PROSPECTS FOR UTILIZATION OF COMPOSITOR'S TAPE IN THE PRODUCTION OF BRAILLE

by Grete M. Grunwald

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This report was prepared by the author as
a consultant to Argonne National Laboratory relative
to their work for the
Dept. of H.E.W., contract OEG-0-9-080144-4280 (032);
it is distributed as a manuscript.

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* (See pp. 5, 6, 7 of report).

A REVOLUTION IN BRAILLE PUBLISHING PROCEDURES?

A goal for many workers for the blind has been to make Braille as abundantly available to the blind as inkprint is to the seeing.(1) The obvious main obstacle in achieving this goal is the relatively small number of copies required in Braille, and the corresponding high cost per copy.

Could not commercial printing give a hand? For instance, "...A text that is automatically revisible and transformable along planned lines would allow regional and minority publishing."(2)

Compositor's tapes (that is, tapes prepared for automated typesetting) contain text in automatically revisible and transformable form. Such tapes, therefore, seem to be useful for minority publishing (as would be any text which is machine-readable). The problem is to find sources for such material.

Is then a Braille Revolution coming, based on compositor's tape?--That would depend on whether there is enough tape available (especially of straight matter); that means enough to assure a Braille publisher fast and convenient access to a wide choice of titles and to keep the overhead from spiraling as a consequence of information-hunting.

Furthermore, not every compositor's tape is equally suitable for transformation; Rice, in the quote above, rightly stresses transformation along planned lines; he lists for instance careful indexing and correct coding as well as "flagging" of points at which decisions may be necessary.

In order to weigh the chances for finding a firm base for Braille in materials used primarily for commercial printing and publishing, it is necessary to understand what is involved up to the stages of printing and publishing literature:

In 1964 approximately 28,000 titles were published in inkprint in the U.S.A.(3) Editing and printing is the combined business of the publishing and printing industry.

This huge industry is in great pains through a challenge which started some 30 years ago, when rapid advances in printing techniques occurred. Mechanization, automation and specialization, together with entirely new techniques, and finally, within the last decade or so, the use of computers in composing rooms caused revolutionary changes.

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(1) Robert W. Mann, "Enhancing the Availability of Braille". American Foundation for the Blind, 1963, p. 413

(2) Stanley Rice, "What's the Future of 'Straight Matter'?" Appendix p. A 37

(3) The World Almanac and Book of Facts. New York World Telegram and Sun, 1966, p. 512

Individual firms adjusted, converted; new mutations evolved. Traditions were shaken. (These statements are derived from the body of quotations in the appendix).

One of the most unsettling events in this whole uproar was undoubtedly the introduction of electronic data processing. Here are a few corresponding news items:

> "...There are approximately 100 to 125 commercial printers, publishers and trade typesetters utilizing the computer for composition functions."(4) October 1966.
>
> "...Phantastic growth of computerized typesetting installations: from 77 in 30 countries in 1964 to 1,093 worldwide in 1969."(5)
>
> "...installations jumped 54% in 1967 and 33% in 1969; in U.S.A. about 900 composition typesetting operations."(6)
>
> "...The first 20 RCA Video comp, which went on line between 1967 and 1969 are capable in themselves of setting all of the books published in the U.S.A. during the full year."(7)
>
> "...There are now well over 1,000 computers being used for typesetting."(8) January 1970.

On the other side of the coin there has been much publicity and unsupported claims. Many references to this kind of "information" are to be found in the appendix. Lamparter says for example: "...Superficial review articles are appearing with increasing frequency in both the business publications and in the popular press. Unfortunately this outpouring of information has too often been incomplete and oversimplified."(9)

Regarding the peculiar aspects of Braille publishing, consider that traditionally manuscripts are submitted to the publishing industry to print books, and eventually some of these books get transcribed into

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(4) William Lamparter, Economist at "Battelle" (worldwide 'contract' research), "Impact of Electronic Composition on Commercial Printing and Publishing". Appendix, p. A13

(5) Spencer A. Tucker, Consultant Director, Composition Information Service, Los Angeles. Printing Magazine, March 1970, p. 37.

(6) Ibid.

(7) Ibid.

(8) McLean Hunter, Computer Information Center, Inc., Los Angeles, "Survey of Computerized Typesetting", British Printer, January 1970, p.16.

(9) William Lamparter. Appendix, p. A13

Braille--relatively inefficient and at high cost. Lately, a few titles were keyboarded for computer processing of the text into Braille grade II. The advantage of this method is that any of the many trained keyboarders can handle English without having to know the rules of Braille Grade II; these rules can be supplied by a computer later. However, the cost for this work was found to be excessive for the production of a relatively small number of Braille copies per titles.

So, it came natural that people concerned with publishing Braille got excited about the possibility to use existing tapes--produced by large commercial printers for their own composition--to generate Braille.

The idea was to obtain compositor's tapes inexpensively after they have been used for commercial printing, where the commercial printer would absorb the high cost of keyboarding--certainly an intriguing thought.

This thought has been pursued for many years and by different people. However, as far as we know, only in one place has compositor's tape been used to produce Braille on a continuing basis and even this operation has again dropped most of the automatic data processing in its operation."(10)

Why, one asks, has the idea of "generating Braille from compositor's tape" been not more successful?

In looking for answers and in order to understand the attitudes of professionals in the field of printing and publishing in the U.S.A. as well as abroad, we searched numerous publications from government, industry and information centers (see in appendix, pages A 6 to A 46); we asked for response to a questionnaire (sample in appendix p. A 47); we visited and interviewed directly a number of experts.

As a result we found much that is disputed, but general trends seem to emerge.

We give here a selection of brief direct quotations taken from publications. (For more detailed and extensive listings the reader is referred to the appendix).

..."We know that straight keyboarding of copy, regardless of the high speed system following, is handcuffed to manual operator speed."
The Honorable J.L. Harrison, p. A 9

..."working to bring about a solution to the conflicting needs for speed in composition and desirable printing practice."
J.F. Haley, p. A 10

..."Opinion regarding markets and production technology...based on few or no data."
H.C. Lamparter, p. A 12

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(10) The joint venture of the University of Münster, with a German magazine publisher and a social agency for the blind, does issue regularly Braille versions of several magazines.

..."The application of computer controlled ultra high-speed typesetting to book production--principally textbooks--is an area of some controversy."

..."the high powered gear saves nothing on keyboarding or proofreading which, with page make up, is at least 80% per page composition cost in book work."

..."to a machine cost of $6 per page one adds at least $8 - $9 for keyboarding and proofing."

..."page rate on a trade book goes from $6.50 - $8 via conventional methods to at least $12 - $15 on an ultra high-speed typesetter."

..."In-house data creation [at] the publishers, [his] immediate advantages lie in control of data creation and production schedule."

Sedwig, p. A 22, A 23

..."Complete automation of typesetting will probably remain a technologist's dream."

..."Any discussion of automatic typesetting seems to flounder at the input stage."

..."typesetting demands a preponderance of data preparation and relatively little computer processing."

..."a consensus of published experience suggests that on a single-column news (newspaper) the improvement in productivity will be about 15 to 25 per cent. A book printer employing wider measures should not expect much more than 7 to 10 per cent."

..."40 to 50% of caseroom time (goes for)...corrections, page make up (takes) a good proportion of the remainder."

Wallis, p. A 27, A 29

..."Computerized composition has not yet made much of a dent in traditional typesetting of 'straight matter' such as book work."

..."What is required of the publishing industry is standardization of format."

Rice, p. A 36

..."Computer typesetting in U.K.: ...already a multiplicity of equipment, which pose problems to the printer who feels he ought to be in."

..."In most instances the basic reason has been (the hope) to reduce costs."

..."Most of the schemes have involved the retraining of linotype operators, many of whom have not yet reached their potential speed on the new keyboard."

Hira, p. A 40, A 43

Results from the inquiry with our special questionnaire were as follows:

Question 1: Tape used: material(s), format(s), code(s).

Question 2: Systems used.

It is particularly striking--and it has, of course, far-reaching consequences--that each of the respondents uses different formats and systems. We therefore think it important enough to quote the corresponding answers verbatim.

1 6 channel punched paper, TTS code.
7 track 556 B.P.I. with BCD blocked in 1000.
ss character records.
2 H 1200, 65K, 6 tapes + 2 discs.

1 perfected from 8 level paper tape by Frieden 2501 keyboards
9 track 800 BPI
variable records.
2 RCA Spectra 70-35 with Videocomp 822 using page 1 software.

1 6 channel TTS paper
special keyboard layout
unjustified
2 Hot metal, Electron mixer, automated via Line-a-Sec. for line measurement.

1 800 BPI mag. tape, EBCDIC code.
9 track
2 IBM 360/30 or 360/40 with ABC composition system.

1 6 level TTS paper tape and MT/ST (extended keyboard-k bak).
We produce tape for composition and computer manipulation.
2 Photon 713-20, IBM MT/SC, AM725, Electrons, Harris fototronic CRT, IBM CRT (Alphanumeric).

1 1/2" Magnetic tape, EBCDIC code
7 track 556 B.P.I.
2 Originally designed/implemented SIGMA 2 equipment.

1 6 channel punched paper, converted to 1/2" magnetic tape
7 track film
2 Videocomp RCAbase system, Spector 70 computer; Poole Brothers' RCA system, Spector 70-35 computer.

Question 3: How clean are tapes? What is the error rate? Are all corrections carried back to data base?
3a: Are tapes complete?

Especially disturbing is the variety of responses to the items "error rate" and "clean-up" carried out on tape. We give therefore again a complete listing.

3 1 error per 1000 characters
3a We correct data after it has passed "Raw" data stage. (clean?)

3 100% clean
3a Yes, 100% carried back; tapes are complete except for front and some back matter.

3 95% clean
3a Corrections are not carried back to data base; tapes incomplete.

3 over 90% correct; (clean)
3a Yes, corrections are--at present--brought back to data base; tapes complete but may be on multi-reels.

3 -----(no answer)
3a Yes, (back to data base); tapes complete.

3 -----(no answer)
3a Yes; all corrected; complete in galley form.

3 All paper, as well as magnetic tapes are corrected; "clean".
3a -----(not answered).

Question 4a: Reformat to specified code?

Some houses can and are willing to do so. Others could do this on magnetic tape only. /Or,/ "Have no present program for this, but it could be done."

4b: Price per title? (reformating to specified code)

"Would depend on amount of change. MT/ST cost per hour is $7.85." "Estimated cost on first basis $1,000"; /others say:/ "program and machine time $200."

Question 5: How long are tapes kept after completion?

"Hold as directed by publisher, or (else) not kept at all."

"Some titles kept not at all, others 4 to 5 years, depending on subject."

"One year, thereafter asking for storage charge."

"If not otherwise specified, will be erased and reused as soon as safely past photographic plate making."

Question 6: Releases of tapes (or copies) for Braille production:

Only one respondent replied: "free of charge". Other responses vary from $15 to $200; or "Free--if costs for eliminating machine commands etc. are recovered."

Question 7: Scope--titles per year--produced with compositor's tape. (Range of estimates by respondents).

Straight English	From 20 to 500 (average 325)
Scient. & College	From 40 to 150 (average 83)
Element. & High Sch.	From 6 to 50 (average 18)

Question 8: Projected usage of compositor's tape by 1980.

Straight English	From 50 to 100% (average 78%)
Scient. & College	From 25 to 80% (average 64%)
Element. & High Sch.	From 75 to 80% (average 77%) (11)

For first-hand information we have visited or contacted the following publishing houses, printing plants and computer composition companies:

Bantam Books, Inc., CompuScan. Inc., Computer typesetting "Black Dot", Dell Publishing Co., R. Donnelly & Sons, Follett Publishing Co., Hadden, W.F. Hall Printing Co., MacGraw Hill Book Co., The McMillan Company, Poole Bros., Prentice Hall, Rand MacNally & Company, Random House, Roccappi Computerized Composition, "Tape Type", Vermont Photo-Tape serv., Westcott & Thompson, and Western Publishing Co.

The Goss Co. in Chicago kindly allowed me to use their excellent library.

The interviews largely reinforced information obtained through the literature research and the questionnaires. The following observations are worth mentioning separately:

a. The research director of a large publisher said: "We use data systems' Keymatic Console (somewhat like MTST, but directly computer compatible output). One should do much clean up at this stage (before composition); keyboarding accounts for approximately 45% of total composition cost."(12)

Advantages of automatic composition are: "The resulting print page is superior to manual composition; furthermore, there is fast turnaround.--Automated composition is mostly attractive for material which is subject to change; but better product and reduction of printing cost (because of optimal page utilization) make straight matter also competitive."--"Newspapers are switching to offset; this causes the hot metal technology to wither, because of loss of their biggest market."

b. A compositor: ..."expects to see hot metal technique to disappear in a few years, to be replaced by optical (film) composition. But tape availability is nevertheless not assured: Only ~5% of the text are

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(11) Several of the respondents stressed the speculative nature of their own estimates. Furthermore, the most optimistic estimates came in several cases from respondents who had only recently started automated typesetting. In the light of the literature quoted it is our opinion that the estimates given here, especially for straight matter, are far too optimistic.

(12) Editors intervention concerns itself mostly with formalism (not much with meaning)--thus unimportant for Braille use even if missing in available tape.

complete, fully corrected tapes and are retained (for future printing, etc.). Most tapes are kept only a short time." /And we may add: often as a jumble of short sections of paper tape which are thrown in cartons without organization. Many corrections are made by hand on the final (film) copy and therefore never get back to the tape!/

"Tapes are not necessarily complete; they may for one book be made by several compositors: sections of one book may be done directly in hot metal, whereas others are done with tape, etc. Many different systems are in use and publishers use different codes, thus making some available tapes incompatible with others."

c. A very large publisher told us that: "straight matter (novels) is usually printed only once";
that: "they use MTST and convert its output into computer readable form".
"...perhaps as much as half of our compositions for books of general interest are presently being composed from tape".
(however) ..."At the present time, we have very little material available on which a 'perfect' tape exists."

..."Unfortunately, most if not all of the conventional composing systems and the earlier photo-composing systems do not result in a correct 'perfect' tape. In the case of all of these systems, the keyboard tape is used to create galley proofs of hot-metal type, or photographically-created type images. All identified errors are then corrected directly in metal type or by stripping corrected copy on the film output. It is only in the case of the more advanced computer composition systems that a 'perfect' tape, embodying all of the corrections, is created."

"Permission to use a compositor's tape would not only have to be obtained from the publisher but also from the author."

d. The president of a large compositor: he confirms that ..."at present composition of 'straight English text' is rarely produced by computer because so far it is more expensive." (Do you expect that to change?) "Definitely!" (How will it become more competitive?) "Prices will come down with volume." (You mean if a publisher contracts with you for 100 book titles instead of 10, you would lower your price drastically?) "Absolutely!" (When do you expect that automated composition will take 100% of this (straight matter) market?) "Never; about 50% in 10 years." "As far as the next six months are concerned it is difficult to predict what we may produce."

Conclusions:

At the beginning of this paper we asked the question whether Braille production can be revolutionized by utilization of compositor's tape.

Techniques for producing Braille in this way do work. But, what does this do to enhance--in Professor Mann's words--the availability of Braille? Unfortunately, the answer to this question is "at present next to nothing".
Relatively few titles get on tape;
relatively few of them get on tape completely;
not many of these are "clean" of errors;

and not all of these are preserved for any length of time after having served in the printing operation--;
and the final residue which is useful for the Braille producer is formated in numerous, different and noncompatible ways.

So, the Braille producer has to pick out a few grains of wheat from what is tons of chaff to him. Furthermore, offerings of tapes by the industry are concentrated in a few special fields, such as textbooks, dictionaries, etc., as a consequence of economic factors. At least this is so at present, and it seems likely that these factors will continue to operate in the forseeable future.

The resulting effort in finding usable material is bound to discourage the Braille producer.

Furthermore, because of the low volume of Braille demand the Braille producer is hardly ever specialized with respect to type of literature; thus, even if compositor's tape were relatively more abundant for some limited part of his production, he would not seem to be much better off: To take advantage of this opportunity would make life for him more complex and difficult and he may well wonder whether the results are worth all that much.

What can be said about the future?

Generally our search has not identified causes for drastic change from the present situation; some agreement seems to exist that more tapes and better tapes will gradually become more available--but hardly anything like complete conversion is predicted by the experts. As a matter of fact there can be seen some factors at work which may counteract such a development, for instance the proliferation of competing and not compatible equipment. It would seem, then, that the future does not hold any revolutionary promise for compositor's tape utilization by Braille producers.

If and when much--or all?--information (including novels, poetry, etc., etc.) will be stored in machines, one would of course not have to worry about sources for machine readable input any more; Braille would simply become one of many possible outputs of "the machine", and complete availability would result.
If and when.....

APPENDIX

to

PROSPECTS FOR UTILIZATION OF COMPOSITOR'S TAPE

IN THE PRODUCTION OF BRAILLE

Note:

The quotes on the following pages are drastically condensed compared to the originals; some are rearranged chronologically.

Automatic Typographic-Quality Typesetting Techniques: A State-of-the-Art Review

by Mary E. Stevens and John L. Little

About the 12th Century, B.C., the Chinese first introduced wooden blocks of movable type. . . .

Johannes Gutenberg, a German stonemason, 1440, demonstrated the practical use of movable metal type. . . . which led to modern printing. . .

Production of printed pages thus dates back at least 500 years. Gradual mechanization of typesetting operations occurred during the following four centuries, including the introduction of keyboards for type selection and the development of devices for the automatic sorting of used type slugs.

The use of machines and of mechanizable processes to improve the utilization of scientific and technical information has a first and obvious area of application in the preparation of copies of text and tabular data for distribution or publication.

Mechanized printing began with the invention of movable type. The first scientific journal began publication in 1665; the first abstract journal appeared in 1807. 1665 1807

An interesting early example of possible mechanical processing for composition of revised and updated bibliographic listings was reported by Charles C. Jewett to a convention of librarians held in New York in 1853. "Every book's title, distinct edition and author is stereotyped upon a plate, mounted on a block in alphabetical order of title. . . . to be able readily to insert additional titles and then reprint the whole catalogue." 1853

So Clapp reports, "a sample catalogue, printed 1854, for the Library of Congress from these plates still exists." The plates warped in storage; Jewett was betrayed by the imperfect technology of the time. 1854

Not until nearly a century later, with both manual and sequential card camera shingling techniques, were some of these advantages realized.

In the late 19th Century, a great leap forward had been made in typographic composition. . . . Linotype by Mergenthaler and Monotype by Lanston. The Linotype, first used by the New York Herald Tribune in the late 1800's, is a keyboard operated machine which casts a hot metal slug for each complete line of type. The Monotype equipment involves two separate machines. A large keyboard used to operate a paper tape perforator. This perforated paper tape then controls a hot metal type slug caster. late 1800's

During the last few decades, and particularly during the most recent decade, there has been a notable increase in the availability of mechanical aids in composition operations.

Eastman Kodak was active in the field of electronic character generation in the middle to late 1940's, leading to demonstrations of DACOM equipment in the early 1950's. As early as 1948, this company filed patent applications with respect to means for displaying characters on the face of cathode ray tube. . . . . these patents were then cross-licensed to RCA, to IBM, and to at least one British organization. late 1940's

The first patent applications for what is now known as the Photon (the Lumitype in France) were filed in 1945.(1) 1945

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(1) Since that time, the inventors Messrs. Higonnet and Moyroud, have taken out over 40 U. S. patents as well as numerous foreign patents on various inventions in the field of photo-composition. . . .

In 1946, Corrado reports, "Mergenthaler was experimenting with a cathode ray tube, closed loop, television system to produce type on film." 1946

Reporting in 1959 on then current progress in photocomposition, Winkler said: "The Fotosetter, developed in 1947 by the Intertype Corporation, was the first commercially available phototypesetting machine. The Photon, of Photon, Inc., was the second phototypesetter placed on the market. In succession, the Monophoto of the Lanston Monotype Company and the Linofilm machine of the Mergenthaler Linotype Company were introduced. The American Type Founders, Inc., has recently made the ATF Typesetter available." 1947

Winkler also describes the Research & Engineering Council of the Graphic Arts Industry, Inc., which was started informally in 1948, and formally incorporated in 1950. 1950

(2) Editor's comment

The year 1954, however, marks the official date of disclosure of the first comprehensive approach to the use of modern machine techniques to typographic quality composition generally involving both computer processing and automatically controlled composition devices (Bafour, 1965).

As Duncan reports: "The proposal to apply the power of modern digital computers to text processing originated with Bafour, Blanchard, and Raymond. Their patent application was made in France in March 1954, and must have been preceded by a great deal of work. Their system as originally conceived embodied a special-purpose tape-typewriter keyboard (at least one prototype was built by Barriquand and Marre) with additional keys for function codes, and means for producing correction tapes and merging them before processing in a special-purpose computer, details of which were also specified in the patent. . . They clearly envisaged that the output would control both automatically operated linecasters and other more advanced photo-composing machines." 1954

At Mergenthaler. . . work was begun on the photocomposer Linofilm, the first prototype production model having been tested in the period 1955-1956.(3) 1955-56

The year 1958 saw the first publicly available production of KWIC (Key Word-in-Context) indexes, those for the Preprints of the International Conference on Scientific Information (machine-produced but not of typographic quality), the initiation of projects to explore the potentialities of photocomposition at the American Chemical Society and, in France, "experiments. . . carried out using a computer of the Societe d'Electronique et d'Automatisme. The output tapes were fed into the Intertype casters of the Imprimere Nationale, equipped with Fairchild readers and control units."

Duncan comments with respect to the latter experiments as follows: "The tragedy is that after the brilliant demonstration of November 1958, the French Syndicate did nothing to exploit the system."(4) 1958

The lead thus lost in France was to be picked up both in the United States and in Great Britain in the period 1959-1962 with respect to photocomposition equipment as such and also with respect to computer control of various compositor functions. Hoffman, in a 1959 survey of composing room materials and machines, reported as follows: "Photography. . . is an industrial phenomenon creating a major upheaval in the graphic arts industry. . . . Electronic control of the photographic composing process is 1959

(2)
Further impetus was given to this type of photocomposition technology by the Graphic Arts Research Foundation, Inc., from about 1948-1949 onward. First commercial computer (UNIVAC) delivered to Bureau of Census.

(3)
Experimenting started 1946.

(4)
The latest information from France is that a large computer firm (SCF) and the typewriter firm of Japy together with Barriquand and Marre are about to carry on the work, having lost a lead of six to ten years.

already here. . . While not at present available commercially, machines such as Monophoto and ATF Typesetter indicate that photographic composition in justified lines of straight matter can be expected soon from several machines."

From 1959 to 1961, an investigation and study of "graphic-semantic" composing techniques was conducted by the Syracuse University Research Institute for the Rome Air Development Center (Buck et al., 1961).

IBM, which was developing the concurrent machine translation efforts, subsequently demonstrated output of text via computer program and Linofilm.

1960 In 1960, as a result of the American Chemical Society's graphic arts research program, production of the quarterly Journal of Chemical and Engineering Data by photocomposition techniques was begun, utilizing manually keyboarded Photon equipment. In the project summary prepared for Current Research and Development in Scientific Documentation, No. 7 (for November 1960), it is stated that results with respect to the economics of the process were not conclusive as of that time, but "there are indications that the process is at the very least competitive with hot metal costs."

A two-year program for the investigation of the use of photocomposition techniques in the setting of mathematical text, such as the journal Mathematical Reviews, was initiated at the American Mathematical Society in January 1962.

1962 In 1962, the Joint Committee on Printing of the U. S. Congress initiated action which led to the establishment of the Federal Electronic Printing Committee, to the setting up of the post of Electronic Printing Officer at the U. S. Government Printing Office and eventually to the ordering of Linotron equipment for the Government Printing Office. (Mergenthaler had already entered into a contractual arrangement with the Columbia Broadcasting System Laboratories for cooperation in the graphic arts field, resulting in the eventual Linotron design).

By this time, also, the Russian All-Union Institute for Scientific Information (VINITI) was evidencing specific interest in computers and high speed composition techniques. Thus, in 1962, Mikhailov reported "development of new highly-productive printing equipment including photo-setting and photo-engraving machines, high-speed mono- and linotypes, composing typewriters," and the like.

In July 1962, occurred what is probably the first finished book of tables involving the combination of computer processing and automatically controlled photocomposition, NBS Monograph 53, Experimental Transition Probabilities for Spectral Lines of Seventy Elements (Corliss and Bozman, 1962; Bozman, 1963). The introduction to these computer-generated tables of values states in part:

"At the beginning of the preparation of this table it was realized that equipment was available which would permit essentially automatic preparation of the finished book. It was therefore decided to attempt to produce this publication by completely automatic methods. An electronic computer could be used for the computation, then the magnetic tape output from the computer could be used to operate an automatic phototypesetting machine which would produce film ready for making the printing plates."

Also occurring in 1962 were the initiation of the automatic composition program at the University of Newcastle, preliminary demonstrations of typesetting by Computaprint Ltd. for the British Institute of Printing and delivery of the prototype Linasec to the Alden Press. The ROCAPPI (Research on Computer Applications in the Printing and Publishing Industry) organization initiated a program for automatic control of hot metal linecasters in October 1962 and went into limited production in January 1963.

1963, may be said to mark the major beginnings of automatic composition. As reported in "The Penrose Survey" for 1964: "A number of firms had installed the Intertype Fotosetter and the Monotype Corporation's 1963 Monophoto, but the more elaborate machines still awaited major acceptance.

This came in 1963 when a number of installations of the Linofilm and Photon-Lumitype were made. . . the decline of printing from movable type can definitely be associated with 1963 . . . 1963 also saw the development and acceptance of setting by computer."(5)

In October 1963, the registrants at the annual meeting of the American Documentation Institute received two volumes of short technical articles, claimed to be the first of its kind to be typeset by computer.

Finally, in August 1964, appeared the first issue of the National Library of Medicine's Index Medicus to be computer compiled and automatically typeset at high speed directly from magnetic tape. 1964

Meanwhile, other news publishing organizations had moved ahead with the installation both of photocomposers and of computer control systems to operate either hot metal casting or photocomposition equipment. Thus, by 1964, it could be reported that "a recently conducted survey. . . revealed more than 75 installations involving the computing equipment of some ten different manufacturers. . ."

Additional evidence of the rapidly emerging state of the art is that of labor relation reactions. In July 1964, union printers went on strike in Toronto.

Two distinct technical advances in type composition have thus emerged over the past two decades, and especially in the past two years: first, the substitution of photocomposition and/or cathode ray tube character generation coupled with photographic, xerographic, thermographic and other copying processes, and secondly, the use of computer techniques or devices up to and including general purpose high speed digital computers to control either hot metal casting or film-set printing processes. In addition, both types of technological development may be and have been combined in a single application.

A third technological development, that of tie-in to communication networks, has come to practical fruition, from 1963 onward, for stock market exchange quotation and newspaper special edition applications at remote locations, such as the RCA-TTS Dow Jones system, the Wall Street Journal system and that of the New York Times.

Closely related to the newly emerging applications of book composition is the notion of the service bureau or center which will do automatic typographic quality composition on input from a variety of sources. Already, "service center developmental activities are fermenting and materializing in many sections of the country." Examples include ROCAPPI (Research On Computer Applications in the Printing and Publishing Industries) both in cooperation with other Philadelphia firms (W. B. Saunders and Computer Composition, Inc.) and in England (Hazell Sun Ltd.), Keydata Corporation (Boston), and others.

Developments involving linkages with communication networks will probably encourage the growth of these and other centers. Duncan reported at the 1964 Computer Typesetting Conference that ". . . data relay equipment over wired networks. . . is at last available. . . of adequate performance and at a reasonably economic cost. We can now expect to see the expansion of service bureaux activities and they may eventually be able to provide computer typesetting programmes for their customers and an off-peak service at acceptable rates."

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(5)

(From pages 66-67) Book composition advantages are at least on the horizon. . . Alden Press:. . . "We look forward to high volume production of quality type at reduced costs on faster production schedule."

In the same year, 1963, Westerham Press Ltd., England, began a research program for computerized typesetting. At Rocappi book compostion developments are under way on a service bureau basis.

Blundell claims: "A special advantage of computers for books is that type only has to be set once. . . ."

A special case of service center operation involving dissemination of news and current trade development information to its subscribers is Composition Information Services, Los Angeles, which issues at regular intervals the CIS Newsletter. In the August 1965 issue, for example, coverage was provided to the impact of potential automation and implied re-education as viewed by the 46th International Association of Printing House Craftsmen, news of a grant for continuation of Newcastle projects for computerized typesetting, and reporting of phototypesetting equipment at an international exhibition in Paris, including Hell, K. S. Paul (P&M) Filmsetter, CAE, Monotype, Photon, Mergenthaler, and others. 1965

INTRODUCTORY REMARKS

by Ethel C. Marden

. . . . electronic computers now affect a whole spectrum of areas; one of the newer of these is printing.

It is a common observation that a change of an order of magnitude -- that is to say, by a factor of 10 -- in a technology produces fundamentally new effects. . . . For example modern jet planes -- about one order of magnitude. Another example is the automobile. But these changes have occurred over a period of 50 to 60 years. By contrast, the first stored-program computer was completed only 17 years ago. Yet such computers have increased the speed of computation by more than 7 orders of magnitude over hand computation. . . . yet this change has come about in a much shorter period of time than corresponding changes in other areas.

change of an order of magnitude (factor of 10) produces fundamentally new effects. . . modern jet planes about one order of magnitude in a period of 50 to 60 years. . . program computers increased speed of computation by more than 7 orders of magnitude in a period of 17 years

Initially some of the effects of the new technology were ignored. Computers were built to compute, so we used them for that purpose; but we still did things in pretty much the same way -- we just did them on a larger scale and we did them faster. In the last few years we have begun to explore many ways in which this technology can be exploited: . . . , . . . , . . . and in electronic composition for printing.

Computers were built to compute, so we used them for that purpose; but we did things pretty much the same way -- we just did them on a larger scale and we did them faster.

The Federal Government spends more than 3 billion dollars a year in computer rental and purchase and in the application of information processing on computers. When this level of spending is reached, cost effectiveness becomes a very significant factor in operation. Cost effectiveness criteria must be applied not only to the cost of initiating a particular operation but also to the costs of error detection and correction in subsequent information processing operations. In data handling operations these latter costs usually represent the major part of the total expense of the operation. In a multistage information processing activity it is desirable to manage when possible with a single input and to generate subsequent ones. Cost effectiveness becomes significant in measuring different ways of handling multistage operations, particularly when manual handling is involved in any portion of the processing. It is easy to calculate overt costs but very difficult to put a dollar value on the intangible cost of errors. This cost is a significant feature in many operations, but particularly in report and manuscript preparation. By means of electronic composition, it should be possible to reduce by a measurable amount the tangible costs of publication and to diminish dramatically those intangible costs associated with error elimination.

The Federal Government spends more than 3 billion a year in computer rental and purchase and in the application of information processing on computers.
Cost effectiveness criteria must be applied not only to the cost of initiating a particular operation but also to the costs of error detection and correction in subsequent information processing operations.

Cost effectiveness becomes significant . . . particularly when manual handling is involved in any portion of the processing. It is. . . very difficult to put a dollar value on the intangible cost of errors; . . a significant feature particularly in report and manuscript preparation

The first stored-program computer in this country, the SEAC, was built by NBS in 1950. In 1965, the Brooks Bill (Public Law 89-306) gave NBS additional responsibilities for standards in both hardware and software, for rendering consultation and advice to other Government agencies in the use of computers, and for the innovation and extension of techniques for their use.

first stored-program computer in this country (SEAC) was built in 1950 (1965 Brooks Bill Law 89-306)

Here an important area is the application of electronic techniques to composition in printing. In this connection we are very much concerned with the development of techniques to expedite the handling of textual information. It is therefore eminently suitable for the Bureau to sponsor this Symposium on Electronic Composition in Printing.

I should not like to predict what changes we shall see in the computer technology or in electronic composition in the next 15 years, or the next 10 years, or even the next 5. But of one thing I can assure you: changes -- and dramatic changes -- there will be.

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. . . in the computer technology or in electronic composition. . . I can assure you: changes -- and dramatic changes -- there will be

A NEW LOOK AT THE GOVERNMENT PRINTING OFFICE

by The Hon. James L. Harrison
Public Printer of the U. S.

. . . Last year the Government Printing Office. . set more than three billion ems of composition. . . Today, slightly over half of our annual printing volume is procured from commerical printing houses throughout the United States. We have more than 2200 firms on our list of active suppliers. . . . In 1960, our business volume was just below $100 million -- this year we expect it to reach $210 million. In 1960, commercial printers did 40 percent of the total and this year will do 55 percent. .With virtually the same work force . . . . we are meeting a ballooning Federal requirement for printing. . . .

We have more than 2200 firms on our list of active suppliers.
our business volume was (1960) just below $100 million -- this year we expect $210 million [1967] commercial printers did 40%; this year will do 55%

Two innovations, as far as the Government Printing Office is concerned, loom large in the assessment of our future plans -- offset and electronic composition. Today, we are producing more impressions by offset than letterpress. . . .

Today we are producing more impressions by offset than letterpress.

While commercial experts were spreading the doctrine of long runs for profit, our offset division demonstrated the soundness of producing even modest runs on web equipment.

This Symposium is chiefly taking place in order to review progress in electronic composition in printing, let me turn to the Government Printing Office's activities in this area. . . .

In 1962, the Joint Committee on Printing. . . . pushed us out into the forbidding and relatively uncharted sea of computer-oriented composition.*

But back four or five years ago when the work of the Committee gave substance to our estimates that 20 percent of all Government Printing was being composed entirely -- or in part -- on EDP equipment, we realized that a temporary or interim solution was needed -- and quickly. So the Government Printing Office seized the initiative and installed a system which we felt would provide much-needed experience, information, and training in this field. . . . we were fixing our sights on the ultimate answers to our composing problems.

we are now [June 1967] expecting delivery of the Linotron system in a few weeks**

we were fixing our sights on the ultimate answer to our composing problems

This first essay into computer composition took the form of two Linofilm keyboards, a Linofilm photo unit, prototype-paper-to and magnetic-to-paper tape converters, three Justowriter perforators, and three electron tape-operated slug casting machines. Two IBM 1401 computers were already in service in our accounts division.

We now have five units and the old 1401's have been replaced with an IBM 360/40 and a 360/50. . . .

Tomorrow you will be treated to a "nuts and bolts" presentation by Jack Boyle. . . .

I want to emphasize that our electronic printing policy is a down-to-earth effort to bring you savings in printing costs. . . Our electronic composition posture is first rate.

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* Our exploratory group, . . . the Federal Electronic Printing Committee's. . . findings formed the basis on which the Government Printing Office has acted, and were instrumental in moving us to the forefront in the search for a suitable electronic composition system.

** We are now on the threshold of realization -- expecting delivery of the highly sophisticated Linotron system in a few weeks.

. . . One thing experience has taught us is that we have just scratched the surface in this field. The state of the art, despite today's complex and sophisticated systems, is in its adolescence. We know, for example, that straight keyboarding of copy, regardless of the high-speed systems following, is handcuffed to manual operator speeds. While we are learning ways to improve manual keyboarding somewhat, increases are not significant. Optical readers and scanning devices offer hopes of freeing input speeds and sending them soaring.

straight keyboarding of copy, regardless of the high-speed systems following, is handcuffed to manual operator speeds
Optical readers and scanning devices offer hopes of freeing input speeds and sending them soaring.

PRESENT AND PROJECTED POLICIES OF THE J. C. P.
Congressional Joint Committee on Printing

by John F. Haley
Staff Director

. . .I shall direct my remarks to many items that should tinkle with familiarity to most of you. . .

Let us depart from the inverted conventions and try to see everything quite plainly as the verbal smokescreen lifts.

Allow me to take you back to another day a little more than five years ago. . .

In 1961 an analysis of the Federal publication indicated that approximately 20 percent of those publications were being composed on some form of automatic data processing equipment. Further analysis of these publications indicated that compromises with legibility, bulk, and printing and binding costs had been made for the sake of pure speed in composition and dissemination of the end product.

After discussions with the major publishing agencies of the Executive departments and staff of the Government Printing Office, a policy determination was made by the Joint Committee on Printing to give a mandate to the Public Printer of the U. S. to develop a program designed to give proper balance to the use of computers in the printing field. All of us concerned with this effort are fully convinced that this was an epochal event in the history of electronic composition. . .

a mandate to the Public Printer of the U. S. to develop a program designed to give proper balance to the use of computers in the printing field

Working to bring about a solution to the conflicting needs for speed in composition and desirable printing practice, this group also analyzed and integrated work that had begun in the various agencies on this problem. . . .

A subcommittee, composed of representatives of the GPO, Army, Navy, and HEW, drafted a set of specifications for the approval of the whole committee which, in turn, submitted them to the Public Printer for his consideration.

After approval of the Joint Committee the specifications were released to the industry on July 17, 1963. . .

On October 15, 1963, a total of six proposals were received from the following firms: IBM, Harris Intertype, A. B. Dick, Alphanumeric, Photon, and Mergenthaler.

A subcommittee of the Electronic Printing Committee, composed of the representatives of GPO, Navy, and HEW, assisted by Mr. Ralph Mullendore of the Bureau of Census. . recommended that the contract be awarded to Mergenthaler.

contract awarded (to Mergenthaler) on March 11, 1964*

This recommendation was endorsed by the full committee and submitted to the Public Printer on January 27, 1964. On March 11, 1964, the Joint Committee on Printing approved the request to purchase two high-speed phototypesetting machines known as Linotrons. The contract was awarded on March 11, 1964.

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* two high-speed Linotrons

Even as I stand here today,* the first of the Linotrons is being prepared for shipment to the Government Printing Office where, after meeting contractual requirements pertaining to performance, it will usher in a new era in composition.

first of the Linotrons is being prepared for shipment to the Government Printing Office*

Why, one might ask, do I say that the Linotron will usher in a new era in composition?

First, I would say that we have bridged the gap that had existed in the speed imbalance between computers and composing devices.

Second, I would say that we have introduced a new technology to composition by means of cathode ray tube outputs.

Third, we have brought together with the Federal service the practitioners of two arts; namely, the art of data processing, and the art of typography. Recognition of each other's problams has been and will continue to be an essential element in the exploitation of this new era in composition.

Recognition of each other's problems has been and will continue to be an essential element of exploitation of this new era in composition.

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* June 15 and 16, 1967

THE IMPACT OF ELECTRONIC COMPOSITION
ON COMMERCIAL PRINTING AND PUBLISHING

by William C. Lamparter
Senior Graphic Arts Economist
Battelle Memorial Institute

. . . . Let me explain what I mean by a commercial printing and/or publishing company.

As the word commercial implies, such a company is in business to make money.* This is an important consideration because it means that the utilization of new concepts, such as computerized composition, must either immediately improve the profitability of the business or at least offer some hope that greater profitability can eventually be realized.

commercial printing and publishing companies in business to make money.

Our definition of commercial printers also includes a number of the specialized segments of the printing industry such as the business-forms printer, the greeting-card manufacturer, the book and periodical printer, as well as the specialist in items such as direct mail, catalogs, and directories. Particularly important for inclusion in this list is the trade composition house. . . . Because of their highly specialized situation, we have excluded newspaper. Operations that exist primarily to manipulate data -- probably by computer -- are not considered to be commercial printers, even though they may at times be concerned with printing. Government operations are also outside of our definition as are those organizations that are not profit oriented. . . .

Our definition of commercial printers includes the specialized segments. . . . book and periodical printer

Particularly important for inclusion in this list is the trade composition house. . . .
Because of their highly specialized situation, we have excluded newspaper

As a part of Battelle's research activities,** we have been conducting almost continuous field interviewing of the group of commercial printers and publishers just described. During the past five years, we have been particularly interested in photocomposition -- or as it might more properly be called, phototypesetting -- and the application of the computer throughout the graphic arts industries.

Automation in the graphic arts -- including, but not limited to, computerized composition -- has been the subject of a number of research projects. . . . In investigating this field I have interviewed a large number of printers and publishers.

The results of our discussions with publishers and printers indicate that the attitudes in the industry toward automation of the composing room are varied and often contradictory.

attitudes in the industry toward automation of the composing room are varied and often contradictory. . .

We did find that there was considerable opinion regarding the markets and production technology associated with computerized composition -- although many of these opinions were based on few or no data. The

opinion regarding markets and production technology . . . based on few or no data.

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* The many thousands of small job printers located in virtually every city, town, and hamlet in this country are prime examples of commercial printers. While many of these operations are small businesses of less than 10 employees, the category also includes medium-sized businesses that, in a few cases range up to 250 employees. Also included are the handful of large companies that make up the "giants" of the producing-printing industry.

** Battelle is a worldwide organization that does contract research in a wide variety of fields (graphic arts during the last 20 years).

repetitive nature of some opinions made us suspicious of their validity, and a little detective work resulted in tracing some of these "opinionated facts" to the same sources of information -- frequently trade magazine articles and convention speeches.

As is unfortunately the case in many areas of the graphic arts, there is a lack of comparative data for computerized composition and its reasonable alternatives. The little factual information available is all too often misused by both the printer and printing buyer in the formulating of conclusions. For example, information applicable to newspaper work has been used to draw general conclusions regarding the applicability of computerized composition for all types of composition work. Another common misuse of data is the comparison of information regarding computerized composition to similar information that concerns completely manual methods. This has the net effect of making computerized composition look more attractive than it really is. . .

While certain portions of the graphic arts labor force present a progressive image, there seems to be a general reluctance on the part of labor to accept and actually permit the application of the computer in an economical manner in the graphic arts industry.

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information applicable to newspaper work used to draw conclusions for all types of composition work . . .

misuse of data by comparing information regarding computerized composition to similar information concerning completely manual methods. This has the net effect of making computerized composition look more attractive than it really is [!] . . . seems to be reluctance on part of labor to permit application of computer in economical manner.

Computerized Composition Today

The interest and controversy associated with computerized composition are as much the result of fantasy as fact. The fact of the matter is that, of the vast volume of material set in type by the commercial printer or publisher, precious little has been set on a computer. There are few publishers who have achieved a tangible reduction in their production costs as the result of utilizing computerized composition. There are few printers who can point to black ink on their balance sheet and say that it represents a profit achieved from supplying computerized composition services. . . . Superficial review articles are appearing with increasing frequency in both the business publications and the popular press. Unfortunately, this outpouring of information has too often been incomplete and oversimplified. . . .

precious little has been set on a computer

There are few printers who can point to black ink on their balance sheet and say that it represents a profit achieved from supplying computerized composition services . . . Superficial review articles appearing . . . information too often incomplete and oversimplified.

Computers are being used by the commercial printer. There are approximately 100 to 125 commercial printers, publishers, and trade typesetters utilizing the computer for the composition function.*

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A number of these computers are associated with a new kind of typographic service firm in the graphic arts. Although one of the principals of this new type of company may be an "old hand" in the graphic arts, perhaps even a compositor, these companies are characterized by their utter disregard of industry traditions and taboos. They are new companies and, therefore, are not faced with the problem of utilizing old equipment on hand as is the entrenched printer and publisher. They are data processing specialists who can look at the requirements for composition from a fresh, new viewpoint. They do not have established labor contracts

a new kind of typographic service firm . . .

They are new companies . . .

they are data processing specialists . . . free to hire labor at the true skill level required . . . and

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* . . . . estimate of commercial computerized typesetting installations based on a survey published in October 1966 by Composition Information Services of Los Angeles, California.

with the traditional graphic arts craft unions, and are free to hire labor at the true skill level required and pay a wage that is in direct relationship to these skills.*

they pay a wage in direct relationship to these skills;

I do not want to imply that these new installations have solved the problems associated with computerized composition. They have not, and in some instances they have created new problems. They are significant, however, because they can bring a new unfettered view to the composition problem and they are able to use low-cost labor when it is appropriate.

in some instances they have created new problems . . . however, they can bring a new unfettered view to the composition problem . . .

Despite the problems, computers are being used by commercial printers and publishers to produce composition. One might well ask, "Why?"

Some composition jobs are computerized because the need for rapid output -- speedy service to the customer -- overrides conventional cost considerations. When unusual speed requirements are not a job condition, the kinds of composition work that can be economically produced on a computerized composition system are limited. Standard straight matter that requires keyboarding, hyphenization, and justification can rarely be done economically on a computer. When the setting of composition can in some way be combined with data manipulation functions, total production costs drop sharply and the computerized approach becomes economically feasible on a total product production-cost basis.

Standard straight matter that requires keyboarding, hyphenization, and justification can rarely be done economically on a computer.

Utilization of the computer becomes attractive when a significant number of keyboard strokes can be saved. Of course, the ultimate in saving keyboard strokes is when a secondary publication can be produced without any keyboard strokes. Thus we can get the output tape for a secondary publication at a minimum cost.

A similar situation exists when an existing publication is to be updated. By merging corrections and new material with old material, the computer can be used to eliminate rekeyboarding the unchanged older material. When information is already in the computer for some other purpose, keyboarding is sharply reduced or eliminated for the production of tape. Any time that maximum use can be made of the data-processing capability of the computer, the composition function becomes economically feasible. This is an important consideration because most commercial printers are not in the data manipulation business.

Any time that maximum use can be made of the data-processing capability of the computer, the composition function becomes economically feasible. . . Most commercial printers are <u>not</u> in the data manipulation business.

The Future

It appears that the printer must change his thinking and become involved in data manipulation if he is going to earn a profit in the computerized composition business.

In the future, the compositor may become merely the operator of photocomposition or character-generation equipment. The equipment would be activated by tapes supplied by the customer. This approach will, of course, reduce the value added to the final printed

In the future, the compositor . . . merely the operator of photocomposition or character-generation equipment, . . . activated by tapes supplied by the customer . . . [since]

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* In an effort to keep costs to a minimum, some of these new service houses have made arrangements with local housewives to perforate the input tape in their homes.

product by the printer. The acceptance of outside produced tapes is a practice that is prohibited in many labor contracts. This may cause considerable problems in the traditional graphic arts shops.

In the future it does seem probable that there will be: (1) some composition jobs that cannot be computerized economically, (2) some that can be computerized, (3) some that require the printer to become involved in data manipulation, and (4) some where the customer prefers to do the data manipulation and furnish the output tape to a composition specialist to be run through his photocomposition or character generation equipment.

The road to computerized composition is difficult and, despite manufacturers' claims and glamour talk to the contrary, much pain, blood, sweat, and tears are necessary to put computerized composition on an economical basis. . . . Composition jobs computerized for the first time are almost never less expensive than conventional typesetting approaches. Even on subsequent runs of the same material, computerized composition must frequently be sold on the basis of a savings in total preparation costs. Unfortunately, customers frequently do not know what their total costs really are.

acceptance of outside produced tapes is prohibited in many labor contracts, this may cause considerable problems

Composition jobs computerized for the first time are almost never less expensive than conventional typesetting approaches.
Even subsequent runs of same material . . . must frequently be sold on the basis of a savings in total preparation costs.

Conclusion

Computer composition can be economical when the nature of the work permits savings in keyboarding.

Commercial computer composition is barely out of its infancy. Its development may well precipitate changes that improve the flow of communications even though these changes may upset traditional functions and patterns of operation in the graphics.

Like many of the commercial printers and publishers that Battelle has been interviewing, we are optimistic that computerized composition will find a significant place in commercial printing.

A BRIEF OVERVIEW

by Samuel N. Alexander
Senior Research Fellow
Office of the Director
National Bureau of Standards

If the Government has a characteristic output. . . it is printed matter in large quantities, amply supplemented by multilith and mimeograph output. . .

. . . . I did not have a prior appreciation of the extent of the Government's dependence on and the variety of its activities in the printing and graphic arts areas. I presume there are some exceptions but it seems as though the Government is involved in printing and graphic arts activities in practically every form in which they are known today. As a consequence, the Government will very likely become the proving ground for a wide variety of innovative practices because of our pioneering in the application of these new tools.

the Government will very likely become the proving ground

I would hope that in these activities there will be a better balance in the proportions of accomplishments reported versus advance publicity on "good intentions" than was the case with the introduction of automatic data-processing techniques into our Government practices. Here publicity consistently tended to run well ahead of accomplishment.

I would hope. . . there will be a better balance in the proportions of accomplishments reported versus advance publicity on "good intentions"

I hope that this community will exercise a little more restraint in reporting its progress and that there will be a careful distinction made among "what-we-are-planning-to-do," "what-we-are-about-to-do," and "what-we-have-done.". . . . There is so much at stake that we cannot afford to take excessively large steps and have temporary failures, backups and start-overs. . .

I hope that. . . there will be a careful distinction made among "what-we-are-planning-to-do," "what-we-are-about-to-do," and "what-we-have-done."
There is so much at stake that we cannot afford to take excessively large steps and have temporary failures, backups and start-overs. . .

We should not each separately have to find out about the common "booby-traps," and disarm them one at a time, each unaware of the other's experience. . . . One must often depend entirely upon the supplier of the equipment for information on the booby-traps that he has observed in his contacts with other customers. . . . The techniques here under discussion are raising expectations that we may soon achieve a new economic balance point in the creation of publications. The relationship I have in mind is between the cost of preparing the material for publication and the follow-on cost of printing and binding. . . . The indications are that -- the not distant future it will become feasible to justify quality type for runs as small as 2,500 and perhaps the break even point may be pushed as low as 2,000. . . .

not distant future it will become feasible to justify quality type for runs as small as 2,500

One of the purposes of the proposed trail-blazer operation is to derive firm information about some of these "trade-off" points. The other objective to try to achieve is to examine the total package of skills complements that will become associated with these new techniques. This is needed. . . . to properly advise with respect to the shifting demands that surely will arise from this new technology. The data processing area is in a rather unhappy state in this respect because of the lack of a purposeful effort to systematically obtain this kind of information in advance of urgent need. . . . all the way from originating the publication to its output and distribution.

COMMENTS

by Mary Elizabeth Stevens
Center for Computer Sciences and Technology
National Bureau of Standards

I would like to remind you of the millions and millions of printed pages that are already in existence and for which we have no capturable machine-form versions. There are similar problems with the continuing flood of publications from all over the world. In many cases we will have access to neither the manuscript preparation nor the typesetting tapes. If we wish to process this great bulk of information by machine, then optical character recognition techniques may prove to be the only economic means of input.

I would like to remind you of the millions of printed pages that are already in existence and for which we have no capturable machine-form versions.

If this proves to be the case, we will need to know certain things. Thus, at a symposium on mechanized abstracting and indexing held in Moscow last September[*] under UNESCO auspices, one of the recommendations that was submitted to UNESCO related to these needs. This recommendation was that all printers of books, periodicals, journals, and the like, be asked to provide in each issue in a special place a full set of all characters and symbols in any font or fonts used in that particular book or journal. The implications for the development and use of OCR techniques are obvious.

1966 under UNESCO auspices: symposium on mechanized abstracting and indexing

recommendations was that all printers of books, periodicals, journals, and the like, be asked to provide in each issue a full set of all characters and symbols in any font or fonts used in that particular book or journal.

My second point also relates to automatic data processing of printed text, but in a slightly different sense. Those of us who use computers for language and text and bibliographic data processing have, like other computer users, asked you who are members of the graphic arts industry to give us back high typographic quality and still keep compatibility with computer speeds of output. And this, I think, you are well on the way to doing for us. However, some of us would now like to ask you to back off just a little on the typographic quality on one minor point. Please be sure you give us, even with variable spacing, some means of differentiation between the period used to end a sentence and the symbol used to indicate an abbreviation or as a decimal point, whether by special spacing or by new symbols, and whether or not this produces "rivers" of white on the page.

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* September 1966, Symposium held in Moscow under UNESCO auspices.

ELECTRONIC COMPOSING SYSTEM APPLICATIONS

by John J. Boyle
Special Assistant to the
Production Manager for Electronic
Printing
U. S. Government Printing Office

This afternoon* I would like to talk about some of the accomplishments of the past four years. What have we learned? What type of work appears to be most practical by this method? What are some of the problems that were encountered and what problems do we see in the future?

What have we learned [last] four years?

. . . what problems do we see in the future?

Four years ago, there were no available composition programs for the IBM 1401 computer. We had on our staff trained 1401 programmers, and computer time available to do a limited amount of composition, so a decision was made to write computer typesetting programs for Linofilm and linecasting machines utilizing available computers.

Mergenthaler at the time had started to write a Linofilm program and we used this as a nucleus to adapt to the specific needs of Government publications. IBM had a typesetting program for the 1620, and with their help, the logic was used to write a 1401 hot-metal composition program. . . .

1963, Mergenthaler at the time had started to write a Linofilm program . . . .
IBM had a typesetting program for the 1620. . .

Our feeling was that typesetting programs should be written so that any style or format could be produced by the computer, within the limitations of the typesetting machine, by very simple changes in the instructions or parameters, or by codes introduced into the input.

This is the ideal. In practice this theory does not always work. Regardless of the knowledge of composition and its variables, each new job will create problems in a master composition program that require additional programming and debugging. In order to get into production we decided to find a publication that had an application and solve the problems one at a time.

The Library of Congress Subject Headings, Seventh Edition, was our pilot project in computer composition. This 1400-page book, containing 326,000 lines, had for many years been produced by hot metal or Linotype, corrections being inserted into standing type. Additions and changes to the previous edition had been issued monthly as cumulative supplements and this type was also held in storage.

The Library of Congress Subject Headings, Seventh Edition, was our pilot project in computer composition.

When the Library of Congress decided that it would be necessary to print a new edition. . . . we were faced with the job of removing 1,368 pages from type storage and manually inserting 86,000 lines of additions, corrections, and deletions.

We felt that this job was a natural for a computer system and with the cooperation of the Library of Congress the necessary programming was started so that we could convert the material to magnetic tape files. . . .

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* June 15 and 16, 1967

The manuscript was converted to paper tape in TTS code on the Justowriter perforators...This paper tape was converted to magnetic tape on the converter, . . . was processed through the computer using a file organization program. . . . The file was then listed on the computer printer to create a proof. This proof was read, corrections were keyboarded on the perforators, corrections were converted to magnetic tape, and the locators on each correction were used by the computer to correct, insert, or delete a line in the original magnetic tape to create a clean tape.

This magnetic tape was then processed on the computer which had been programmed with the Linofilm composition program to produce a new magnetic tape written in the language of the phototypesetter.

The Linofilm magnetic tape was converted to 15-channel paper tape which was used to drive the photo unit and produce galley paper positives...Negatives were made, and the Seventh Edition was printed from offset plates. . . .

. . . . Several computer programs in addition to the composition program are involved. The cost of converting the data to machine readable language is comparable to resetting in hot metal type. So where is the payoff? How do we save the agency money on this job?

The cost of converting the data to machine readable language is comparable to resetting in hot metal type. So where is the payoff?

We have 3 reels of magnetic tape instead of tons of metal to store. When we are ready to print the next edition the magnetic tapes of the supplements will update the basic edition at much higher speed and lower cost than a craftsman manually inserting type slugs... Manual composition, some of the proofreading, and manual page makeup will be eliminated. The publication will be produced on a much shorter time schedule and the data will be more current.

We have 3 reels of magnetic tape instead of tons of metal to store.

Manual composition, some of the proofreading, and manual page makeup eliminated, . . . time schedule shorter, data will be more current.

Let's look at another early example -- the classification index of the Patent Office Weekly Official Gazette. . . . A total of $68,409 patents were issued in 1966.

Patent Office Weekly Official Gazette /classification index/

Prior to computer composition, the weekly index was set on the Monotype, proofread from copy,* corrected, made up into pages, proofread again from copy, and corrected. It was then ready for press.

... Again with Mergenthaler's help, programs were written so that we eventually were able to put the weekly cards into the computer which assigned column identification to each entry, sorted the lines into columns, and wrote a magnetic tape for Linofilm to produce completely made-up pages ready for offset printing. This

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* Now where did the copy come from? Back at the Patent Office as a part of the issuance procedure, a keypunch operator punched an 80-column tabulating card which contained the information we wanted to set, plus other information necessary to the Patent Office. The tab cards were listed on the printer and the three fields of information became our manuscript copy.

So what did we do? We duplicated the keystrokes on a Monotype that the operator had already accomplished on the keypunch. We made keyboard errors which had to be corrected and revised. In addition, the 52 issues of weekly indexes were not practical to merge and consolidate by hand and in order to produce the annual index we reset the entire job.

sounds like a lot of work for the computer but it takes only a few minutes each week. There is no composition, no proofreading, and no makeup performed manually on this job. At the end of the year the cards are written to magnetic tape, tape is sorted, and the Printing Office reruns the job for the annual. Page costs are less than one-third of the hot-metal rate. . . .

Page costs are less than one-third of the hot-metal rate

While we were working on these jobs another very important series of publications was brought to our attention. The Department of Defense Technical Abstract Bulletin and the Commerce Department U. S. Government Research and Development Reports are announcement journa'ls that contain abstracts of documents available in the Defense Documentation Center and the Clearinghouse for Scientific and Technical Information.

The Department of Defense Technical Abstract Bulletin and
The Commerce Department
U. S. Government Research and Development Reports announcement journals

The abstracted information was being keyboarded on paper tape perforators for input to the computer to create a base for information retrieval. As a byproduct of computer input the perforator produced a typescript proof which was pasted up to use as camera copy for offset production.

It was desired to improve the typographic quality . . . . and reduce the number of pages. . . .

It was desired to improve typographic quality. . . and to reduce the number of pages. . .

Again, programs were written to edit the material and assign typesetting information which had not been keyboarded in the original perforation. Modifications were made to the composition program to handle this job. We now produce both of these publications in graphic arts quality, in nearly 40 percent fewer pages over typewriter copy, on a fairly tight schedule every two weeks. . . . Actually, from the time of the initial study and decision to proceed, it was nearly one year before we were in full production.

We now produce both of these publications in graphic arts quality in nearly 40% fewer pages over typewriter copy, on a fairly tight schedule.

I have purposely selected these three publications to point out the flexibility of the input. The Subject Headings was produced from paper tape keyboarded in the Government Printing Office specifically to create a master file for future printing. The Classification Index*was produced from an existing tabulating card file without any printing or typesetting information. The Technical Abstract Bulletin and the USGRDR were produced from a magnetic tape generated by a Univac 1107 computer. We have in regular production a large publication for the Department of the Army which comes from an RCA 301 computer. Magnetic tapes are received regularly from the National Bureau of Standards IBM 7090 computer at Boulder, Colo. . . .

"Subject Headings:"
from paper tape;
"Gazette:"
from tabulating card file,
"Technical Abstract and USGRDR:"
from magnetic tape

The Linotron hasn't been mentioned up to now because the problem is not that different. If we can produce the right kind of work economically on comparatively slow equipment, this should be sufficient proof that we can show dramatic savings on a machine that is 100 times faster. A whole new area of computer composition will become feasible with this added speed and reduced character cost.

Linotron hasn't been mentioned . . because the problem is not that different. If we can produce the right kind of work economically on slow equipment, this should be sufficient (!?) proof that we can show dramatic savings on a machine that is 100 times faster.

*Gazette

In summary, I would like to point out that computer composition is not going to solve all of your composition problems . . .

The determining factor must be the cost of conversion from the present method to the new method and the determination whether that cost can be recovered in a reasonable time by savings in other areas.

It has been our experience that considerable time elapses and considerable sums of money are spent before a publication becomes an actuality. . . .

Keep these goals in mind and use them as guidelines for the selection of suitable work:

1. Reduction in cost by reduction in bulk of computer printout.
2. Reduction in cost by elimination of rekeyboarding data already in machine-readable language.
3. Reduction in cost by elimination of manually correcting standing type on recurring publications.
4. Improved schedules and more current publications.
5. Improved quality and upgrading of Government publications.

The determining factor must be the cost of conversion from the present method to the new method and the determination whether that cost can be recovered in a reasonable time by savings in other areas.

PROGRAMMING
CRT'S FIRST GENERAL BOOK

by Peter Mollman
Production Manager, Trade
Harper & Row Publishers, New York

High in Harper & Row's multi-packaged payout is a set of programs which, with relatively minor adjustments, now can be adapted to similar formatted books.

Setting a 60,000-word mystery book via CRT (Cathode Ray Tube) composition was an experiment -- to see if the high-speed process could give us the sharp, clear, book-quality type and correction capability we needed to offset the spectre of rapidly rising per thousand em rates in hot metal.

Automation with hot metal, we figured, had gone about as far as it could go. So, beginning with a discussion in September, 1967, between myself and representatives of Haddon Craftsmen, a Scranton, Pa., firm which produces many Harper & Row books, we evaluated alternative processes. Haddon had contacts with RCA and had contracted to set a book at Videographic Systems, Inc., Hauppage, N.Y., a composition service bureau utilizing an RCA Videocomp.

In theory, CRT composition should have been the answer we needed because of its high-speeds and flexibility.

The text was simple straight matter with some extract.

We also set a simple back-up. Haddon Craftsmen would punch TTS tape on the book and hold it. If the experiment didn't work, we could always run the tape through the TTS Linotypes and produce the book on time.

There were just a few type faces developed at that time. We selected one called Videocomp Janson

Characters Clean and Sharp

Within a week, RCA's computer expert came back with a page of reproduction copy.

The next session concerned book composition methods, procedures and style. We went over editorial styling.

In theory, the programming sounds simple. A program for the basic page length was set up, with running heads. A program for extract and a separate extract were put into the computer. Another program handled chapter openings. Italics and small caps were to be handled by

CRT FOR STRAIGHT MATTER?
[as answer appearing in same issue]

by Henry Sedgwick
President, Sedgwick Printout Systems,
New York

The application of computer-controlled, ultra high-speed typesetting to book production -- principally textbooks -- is an area of some controversy. It's hard to see how mighty character generators such as CRT machines, that lease, along with the computer, for about $20,000 per month, can compete with Linotype which you can buy for about $40,000 or a second-generation phototypesetting system which might cost about $50,000. This is especially so when you consider that the high-powered gear saves nothing on keyboarding or proofreading which, with page make-up, is at least 80% of per-page composition cost in book work.

Looking at per-age machine cost alone, the super-typesetters would have to set about 3,300 pages per month, or about one-half million book pages per year (more than 1,000 books), just to get the cost down to $6 per page. I don't know if there are many book manufacturers doing that kind of volume. And I question the economics further if, to a machine cost of $6 per page, one adds at least $8-$9 for keyboarding and proofing.

The glamor attached to computer-controlled typesetting notwithstanding, what cost glamor if the page rate on a trade book goes from $6.50-$8 via conventional methods to at least $12-$15 on an ultra high-speed typesetter?

Advantages in Production Control

But there's another side to the story. Current production methods involve author, editor, art and production departments and the typographer in an impossible series of communication and co-ordination difficulties.

In the existing system, the author creates the data and submits a manuscript to the publisher. Inevitably, there's at least one re-typing of the manuscript before it goes to the typographer -- who then solemnly keyboards the data all over again either on-line or on tape.

In this system, the publisher and typesetter spend half their time putting errors into the manuscript and the other half getting them out! How many times have we seen corrected lines, or AA's returned from the typesetter with new and imaginative errors inserted?

normal shift operators, similar to the TTS units.

On Nov. 15, we went to Videographics to see the first run-through.

The punched paper tape moved first onto a magnetic tape, at a speed of 300 CPS. The magnetic tape then ran through the first stage of the RCA Spectra 70/45 computer, which checked for minor errors in input and controls. A computer printout could be read at this stage, which had line/character co-ordinates.

The second stage of the computer run-through did three things: hyphenation and computations for pagination for all types of pages; transferring the internal computer code to a CRT code; and, finally, pulling from a core disc the actual data on the proper fonts to be used. The computer read this tape at a speed of 30,000 cps.

The third, or output stage, actually pulled the Videocomp data to create each character on the cathode ray (each translated into a series of dot segments) from a core disc and transferred the Videocomp-ready information to tape. At this last stage, a light indicates which page is being worked on, so it is possible to run the magnetic computer tape to a precise spot and then pull only what is needed on to the tape.

After the orientation we did a run-through of the first chapter. It took about 15 minutes from tape insertion until the first page of clear, black reproduction copy was pulled. And a new page came out about every 10 seconds.

We also decided to run through a quick-change experiment. With this run-through we were convinced that we were over the major hurdle, and only the minor details were yet to be solved.

We took the chapter back to the Harper office, and with the designer made some basic decisions.

'If At First You Don't Succeed'

The go-ahead was given and several weeks later we got the complete book. This was a new experience for the proofreading sections at Harper, so they received a basic orientation on how the system worked.

Bound galleys were produced from the master set by Xerox-microfilm at about the same cost as normal bound galleys.

The second run-through solved most of the problems.

There's another problem. The moment the publisher hands his manuscript to the typographer or book manufacturer he has completely lost control of the data creation and production schedule. The new technology offers an opportunity to restructure this chaos.

In-house Data Creation

The new technology makes it possible to convert the manuscript to machine-readable form in one location and typeset in another -- giving the publisher the opportunity to take in-house the activity of what the computer crowd calls data creation. The publisher can prepare a tape, which -- after further processing for insertion of page, format and typesetting codes -- will be ready for typesetting first in galley, and then final page form. This structure puts the responsibility of valid data creation where it belongs and gives the publisher far greater control over production schedules.

Finally, a perennial problem in conventional methods of textbook production has been that the typesetting cycle is simply too long for the majority of textbooks, which must have current information when published. Time span can run from an average of six months to 18 months and longer. Data transformed into machine-readable form can readily be updated.

I don't think that the publisher using the in-house system mentioned above would net a reduction in typesetting costs. Using our price structure as an example, typesetting costs, after receiving a fully formatted magnetic tape, would run no more than $2.50 per page. This would include two galley runs and final page make-up.

This cost does not include the step between the publisher's keyboard and our typesetting system -- insertion of formatting and typesetting codes. A fair guess on that would be another $4-$5 per page. Nor does the cost include keyboarding or proofreading which -- in the system I've described -- becomes the publisher's in-house cost.

The publisher's immediate advantages, then, lie in the control of data creation and production scheduling. Ant that cannot help but be of substantial interest.

The proofreaders found that once the type was correct it stayed correct.

The final repros were taken to RCA Graphic Systems headquarters for conversion to film positives used to make negatives for producing the book by offset.

Correcting the manuscript proved to be as easy as advertised.

Every element that we had worried about was solved.

McCALL and the COMPUTER

One of the first printers to seriously investigate the commercial feasibility of the new computerized cathode-ray tube electronic typesetting techniques was McCall Printing Co....

To form its Graphics Research Laboratory, McCall Printing simply took over...the former headquarters of RCA's Graphic Systems Div., Dayton N J

CRT Typesetting Commercially Feasible

Two years later, McCall's Graphics Research Laboratory has developed an adequate base of computer programming techniques to make CRT typesetting commercially feasible for specific jobs (and along the way has had to develop some of its own equipment), so that the emphasis at the plant is now on typographic production rather than on development work [*]...But magazine composition has proved to be the area for which CRT typography is least suitable, at present, because of the variety of page formats and display type faces used by magazine designers.

magazine composition has proved to be the area for which CRT typography is least suitable

...Computer programming costs for a single page format run from $500 to $3,000 each, so that Videocomp is only practical for composition of a large number of pages which use the same "rules" for format.

...Computer programming costs for a single page format run from $500 to $3,000 each

Computerized CRT composition does have a competitive edge according to McCall GRL executives, for directory or reference work typesetting jobs, where "standing" type is updated for successive editions, or where the computer arranges information which is keyboarded in random order. Mr. Moore anticipates that about 80% of GRL's sales volume in 1969 will be in this kind of typesetting, with the remainder in miscellaneous "straight composition."

Mr. Moore anticipates that about 80% of GRL's sales volume in 1969 will be in this kind of typesetting with the remainder in miscellaneous "straight composition."

Composition for college textbooks may be another significant market for computerized CRT typesetting, Mr. Moore believes. In order to protect sales of new texts when second-hand copies begin to show up in the bookstores, the publisher usually issues a new edition every few years.[**] To obsolete the previous edition the new edition is normally reset in a new typeface and the format rearranged so that the same material is on different pages in the two editions.

...textbooks...significant market...

To obsolete the previous edition the new edition is... reset in a new type face... same material is on different pages in the two editions.

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*McCall executives originally hoped that CRT system might be useful for typesetting for magazines (McCall's Dayton Div., "the world's largest printing plant," produces more than 60 magazines, including many of the largest national publications).

..."the world's largest printing plant"

**...now able to produce a new issue every two weeks instead of once a month or the major book publisher which will be able to issue a revised edition of a dictionary every one or two years, instead of the longer intervals required when using traditional methods.

...able to produce a new issue every two weeks instead of once a month...

On typesetting for the first edition, computerized CRT typesetting is somewhat more expensive than hot metal...

On typesetting for the first edition computerized CRT typesetting is somewhat more expensive than hot metal...

Magnetic tape keyboards are available from data processing equipment manufacturers but are designed as replacements for key punches while keyboards offered by graphic arts manufacturers for typesetting primarily produce paper tape according to McCall officals. Paper tape is a big drawback in computerized typesetting because of the relatively slow speed of paper tape readers. A magnetic tape reader can feed data into a computer at 150 times the speed of a paper tape reader

...A magnetic tape reader can feed data into a computer at 150 times the speed of a paper tape reader.

Paper tape is also susceptible to machine error (inoperative punches incomplete perforation reader unit errors caused by splices, etc.)...

Paper tape is also susceptible to machine error ...

From the corporate viewpoint McCall Printing's short term goal in entering the CRT composition field was to keep pace with rapid change the computer has introduced to the printing and publishing industry and to be in a position to offer customers the benefits of combining data retrieval techniques with photocomposition...

From a longer-range viewpoint, the most important rationale for entering the CRT composition field is the belief of McCall Printing executives that the time is not far off when photographic input will be required for all processes, including letterpress....

While computerized compositon has shown the least promise to date in publications field Mr. Harris reports growing interest in the process by publishers of magazines which have a highly consistent format and urgent deadlines, such as news weeklies (McCall plants currently produce Newsweek and U.S. News and World Report.)

...computerized composition has shown...growing interest in the process by publishers of magazines...

While admitting that computerized composition is quite unlike its traditional activities, McCall Printing Co. believes the new technology will significantly alter the complexion of the printing and publishing business -- and is willing to pay the price of staying ahead of change.

...McCall Printing Co. believes the new technology will significantly alter the complexion of the printing and publishing business...

/text (in the original) appearing under pictures:/

Typefront programs are stored on disc pack unit for retrieval by main computer.

Proofreaders check manuscript against conventional computer print out before the job goes to the Video comp.

Proofreaders check manuscript against conventional computer print out before the job goes to the Video comp.

Card punch keyboards are used for input of programming and for insertion of corrections. Finished tape output of computer is transferred to the Videocomp control unit, which drives the CRT image-generating unit.

British Printer, July 1969

by Lawrence Wallis

COMPUTER SETTING METHODS, COST and PERFORMANCE

Lawrence Wallis, formerly Systems Adviser to the Monotype Corporation, recently joined Crosfield Electronics' phototypesetting division. He was for many years a teacher of composition methods.

Complete automation of typesetting will probably remain a technologist's dream. ... OCR has a long way to go before reaching full technical maturity. Dr. M. Spooner of Cornell Aeronautical Laboratories stated some months ago that the process was 'at least ten to 20 years away from reading handwriting at a practical level'.

Any discussion of automated typesetting seems to flounder at the input stage, where the problems of manner are manifold. Typesetting demands a preponderance of data preparation and relatively little computer processing - whereas in many other data processing fields the requirements are reversed, with small amounts of data undergoing extensive computer manipulation. In the latter case, the user gets more data out of the computer than he puts in, while the typesetting plant has an equivalence of input/output volume: a factor tending to pare down operating margins. Doubtless this characteristic of typesetting has inclined to militate against the profitability of current computer installations within the trade. . .

Any discussion of automated typesetting seems to flounder at the input stage. Typesetting demands a preponderance of data preparation and relatively little computer processing

Typesetting automation should not be looked at in isolation or as an end in itself; the subject needs to be related to the basic structure of the industry.

It is worth recalling that some 60 per cent of printing companies in the UK have fewer than 25 employees; ... Even in the USA around 80 per cent of the printing establishments have payrolls of fewer than 20 people.

Even in the USA around 80 per cent of the printing establishments have payrolls of fewer than 20 people.

Nevertheless, a trend towards group activity through firms merging or entering into associations can be discerned on a world-wide front, . . . about 100 plants account for one third of print sales in the USA. . .

Nevertheless, a trend towards group activity through firms merging or entering into associations can be discerned on a world-wide front; about 100 plants account for one third of print sales in the USA.

Systems in Practice

Businesses in the upper reaches of the industry are obliged to investigate, and possibly apply, new typesetting techniques for four reasons:

(1) to stabilise spiralling production costs;

(2) to overcome a shortage of manpower, whether skilled or unskilled;

(3) to combat increasing competition from television and other mass communications media; and

(4) to satisfy the growing market for printed matter and to handle quickly the explosion of information in the scientific and technological fields.

Some indication of the potency of these factors has been given in successive surveys of computer typesetting installations published by Composition Information Services of Los Angeles. Only 77 plants were recorded for 1964 as compared with over 500 in 1967, and the number for 1968 showed another marked increase to 821.

Surveys of computer typesetting installations recorded
77 plants for 1964
over 500 plants for 1967
821 plants for 1968.

Whether the 800-odd decisions to install a computer for typesetting control were all reached on a rational basis must remain a moot point, thought it seems hardly likely, since most printers show an alarming lack of awareness about the running costs and operational performances of their existing systems. Any savings that a computer may bring can be reliably assessed only on the basis of this kind of knowledge. Investment in a computer strictly for typesetting purposes can be supported only by three potential areas of saving:

Whether decisions were all reached on a rational basis - most printers show an alarming lack of awareness about running costs and operational performances of their existing systems.

(1) increased keyboard production;

(2) reduced handling of matter in a caseroom or film make-up department; and

(3) more efficient use of typesetting machine time.

In other words, the extra cost of computer processing must be recouped by savings elsewhere in the production chain.

The extra cost of computer processing must be recouped by savings elsewhere in the production chain.

It must be appreciated, too, that with a 'straight throughput computer system costing about £8,000 +, such as Justaper or PDP-8L, the gains and economic recovery must be sought exclusively from boosted keyboard productivity and enhanced output from typesetting machinery. It becomes extremely difficult for the book and general printer to justify an investment on these grounds - although it would be hard to imagine a more efficient installation than the Linasec at Richard Clay Ltd, Bungay, processing tapes for a battery of tape-operated linecasting machines engaged on paperback book production. Nevertheless, a single-pass computer system will appeal in general more to a newspaper plant, where the frequency of the end-of-line cycle on narrow measures provides the conditions for a significant increase in perforator output when transferring from justified to unjustified tape production. About 30 characters are contained in the average single-column newspaper line as opposed to some 50 or 60 characters in a book measure. Thus a newspaper production manager may well anticipate about 50 per cent more benefit from a computer at the data preparation stage than his counterpart in a general printing plant.

A single-pass computer system appealing more to a newspaper plant.

Newspaper - About 30 characters in the average single-column line - 50 or 60 characters in a book measure. Thus newspaper about 50% more benefit at data preparation stage than a general printing plant.

Keyboard Speeds

Statistical expressions of the increases in keyboard productivity associated with a changeover to unjustified tape usually take the form of nebulous percentages, whereas the genuine seeker of information really wants to know the keystroking rates attained with and without the aid of a computer. Alas, I am aware of very few figures of this nature. However, a consensus of published computer-controlled typesetting experience suggests that on single-column news the improvement in productivity will be about 15 to 25 per cent (some have been less fortunate), so that a book printer employing wider measures should not expect much more than 7 to 10 per cent. Recent research suggests that these figures are quite realistic. The inherent skills of keystroking apply equally to the punching of justified and unjustified tapes; therefore, to expect an increase greater than those indicated, from the installation of a computer alone, is being somewhat optimistic. . .

Statistical expressions usually take the form of nebulous percentages.

A consensus of published experience suggests that on single-column news the improvement in productivity will be about 15 to 25 per cent. . . .

a book printer employing wider measures should not expect much more than 7 to 10 per cent.

The inherent skills apply equally to the punching of justified and unjustified tapes.

For the book and general printer, often using Monotype machines, the single-pass computer system would seem to offer very little beyond the 10 per cent or so increase in keyboard productivity. Multi-pass computer systems appear to be much more promising in these areas of the industry. . .

For the book and general printer, single-pass computer system offer little beyond the 10 per cent increase in keyboard productivity. Multi-pass computer systems appear to be much more promising.

With a multi-pass system, a book and general printer is offered wider operating margins due to computer correction and page make-up routines that reduce the handling of metal and film in the composing room. Potential improvement in keyboarding output ensues as well. Published work studies have shown that some 40 to 50 per cent of caseroom time is not uncommonly spent on corrections, while page make-up must account for a good proportion of the remainder.

Published work studies have shown 40 to 50 per cent of caseroom time is not uncommonly spent on corrections, while page make-up must account for a good proportion of the remainder.

Corrections

In order to effect tape-merged corrections by computer, an interim proof becomes vical before the copy is finally committed to metal or film; up to now this has proved to be something of a stumbling block... /In other words,/ the computer print-out and hard copy will serve for in-house checking only. ... And one is left with the daunting prospect of tape-operated line-casters introducing a mechanical error of 2 to 3 per cent (sometimes more), which largely negates the object of completing corrections at the computer processing stage. Such problems incline one to the view that a cheap single-pass computer system is much more apt for a hot-metal plant, unless other tasks are being integrated as well.

tape operated line-casters introducing a mechanical error of 2 to 3 per cent, which largely negates the object of completing corrections at the computer processing stage.

Hot-metal Monotype machines are mechanically much more reliable and accurate than tape-operated linecasters, but one encounters the encumbrance of an off-line tape conversion process to establish a link with the computer. . .

Additionally, the kind of work produced on Monotype machines often cannot be adequately reflected by a print-out or hard copy.

Proofing

Photosetting equipment would seem to be much more compatible with a multi-pass computer scheme and the two are complementary. With medium and high speed equipment, the output machine can be employed not only for the production run of film or paper, but as a proofing device as well.

Some photosetting machines have normal and high-speed modes of operation, the former to give the best quality of image for the finished job and the latter to provide a somewhat degraded image for proofing purposes. As an example, the Linotron 505. . .

Some photosetting machines have normal and high-speed modes of operation

Linotron 505 writes out in finest definition at around 70 a second debast version of same character at around 180 a second.

. . .Speed of character production becomes the key factor in this matter, since a double pass through a photosetting machine producing tens, hundreds, or thousands of characters a second is quite feasible, as compared to some 3 to 7 characters a second with hot-metal equipment.

Proofs from a photosetting machine (though of degraded quality in some cases) closely simulate the ultimate job. . .

Several book and general printing firms are at present engaged in the launching of production schemes involving the double-pass technique through a photosetting machine coupled with computer control and corrections.

Several book and general printing firms at present engaged in launching double-pass technique through photosetting machine

Three well-known British book-printers have each installed an Elliott 903 computer and a Photon-Lumitype 713/30. . . .

. . . . one of the firms has indicated that after the production of only a few books the projected costs appear to be rather better than those for Monotype composition. . .

. . . . Obviously for directory work and the like, demanding an updating and sorting capability, the use of magnetic tape may be advisable, but it should be remembered that magnetic tape operations demand a conditioned environment which could absorb quite a bit of capital. Not so long ago magnetic tape was considered to be an essential part of a multi-pass computer typesetting system, as evidenced by the installation at Rocappi Ltd: a salutary comment on the pace of modern technical progress.

for directory work and the like magnetic tape may be advisable, but be remembered that magnetic tape operations demand a conditioned environment

It is unlikely that newspaper printers will view correction routines in the same way as general printers. . . . Irrespective of whether a newspaper is set in hot metal or in a photoset medium, the business of corrections can be most quickly achieved at justifying keyboards and by manual insertions in the page.

Types of Computer

Most people in the industry are now familiar with the existence of two groups of computers: (1) single-purpose machines, and (2) general-purpose machines. In the early days of the technology, the special-purpose machine was far and away the most popular, but the pattern is changing. Of the total installations recorded by CIS in 1966, nearly 51 per cent were special-purpose computers, but in 1967 and 1968 the share had dropped to 47 per cent. . .

Of the total installations recorded by CIS in 1966, nearly 51 per cent were special-purpose computers, but in 1967 and 1968 the share had dropped to 47 per cent.

The main difference between special-purpose and general-purpose machines is that the former have programs wired into the hardware, while the latter have stored software programs that can relate to a variety of functions.

general purpose machines have stored software programs that can relate to a variety of functions

. . .special-purpose computers have essentially wired-logic programs but with character widths, etc., stored on a magnetic drum or in a magnetic core.

In some respects single-purpose machines still have certain attractions. They can be easily integrated into an existing typesetting system.

. . .the biggest disadvantage of a wired-logic special-purpose computer is its inflexibility. . . .

Unless a printer can define with certainty the models of typesetting machinery and classes of work that he will be utilizing and producing for the next five to ten years, an investment in a special-purpose computer hardly makes sense. Provincial newspaper plants and some book printers may well be in this kind of position as far as typesetting goes and uninterested in the broader data processing aspects. /1/

General-purpose models

. . .In the typesetting field the smaller general-purpose machine, instanced by the IBM 1130 and the PDP-8 series, has made the deepest inroads. It is interesting to observe, too, that most of these general-purpose machines have been used in a special-purpose manner for typesetting. . . .

In the typesetting field the smaller general-purpose machine has made the deepest inroads

The speed of the punch provides some idea of the output that can be obtained. With regard to magnetic core storage, the minimum amount represents that necessary for running a typesetting program, but the maximum ought to be borne in mind where expansion into data processing is contemplated. . .

A manufacturer must strive for overall market acceptance and must necessarily deal in technical generalities. Consequently, a program emanating from a manufacturer will be quite rudimentary in the typesetting sense: a viewpoint that I have aired consistently since 1964 and one that has been repudiated by computer manufacturers with equal constancy and vigour.

Special Programs

. . .Unless a printer is dealing in a repetitive and uniform product, like paperback novels, magazines, or newspapers, the software supplied by a manufacturer is liable to be deficient. Therefore, a book or general printer (and I suspect others as well) must be prepared to seek alternative solutions. There appear to be three avenues worthy of exploration.

Other Applications

. . .One supposes that the most profitable exploitation of a general-purpose computer for composition occurs when data processing and typesetting interact in some ways. . .

Directories, parts lists, electoral rolls, concordances, statistical and mathematical tables are ideal subjects for computer typesetting, but another fruitful outlet must be work that involves a high proportion of labour costs, particularly at keyboards.

another fruitful outlet must be work that involves a high proportion of labour costs, particularly at keyboards

Maths Setting

Mathematical setting, along with heavy tabulations, must come within this category. Character selection and the proper arrangement of formulae are the principal difficulties associated with mathematical work. Hitherto the research into the computerization of mathematical composition has been somewhat disappointing, as evidenced by the American Mathematical Society developing a mnemonic system of keyboarding that seemed to complicate rather than simplify matters. . . .

. . . the research into the computerization of mathematical composition has been somewhat disappointing

Clearly the problems of character selection arising from the wide range employed are best overcome by an appropriate choice of keyboard, while the programming should be mainly concerned with reducing and simplifying the control coding necessary to place one element of a formula in proper correlation with another.

problems of character selection best overcome by an appropriate choice of keyboard

"WHAT WE LEARNED in 16 YEARS of PHOTOCOMPOSING"*

by Howard King, part owner of the American firm Graphic Services Inc.

My 16 years' experience as part owner of Graphic Services Inc., of York, Pennsylvania. It has been said that we operate the largest photocomposition plant in the world.

Now for the very first time, we are hearing predictions made that hot metal will be almost a lost art by 1975.

First phototypesetting machine was placed on view at the 1950 Graphic Arts Show in Chicago.

Strange as it may seem, up until the year 1968, comparatively few plant owners ventured into photocomposition. Why have so many plant owners become vitally interested all of a sudden? ... until 1945 was the costliest and the slowest ... soon it became the fastest and the most economical of the three processes - ... more books are being printed today by lithography than by letterpress and, because of the expanding phototypesetting industry, this trend can be expected to continue.

photocomposition ... until 1945 was the costliest and the slowest ... soon it became the fastest and the most economical of the three processes

Another reason, perhaps, for the rush to purchase photocomposition equipment is the predictions of some experts, both in and out of our industry. They forecast the need for unprecedented quantities of printing on the part of their clients. Their predictions are based on the graphic arts industry playing the leading role in the exploding 'knowledge industry.'

Some experts, both in and out of our industry forecast the need for unprecedented quantities of printing on the part of their clients. graphic arts industry playing leading role in the exploding 'knowledge industry.'

First, the quality we must maintain daily to satisfy our customers and the final results we secure from our present equipment, are unobtainable from hot metal because of the flexibility of our photographic process. A perfect example of this is the 'repro proof.' None can match the quality of a negative or positive you would receive from us.

We work strictly with film, and not with paper positives. The film coming from our typesetting equipment in galley form is first put through one of several LogEtronics processors, after which it is run through a Potdevin waxing machine.

Because of the wax back we place on all pieces of film, we have been able to go back to our original pasted-up positives as much as seven years later and make corrections in pages without any noticeable change in the quality. This is particularly important to those book publishers who want to revise some of their important titles every few years.

We also feel that those publishers confronted with large amounts of tabular composition will benefit greatly in having this type of work done by our systems. Tabular composition is set on our Fototronic

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*Based on an address given by Mr. King at this year's anniversary convention of the International Association of Printing Housecraftsmen Inc.

equipment and we guarantee perfect alignment of columnar material and extreme high quality at a price that is on a par with if not better than, any hot metal system. But, may I stress, we are not a cheap house, because quality is expected of us daily.

Tabular composition is set on our Fototronic equipment at a price that is on a par with, if not better than, any hot metal system.

There are those in the composition business who have the feeling that corrections in phototypesetting is the real problem. We insert corrections into galleys or pages according to the accepted techniques advanced many years ago by the Harris-Intertype Corporation.

We insert corrections into galleys or pages according to the accepted techniques.

The difference, and the reason we are able to keep corrections costs at about the same as in hot metal, is because our six correction room staff are carefully trained, competent and experienced. ...

Corrections costs at about the same as in hot metal.

When you realize that we have 40 persons setting type and only six making the corrections, then surely corrections are not a serious problem as some may think.

The output from our Fototronics is, of course, in the form of film positives.

The output from our Fototronics is, of course, in the form of film positives.

The value of the computer is two-fold. In the first case it increases keyboard speeds and therefore raises productivity by 20-30 percent, and in the second it increases accuracy.

Computer's value is two-fold: raises productivity by 20-30%, increases accuracy.

As to the economics of the computer system which we installed in September 1967, we feel it began paying its own way two months after.

Economics of the computer system began paying its own way two months after.

Where do we go from here? you might ask. Should we be thinking of a CRT machine or would we be better off working on additional programmes for our computer. ... or the merging of magnetic tape, or retrieval systems, or printout devices for the publishers? Or perhaps we should be thinking of the impact of the consumer's involvement in the typographic production process, or a page make-up system, or data transmission? We are of course, actively working on some of these problems now.

We must also recognize that one of the prime movers of the avalanche of change in the graphic arts is a relatively new breed to the industry - electronics and data processing technologists and computer-oriented management. This group has been the nucleus which has shaken the very foundations of printing.

Electronics and data processing technologists and computer-oriented management has shaken the very foundation of printing.

For example, a few months ago a publishing company technologist reported on a recent study he made of electronic editing and composition. He forecast writing and transcription on magnetic tape directly from typewriter keyboards on a larger scale within a year or two. (It is possible to do this now, but we feel it is still too costly, and not always the most practical method.) The writer continued by predicting that cathode ray tube display editing equipment will be available this year and that there will be ample cathode ray tube typesetting equipment available in two or three years, as well as long-distance data transmission at much lower rates within 3-5 years.

Forecast:
writing and transcription on magnetic tape directly from typewriter keyboards on a larger scale within a year or two.
Cathode ray tube display editing equipment will be available this year.
Cathode ray tube typesetting equipment available in two or three years, as well as long-distance data transmission at much lower rates within 3-5 years.

The technology this writer refers to is not the simple computerized justification and hyphenation of type lines, the use of second-generation photocomposition machines, or the use of punched paper tape within conventional composing room boundaries. Rather, it is a basic reshaping of the total write-edit-compose process - from the point at which the writer first records his thoughts on manuscript through to finished typeset pages.

We seem to be moving in this direction quite rapidly and because we are, there is no question, the cost of people is rising and will continue to rise.

The cost of computers is declining and will continue to decline.

The cost of high speed photosetters will decline in years to come.

These, it seems to me, are reasons enough why more firms are entering the field of photocomposition this year. . . or making an effort to enter it.

It is a basic reshaping of the total write-edit-compose process.

The cost of computers is declining and will continue to decline. The cost of high speed photosetters will decline in years to come.

COMPUTERIZED COMPOSITION:
What's the Future for 'Straight Matter?'

by Stanley Rice
Senior Textdesigner for
Harcourt, Brace & World

"Computerized composition has not yet made much of a dent in traditional typesetting of "straight matter," such as book work, although the new computer methods have found significant acceptance in the specialized field of directory-type reference work composition, where the computer's ability to rearrange material provides obvious advantages. . . ."

Henry D. Sedgwick, of Sedgwick Printout Systems, a newly-formed New York Videocomp typesetter, . . . "offers the book publishing industry an opportunity to rationalize its complicated and time-consuming production methods."

Speaking from the publisher's viewpoint, Stanley Rice, a senior textdesigner for Harcourt, Brace & World, argues that his industry must completely reorient its thinking in order to take advantage of the possibilities inherent in computerized composition.

"A general purpose computer is fundamentally different from any machine we in publishing have ever worked with or designed for," Mr. Rice said in a recent talk to the American Institute of Graphic Arts Book Clinic, "because all its functions have to be defined for it. To code all these specifications completely for a one-time job on a one-code-to-one function basis requires so much function coding that the overall economy is often wiped out in spite of the speed of eventual setting."

The obvious solution is to build sets of special instructions concerning the format of a specific editorial structure, which can be stored in the computer memory and activated by insertion of a single format code, Mr. Rice noted. "For example, if we always set an extract with space above it, left indented, reduced size, space below it, this is obviously a repeating problem, even if we do not always set it 9 on 11 Caledonia, one em left indent, six points space above and below it."

". . . what is required of the publishing industry is standardization of formats -- the points at which decisions will have to be made about space, indent, typeface, size, measure, etc. -- with the values of each variable to be decided at a later time, either by a designer or by a standard configuration solution, Mr. Rice said. . . . "There are certainly fewer than 100 common editorial formats that need to be described. They can be specified with respect to their decision points -- and possibly provided with some partial solutions."

"Such action on standardization, however, would accomplish only the very rudimentary goal of adapting to the computer the traditional operations now performed by conventional machines and people,"Mr. Rice said. "The pioneers in writing this kind of program have tried to deduce what publishers need from studying our past and present products." Use of computerized

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. . . argues that his industry must completely reorient its thinking in order to take advantage of the possibilities inherent in computerized composition

". . .
To code all these specifications completely for a one-time job on a one-code-to-one function basis requires so much function coding that the overall economy is often wiped out in spite of the speed of eventual setting.

". . . what is required of the publishing industry is standardization of formats. . . ,

with the values of each variable to be decided at a later time. . . "

systems can make possible wholly new approaches in publishing, he suggested.

"The process of "exploding" or rearranging information "is often considered applicable mainly to catalogs. It certainly does apply nicely to catalogs, but it is best thought of as a more general process, with other potential uses," he said.

"The time is perhaps not too far distant when we shall want to plan that all important material that is to be keyboarded for typesetting should have a machine-readable result that can be computer processed and stored; . . . and conversely that all likely data that is to be computer processed should also be planned so that it can be typeset if desirable. This would require that points in the material at which a decision may later be necessary must be "flagged" with appropriate codes inserted during the keyboarding," Mr. Rice said.

"While up-dating of a text is the most obvious use for the "exploding" process," Mr. Rice said, "there are a variety of other possibilities, such as creating several versions of the same work by abridgement or by simplification of language through word or phrase substitution. . . ."

"A text that is "automatically revisable and transformable along planned lines would allow regional and minority publishing" with little penalty in composition cost," Mr. Rice said.

"None of these possibilities executes itself; they all depend on imaginative planning ahead, careful indexing and correct coding. These things will not be simple; but neither is it simple to do things over and over by hand. The re-composing of the building blocks of information is one aspect of computerized composition which the academic community is finding to be of the greatest interest and potential, and which is now becoming the raw material of publishing."

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". . . The re-composing of the building blocks of information. . . of the greatest interest and potential, . . . now becoming the raw material of publishing."

DON'T LET US KID OURSELVES ABOUT COMPUTERS by R. F. Griffin, Muirhead Limited

... the name electronic brain ...

... it was an entirely false description.

The "electronic moron" might, indeed, be a better name. It is a moron which does precisely what it is told - and fast. ...

The computer is many things: ...

But it cannot think. It cannot create. It needs man as a team-mate. And it will ever be thus.

One cannot escape the fact that all the functions that have ever been listed as being the forte of the computer involve logic. From a typesetting point of view, this could be disastrous. Because typesetting is concerned with language, and language has evolved with hardly a logical fibre to its make up.

Hyphenation is a case in point ... hyphenating after "THE" is allowable where this is the first syllable of a word. This would be fine in the case of "theodolite", "theorem" and "theosophy" - but what about "therapist"?

...

Choose a computer which is designed to handle just those parts of the typesetting operation that electronics is best fitted to handle, but which leaves the remainder firmly in the hands (or rather the head) of the compositor.

This narrows the field down very considerably for it is tantamount to saying that you should choose a computer which is purpose-designed for the typesetting job.

It is perhaps unbelievable to anyone outside the computer industry that such purpose-made equipment should be very considerably cheaper than an "off-the-peg" machine. But this, in fact, is so. Suppose we discount the original purchase price of a general-purpose computer - hard though it may be to shrug off such an astronomical figure - and think purely of the "software" (programming) needed for each separate typesetting task it is to be set to perform. The cost of each general-purpose computer program - for say setting one journal - could cost up to 50% of the price of a complete purpose-designed typesetting computer with built-in capabilities to handle as many jobs as you care to give it.

Suppose we think purely of the "software" needed for each separate typesetting task it is to be set to perform. The cost of each general-purpose computer program could cost up to 50% of the price of a complete purpose-designed typesetting computer.

The Muset K-380-B is an example of purpose designed typesetting computery which illustrates these points. It is low-cost electronic equipment for the automatic production of high quality type composition from unjustified TTS tape. It has built-in facilities for handling all normal composition functions automatically, thus obviating the need for programming and the purchase of expensive software.

The operator merely taps out his text to produce an unjustified tape which is fed to Muset. The equipment then automatically produces a fully justified tape in which typeface, type size, line measure and setting styles are as specified by the operator.

By means of input tapereader-alloters the outputs from up to sixteen remotely sited keyboards can

By means of input tapereader-alloters the outputs from up

be routed to a single Muset. A westrex punch operating from the computer's output produces the final fully justified 6 level TTS tape at a rate of 110 characters per second - and this enables no less than fifteen line casters to be operated at the rate of twelve lines per minute.

These are the operations that electronics can perform so superbly well - all involving logical rules, all performed at high speed.

But the spelling of the words, the punctuation, the hyphenation. These are strictly for the operator.

...

Versatility

One of the printers who have installed Muset and have found that it solves one of their most troublesome problems is Buxton Press Ltd. of Buxton, Derbyshire. It is mainly used for setting several monthly magazines, including DESIGN ELECTRONICS, COMMERCIAL VEHICLES, CARPETS AND TEXTILES.

They cover a pretty wide range of sizes and type faces and illustrate the ability of Muset to handle easily and quickly many changes of typeface, type size and line measure.

This small installation - it occupies less than 4½ square feet of table-top - has by itself almost doubled this company's capacity for the composing room. Without any addition to the TTS installation it now serves the new lithographic side of the business as well as the letterpress plant for which it was originally equipped.

Many points are abundantly clear from the industry's experience of computers to date.

Firstly, they help human operators but do not replace them. Secondly, they are extremely efficient at doing what they are designed to do - those operations that are governed by immutable logic. Thirdly, they can be an extremely economical way of getting first class setting quickly - provided they are designed for the typesetting job.

Bearing all these points in mind, any printer with a TTS system or who is contemplating installing one can be sure that this application of electronics is one that will almost certainly carry him to extra profitability.

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2. they are extremely efficient at what they are designed to do;
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AN ANALYSIS OF
COMPUTER TYPESETTING SYSTEMS IN THE UK

D. L. Cooper and C. D. Nield

Preface

Why this survey

In the rapid and far reaching expansion of computer technology, it was inevitable that it made its impact on the world of print and in a short space of time, 'computer-typesetting' (or one of its variants) has become part of many printers' day-to-day language. There are places where 'ems and ens' are being replaced by 'bits and binaries' and the language and methods have already necessitated the creation of computer-typesetting specialists.

. . . rapid and far reaching expansion of computer technology . . . its impact on the world of print.

It is a new and expensive field and there is already a multiplicity of equipment and application which pose problems to the printer who feels he ought to be in on the new technology. Rapid development likewise causes concern to those who have already taken the plunge.

. . . already a multiplicity of equipment. . . which pose problems to the printer who feels he ought to be in.

For some time it has been considered that Pira ought to be in a position to give broad advice on this subject to the industry--to be in fact a bridge between the computer and the printer. . .

Introduction

James P. Turner

When the merger between PATRA and BP & BIRA took place in June 1967, it became possible for the new organization, Pira, to consider its role in the field of computer typesetting. Two complementary interests, namely the Computer Section and the newly formed Composition Section, were brought together to take up this problem.

It was decided, with the approval of the Printing Divisional Committee, to initiate a survey into the use of computers in typesetting in the UK. A project panel under the chairmanship of Mr. J. P. Turner, Assistant Controller of HMSO, was set up to guide the team.

a survey into the use of computers in typesetting in the UK

This report presents the results of the survey. It has been a deliberate decision to present a report which discusses the reasons that have motivated printers in installing computers for typesetting and problems that have been encountered in systems design.

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Section 1

PLANNING FOR A COMPUTER SYSTEM

1. The basis for computer involvement
   In most instances the basic reason has been to reduce costs, but the justification in economic terms depends on individual circumstances. Financial incentives include the Government grant for computers, which varies from 25% to 45% depending on whether the firm is in a development area.

In most instances the basic reason has been to reduce costs

2. Considerations in system design
   The following considerations have been taken into account in the installations visited.

a. Keyboard/computer relationship.
One of the first considerations, though not necessarily the most important, concerns the interface between operator and computer. There are basically three methods of input:

i. On-line.
ii. Semi-on-line.
iii. Off-line.

Both on-line and off-line systems may be designed which give most emphasis to higher productivity, however, operatives with a particular temperament are required for systems from which all intellectual activity has been removed. Most firms visited recognized this fact and designed their system so that operatives participated in it more than they would need to if higher productivity was the only goal.

Operatives with a particular temperament are required for systems from which all intellectual activity has been removed.

In one instance at least, where maximum keystrokes had been the goal, some of the operators had asked to be returned to their former activities.

It is unlikely at present that on-line input keyboards can be justified financially for non-newspaper work. The preparation of copy on keyboards is likely to be only a small proportion of the total work load of the computer.

b. Associated applications
Another consideration which will affect the design of the system depends on whether the computer is to be used for more than setting lines of type.

In non newspaper systems, additional benefits will accrue from computer systems that handle files of information which are updated from time to time. Further benefits will also come from efficient systems for processing authors' corrections and carrying out editing functions such as page make-up. Such editorial work is carried out on the information stored on magnetic tape. Typesetting does not take place until the copy is correct . . .

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d. Output medium
The question of whether output should be to hot metal or phototypesetter is not always within the terms of reference of the system design. Examples of both types of system have been seen. The output medium will, however, have an impact on the system for copy preparation, proofing, reading, editing, make-up and printing.

In a situation where the output is to hot metal, a line-printer proof with a limited character set may be acceptable internally but it is not likely to be acceptable to the customer. A chain printer such as that

installed at Garden City Press, having as it does a much wider character set, may provide an acceptable alternative.

e. Development

f. Reliability

g. System specification
A number of considerations should be taken into account, the most important of which are:

i. The system design presented as a specification to manufacturers should be fully documented. This should include not only flow charts of each section of the system but details of the amount and type of copy and its frequency and rate of process. In return the printer should expect a similar standard of documentation from the manufacturer. This should include details of how the system design is to be implemented and specifications of all programs to be supplied. It has been evident from our discussions that manufacturers are loath to disclose certain parts of their programs, especially those associated with the logic behind hyphenation routines. Although no doubt a case can be made out for secrecy in these circumstances, it can cause serious inconvenience to printers who wish themselves to modify a program to take into account their own particular circumstances.

It has been evident from our discussions that manufacturers loath to disclose certain parts of their programs.

h. System development and staffing
The range of tasks with which the computer will have to deal will almost certainly increase with time. The printer, having assured himself that the range of equipment supplied by the manufacturer will cope with these extra demands, must further decide how the necessary systems design and programming can be accomplished . . .
Although training of existing staff to operate the computer does not seem to have presented any difficulties, the problem of retraining keyboard operators has to be faced. This is recognized to be a very important point but does not come within the terms of reference of this report.

the problem of retraining keyboard operators has to be faced. This is recognized to be very important point but does not come within the terms of reference of this report.

Section II
CONCLUSIONS

a. Increase in key depressions per operator, per hour. Those who have set this as a prime objective have, in general, not yet achieved their target. The main reason is that not all operators are able to resign themselves for a full shift to an activity from which all intellectual content has been removed.

Another reason is that most of these schemes have involved the retraining of linotype operators, many of whom have not yet reached their potential speed on the new keyboard. Apart from the cost aspect, an increase in the rate of key depressions may be important where labour is in short supply . . .

Most of these schemes have involved the retraining of linotype operators, many of whom have not yet reached their potential speed on the new keyboard.

c. Financial savings in areas other than setting lines of type.
The financial benefits to be obtained from these associated activities cannot at present be assessed directly, as all such systems seen are still in the development stage . . .
For non newspapers the choice of work which can be profitably produced by computer systems must be carefully considered. The decision to choose a computer system must reflect not only the capability of the firm but also the presence of a suitable market large enough to utilize the computer to its best advantage. It would be futile to enter into the computer typesetting field without making a detailed cost comparison . . .
Insofar as the system design is concerned, the main conclusion from the survey has been the degree to which printers have been willing to accept from computer manufacturers systems and program packages without careful analysis of their particular situation. The computer and the printing process have a unique relationship, in that the computer replaces part of the process itself rather than being an adjunct to it. For this reason it is even more important that the role the computer can play should be most carefully considered. Its relationship to the other parts of the process are likely to differ from one firm to another and thus the computer's versatility can best be used in a bespoke system. It is not surprising that this situation has arisen, considering the lack of disinterested advice available. . .
Few printers have staff qualified to develop computer systems and programs in step with the development of the business as a whole. The degree to which this is necessary will depend on the particular circumstances. In some cases support could be supplied by Pira or other independent consultants who will be able to implement these developments.

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EASTERN EUROPEAN PRINTING EQUIPMENT

PEM reports on Inpolygraphmash 69

For the visitor to Sokolniki Park, Moscow, in July it was difficult to realize that this was the first international printing exhibition ever held in Russia. The participation of around 700 companies and organizations from 20 countries made Inpolygraphmash a major event by any standards.

Comments on the attractive British pavillion are made elsewhere in this issue, and most of the Western European equipment seen at Moscow will be shown in Milan and featured in GEC preview of PEM in October. This review, therefore, concentrates on products from Eastern Europe which are not widely known in Britain.

text layouts as shown in draft

Statistics issued by the Soviet authorities reveal that 8,000 newspapers and more than 4,300 magazines with a total circulation of 250,000,000 are published in the USSR, as is every fourth book title in the world. With figures sueh as these it is perhaps not surprising that generally there appears to have been rather more attention paid to the quantity than to the quality of Soviet equipment, and that some of it is four or five years behind the west, technically speaking.

Statistics reveal that 4,300 magazines are published in the USSR, as is every fourth bock title in the world

These are, it must be stressed, generalizations, and the overall impression is one of amazement at the very wide range produced by an industry that did not come into being until 1931, with the first flat-bed press of Russian make, and one year later with a linecaster. Nowadays some 2,000 eomposing maehines alone are produced annually.

Nowadays some 2,000 composing machines alone are produced annually.

Composing

It was in the extensive display of Russian composing equipment that was to be found one of the few novelties at the exhibition, plastic type for hand setting. The equipment is similar to that for casting individual metal characters for founders type, but with the pot containing granulated plastie heated to a temperature of 200°C in 45 minutes and injection moulded by a piston. Body type of 6 to 12 point size can be cast at a rate of 24 to 40 eharacters a minute. To quote from the Russian literature, "the process for manufacturing type from AT plastic eompound satisfies the strictest requirements towards the preeision of casting and the quality of typeface." It adds that the cost is reduced, the life of the type increased fourfold, weight reduced to a tenth, and working eonditions improved. The material, which can be reeovered and remelted just as with metal, has a speeific impact strength of 18-20kg/cm^2, flexible strength of 1300-1400kg/cm^2, heat resistanee of 72°C, and is resistant to benzene and kerosene, PEM awaits world reaetion to this development with some interest.

plastic type for hand setting

granulated plastic heated and injection moulded by a piston. . . east at a rate of 24 to 40 characters a minute

the cost is reduced, the life of the type increased fourfold, weight reduced to a tenth,. . .

There were at least eight different models of Russian-made lineeaster on show at Moscow, some of them already available in Britain. Single-type hot metal casters, their equivalent in film, display, slug

and strip casters were also in evidence. There appeared to be a lack of computerization in typesetting, with the exception of a photosetter with a capacity of 540 cps and two keyboard systems. The latter are for the preparation of 6-level and 7-level perforated tape for hot metal or filmsetting machines. Both have hard copy facilities, automatic justification, runarounds, etc., and provision for merging of corrections to produce a clean end product.

It is interesting to note the emphasis placed in the descriptive literature on the fact that text preparation and page makeup are performed under the control of the editor in the publishing house.

text preparation and page makeup are performed under the control of the editor in the publishing house

Processing

In view of the fact that Russia lags some distance behind the west in the development and use of plastics, it is rather surprising that one of the novelties in the processing section should, as in the composing display feature a device utilizing plastics. The equipment in question is a casting unit for the production of polyetherurethane flexographic printing plates. Accuracies of +0.05mm and -0.07mm are claimed, obviating the need for shaving. Casting time is 15 to 20 minutes at 110°C. . . .

Russian printing is very predominantly letterpress at the moment, and the lithoprocessing equipment was largely conspicuous by its absence. So far as could be ascertained, presensitized plates are unknown in the USSR, although the success of Rotaprint machines in that market and the interest shown on the SD Syndicate lithoplate stand are certain to have an effect in that respect at least. Although the unit itself was not demonstrated, details were provided of a mechanized production line for the processing of diazo-coated bimetal plates of various types to a maximum of 2.52m^2 surface area at an output rate of 18 a minute.

Study Predicts
PHOTOTYPESETTING to RISE 300 percent
in Next Five Years

Creative Strategies, Inc.
(CSI)

Los Altos, California --

Phototypesetting is expected to mushroom 300% in the next five years to become a $150 million a year business by 1975, according to a new research study prepared by Creative Strategies, Inc. (CSI).

Phototypesetting (by 1975) to become a $150 million a year business.

CSI, a high technology research and consulting firm, reports in depth on four new segments in the phototypesetting market which, in the next five years, are expected to capture 65% of the market.

to capture 65% of market

The fastest growing segment, low-priced text oriented machines, should grow at a compound annual rate of 43%, the study predicts.

low-priced text oriented machines annual growth -- 43%

The medium-priced ($100.00) electronic CRT devices can anticipate a compound annual growth rate of 38%.

medium-priced CRT devices anticipated growth rate -- 38%

The extremely fast, high-priced CRT machines (over $300.00) are expected to reach market saturation and experience declining sales after 1973.

high-priced CRT machines expected market saturation after 1973

This is partly attributable to their high-speed capability -- eight CRT machines, working a single shift, could typeset all the books published annually in the U. S.

ETD/PD/0086

ANL
1970

AVAILABILITY OF COMPOSITOR'S TAPES FOR BRAILLE PRODUCTION

1. Tape material(s) Format(s) Code(s) used:[1]			
2. System(s) used[2]			
3. How "clean" are tapes? Are all corrections carried back to data base? Are tapes complete?	a) Average	b) Best ~10%	c) Least 10%
4. Could you reformat tapes to a specified code and eliminate machine commands?[3]	a) Would reformat and "clean up"	b) ~price per title $	
5. How long are tapes kept after completion?	a) Average	b) clean tapes	c) "Raw" tapes
6. Given Publisher's authorization would you release tapes or tape copies for braille production exclusively (non for profit)	a) Free of charge	b) At ~$ per copy	
7. What is the "scope" of texts produced with compositor's tapes (titles per year)	a) Straight English	b) Scientific & college	c) Elementary & High School
8. What do you project to be the usage of compositor's tape in % of all type generation by 1980?	a) Straight English %	b) Scientific & college %	c) Elementary & High School %

[1] For example 6 channel, punched paper, TTS, or 1/2" Magnetic 7 track 556 bits per inch BCD etc.

[2] For example RCA 301 CRT System + XYZ Computer & IBM MTST editing facility etc.

[3] The reformatted text would thus be equivalent to a clean edited manuscript in the code & format specified (say 556 bpi/BCD).

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