

Sarah Hartzell

CINE-GT 2920 Final Paper

Prof. Ann Harris

December 3, 2020

Talking Paper: The Synchrofax and the Sound Page

Overview

Magnetic media is far from an obscure format, nor is it yet entirely obsolete. But in the relatively long history of magnetic media, many formats and devices quickly fell into obsolescence before making much of an impact on the history of the medium. One such device is the Ricoh Synchrofax, also known as the 3M SoundPage in the United States. The device is an odd combination of audio and visual media, through the use of magnetic coated paper sheets. Though nearly extinct today, the Synchrofax found a strong niche in the educational market several years after its invention.

The Technology

As mentioned, magnetic media has taken a wide range of forms since the 19th century. As a support for recordable magnetic material, paper has been around since the 1930s. Paper was originally chosen for its dimensional stability, ease of use (such as the ability to annotate its verso), and low cost. These qualities stand in contrast to the plastics that later became popular for their durability and smoother finish. Early advocates foresaw the potential to produce magnetic

media “in sheets, disk, ribbons or bands,” though ribbon or tape remained the most common for much of the 20th century.¹

It is not clear when sheets of paper were introduced as a support for magnetic media, but several devices were introduced to the commercial market in the 1950s using magnetic coated paper sheets as storage for sound recordings. Remington introduced the Ultravox dictation machine in 1954, which used magnetic sheets, or “soundsheets,” as its recording material. The sheet was inserted into the device, where it wrapped around a drum that housed the magnetic head. The user spoke into the microphone and the sound was recorded onto the paper. Playback operated with the same tools; the microphone doubled as a speaker and the magnetic head read the material as well as recording it.²

Canon and Ricoh introduced remarkably similar devices in 1959 that deviated from Remington’s model by utilizing the visual component of the soundsheet. Canon’s Synchroreader resembled a flatbed scanner with a magnetic head that passed underneath the sheet, reading or recording dictated sound while the front of the paper is accessible for writing or reading. The Synchroreader did not sell well and was quickly removed from the market.³

The Ricoh Synchrofax operates similarly. Magnetic coated A4 paper is placed on a clipboard-like device that houses a rotating disc with a magnetic head on a sliding arm that moves away from the center of the page as the disc rotates. This essentially creates one spiral track on the page that can hold up to four minutes of sound. The microphone doubles as a speaker through which dictation is recorded and played back. Controls are quite simple: rewind, fast-forward, and play/record/stop.⁴

¹ Howell, “Magnetic Sound,” 44.

²“Remington / Dictaphone Ultravox.”

³ Bhatt, “Product Innovation,” 98.

⁴ Sakae, US3074724A.

Ricoh's Synchrofax and Canon's Synchroreader were introduced in the same year and with very similar designs, so it is unclear why Canon's device failed and Ricoh's succeeded. The Synchroreader is noticeably bulkier than the Synchrofax and generally has a more industrial design, while the Synchrofax is smaller and simpler in appearance. This may account for the long-term success of the Synchrofax in non-office settings, as will be discussed later. Additionally, the Synchroreader was withdrawn within two years, while the Synchrofax found success outside of Japan in later decades.

User Groups

The Synchrofax was intended as a dictation device for office workers, however its primary users rarely fell into that category. The market for these devices was quite large and diverse in the mid-20th century, with evolving technologies in magnetic media, grooved media, and eventually digital recording by the 1980s. We can never be certain why other devices took off in this market and the Synchrofax did not, but Ricoh did pivot to other outlets fairly quickly.

Research from the United Kingdom and Japan emphasizes the benefits of using the Synchrofax as an educational tool. As early as 1963, a survey of educational materials in Japan studied the utility of magnetic paper devices for students learning current events, languages, and arithmetic. The study lists seven key benefits of the technology: the simultaneous audio and visual stimuli, ease of operation, ease of navigation and replay within the track, physical convenience and flexibility of the sheets, reusability of the sheets, low cost, and good quality of sound.⁵ These details explain why the Synchrofax would appeal to both educators and students. The cost, convenience, and versatility speak to the needs of school teachers and administrators,

⁵ Duke, "Survey of Educational Media," 170.

while the ease of use and multi-sensory experience appeal to young learners in a classroom setting.

Further research from the UK among third and fourth grade students goes so far as to suggest a unique benefit from Synchrofax educational materials. The consensus seems to be that it is especially of use to special education students. One report says, “The rather slow readers are being helped by having complete pages of the programmes ‘talked’ on to the Ricoh-synchrofax machine by the teachers and Mr. Kefford. Thus the children are able to *listen* to directions as well as to *read* them and can therefore carry out the activities while improving their reading skills.”⁶ A separate study several years later affirms the utility of Synchrofax pages in a “non-book library,” containing both pre-recorded pages and materials recorded by other students. This study also recognizes the benefits for “the poor reader who may be deterred from using the original reference books because of the basic difficulties he experiences,” while also expanding the results to include the benefits of students recording their own material to “become more aware of the problems involved in good oral communication ie reading speed, pronunciation, diction and audibility.”⁷

Upon its introduction in the United States, the Synchrofax (now SoundPage, with a slightly refined design) was marketed directly as an educational device, making the most of research previously done abroad. *Popular Science* featured the SoundPage in its “What’s New in Electronics” spread in May of 1973 under the heading, “For teachers: pictures that talk.” The announcement indicates the intention to rebrand the device under 3M, calling it “new” more than a decade after its invention and highlighting the possibilities for teachers with no mention of office workers or dictation. It is also interesting to note the devices that are featured in the spread

⁶Kefford, *Nuffield Foundation*, 10. Emphasis original.

⁷Frankcom, “Educational Tehcnology,” 25.

with the SoundPage: a music cartridge player and a digital stopwatch. This collection of electronics gives some insight into the technological landscape at that time. Magnetic and analog media were still common in various forms, but basic digital technologies were also emerging in some sectors, supplanting common analog devices, though still with a hefty price tag.⁸

There is some evidence of the Sound Page being used in other settings, but less is known about why and how it was used. The Navy and Marine Corps' Catalog of Audiovisual Productions lists several technical and administrative manuals recorded on the SoundPage in 1979 and 1980.⁹ Perhaps this format was chosen for the benefit of pairing a spoken description or instruction with diagrams or other graphics, though it remains unclear why the SoundPage would be more beneficial or convenient to the military than simple printed manuals or other audiovisual formats.

Demise of the Synchrofax and Future of the "Talking Book"

Despite not reaching its target audience in its early life, the Synchrofax maintained a remarkably prolonged presence in the educational sector. It is hard to know if there is anything inherent to the Synchrofax that led to its demise, as in faulty mechanics or a sudden disappearance of parts and servicing, but the long lifespan in schools would indicate to the contrary. Instead, its eventual obsolescence is more indicative of the larger technological landscape for audiovisual media.

⁸ "What's New," *Popular Science*, 94.

⁹ U.S. Department of Defense, *Catalog of Audiovisual Productions*, 338-343.

Based on extant material, the Synchrofax was used in American schools at least through 1996.¹⁰ By this time, cassettes, cartridges, and optical media were commonplace. To use the example of dictation devices, since the Synchrofax was invented, machines had gone from taking up a corner of a desk to fitting in your pocket, recording ten times as long on a cassette just larger than a business card, in the case of the microcassette, and even more extreme progress with digital devices by the new millennium.

In general, the convenience of the size and storage is less applicable to educational use, as the bite-sized audio and large visual area were part of the appeal to children. But the audiovisual market overall did skew towards smaller devices with greater storage capacities for lower cost, so multimedia curricula may have similarly adjusted towards books on tape/CD or instructional VHS tapes and DVDs. For example, in a foreign language class, rather than each student using a Synchrofax to read and hear the pronunciation of words, a CD can be played for the whole class as they read along in the textbook. These formats would also be more desirable for school libraries, as they could be played on less proprietary devices or loaned to students and teachers who likely did not have Synchrofax players at home.

These factors become even more apparent with digital technologies and personal computers of the 2000s. In his survey of this type of media, Frohlich credits the ideal of the “talking book” as a motivating force for combined sound and printed image technology, describing the Synchroreader as a major stepping stone in this evolution.¹¹ The talking book has been nearly achieved in several forms, but never quite literally. Computers have been able to combine text and images with speech for quite some time. Audio CDs have been released that

¹⁰Techmoan, “RetroTech: Recordable Paper.” Pages acquired by the creator include recordings of popular songs released in 1996.

¹¹ Frohlich, “Chapter Two,” 18.

can be played in a computer as a CD-ROM to integrate videos, images, and multimedia material. Likewise, interactive websites and computer programs integrate sound and video to written text or still images. Even physical books can “talk” in some instances. Children’s board books have integrated electronic panels that play sounds when buttons are pressed in accordance with symbols on the page.¹²

The most direct successor to the Synchrofax in this “talking book” genre, at least to this writer’s memory of elementary schools in the new millennium, is the LeapPad, introduced by LeapFrog in 1999. Like the Synchrofax, it combined a reading device with interchangeable pages, except the LeapPad had a computer base that worked with booklets and digital cartridges rather than magnetic coated sheets of paper. The reader used an attached stylus to tap the pages of the book, which interacted with the base to activate different sounds, like reading a sentence word by word or naming states on a map. It was marketed as a learning tool for reading, phonics, geography, and music.¹³ While the technology itself is quite different from that of the Synchrofax, as well as lacking the ability to record user-generated material, the idea of a learning tool that combines printed text and images with corresponding sound is one that has carried over through each generation of audiovisual media.

Preservation Issues

There do not seem to be many Synchrofax devices or sheets left in existence, the reasons for which are largely speculative and present numerous problems for preservation. The main obstacle is likely resources; the primary user group of public schools is not likely to have the money, space, or inclination to preserve its aging technology. It is quite possible that machines

¹²Ibid., 21.

¹³ Analog Memories, “LeapPad Learning.”

and sheets were used until they no longer worked and then discarded, or merely discarded when replaced with new technology.

From a more technical standpoint, there are some elements of the Synchrofax that do not lend well to preservation, primarily in the magnetic sheets themselves. The machines seem to be quite sturdy and since their operation is so simple, the chance for destruction from user error is low (though considering the young age of many of these users, the likelihood may be slightly higher). The design of the sound sheets, though, could pose a problem. For one, the magnetic material is unprotected, exposed to all sorts of damage like scratching, bending, water damage, tearing, etc. Though the simple paper design was the appeal of the medium, it could also be its downfall; one of the reports mentioned above lists the benefit that “the recorded sheet can be folded and sent by mail or can be readily filed and kept as reference material.”¹⁴ Surely this was seen as a boon to users at the time, but from a preservation standpoint folding recorded material into the size of an envelope or stacking numerous sheets together in a filing cabinet is far from best practice. Damage to the recording side of the paper could result in distorted sound or skipping in the track, while the paper itself could stick together when stacked, especially if the environment is too humid or if there is any water damage.

Likewise, the recorded sounds themselves are far from everlasting. Another benefit of the system was the re-recordable sheets, meaning the amount of material that has been lost and replaced is hardly calculable. As shown in the TechMoan video, students recorded over their teachers’ recordings with songs from the radio. It is unlikely that Celine Dion’s “It’s All Coming Back to Me” will soon be forgotten, but that original material from the teacher is sadly irreplaceable. Because it is not apparent just from looking at a sheet whether it has anything

¹⁴ Duke, “Survey of Educational Media,” 170.

recorded on it, original recordings may have been accidentally replaced, as well. This also makes it more difficult for preservationists to assess the contents of a sheet without a means of playback. Given the scarcity of Synchronfax machines, further research may aim to read the recorded paper through other means.

Fortunately, there are some features of the sound sheets that are more stable. Unlike magnetic tape, magnetic coated paper sheets do not have to pass through a complex system to be recorded or played back; instead a single head rotates slowly along the surface of the sheet, so the wear on the magnetic material is minimal. Furthermore, the sticky shed that affects magnetic tape may be less prevalent on magnetic sheets since there is not direct contact with another layer of material as there is with a reel of tape. Additionally, the paper itself may be stable, depending on what its coating is made of and whether it is acidic or not. The ink used to print onto the sheets also varies in stability depending on its makeup. Photocopies and laser printing are relatively stable, though even within these categories there can be fluctuation based on manufacturer.¹⁵

¹⁵“Office Printing and Reprography.”

Annotated Bibliography

Analog Memories. 2018. "LeapPad Learning Center | Television Commercial | 2000." YouTube Video. *YouTube*.

https://www.youtube.com/watch?v=Nzca5ElNRv8&ab_channel=AnalogMemories.

YouTube video of early LeapPad commercial. Demonstrates use and marketing of the device.

Bhatt, P. (2004). "Product Innovation and Customization." *Vision: The Journal of Business Perspective*, 8(2), 97-110. doi:10.1177/097226290400800210

History of Canon technologies, including the Synchroreader. Mentions that it was only on the market for two years, but that it laid the groundwork for other Canon devices.

Duke, Benjamin C., ed. "Survey of Educational Media in the Far East: Instructional Uses and Research Direction." *Office of Education Bulletin*, no. 40 (1963).

Comprehensive study of educational devices used in Japan, including the Canon Synchroreader and the Ricoh Synchrofax. Lists benefits of these kinds of recordable magnetic paper for students and teachers, including combined audiovisual stimuli, convenience, operation, cost, and sound quality.

Frankcom, K. "Educational Technology in the Primary School-- the Ricoh Synchrofax." *Visual Education* 25 (April 1973): 25.

Study from junior school in UK. Compiled a library of soundpages, both pre-recorded and recorded by fourth grade students, and studied the benefits for young students. Concluded that they especially benefit "poor readers" who may not otherwise seek out written materials, as well as the students doing the recording who learned communication and public speaking skills.

Frohlich, DM. "Chapter Two: A Brief History of Sound & Image Media." In *Audiophotography*. New York: Springer Science and Business Media, 2004.

History of different audiovisual technologies. Includes a section on "sound and the printed image" which discusses the evolution of these devices and the many ways in which they failed. Describes a consortium that aimed to develop a "talking book" in 1959. The author gives nearly all credit to the Synchroreader. Describes modern analogous devices, like CD-ROM, audiobooks, audio chip-based books, LeapPad.

Griffin, Diane. *Slow Learners: A Break in the Circle: A Practical Guide for Teachers*. London: Woburn Press, 1978.

Compendium of learning devices and their uses in special education. Listed as the Synchrofax Audio Page. Noted for its versatility, use in pre-reading training, sight vocabulary acquisition, phonics, spelling, comprehension, creative writing, etc.

Howell, H. A. "Magnetic Sound Recording on Coated Paper Tape." *Journal of the Society of Motion Picture Engineers* 48, no. 1 (January 1947): 36–49.

History of magnetic recording. Includes extensive details of chemistry and physics, as well as an overview of the different innovations in the medium. Argues that paper is beneficial as a tape support because of its dimensional integrity, ability to write on the back, and low cost. Foresees the potential for sheets, disks, ribbons, or bands of magnetic coated paper.

Kefford, Colin W. Publication. *Nuffield Foundation 'Resources for Learning' Project. A Multi-Media Programmed Approach to Environmental Studies.*, 1968.

Report on UK junior high audiovisual and multimedia education in environmental studies, geography, and social studies. In addition to studying film, slides, and audio tapes, the Synchrofax is listed as a motivating tool for "slow readers" as it combines the audio and visual elements studied in one device.

"Office Printing and Reprography." Preservation Self-Assessment Program. University of Illinois. <https://psap.library.illinois.edu/collection-id-guide/officeprintcopy#colorxerox>.

Information on printing processes, including deterioration, chemistry, and levels of risk. Notes the time periods and main users for each process, which could help speculate about the state of sound sheets.

Otter, Willy. "Ultravox (Diktiergerät) U-402." Ultravox U-402. Radio Museum. Accessed October 14, 2020. https://www.radiomuseum.org/r/dictaphone_ultravoxdiktiergerae_u_40.html.

Encyclopedic entry for the Remington Ultravox. Most useful for its photos, which show exterior and interior mechanics.

"Remington / Dictaphone Ultravox (1954 - Late 1970s)." Museum of Obsolete Media, September 14, 2020. <https://obsoletemedia.org/remington-dictaphone-ultravox/>.

Brief history of the Ultravox and its magnetic sound sheets. Describes how the machine operates: magnetic sheet inserted into device and wrapped around a drum which reads the material. Indicates that once the machine was bought by Dictaphone it transitioned into a cassette-based device.

Sakae, Fujimoto. Apparatus for positioning recording and recorded sheets on a magnetic recorder and reproducer, US3074724A, issued January 22, 1963.

Synchrofax patent. Includes the reading and recording device but not the paper. Shows internal mechanism, including a magnetic head on a sliding arm that rotates on a disc base. External mechanism shows solid plastic sheet that lowers on top of the page, likely to keep magnetic material in direct contact with tape head, as well as control buttons.

Techmoan. "RetroTech: Recordable Paper - The 3M Sound Page." *YouTube*, 2018.
https://www.youtube.com/watch?v=kdfTuE9XHas&ab_channel=Techmoan.

Demonstrates use of the Sound Page, giving a brief history of the device. Includes original Sound Pages from the Oklahoma education department (likely created by an outside company), indicating the different age ranges and uses of the device. Shows blank pages that had been recorded over with songs from the radio including "It's All Coming Back To Me" and "Head Over Feet." Some of the only information I could find about how the pages actually look and play now.

U.S. Department of Defense. *Catalog of Audiovisual Productions: Navy and Marine Corps Productions*. Volume II. Washington, D.C.: Naval Publications and Forms Center, 1984.

Listings for documents recorded on the 3M SoundPage in 1979 and 1980 by the Navy and Marine Corps. Listings include personnel processing instructions, service record maintenance, joint uniform military pay system, loss of feed pressure instructions, loss of feed suction instructions, excessive lubricating oil pump discharge pressure, casualty to the deaerating feed tank.

"What's New in Electronics." *Popular Science* 202, no. 5, May 1973.

Section of *Popular Science* magazine introducing the SoundPage as a "new" 3M invention in the US in 1973. Marketed as a tool for teachers, "pictures that talk," describing the use and benefits of using in the classroom. Lists the price as \$299.