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25 SEP 1975

MEMORANDUM FOR: Deputy Director for Administration

SUBJECT : Office of Logistics (OL) Accomplishments With Widespread Effects

1. In response to your request, we are forwarding short descriptions of accomplishments or innovations which might be used in any program designed to counteract the adverse image of the Agency resulting from the current investigations. The descriptions are necessarily brief, but we intend them to provide a flavor of the subject so that a judgment can be made regarding their further use and value.

2. The following are accomplishments or innovations which originated in, or were pioneered by, OL and which resulted in benefits to industry, to the community, or to humanity:

a. Electronic Processing of Intelligence Composition (EPIC)

During the early 1960's, a computer-assisted typesetting system was developed by a team of Printing and Photography Division technicians. This system was several years ahead of the state of the art at that time. In essence, it is a complete text processing system which can utilize the benefits of source tape, process that data through format programs for hyphenation/line justification and page makeup, then output that data to a phototypesetting for automatic full-page casting on film. The real breakthroughs of this system were the automation of formatting, page makeup, and hyphenless line justification. Further information is included in attachments A and B.

b. Continuous Tone Printing

This process was also developed by Printing and Photography Division personnel in the early 1960's. From the film positive, the image can be transferred directly to a printing plate without screening or changing the image through the camera or other related operations. Additional information on its development is also contained in attachments A and B.

c. 70 mm Camera

Prior to 1960, the commercial market could provide no photographic equipment or technique which would improve the production of photographic prints from various sizes and qualities of negatives. Printing

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and Photography Division personnel designed this unique 70 mm camera which, with dual optics, can simultaneously copy a variable size photograph or transparency and a fixed size caption onto the same negative. This camera has resulted in a streamlined operation compared to an almost completely manual operation prior to its use. Additional information is contained in attachment A.

d. Architectural Design Layout Control System

During the original design of the Headquarters Building, a Real Estate and Construction Division architect designed and implemented this system which was used to control and accomplish the layout design of the Headquarters facility. The system was not only used throughout building occupancy but is in continuing use today for layout design modifications. A patent has been obtained on a portion of the system and several Government agencies have adopted the system in their building planning efforts. In 1960, the architect was awarded the National Capital Award as part of "Architects, Engineers, and Scientists Week" sponsored by the Washington, D. C., Council of Architectural and Engineering Societies, and the Washington, D. C., STATINTL Academy of Sciences.

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f. Closer to home, we were asked if we might have some simple tasks or operations which might be performed by persons attending the Fairfax Activity Center for Retarded Adults as aids in their therapy. At that time, our Central Depot had many small stock items which needed to be placed in small plastic bags for better control and issue. From 1971 through 1974, people at the Center bagged thousands of such items, and they also made "corner pads" for use on packing containers. There was no cost to the Agency, but we hope we assisted the Center in its goals. Our contribution to the effort ceased only because our requirements had been filled. Logistics Services Division also uses a Maryland facility for the handicapped for certain lower-skill requirement projects. The latter is on a contract basis.

g. In 1972, we provided a crane to the Department of the Interior to assist at Turkey Run Park in repairing damages resulting from tropical storm Agnes.

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3. Other significant accomplishments, the basis of which were not originated by OL but in which we made a considerable contribution to their success, are:

a. Drug Abuse Exhibit

An exhibit showing various drugs, the tools for their administration, and results of drug abuse was developed by the Graphics and Visual Aids Staff of Printing and Photography Division with the technical assistance of Office of Medical Services. This exhibit, in addition to having been on display in the Headquarters Building, has also been loaned to local high schools, local police departments and civic organizations, National Security Agency, and has been displayed at the American Medical Association Annual Regional Conventions at San Francisco, Cincinnati, and New York. A portable version of the exhibit has also been developed for use in indoctrination programs for employees and dependents going overseas.

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b. Heart Disease Detection Exhibit

This, too, was developed by our Graphics and Visual Aids Staff with the technical assistance of the Office of Medical Services. It also has had rather wide distribution and display at medical assemblies both locally and in distant cities.

c. OL is the first component in the Administration Directorate, and the second in the Agency, to implement and administer a formal upward mobility program. Upward mobility programs, for purposes of this discussion, are to be distinguished from other personnel development techniques such as the LOT program in this office and the CT and PT programs of other directorates.

4. If other accomplishments of this nature come to mind, we shall communicate them to you. Unfortunately, many of the more spectacular things that we have accomplished are in the areas of ordnance and airborne developments which, of course, are not appropriate for this program. Questions concerning items in this paper may be addressed to [redacted] on extension [redacted]. If additional detail is required, he can develop it for you.

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/s/ Michael J. Malanick
Michael J. Malanick
Director of Logistics

Atts

Distribution:

- 0 + 1 - Adse, w/atts
- 1 - OL/P&PS (Official), w/atts
- ① - OL Files, w/atts P&PS
- 1 - D/L Chrono

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Reprint from April 1965 issue of PRINTING PRODUCTION Magazine.

NOW: HYPHENLESS JUSTIFICATION

THE troublesome end-of-line hyphenation problem with which a large number of computer and printing organizations continue to struggle in computer produced text may become a thing of the past. A small team of specialists in the Central Intelligence Agency has developed a novel approach, amazing in its simplicity, which virtually eliminates hyphenation while still retaining justification.

The success or failure of present computerized book composition systems hinges largely upon the computer's ability to provide correct end-of-line word divisions required for justification. Several years and hundreds of thousands of dollars have been spent in attempting to develop dictionary and logic systems which will attain the necessary accuracy required for high quality composition.

Existing computer systems cannot yet equal the accuracy of the average keyboard operator in hyphenating end-of-line words although a fairly high degree of accuracy is obtained in some cases. Accuracy is needed in computer composition because of the problems of correcting errors and the constant demand for greater speeds.

Present Hyphenation Systems Pose Dilemma

With the present state of the art, the printer must choose between a system obtaining high accuracy with proportionately higher computer costs or a less sophisticated system providing a lesser degree of accuracy with the attendant error cost factor. Any system permitting errors poses the problem of new errors being introduced when corrections are required.

The idea of eliminating the end-of-line hyphen is not new. Some newspapers and printing companies now justify text without the use of hyphens by the use

of excessive interword spacing and fixed letter spacing or a combination of both. Some publications appear with an unjustified single or multicolumn format. Unfortunately neither of these systems provides acceptable typographic quality for book production.

A primary rule in typesetting is to avoid hyphens wherever possible since they destroy continuity in reading. It is obvious, then, that the real need is for a simple plan which eliminates the end-of-line hyphen without sacrificing typographic quality.

Uncle Sam's team feels that they have solved this problem by the use of a variable set size technique on a line-for-line basis. In simpler terms, this means that a sort of coefficient of expansion or contraction is applied to the proportional spacing between characters in each line of text. The line is thus expanded and contracted without destroying the proportional values of the individual character as is the case with fixed letterspacing.

The variation in appearance of the lines of text produced by this method is sufficiently subtle to remain unnoticed by the average reader. The ability to expand and contract provides sufficient latitude in justification so that the need for end-of-line word division is rare. The computer programming and processing which is required for variable set size justification is many times simpler and less costly than that required for end-of-line word division and hyphenation. The problem of accuracy in word division is avoided.

The CIA prints in its own facilities a number of high quality book type publications. These publications are set in type on Intertype and Monotype machines and are printed by offset from plates made from positive Mylar proofs pulled directly from the type. For the past five years the majority of this composition

46. General

This section generally covers organic and normal supporting units of mechanized infantry and armored brigades. Nonorganic combat support units available to brigades in the support role include tactical air support; Army aviation; and artillery, chemical, engineer, and ground transportation units. An appropriate number of mechanized infantry battalions and tank battalions are attached to the brigade headquarters according to the operation plan.

An example of normal composition in 19 pica measure shows four hyphens in one paragraph (left). Corresponding sample using variable set sizes of 10, 10½ and 11 eliminated the hyphens. Abnormal lines are marked in margin with set sizes.

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- 11-②
- 10-③

**Various solutions have been broached for the problem of hyphenation
in connection with high speed composition, from abandonment of
justification to automated hyphenation by computer.
Here is a development suggesting that hyphenation itself may go**

By **GEORGE Z. KUNKEL** and **TILMON H. MARCUM**
Central Intelligence Agency

has been done on Model F4 Intertype machines operated by Teletypesetter tape.

About a year ago the Agency's printing engineers and computer specialists began studying the possibility of doing page composition by photocomposing from computer prepared tape. This study developed the feasibility of this type of composition and a thorough investigation was made of all available photocomposing equipment. After considerable study a Model 513 Photon has been obtained for this composition. A primary reason for this selection was the 513's capability of changing set sizes from codes inserted into the computer prepared tape.

The printing engineers and computer specialists began the job of programming an IBM 1410 computer for this typesetting job. Agency personnel had talked with other printers and computer personnel and had visited numerous printing plants in their investigation of the problems involved in this method of typesetting. Since they were interested in page composition, this aspect received most of the initial attention.

Word Division Proved To Be Primary Problem

It soon became apparent, however, that the primary problem involved in this type of computerized composition was not in page makeup but rather end-of-line word division and hyphenation. Consequently the computer specialists and printing engineers gave consideration to the number of known methods of handling this problem.

It was apparent that the end-of-line hyphenating problem would require considerable programming time and computer capacity. Further, it was found that hyphenating inaccuracies, computer capacity, loss of speed, dictionary cost, etc., were still problems.

Before getting into programming for hyphenation, the Agency personnel began a thorough study of any alternatives to end-of-line hyphenation. Since the 513 Photon had been selected for the composing job because of its tape-operated set size changing capability, the Agency engineers felt there was a possibility of using this capability for justification without end-of-line hyphens in average book composition. Further study indicated that hyphenless justification of practically any measure of composition was possible by varying set sizes of individual lines.

The varying of set sizes permits a delicate method of proportional letter spacing. Numerous sample pages have been set in which four different set sizes are used and the resulting typography is satisfactory for book composition of relatively high quality. Since the program is not yet operative, the described technique was simulated on a Monotype keyboard and the sample pages set on a Monotype machine.

The system of employing proportionate letter spacing by set size changes will work as follows:

The computer is being programmed to compute for end-of-line decisions utilizing 2, 3, 4 or 5 set sizes
continued on page 89

EDITOR'S NOTE—One of the authors of this article, George Z. Kunkel, presented a report on hyphenless justification at the recent Conference on Computerized Typesetting held by the Research and Engineering Council of the Graphic Arts Industry, Inc., in Washington, D. C. Because the subject has unusual current interest and importance, we are presenting this full account. An on-the-scene report of other aspects of the Conference will be given next month.

The geological formation of that portion of the American Union, which lies between the Alleghanies and the Rocky Mountains, has given rise to many ingenious theories. Virtually, the whole of this immense region is a plain. For a distance extending nearly fifteen hundred miles east and west, and six hundred north and south, there is scarcely an elevation worthy to be called a mountain. Even hills are not common; though a good deal of the face of the country has more or less

of that "rolling" character, which is described in the opening pages of this work.

There is much reason to believe that the territory which now composes Ohio, Illinois, Indiana, Michigan, and a large portion of the country west of the Mississippi, lay formerly under water. The soil of all the former States has the appearance of an alluvial deposit; and isolated rocks have been found, of a nature and in situations which render it difficult to

in Ohio, Michigan, Illinois, and
● Indiana. They labor under the
8½ disadvantages of a scarcity of wood
● and water—evils of a serious character,
7½ until art has had time to supply the
deficiencies of nature. As coal is said
to abound in all that region, and wells
are generally successful, the enterprise
● of the emigrants is gradually prevailing
7½ against these difficulties.

The second description of these natural meadows lies west of the Mississippi, at a distance of a few

Three specimens of hyphenless composition on 11 pica measure show many consecutive lines all in normal set size of 8. Third sample shows three abnormal lines, two of 7½ set size and one of 8½, as indicated by marginal bullets and numbers.

Hyphenless Justification

(CONTINUED FROM PAGE 45)

close enough in size to each other to be inoffensive typographically and yet disparate enough to significantly increase justification range. The computer will arrive at end-of-line decisions for all set sizes involved, choose the set size in which an interword or other natural line ending code (period, em quad, compounding hyphen, etc.) occurred in the justification range and incorporate in the output tape the appropriate set size codes to accompany the line.

Hyphens Can Be Eliminated

Many rules and variations in set sizes and data blocks can be developed but the ultimate result is that hyphens can be eliminated or reduced to the degree that they would no longer pose a problem to the computer, the printer, or the reader.

Adoption of this system of typesetting will:

- (1) Reduce computer processing time.
- (2) Simplify hyphenation logic and reduce initial programming time and costs.
- (3) Enable the use of less expensive computer equipment.

This system of phototypesetting from computer prepared tape has the advantage of completely eliminating the need for the complicated programming now in use for end-of-line hyphenations. This in many instances would indicate that a smaller computer or less peripheral gear may be used for relatively complicated composition.

The drastic reduction in the correction problems caused by improper hyphenation is another advantage which many printers will welcome. This is particularly true in the case of photocomposition and its attendant correction problems. Obviously the computer when processing data for this system will need a routine to take care of the inevitable line which will not succumb to the set size change method.

This routine need only provide for enough expansion and contraction capability in the two lines involved to allow for application of a human decision. A simple solution would be for the computer to produce the lines involved by insert-

ing a hyphen at any point in the troublemaking word which would allow the median set size and a median width interword space. Even with this method the division may be correct and at least there would always be sufficient latitude for adjustment.

The agency plans to edit tape on the 1410 computer by proofreading one or two computer printouts prior to creation of final tape for use on the photocomposing machine. Thus the rare instance where an end-of-line hyphen would be necessary can be determined from the printout and the necessary correction incorporated in the final tape. It would never be necessary to correct hyphenation after the page has been set. ◊

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