

EXHIBIT 19

NOTE ON TYPESETTING BY COMPUTER

The bulk of commercial printing work depends on typesetting, that is the arrangement of type characters from which the final printed version is produced directly by impression (letterpress), or indirectly by photo-lithography. The bulk of typesetting is done mechanically by an operator at a keyboard similar to that of a typewriter. The depression of a key initiates a process which results in the production of a piece of metal type. Although machines which produce the type directly on the operation of the keyboard are used (especially by newspapers), it is more usual to separate the keyboard from the type casting machine - the means of communication being punched paper tape.

More recently photocomposing machines have been introduced which assemble the characters on film for reproduction by photography. Although these offer the promise of increased speed of composition, the keyboard operation is broadly similar to that for hot metal composition.

A printed page is expected to consist of justified lines, that is lines of equal length to give a straight margin at the right and the left. In normal typesetting the decision where to break the line, and if hyphenation is unavoidable, the word, is made by the keyboard operator. This is a skilled, time-consuming job, and requires a thorough understanding of typography and house style. An operator's time is therefore a significant factor in publication costs. One of the things the computer can do is to relieve the keyboard operator of the need to make these decisions, and hence speed up his work and increase productivity. All the hyphenating and justifying is done for him.

Two other main advantages stem from computer composition. Where the printed matter is to be in the form of tabulated information, such as bibliographies, directories or calendars, which may have to be brought up to date at frequent intervals, the preparation of the copy can be closely linked with the computer. Insertions and additions can be easily made for each successive edition of the publication.

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The remaining point is that computer composition makes possible the storage of texts on magnetic tape. Complete publications can be stored in compact form, without the inconvenience, wear, and cost of keeping type standing from edition to edition. The texts can be run through the computer at any time to produce the necessary instructions for the copy to be set in type of a different size, style, or format, without the texts having to be reset manually on the keyboard.

An additional advantage in the production of indexes to bibliographies, directories or calendars, is that the stored text can be sorted by computer and then printed in a different order. A two-part directory of representatives of organizations and of organizations with their representatives, can be produced by preparing only the more complex half of the text manually. This is then sorted and edited to produce the other part (see Exhibit 20). In some cases it is possible for the computer to examine individual entries, such as bibliographical references, and pick out the words to be included in the index.

Typical System and Procedure

Exhibit 21 is an outline flowchart illustrating a multi-pass system with correction but without page make-up facilities. The passes are:

- keyboarding of manuscript (if a typed version was obtained at the same time the result would be as in Exhibit 22), input to computer system via paper tape containing unjustified text and format control messages. (The head of the tape carries indications on the factors such as type style and spacing limits, that are not generally altered during the course of a job, see Exhibit 22.

During the first run on the computer, tables describing the required type face, are loaded from a library tape. By reference to these tables, text is composed into lines, justified and hyphoniated as necessary, and written to magnetic tape. Simultaneously, a proof print is produced on the line printer (see Exhibit 23).

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- After the proof has been read (Exhibit 23), corrections are punched into paper tape. Corrections may include not only alterations to the text but also amendments to the job specification and format control messages.

During the second run on the computer, these corrections are incorporated into the text file produced by the first run. At the same time, the revised text is again composed into lines and written to magnetic tape, and a second proof is taken. This correction run may be repeated as many times as are necessary to obtain an error-free output tape. The relationship between the contents of the original main tape, the corrections tape, and the corrected main tape is shown in Exhibit 19a.

- A further run (not shown in the Exhibit) is used to break up the text into pages and add page headings and numbers. Indexing could be performed at this stage. A page proof is provided.
- The final run translates the text from computer code into the particular code used by the film setting machine or the hot metal caster. The text is then punched out onto paper tape for input to either of these machines.

The proof printout is all in capitals, with about ten basic symbols to show shifts and other typographical changes. Each line is identified with a number. These points are made clear in Exhibit 24. The punched corrections identify the line in which the correction is to be made and would look the same as in Exhibit 22, if typewritten simultaneously.

Summary of Advantages

- composition costs are reduced because
 - text can be typed by less skilled (therefore less expensive) personnel
 - justification and hyphenation decisions are performed by computer more rapidly
 - composition can be optimized saving 5% space per page

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- additions or modifications to text in the form of bibliographies or reference works can be made easily
- reference works in two parts (e.g. list of persons within organizations; list of persons cross-referenced to organizations) can be prepared by composing one part only and then sorting the data automatically
- text can be stored in a compact form at low cost
- text is always ready for print and does not wear as with cast metal
- proof reading is reduced
- considerable flexibility in printing only selected portions of the stored text for different publications
- ties in with invoicing, rappels, administrative operations
- text can be analysed to prepare indexes automatically.

Summary of Uses: Principal applications currently feasible are the preparation of reference works published at regular intervals giving updated information, e.g. directories, encyclopaedias, membership directories, abstracts and indexes, telephone directories, bibliographies. The stored text can be used for surveys with considerable advantage since they can be made rapidly and the data base can be easily kept up to date.

A few Figures

- paper tape original read by computer at 500 - 1000 characters/sec; processing at 4,000 characters/sec.
- computer produces proofs at 1,000 lines/min
- alphabetic index of 20,000 entries prepared in hours rather than weeks.
- final page formation in hours rather than in weeks (approximately 30 sec per page).

Costs

It is difficult to give an indication of costs except for a definite problem. In the case of the UIA problem, offers from printers using the classical method and one using computer typesetting indicated that the latter was cheaper than two offers by printers using conventional

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methods. This did not take into account the advantages arising from the ability to produce specialized publications, surveys, etc.

The Future in Computer Typesetting

The future in computer typesetting terms is full of conjecture. Machines producing images by means of cathode ray tubes are coming off the drawing board and on to the market, and appear to be capable of setting type of an acceptable quality at much higher speed; electron beam microfilm printers producing at the rate of 90,000 characters a second are being discussed; the development of ultrahigh speed magnetic drum printers producing a printing image directly from the computer core and running at speeds in excess of the newspaper rotary could indicate the elimination of typesetting as a separate process altogether.