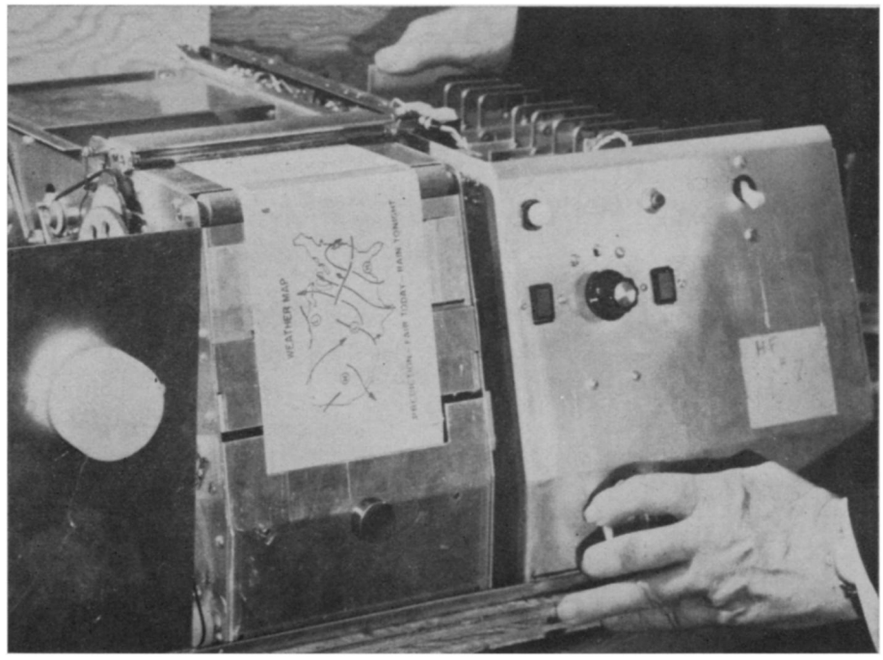
ELECTRONICS

Publishing Goes Electronic



R.C.A.

Home facsimile system: TV attachment turns out maps, printed matter.

by Carl Behrens

Books are not about to be replaced by electronic substitutes, but changes are in the works as the publishing industry moves farther and faster into the electronic age. Among the trends:

- Increasing use of computers in composing rooms and printing houses, as well as in library cataloging.
- A spate of marriages between electronic firms and publishing houses, including such prestigious companies as Random House, which was bought by Radio Corporation of America, and educational publisher D. C. Heath, acquired by Raytheon. More than 100 such mergers have been reported.
- Announcement by R.C.A. that it has developed a machine to send printed matter over television channels. A small home printer receives signals through the TV antenna and prints without interrupting the program.

Of these developments, the home printer is most likely to have a revolutionary effect on the form of reading matter that gets into the public's hands, but it has the longest lead time.

The printer uses standard electrostatic printing paper commonly used in transmitting radiophotographs. A varying electric signal is timed with the rotating drum—a dark spot on the picture corresponds to a strong signal and a light spot to no signal. When the electricity passes through the paper, it makes a mark. How dark the mark is depends on how strong the signal is. Since the signal is synchronized with the rotating drum, the dark spots on the original copy show up in the same place on the transmission.

At present the machine is only an experimental prototype. The only reason R.C.A. officials released information on it was because they want to test it over the airways, for which they need Government permission.

But the printer does work. As tested on the company's own closed-circuit TV, it can send a paperback-sized page of printed matter over the air in about 10 seconds. Graphic material can also be sent. The printing signals are transmitted during the instant when the TV's electron beam, having swept over the entire screen to paint its picture, cuts off and moves to the top of the tube to start again. This vertical blanking interval takes place 60 times a second, and in electronics, a lot can happen in a fraction of a second.

"When we talk about this machine, every newspaper writer assumes we're talking about electronic newspapers," says Dr. James Hillier, vice president of R.C.A. Laboratories where the printer was developed. "But that's only a small part of it." Among the possibilities he lists are football programs and diagrams

of plays just run; stock market reports, charts, and weather maps; and text material to accompany educational TV programs.

R.C.A. spokesmen emphasize that the printer is not likely to sweep the newspaper out of business. Electronic equipment costs more, and so does the copy paper used in the printer. Full page grocery store ads don't seem very practical.

Despite this, the appeal of electronically delivered newspapers is strong, particularly on snow stormy mornings. Technical problems of format and handling can be licked, the engineers are convinced. As for cost, consumers long ago decided that convenience and looks are worth paying for, as Henry Ford discovered when he was forced to drop his minimally priced Model T and paint his cars other colors than black.

The main drawback to facsimile printing in the homes—a dream of engineers since the late 1930's—has been the lack of a network of transmitting and receiving stations. With the new system riding piggyback on the TV waves, and a TV set in every home, that problem has been eliminated.

Another development that is likely to alter the form of printed matter—perhaps in the nearer future if cost problems can be whipped, is computer-aided education (SN: 4/29). It is this move that is immediately behind the rush by electronics firms to acquire publishing subsidiaries.

The textbook industry, which far outproduces other book publishers, has been booming in the last decade, partly on account of substantial increases in prices but largely because of expanding markets.

Although most experiments with teaching computers now are aimed at the elementary school level, where drills in arithmetic and other repetitive subjects are being taken off the shoulders of the teacher, this is likely to change once computer experts learn how to teach more complex subjects.

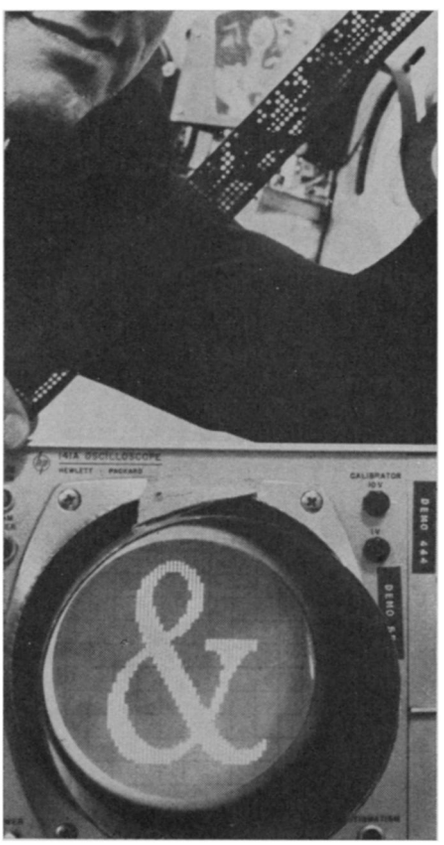
With the expertise gained from specialists in the textbook field, computer firms hope to move into fields of education where complex logical patterns of thought have to be developed. When they do, the textbook-teacher pattern will undoubtedly change. But how fast is still an open question.

As engineers discovered early in the experiments, there is a big difference between designing hardware and preparing course material that is useful in the computer context.

As an IBM spokesman says, "It's up to the educators" to decide what goes into a computer's program. If the computers are to pay for themselves—the cost of a one-year first-grade experimental program carried out by Stanford University came to about $1.5 million—they will have to be a substantial improvement over the teacher-workbook combination. And it's the educational input—the software—that will make the difference. And it's there that the newly merged companies are bending their efforts. Programmed instruction divisions, sparked by successful training programs run in Poverty Program job corps camps in recent years, are now a fixture in many electronics firms.

The printing end of the publishing business—usually separated from publishing itself—is receiving its own impact from automated processes. IBM has developed a system that takes a paper tape—or other input—with a continuous stream of words and automatically chops the copy into equal-length lines with proper hyphenation.

R.C.A. has a machine that composes a page on a cathode ray tube and takes a picture which then can be used for photo-duplication. This electronic composer starts with a paper tape, which is made manually from the original copy. The paper tape is fed into a computer, as in the IBM system, to hyphenate and justify the words into lines of equal length.



R.C.A.

Electronic typesetting by computer.

The output can be either another paper tape, or according to the latest development, a magnetic tape with the justified copy recorded on it. The magnetic tape saves a tremendous amount of expensive computer time, putting out 30,000 characters a second, compared with 100 characters on paper tape. Space is also saved: seven feet of paper tape are needed to hold the same information as one inch of magnetic tape.

From the computer the tape goes to photo-composer, which has in its memory the alphabet in the form of microscopic dots. The input tape calls different characters from the memory, assembles them from dots and displays them on the cathode ray tube, a line at a time. The composer, called a Videocomp, can set up 650 characters a second, which comes out to 900 lines a minute or a newspaper page in an hour.

An almost identical machine is being built by Mergenthaler Linotype Co. and C.B.S. Laboratories for the U.S. Government Printing Office.

A GPO spokesman says the composer will be used primarily on material that is already in computer form, such as Defense Department supply lists and index material. This kind of data, already on magnetic tape, can be fed into a properly-programmed computer for justifying and preparing for input to the photo-composer. In this process, there is no manual punching of a paper tape, which is almost as time-consuming as setting type on an ordinary linotype machine, he says.

The Mergenthaler machine, which is undergoing final acceptance tests now, should be delivered within a month.

While these new techniques should bring increased speed and efficiency to the editing of some text material, along with cost savings, they are not likely to revise the form of the product which users will end up with.

Advances in library computerization may. At present, several advanced libraries, such as the National Library of Medicine in Bethesda, Md., are using computers to catalog and organize articles and reports in medical journals according to subject and make these selective lists quickly available.

Far out enthusiasts, however, talk of completely automated libraries, where books are never handled. The material would be cataloged and organized as now, but instead of a bibliography, the information itself would be displayed.

The uses of such cold-hearted efficiency factories are likely to be limited. As a political science analyst puts it, "research can be done by two-dollar-an-hour college kids earning their movie money. To come up with something meaningful, you have to do more than gather information, you have to brood on it and digest it. TV screens can't be digested the way books can."