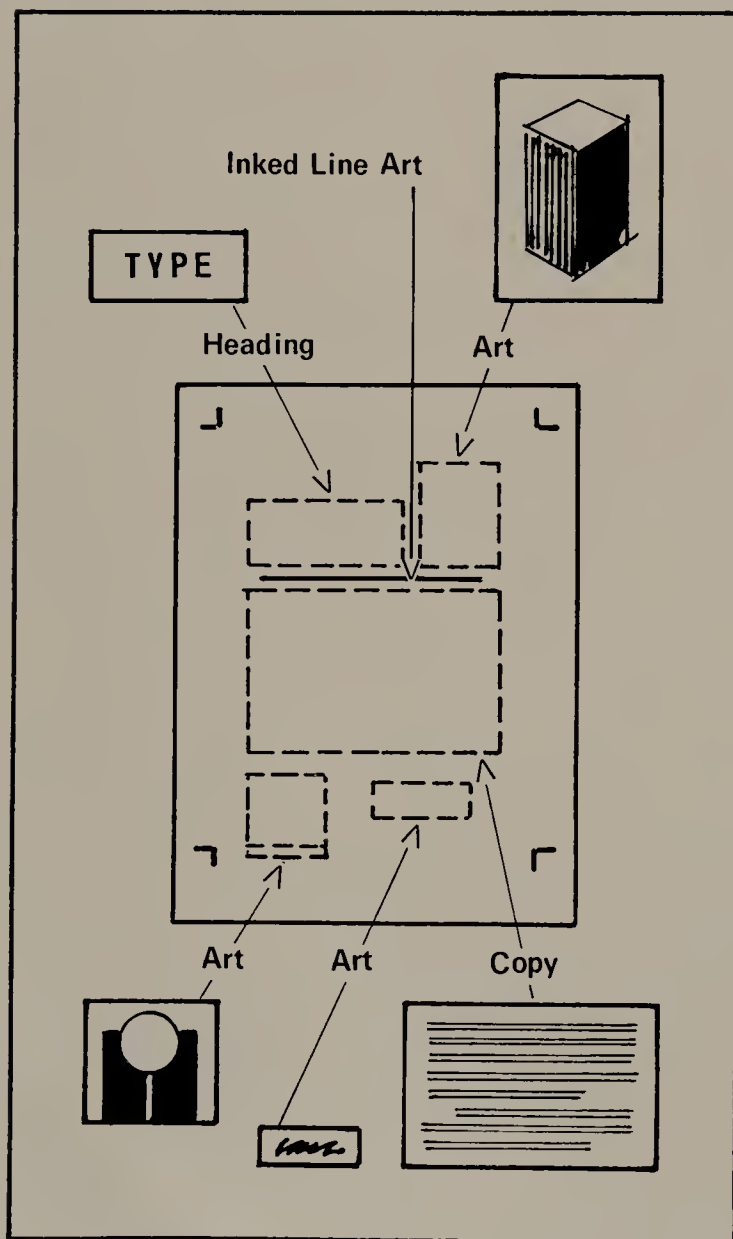
19-3. Paste-up is a means for assembling typesetting into graphic art suitable for offset printing. This simplified chart distinguishes the separate elements that may be assembled into such a product. The copy and heading are typeset.

With the use of word processing and typesetting in the editorial function, the following art production, design, and illustration functions acquired in-house form the art department. It is important to recognize that in terms of personnel there is some overlap of skills. There can be a relationship between typesetting and art production as paste-up or between design and paste-up. The aptitude and temperament that go into a developed skill traditionally separate editorial and art departments; this is to say that editorial and art skills are not usually found in the same individual because of the different interests involved. Within this grouping further divisions are traditionally found between editorial and typesetting and between design and illustration. As the skills and specialization become greater, subject matter is divided into consumer-oriented or industry-oriented. In-house graphics offers an opportunity for high specialization for particular products and with it a greater degree of refinement and expertise in a particular graphic product. It can also apply to a wide range of graphic products on a particular subject. This is analogous to professional editorial work and professional advertising work, respectively.

The creation of a graphics department obviously relates the practice of in-house graphics to the external professional graphics field. This relationship provides the liaison with subcontractors. It also provides a degree of expertise in-house and other support helpful to management for the development of professional graphic product.

The use of a graphics department in-house, as described, is not a new development; what is new is the complete production of graphic product and the demand for this in the context of the new communications technology. Word processing is the first rung of the ladder that brings the capability of producing the complete graphic product in-house, with the consequent savings, benefits, and advantages. Word processing may be used solely as a substitute for a typewriter, but its presence opts for the further development of its potential for graphic production. With this development a graphics department is formed as part of the wider area of communications and beyond this an in-house art department.

20.

Contribution of the Art Department

The art department is distinguished as a separate entity within the graphics department. Art is the segment of graphic production that deals with design and visualization and with the production of visual images for reproduction. It traditionally is distinguished from both typesetting and reproduction or duplication because of the distinct interest patterns of personnel. As a separate entity it makes use of typesetting during the design and production of a graphic piece such as a brochure or newsletter, and it is the function that carries the editorial idea to completion as a graphic product.

In the normal flow of graphic production, whether the copy is written or not, the idea for any graphic product is first designed and visualized. The visualization is called a layout, and the layout is produced by an artist. With acceptance of the design, the layout acts as a blueprint for producing the typesetting and art for the finished piece because it shows the size and relative importance of each element and indicates their relations to each other. Because graphic products normally use pictures and art and because typography is only one element in the design, the latter would be designed

to relate to the other art elements. The idea for a graphic product can come from either the copy side or the art side, and such ideas are developed in response to executive initiation or some other need.

The traditional functions of the art department, as they have been used in a number of businesses, incorporate the development of ideas, visualization and layout, subsequent production of elements such as illustration, photography, and mechanical art, and assembly of these pieces into a finished piece of art suitable for reproduction.

With increasing use of in-house typesetting and paste-up for offset printing, the layout and visualization stages are sometimes omitted along with the art, and the simplified graphic piece is typeset to a format. The design is the format; and, as the paste-up is assembled, the elements of typography are fitted together. This simplified practice of developing a graphic product is done to lower costs, though it sacrifices the use of art and to some extent the quality that would be gained from planning a design. The simplified system works according to the success of the format used and the skill of the **121**

paste-up artist in solving design problems. The traditional practice treats each graphic product individually and produces a design for it, while the format and paste-up method fits every graphic product into the same format and solves every variation at the time of paste-up.

With both methods an artist is needed to handle the typography and to produce the finished graphic product. The traditional art department provides the additional functions of design and illustration. They would be used in-house if volume of production were sufficient to support them because of their benefit to the quality of the company graphic product.

One method of dealing with the requirement for fewest personnel is the traditional company art director, who would handle both design and paste-up of the typesetting flowing from the editorial side of the graphics department. This method works especially well for the production of a company publication. The use of art is handled by subcontracting as the situation demands. With expansion assistance is needed with paste-up and layout; in-house art may follow later.

COST CURVE
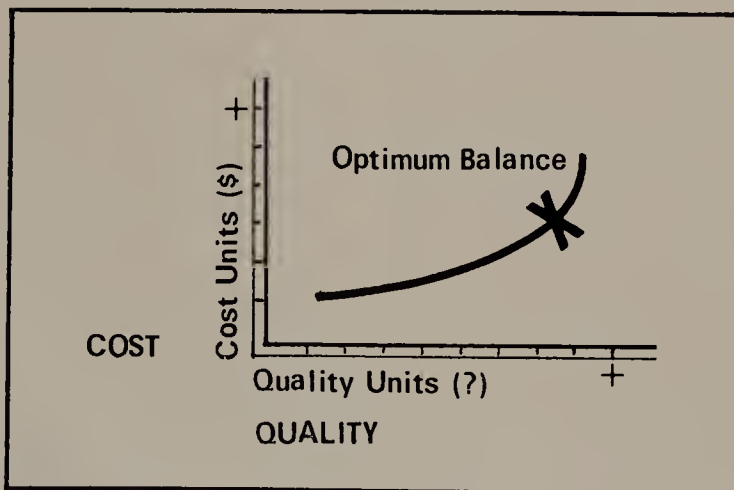
20-1. Beyond the obvious talent required to produce graphic communication, the scope of the system and the quality of the equipment also have a relationship to the product quality that can be expected. This immediately puts quality into a relationship with cost as reflected by the system design. Like so many aspects of business, if quality was quantitative, it could be charted for the optimum balance of investment against communication needs.

It is important to notice that a centralized art department that serves the needs of the entire company, not just one department, has a workload that can support an art department and distribute costs according to the use made by various departments. Such a functional design for use of personnel contributes more experience and better talent and the support of less-experienced talent through association with the more experienced. While such an arrangement does require queuing of work and a company policy of priority, it contributes the best in talent and service for the company product and coordinates it better. It also provides for the highest personnel morale and productivity.

Higher morale and greater productivity are also a result of concentrating the use of word processing and typesetting into one department. It is consistent with the use of specialized and trained personnel rather than the dispersing of job function into many different duties with specialization in none. Such a centralized editorial-typesetting department will coordinate and work better with an art department, and the flow of work to production will obviously improve. Concentration of personnel into a single department will also enable the department to handle an intermittent or uneven workload better.

Specialized art and typesetting departments contribute more support for company activities. While either department separately or a graphics department collectively may not necessarily be involved with administration, the greater expertise will always provide a better product for company communications, and the higher morale of the group will assure more professional work and productivity as a result of centralization. It is well known that two people together can undertake what neither alone can do, and the synergistic effect of a group can affect morale.

The specialized ability of an art department, depending on the expertise and knowledge of its personnel, can also be used in other ways than that of producing graphics on paper. The art department can contribute presentations and visualizations of design; with suitable expertise it can contribute to product design or other sales efforts requiring a broader view of communications. The graphic product used by a company may have a number of

forms, such as audiovisual. The many possible functions of a graphics department—editorial, art, and reproduction—relate to and coordinate with the need of the company. As the functions are extended, graphics becomes part of the larger form of communications, and communications is the umbrella that covers all the activities.

Lines of Authority

The ever-expanding uses and fast-developing technology of communication have made necessary their organization and control within a business. Implementing cost control of these functions has been chiefly responsible for the need to organize and manage them. This need has created the position of communications director. As business communications have expanded, the organization of these functions has achieved considerable savings and better coordination through the design of a comprehensive communications system.

A comprehensive communications system covers planning for all forms of communication plus cost management. This covers phones, switching systems, switchboards, phone lines, computers, computer links, code management, terminals, word processing, typesetting, art, duplication, reprographics, and all the technologies, equipment, and personnel to support the operation of the system. This clearly involves a wide range of technological expertise, and it would require considerable investment to design, install, and implement a comprehensive system. Statistically there are twice as many workers in communications as in manufacturing and agriculture combined.

The contribution of the art and graphics department is but one part of the much larger picture of communications. Now that communications systems must be managed, schools are rising to the challenge by providing communications as a major field of study and by presenting degrees in communications. Specialists in the field of art fit into the field of communications under the larger umbrella of a communications system. Traditionally an art department functioned as the design and management leader of a graphics complex, and it could be run by an art director or a production director. Large organizations put these positions at the vice-

president level to coordinate them with management needs. The expansion of communications technology through use of the computer and word processing for graphics places graphics under a communications director and coordinates it with all other forms of communication within a company.

The art department may be a separate entity of management to provide executive function and

LINES OF AUTHORITY

COMMUNICATIONS DIRECTOR

TRAFFIC DEPARTMENT
Equipment
Phone Management
Filing

EDITORIAL DEPARTMENT
Word processing
Typesetting
Editing

ART DEPARTMENT
Paste-up
Layout
Art Direction

GRAPHICS DEPARTMENT
Reprographics
Printing
Management
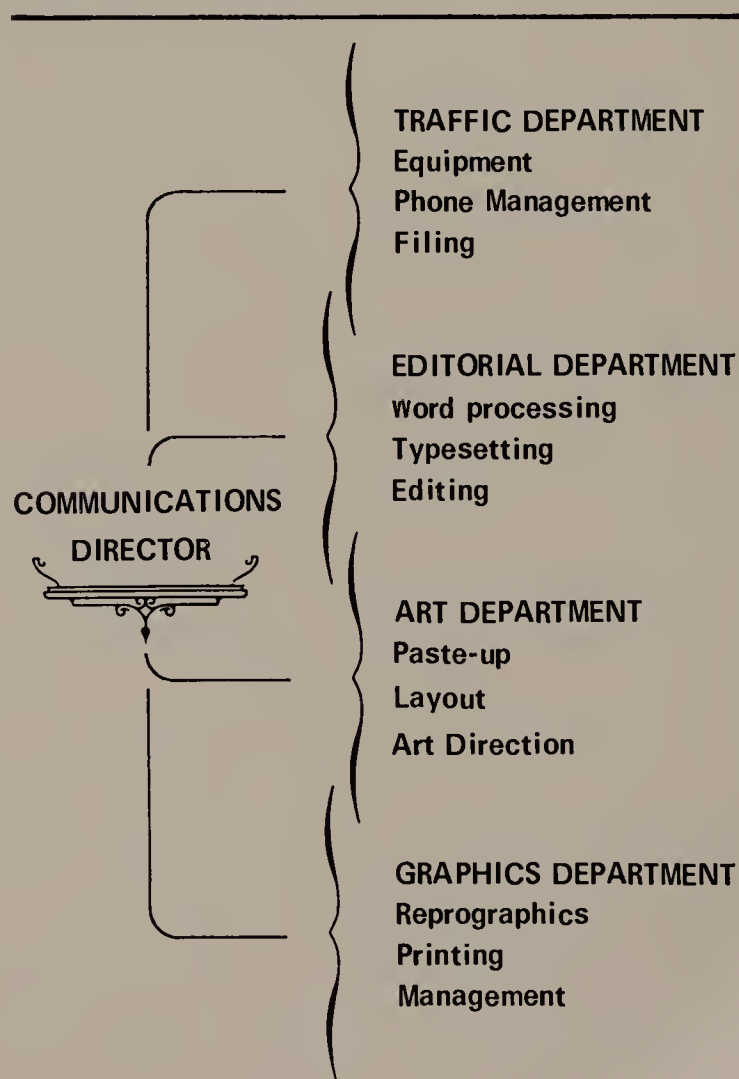
20-2. The lines of authority from the communications director are charted here in a horizontal relation of equal and separate departments. They could also be structured vertically under any of the separate departments. It is plain to see the relationship of each department to independent businesses functioning outside the business being served instead of being part of an in-house structure.

support for administration, but it is now coordinated with purchasing, data processing, production, sales, and distribution. Of course, the company-wide base for management of art in particular and communications in general has proven most efficient in terms of costs. This becomes obvious in terms of multiple use and efficiency of equipment. Perhaps less obvious are the benefits in terms of worker morale, as has been proven, and the upward-mobility factor. The centralized company-wide base also pools demand, makes more services possible, uses less space, and, with the need for cost control, prevents hiding costs for services used.

The management practice of pulling out communications costs separately instead of lumping them under administration immediately opens a method of managing these costs. With management comes the opportunity to centralize purchasing and make an investment in equipment for every department. This implies that loss of personnel in any department is more than compensated for by greater communications power and increased effectiveness. As with data processing, where the introduction of computer technology wrought considerable change, such changes almost always seem difficult at first. The linking of communications to the computer can also present changes; yet, if the benefits clearly outweigh the disadvantages, these changes eventually come about.

To the executive using communications services perhaps one of the main factors of change is use of red-carpet service: the red carpet is where you line up to wait. Queuing with computer service is so quick as to scarcely be noticeable, and, with a properly designed system, never a handicap. Functions of the graphics department, however, take time for production, and queuing is always necessary to some degree in the operation of an effective department. Only an excess of personnel will prevent queuing and provide immediate service, though time is still required to produce the work ordered. Art departments can be organized with particular specialists assigned to department work but from a position in a centralized art department, where these artists may be used for other work when the specialist department is quiet. This can provide the

best of all situations under proper management, though it is less cost-efficient than specialist functions in one art department without relation to outside department assignments.

Personnel identification with departments or functions is always a delicate balance peculiar to each business and something that requires careful management consideration. Centralization is easily most efficient and provides a beneficial balance in all cases, yet it will have to be related to the peculiarities and priorities of each business. With sufficient size there will be a hierarchy of department-head management under a communications director, which will create the most effective organization of switchboard, traffic, word processing, art, and reprographics. According to the need for functions, equipment, and use of personnel, these functions will be structured into a relationship and in a large organization will include a further hierarchy under each communications department head.

Division of Responsibility

With all communications functions placed under one department, responsibilities and job descriptions can be structured to the product load of the business they supply. The overall organizational responsibility would be that of the communications director. He or she would make the work-flow study and select the best methods for the business practice from a background of expertise in the many methods of handling communications functions. Following the organization of communications functions, the responsibility would be subdivided to departments and to department personnel for implementation. The various functions required by the particular business would be grouped into job functions so that personnel spanned the total communications use of business practice.

The larger department can provide greater specialization for communications functions and with this greater expertise. The difficulty arises with a small staff that must span a variety of duties to fulfill the communications function. In general, this requires greater experience and expertise of personnel, but there is also the option of using outside subcontractors to extend expertise and communications functions. This uses in-house capacity to its

greatest extent and then overflows to the sub-contractor.

The use of outside suppliers can be arranged for in a variety of ways, such as by guaranteeing a minimum use of service in a time period. This is one of the better ways to handle periodic overflow work without having to expand staff in-house. But the subcontractor, having to stand at the ready, must try to balance this business with other clients, which sometimes means maintaining personnel on staff who must be reflected in contract costs. The in-house activity will always be less expensive if the workload can be spread out instead of the sporadic monthly, bimonthly or quarterly cycles of workload that will be most cost-effective when sent to outside suppliers. For example, typesetting done only once a month can be most cost-effective when sent out, or artwork needed only quarterly may best be contracted for with an outside supplier.

Communication techniques used as a supplement to administration are often less effective than techniques organized into a communications department that has responsibility only for communications. Administration may dominate communications use, but cost control is effective only when responsibilities are directed to and structured under communications, because the overlap of duties makes it impossible to apportion time records to activities. Data processing, another department likely to inherit communications tasks because of computer use and the similarity of equipment, is likewise oriented to accounting and not to communications. The centralization of communications activity makes cost accounting possible and places responsibility into the most competent specialist hands.

Specialist responsibility makes divisions of communications services accountable to the communications director for cost control. A services-ordered accountability prevents misuse of communications. Phone use and long-distance calling give one example of accountability because it is well established that, when calls placed are recorded and billed by computer to the department making them, after unrestricted phone use there is a drop in expenditures for phone services. The larger picture also benefits from a free and open

structure. By placing communications services in one department, where there is responsibility only for communications, the maximum open structure of organization for communications use is provided with accountability for communications services used.

Art services by an in-house art department in conjunction with typesetting and word processing can also be handled on a service-time basis to allocate communications costs. Each job coming through the department can be given a job number and time billing by personnel, and this is no different from the practice in a commercial art studio or typesetting shop. An art director will usually delegate and guide work under his direction and will have a clear idea of who is spending how much time on what so that in practice the department head will understand how the time is being spent. Job cards or time records filled out by staff only document and validate figures that any department head could provide.

Centralized communication services can also provide the open structure that pools responsibility for function, permitting staff to move about within the structure. This facilitates the handling of different kinds of work assignments within the department and helps to compensate for an uneven workflow from different departments using these services. Such a practice also provides job interest for personnel with a change of practice as different needs arise. Large departments provide upward mobility as well. Specialization can be achieved because of centralized responsibility and cost accounting.

The open structure within a centralized communications department makes possible the formation of specialist functions for support groups or other special purposes. Personnel can be assigned for special projects such as presentations, extending the function of communications for other departmental uses having to do with these specialist skills. Department heads working under a communications director will have the responsibility of coordinating workflow and special projects.

Cost accountability and mock billings in-house are but another way of dealing with responsibility. The classification of personnel within one depart- **125**

ment or another provides orientation and scope of duty. The in-house communications department, paralleling commercial practice in the external communications industry, fits the existing model used for training in schools and for developing practice in the field of application. The parallel job descriptions and responsibilities make acquisition of personnel easier because the positions in-house are similar to those in the field of communications in general. They conform to the existing marketing of skills. The main boundaries are those mentioned, the division between editorial and art skills, though there are those who bridge even these broad parameters with a range of skills.

Qualifications for secretarial skills have reached a new high point with the addition of word processing and machine editing. An extension into communications specialties is possible for many, though perhaps more are oriented to administration and to business services. As in the graphic industry, practices are changing with new technology. The two areas are merging due to the availability of machines and technologies that link the practices of the two.

The addition of word processing and other computer techniques to office practice leads directly to typesetting. The use of typesetting in turn leads to an in-house art department. A further development of reprographics and phone services with use of the computer leads to communications in general. But even without sizable development the communications concept relates to the use of word processing and the division of administrative, editorial, and graphic responsibility. The use of computer technology brings change and opportunity. Many practices of commercial art and graphics can now be brought into the office as the use of communications is brought to a professional level with the development of in-house graphic capability. Such a development is the logical extension of the equipment and technology being put in place.

20-3. As a communications director what would Benjamin Franklin look like if he used a word-processing system for automated typography? Ted Garon, President of Garon Graphics and past President of Printing Industries of America's Los Angeles Association, is a pioneer in the use of computerized typesetting systems. He is shown here with a system developed to use the MTST for input and integrated with further processing to produce typography. Such systems paved the way for the use of word processing, the integration of typesetting and graphic art, and the use of in-house graphics.

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WORD PROCESSING

A Guide to Typography, Taste, and In-house Graphics

ROD VAN UCHELEN

Word-processing machines are turning offices into art departments. And now just about anyone can produce attractive and professional in-house graphics using word-processing technology and the proven guidelines given in this book.

Rod van Uchelen, a highly successful commercial artist, clearly explains the general functions of the word processor. He examines the economic justifications for automation and how they relate to communication needs. Viewing typography as an art, he shows how to use the machine not only to produce art but also to establish art values.

Taste and its relationship to typographic design are thoroughly explored. You'll see how to create readable, dramatic, and pleasing design by using contrasts in the size, form, and weight of the letterforms, as well as in the spacing and layout of the typographic composition. And you'll have guidelines for selecting—from the hundreds of available typefaces—the two or three most suitable for your particular message.
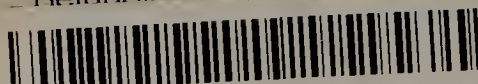
The author explains why it is useful for a business to be able to produce graphic material both for planning and formulating ideas as well as for communication. He describes the functions and management of an in-house graphics department, examining in detail the skills, resources, formats, reprographics, lines of authority, and divisions of responsibility that contribute to a successful operation.

Essential to everyone involved in graphic design, this book offers detailed, authoritative guidelines for effectively using word-processing equipment. It provides the thorough knowledge of systems capabilities that helps you take full advantage of typographic options.

Rod van Uchelen is a nationally known artist, art director, and teacher with over 20 years of professional experience. He began his career at Walt Disney Studios and has since been associated with Petersen Publishing Company and Foote, Cone, and Belding, as well as teaching at the Hollywood Art Center. As a painter he has had several one-man shows and was featured in *Famous Artists*. He is also the author of *Paste-up: Production Techniques and New Applications* and *Say it with Pictures: Graphic Communication with Illustration,* both published by Van Nostrand Reinhold.