CAN YOU HEAR ME?:
SOUND-CAPTURING TECHNOLOGY AND THE
PROBLEM OF OBSOLESCENCE

BY

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I dedicate this research to my grandmother. I finally finished this "little report."

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ABSTRACT

This thesis examines technological obsolescence in archival record-keeping. In part a material culture study of the Gray Audograph, a dictation machine popular from the 1940s to its discontinuation in the 1970s, and in part a case study of Tennessee's legislative recording program, the thesis explores the complex relationship archives have with technology. It investigates the inevitable truth that technology will become obsolete, resulting in dire repercussions in record-keeping institutions. As such, the thesis is also a discussion of record migration and other tactics invoked by record-keepers to permanently sustain audio formats, and ultimately questions whether permanence, sustainability, and stability are achievable.

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CHAPTER I

INTRODUCTION

Permanent: continuing or enduring without fundamental or marked change: stable. -Merriam-Webster Dictionary[1]

Permanence: the inherent stability of material that allows it to resist degradation over time. -Society of American Archivists[2]

Permanence is simultaneously aided and challenged by new technology. Advancements and enhancements lengthen mechanical lifetimes by creating a supposedly more stable product more efficiently, and at a lower cost. New products create a need for new professional skills, which in turn prompt and promote technology-driven, consumerist work environments, the managers of which are constantly on the hunt for the next best thing. But as new technologies come to the forefront, others fade to the background, become unpopular and unused, and fall into disrepair sitting forgotten on a shelf. Obsolete machines would all but disappear if archives and museums did not become their final resting places. These cemeteries of defunct machinery symbolize years of evolving record-keeping methods. Though most machines have fallen out of common use, archival institutions depend on the usability of obsolete technology, particularly audio-visual devices, to continually provide access to certain records.

The problem of obsolescence in the archives is rarely discussed in great capacity in public history scholarship. More so, the concept of obsolete technology is referenced

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[1] "Permanent." Merriam-Webster.com. Accessed October 4, 2013. http://www.merriam-webster.com/dictionary/permanent.

[2] Richard Pearce-Moses, "Glossary of Archival and Records Terminology," accessed October 4, 2013. http://www2.archivists.org/glossary/terms/p/permanence

as a catalyst for migration policies or pertaining to digital records management. From an administrative standpoint, migration is the endpoint of obsolescence: the solution to the problem that has and will always affect archival institutions. However, it is pertinent that archivists not just be acquainted with the methods by which records can be saved, but become aware of the process by which record-creating technology becomes unused. Further, archivists must recognize the influence obsolescence has on long-term preservation and access and evaluate solutions accordingly.

Audio-visual mediums, as electronic records, provide particularly good examples of preservation problems because, as continually evolving technology, they are more susceptible to obsolescence.[3] Archivists must adapt sound and video-captured records in order to both preserve records and provide access to them. From a preservation standpoint, audio-visual mediums and technology in general are popular subjects in public history scholarship. However, in archival scholarship there seems to be more of an emphasis on preservation of film and photographic records, than audio records. Scholars such as Mary Ritzenthaler, who wrote the principle preservation guide for the Society of

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[3] Richard Pearce-Moses, "Glossary of Archival and Records Terminology". Society of Tennessee Archivists. Accessed October 9, 2013. http://www2.archivists.org/glossary/terms/e/electronic-record. Electronic Record: "(also digital record; automated record, largely obsolete)...Data or information that has been captured and fixed for storage and manipulation in an automated system and that requires the use of the system to render it intelligible by a person. Notes: 'Electronic records' can encompass both analog and digital information formats, although the term principally connotes information stored in digital computer systems. 'Electronic records' most often refers to records created in electronic format (born digital) but is sometimes used to describe scans of records in other formats (reborn digital or born analog). Electronic records are often analogous to paper records; email to letters, word processing files to reports and other documents. Electronic records often have more complex forms, such as databases and geographic information systems."

American Archivists (SAA), and Gregory S. Hunter, author of an extensive work on archival history and theory for the American Library Association (ALA), both presented standards and best practices of preservation, but neither dwelled long on the subject of sound-captured records.[4] In a search of SAA publications, three articles from the periodical *The American Archivist* stand out as audio-specific scholarship. The most recent article, "Sound Practices: On-line Audio Exhibits and the Cultural Heritage Archive" by Ian Craig Breaden, published in 2006, did not discuss preservation of audio records, but focused on the functionality of audio records in Web exhibits.[5] Breaden proposed a set of standards for archives to use to increase performance of audio exhibits. Before Breaden, it does not appear as though audio records were discussed extensively since the 1990s. In 1990, Christopher Ann Paton published "Whispers in the Stacks: The Problem of Sound Recordings in Archives," in which she explored why sound-captured records have largely been ignored by archivists.[6] Paton discussed reasons such as a "lack of communication between 'paper' and 'sound' archivists…[and] difficulties of appraisal, processing, use, and preservation that sound recordings pose for archives that are oriented toward the care of paper materials."[7] She noted that issues of "aging" audio recordings

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[4] Mary Ritzenthaler, *Preserving Archives and Manuscripts*, 2nd ed. Archival Fundamentals Series II (Chicago: Society of American Archivists, 2010). Gregory S. Hunter, *Developing and Maintaining Practical Archives: A How-to-Do-It Manual*, 2nd ed. (American Library Association, Neal Schuman Publishers, Inc., 2003).

[5] Ian Craig Breaden, "Sound Practices: On-line Audio Exhibits and the Cultural Heritage Archive," *The American Archivist* 69 (Spring/Summer 2006), 33-59.

[6] Christopher Ann Paton, "Whispers in the Stacks: The Problem of Sound Recordings in Archives," *The American Archivist* 53 (Spring 1990), 274-280.

[7] Ibid.

should be addressed before problems of preservation become overwhelming. Paton wrote another article in 1998, "Preservation Re-Recording of Audio Recordings in Archives: Problems, Priorities, Technologies, and Recommendations," in which she offered, "a context for examining archival audio holdings, determining preservation needs and priorities, and planning audio re-records (reformatting) projects."[8] Of these three articles, Paton's works came closest to discussing obsolescence in that she focused on the relationship between archivists with different specializations, reformatting projects, and the necessary skills, equipment, and personnel necessary for working with new and older sound-capturing technology.

My purpose in studying sound-capturing technology, specifically, is two-fold. First, sound in itself is a natural phenomenon that penetrates every facet of life. Whether through music or speech, the tick of a clock or the honk of a car horn, audible vibrations induce reactions in any and every listener. Because sound has become almost ordinary, it represents an accessible medium by which to discuss technological obsolescence. Second, while the study of sound dates to several centuries Before the Common Era, sound-capturing as a scientific process is still a relatively young technology.[9] Successfully capturing sound on a physical medium dates to about the mid nineteenth

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[8] Christopher Ann Paton, "Preservation Re-Recording of Audio Recordings in Archives: Problems, Priorities, Technologies, and Recommendations," *The American Archivist* 61 (Spring 1998), 188-219.

[9] For an interesting overview of dictation machine history, see David Morton, "Inventing the Dictation Machine" on "Recording History: The History of Recording Technology" http://www.recording-history.org/HTML/dicta_tech1.php. For more about the author, see David Morton, "David Morton: Bio Page" on "Recording History: The History of Recording Technology," http://www.recording-history.org/HTML/morton.php

century, although the earliest mechanisms did not play back the sound. Later in that century, through the twentieth century, and up until now, scientists and inventors have conceived new ways to make sound-capturing mediums easier to produce, cheaper, and all-around better for the time in which they were intended for use. But that brings up the question of why capture sound at all.[10] From a musician's standpoint, sound recording proliferates a work of art, making it accessible to the average Joe and Jane. What, then, is benefitted from capturing ordinary speech? The answer is truly an endless one, but a few reasons include: the power and persuasion of words, evidence of intent, and the documentation of society. In this study, recording-keeping within the context of capturing spoken word is at the forefront.

The speech-centric nature of this study necessitated the examination of a speech-specific sound-capturing device -- particularly one that represents an obsolete technology. The Gray Audograph, a portable dictation machine which produced analog sound on plastic discs, is an ideal machine for three reasons. To begin, it has a certain novelty: very few have heard of this machine. Despite its wide use as a corporate dictation machine and inclusion in numerous dictation textbooks, the Audograph is not included in popular memory the way the Dictaphone or the Edison "diamond discs" are. To have heard of the

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[10] Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction* (Durham, NC: Duke University Press, 2003). Jonathan Sterne posed an interesting discussion of the cultural aspect of sound reproduction in which he concluded, "Capitalism, cities, industries, the medicalization of the human body, colonialism, the emergence of a new middle class, and a host of other phenomena turn out to be vital elements of the history of sound – and sound turns out to be a vital element of their history (p. 343)." By focusing less on the technology of sound and the lived experience of hearing, Sterne tied the development of sound techniques by actors at the turn of the twentieth century to the development of modernity.

Audograph, one would have needed to use it during its heyday, come across its recording discs in an archival institution, or be particularly versed in the history of obscure sound-capturing machines. The Tennessee State Library and Archives (TSLA), where I became acquainted with the machine, meets all these criteria.

The Gray Audograph is also a rarity today. There are few machines that are known of. TSLA possesses three machines, and according to staff who work with the Audographs, there are two machines in Washington D.C. The odds of finding a functioning machine are even less. Of the three machines at TSLA, two are original to the institution, and still function. A staff member purchased the third machine to aid in the duplication of Audograph discs and migration of the records to cassette tape. One of the three machines contains a modified stylus to keep playback in working order. Although the Audograph machines are not used daily anymore, TSLA staff on occasion utilizes them to re-copy and replace corrupted cassette tape copies.

Finally, and perhaps most importantly, the Gray Audograph as an object is representative of the history of business, the State of Tennessee, and archival record-keeping. For business history, the Audograph is an example of a technology which shaped the office environment. In a mechanical sense, it exemplifies the consumer's search for cost effectiveness and efficiency in the workplace. But the Audograph, and other emerging technologies such as the electronic typewriter, also influenced the workforce and culture. The new technology changed secretaries' skill sets and their relationships to office executives, and Audograph advertisements established work hierarchies and reinforced gender lines.

Historians of business, labor history, women's history, and social history have increasingly become aware of the effect technology and the expansion of capitalism has on the work place. Margery W. Davies, for instance, in her 1982 book *Woman's Place is at the Typewriter*, examined the circumstances that led to the predominance of women in clerical positions, particularly emphasizing the influence of capitalist expansion post-Civil War America.[11] She explained that when businesses grew in the post-Civil War years and became part of the expanding national market, office workers started to "rationalize" their offices by dividing into departments with specific tasks, resulting in routinized jobs and less opportunity for advancement. Davies argued that literate women stepped into these routinized clerical rolls because they were ultimately not bothered by the lack of advancement and they were denied entrance to most professions. Elyce J. Rotella had looked at the same theme a year earlier in her article, "The Transformation of the American Office: Changes in Employment and Technology."[12] Rotella noted the close correspondence between the introduction of mechanical devices and routinization and the changes in workforce composition, which included the adoption of new technical skills, in the post-Civil War decades. Margaret Lucille Hedstrom also explored and expanded upon this theme in her dissertation "Automating the Office: Technology and Skills in Women's Clerical Work, 1940-1970," in which she analyzed changes in office

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[11] Margery W. Davies, *Women's Place is at the Typewriter* (Philadelphia: Temple University Press, 1982).

[12] Elyce J. Rotella, "The Transformation of the American Office: Changes in Employment and Technology," *Journal of Economic History* 41, no. 1 (March 1981), 51-57.

work methods and technology in paperwork-intensive businesses post-World War II.[13] Particularly, she looked at the introduction of automated systems and computers into clerical work and examined why managers' efforts to use the technology to cut costs and curb workforce growth largely failed. She argued that managers often overlooked the skills of clerical workers and complexity of their work, and reaffirmed the importance of workers' skill and careful judgment in handling clerical work.

Studies of white collar work also included historians who did not agree with the assumption that technology and capitalism shaped the office environment. Lisa M. Fine refuted the stance that the post-Civil War transformation of clerical positions into women's work was due to rationalization, routinization, and mechanization of businesses.[14] Rather, she argued that women created opportunities, in addition to responding to them. Using advertisements such as the 1904 Smith Premier Typewriter Company, which display a male and female stenographer on equal ground, and then later ads of the 1920s, which represented the work to fit a conventional female image, Fine explained that the feminine clerical role had to be culturally and socially constructed. She further argued that the appeal of work lay with offers of a secure living, with good wages at reasonable hours, and the notion of comfortable independence. And Kim England and Kate Boyer, while neither fully discounting nor confirming the stance that technology shaped the work environment, argued in their article "Women's Work: The Feminization

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[13] Margaret Lucille Hedstrom, "Automating the Office: Technology and Skills in Women's Clerical Work, 1940-1970" (PhD dissertation, University of Wisconsin, 1988).

[14] Lisa M. Fine, *The Souls of the Skyscraper: Female Clerical Workers in Chicago, 1870-1930* (Philadelphia: Temple University Press, 1990).

and Shifting Meanings of Clerical Work," that the meaning of clerical work has shifted according to economic and cultural circumstances over time.[15] They explained that a spectrum of processes, including the role of clerical work, redefined women's role in businesses. Overall, scholarship on both sides of the technology-driven change discussion have greatly enhanced our understanding of white-collar work and workers by dissecting the cultural and economic influences throughout late nineteenth and twentieth-century American history.

The Tennessee government's use of the Gray Audograph from 1955 to 1974 marked a milestone in documenting the state's history. Several states recorded their legislatures' proceedings, though mostly by hand-written notes and seemingly with no intention other than creating the formal published journals of state acts.[16] Tennessee was the first to establish a permanent policy for recording their General Assembly, reflected in Senate Joint Resolution 6 (1955).[17] The resolution at once allocated responsibility for recording to TSLA, and it noted the importance of an official record for protection of Assembly members and benefit for students and other persons. It also recognized the popularity of sound-recording technology with its beginning declaration, "Whereas, the

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[15] Kim England and Kate Boyer, "Women's Work: The Feminization and Shifting Meanings of Clerical Work," *Journal of Social History* 43, no. 2 (Winter 2009): 307-40.

[16] Dan M. Robison to librarians and archivists of Connecticut, Maine, New York, North Dakota, Pennsylvania, and West Virginia, November 24, 1954, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

[17] For the Resolutions: Tennessee General Assembly, Senate Joint Resolution No. 6 (Nashville, January 6, 1955) and House Joint Resolution No. 24 (Nashville, 1955), Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

practice of making recordings on wire, tape and discs has become widespread….”[18] The

decision of TSLA to use the Gray Audograph was technology-based. At that time and in

that market, the Audograph was a machine which promised excellence in record-keeping.

By choosing it, TSLA opted for sustainability and permanence. By adopting a formal

policy, the Tennessee government indicated a desire for accountability and a sense of

greater political and historical awareness.

Sustainability, permanence, ease of use, and clarity of recording were major

selling points for the Gray Audograph. In terms of archival preservation and access, it

seemed ideal. For the time the machine was manufactured (1946 - 1976), it was an

excellent sound-capturing technology. However, the Gray Manufacturing Company

ceased production in 1976. Though TSLA stopped recording on Audograph discs in 1974

in favor of another medium, the halt in production caused great repercussions in record-

keeping. Only by constant machine maintenance and care (with dwindling resources),

environmental monitoring for the discs, and eventually a migration policy (which allowed

the recording to be transferred from one medium to another) could TSLA sustain the

original recordings containing two decades of state legislature sessions. In the 1990s,

TSLA staff transferred the records from Audograph disc to cassette tape, on which the

current sessions were recorded. In 2008, TSLA switched from the use of cassette tapes to

recording in a digital format, now the most widespread and popular method for the

creation of records. But the question now is how long will the current digital formats be

sustainable? The fifty year move from Audograph disc to cassette tape to digital is

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[18] Public Acts of Tennessee, 1955. Senate Joint Resolution No. 6, pg. 1367.

indicative of a natural evolutionary cycle, with plausible projections for the sustainability of physical mediums. Because digital is not physical, any single format's lifeline is unknowable. It is increasingly apparent that digital formats will adapt and change faster than their physical predecessors, especially when one considers the technological leaps in digitization and rapidly appearing advancements since the year 2000. And though there are current archival standards for digital audio espoused by the United States Library of Congress, many digital audio formats exist and provide varying levels of sustainability.[19] Ultimately, digital formats, while arguably easier for sound-capturing and accessibility now, will become prey to obsolescence quicker than physical mediums, and institutions like TSLA will be forced to adapt in order to sustain both old and incoming records.

The idea of permanence permeates archival practice. It is essentially the core of any archives' mission: stability, protection, preservation for the ultimate aim of providing access to records that, with the aid of active and conscientious record-keepers, have withstood time. Obsolescence constantly works against permanence, to the detriment of archival institutions. But with obsolescence comes a grand tradition of advancement and leaps in innovation that is reflected in the records themselves. The Gray Audograph represents the starting point in a chain of technological improvements utilized by the Tennessee government and provides an example of this broader obsolescence phenomenon.

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[19] "Sustainability of Digital Formats: Planning for Library of Congress Collections: Format Descriptions," Library of Congress, accessed October 9, 2013. http://www.digitalpreservation.gov/formats/fdd/descriptions.shtml

CHAPTER II

THE GRAY AUDOGRAPH AND ITS IMPACT ON TWENTIETH-CENTURY
SECRETARIAL CULTURE

A 1956 training textbook stated, "Taking dictation and transcribing dictated materials into communications and reports that are accurate and in good form are two of the secretary's most important responsibilities."[1] Before the rise of personal computers, and even to a large extent today, businesses relied heavily on a secretary's ability to absorb and translate information. Transfer of information became what can be considered a determinant of success for secretaries and dominated their daily tasks, affected their relationships with associates and bosses, and ultimately shaped their education. The introduction of the Gray Audograph and similar dictation machines, like the Edison Voicewriter and Dictaphone, to the business consumer market altered this secretarial culture. Popularly used in a variety of settings such as business and governing entities, they greatly affected the methods by which office secretaries learned and executed dictation practices, and transformed the ways in which dictators created and secretaries maintained records. The following is an examination of the Gray Audograph and the impact it had on its cultural landscape.

The Gray Audograph was one of the many brands of sound capturing machines popular in the 1950s, 1960s and 1970s (figure 1). Designed as a portable dictation

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[1] Esther Kihn Beamer, J. Marshall Hanna, and Estelle L. Popham, *Effective Secretarial Practices: A Collegiate Textbook for the Training of Secretaries, A Handbook for Practicing Secretaries*, 3rd ed. (Cincinnati, OH: South-Western Publishing Company, 1956), 97.

Figure 1: Gray Audograph and disc. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

system, it used thin, blue plastic recording discs about the size of 45rpm records, rather than wax cylinders or magnetic tape. It was similar to a vinyl record in that there was a spiral groove on which a needle travels and picks up analog vibrations for amplified sound. The needle started playing from the middle of the disc and wound outward. The company which produced it, the Gray Manufacturing Company, Incorporated, started in Hartford, Connecticut in 1891 and operated until 1976. Originally known as the Gray Telephone Pay Station Company (until 1939), it manufactured pay telephones, dictation machines, answering machines, turntables, and tonearms. Gray began production of the Audograph in 1945.[2]

The Audograph could be operated through a series of easy steps.[3] After plugging the power cord into an electrical outlet, a secretary connected a control switch to the machine in the form of either a typewriter or foot control for quick start and stopping playback (figure 2). Upon making sure the control lever, which determined whether the machine was recording, was in playback or in neutral, the secretary turned the on-off switch. She then placed a disc on the spindle and pushed the spindle to the right so that the right section of the disc slid under the needle within the recording compartment. A listening device attached to the front of the machine through a port between the dials allowed for sound adjustment. The control lever could then be pushed to the right for playback, and the control device activated to start the playback (figure 3). The final step

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[2] "History of the Radio Manufacturer Gray Manufacturing Co., Inc. Hartford, CT," http://www.radiomuseum.org/dsp_hersteller_detail.cfm?company_id=11120 accessed May 1, 2013.

[3] M. Fred Tidwell, *A Training Course for the Audograph Secretary* (Harford, CT: Gray Manufacturing Company, 1952), 1-3.

Figure 2: Side of the Audograph featuring the typewriter or foot controller port. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

Figure 3: Control switch for recording and playback. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

Figure 4: Front of the Audograph featuring the volume, tone, and speed controls. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

before transcription involved listening to some of the contents of the disc in order to adjust volume and tone (figure 4). Gray described the Audograph as an "electronic sound recording and reproducing instrument for monitoring of communications circuits and other special sound recording applications where uninterrupted operation is required."[4] It ran on a belt and motor, and every machine had a record-reproduce amplifier, which, in the case of the Tennessee State Legislature's system, allowed for simultaneous recording and reproduction on two different units. The Audograph recorded on "Flexograph" discs, which Gray boasted as providing "the finest possible recording and reproduction … [and] lowest possible surface noise."[5] Each was a flexible, flat, and "virtually unbreakable" blue-colored disc made of Vinylite plastic, which withstood environments up to 180°F, was flame resistant, and easily filed for record-keeping (figure 5). It was an "economical one-hour disc."[6] Gray built these machines for a heavy dictation flow rate. The price was moderately expensive. The dual monitoring recording system and adapters that TSLA bought for the Tennessee State Government in 1954, for example, cost $764.99.[7] The discs cost $13.50, index strips cost $4.00 (attached to the front of the machine for indexing and quick referral of the recording), and file envelopes cost $2.50 (figure 6).

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[4] The Lanier Company to Tennessee State Library and Archives, October 14, 1954, Tennessee Legislative Collection, Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, Nashville, TN.

[5] Ibid.

[6] Ibid.

[7] Ibid.

Figure 5: Gray Audograph disc. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

Figure 6: Audograph disc in its storage sleeve. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

Some advertisements even featured rental deals for the single machine units.[8] Company

descriptions, product brochures, and advertisements particularly emphasized the ease and

usability of the Audograph machines and reliability of the discs, which, in comparison to

similar products like the Edison and Dictaphone, seemed like a prudent investment.[9]

Product brochures and advertisements, such as those found in *Time* and *Fortune*,

shrewdly featured a targeted audience—the executive and boss, or those who dictated.

Because the machines were portable (despite weighing about fifteen pounds), Gray

particularly emphasized the dictation machines as being perfect for the working man on

the move: ideal for any type of travel – whether by car, train, or plane – or just for late

nights at the office or at home. Gray also indicated that the Audograph would improve

workflow between dictator and secretary, specifically in that the dictator did not occupy a

secretary's time in dictation sessions, keeping her from other necessary work. In defense

of the Audograph, Douglas Fisher, Executive Counsel for the Office of the Governor of

Tennessee wrote in a 1954 memorandum:

> Use of the machine for dictating circumvents my keeping a secretary idle during a
> substantial part of the day when dictation is interrupted by telephone calls.
>
> Occasionally, when our correspondence is particularly heavy, I come to the office
> at night and catch up. This would, of course, be impractical without the
> machine.[10]

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[8] "Gray Audograph V: Most Unusual Rent in Town," advertisement in *Time*, February 27, 1956.

[9] Product Brochures, Folder 34: 36-30 Archives Division – Recording of Legislative Sessions; and Governor Clement Papers, Box 36 Folder 19, Tennessee State Library and Archives, Nashville, TN.

[10] Memorandum from Douglas Fisher, December 27, 1954, Governor Clement Papers, Box 36 Folder 19 Tennessee State Library and Archives, Nashville, TN.

For Fisher, the inclination to keep workers on schedule and on task seemed reason

enough to purchase an Audograph machine. Whether for mobility or workflow, it is

evident that Gray directed their product campaigns to the dictator as the primary user of

the Audograph machine.

It can be argued, however, that the secretary was as much a target audience as the

dictator. Though most advertisements and product brochures seemed to speak directly to

the dictator, many times they featured secretaries at work with the machines in

photographs, with and without the dictator (figure 7). Product brochures in particular

engaged with the secretaries' work as transcribers and records keepers.[11] To that end,

Gray published a guide titled *A Training Course for the Audograph Secretary* (1952),

which not only explains how to run and handle the machines and discs, but gives a

preparation course for listening, filing, grammar, spelling, and punctuation. It also

included practice exams and an index of mechanics for machine maintenance. It is

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[11] In the periodical *The Secretary*, most general advertising targeted the secretary as a transcriber both visually and textually. In the late 1950s, the magazine printed about five or six advertisements for the electronic typewriter and improved typewriter tape per monthly issue, in comparison to advertisements for disc dictation machines (particularly the Edison Voicewriter and the Dictaphone), which by 1961 received only about one per monthly issue. When dictation machine ads appeared, they tended to emphasize time management. In the 1960s, ads still largely focused on typewriters and copier machines, though there were some advertisements for dictation machines (the disc Soundscriber appeared, and there was a noticeable rise in popularity for the reel to reel recorder Norelco). By the 1970s, much more emphasis was placed on typewriters, copiers, furniture, writing implements, correction liquids, tape dispensers, index files, and other small office supplies. If dictation machines were advertised, it was usually one monthly ad for the reel to reel Norelco, IBM's recorder cartridge system which involved 6-minute discs (debuted in 1975), or minicassettes; however, advertisements for other office appliances and supplies still heavily outweighed the amount of advertisements for dictation machines.

apparent that though Gray considered the dictator to be primary audience for its product,

they were quite aware that the secretary was accountable for most of the machine's use.

Perhaps Gray, when developing the advertising strategies, in some way

understood that the secretary represented the mechanics of a business and therefore

inserted her into the product promotional material. Any given secretary acted as an

assistant, a typist and transcriber, an organizer, a records manager, and an information

and workflow intermediary. But what did a secretary look like when the Audograph

dictation machine became a popular tool? In 1954, Irene Place and Madeline S. Strony

described the position as such:

> Studies show that the typical or average person employed as a secretary is a
> female, thirty-two to thirty-three years old, who has worked for at least twelve
> years. She is supposed to be prepared to take dictation at 120 words a minute,
> transcribe it at 70 words a minute, spell and punctuate accurately, detect
> grammatical errors, develop and maintain filing systems, greet callers, handle
> telephone calls, reconcile checking accounts, and prepare a variety of statements
> and reports.[12]

Executives expected secretaries to do these tasks on a daily basis diligently and

flawlessly. Through the series of tasks and as a gatekeeper to the business, a secretary

would be expected to build rapport with customers, coworkers, and a boss. On top of the

physical demands, however, Place and Strony further described an aspect of a secretary's

job that was behavioral:

> She is to be intelligent, alert interested, and agreeable. She is to have a good
> memory, keep confidences, be a mind reader, show no prejudices except loyalty
> to the firm and immediate employer, and be smartly dressed and well groomed at

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[12] Irene Place and Madeline S. Strony, *The Road to Secretarial Success* (New York
City, NY: McGraw-Hill Book Company, Inc., 1954): 4.

MAKES YOUR SECRETARY TWICE AS VALUABLE!

THE time the Audograph saves your secretary from routine dictation leaves her free to be a much more valuable executive assistant to you. You'll find that like you, she *will* really enjoy using the Audograph — and you know how much better she works when she *likes* what she's doing.

With the Audograph everything's *just* as she likes it. Listening devices, for instance. She has seven types to choose from and none of them muss her hair. She hears perfectly. She can type much faster and more accurately because corrections and end signals show up on the exclusive Illuminated Index. She gets more done, more easily. Think over *all* of Audograph's advantages — *and decide to see it without delay!*

Figure 7: Product brochure featuring an Audograph advertisement aimed at the dictator but picturing the secretary, c. 1954, from the Governor Clement Papers, Tennessee State Library and Archives, Nashville, TN.

all times. No wonder a top-notch secretary is referred to as one of the greatest nonmechanical wonders of the twentieth-century![13]

"Nonmechanical wonders" seemed a most accurate portrayal of a secretary. But with its and similar other machines' introduction to the communications market, the Audograph dictation machine mechanized at least one aspect of the secretary's job.

Before offices used the Audograph and other similar machines, dictation involved a direct transaction between a dictator and a secretary, in which the dictator spoke and the secretary took notes for later transcription. Dictation involved its own set of instruction for secretarial behavior and action.[14] Secretaries were required to have pencils and notepaper at their desk, and sometimes strategically hidden in the dictator's office, so that they could be used at a moment's notice. When note-taking, a secretary sat facing the dictator in order to hear the speaker clearly, and knew that she must never look annoyed or irritated at the information the dictator presented or with the dictator himself. The secretary listened and did not interrupt for any reason because she reserved questions of spelling, phrasing, or pertinence of information for the end of the session or individual document. Secretarial textbooks instructed that the secretary should know the dictator's habitual tendencies and voice speed in order to promote consistency in note-taking. After a dictation session ended, the secretary transcribed her notes as soon as she was able, and accurately and effectively proofread. She made judicious choices for grammar and punctuation, and read ahead in her notes to avoid mistakes. Finally, after transcription a

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[13] Ibid.

[14] Information in this paragraph comes from a number of textbook sources over the 1950s, 1960s, and 1970s. See bibliography.

secretary filed both a copy of the transcription and the used notepaper. The goal in this process was efficiency, and dictators expected secretaries to execute their tasks quickly, correctly, and with discretion.

Secretaries traditionally accomplished the dictation process through a note-taking method called shorthand. Shorthand comprised a major area of study for the aspiring secretary, and, aside from behavioral studies and record-keeping, constituted a large portion of instruction. Schools and training programs published vast quantities of textbooks and practice books for the art of shorthand. By definition, it was a method by which secretaries could take notes quickly by using writing symbols and markings that represented sounds or short phrases. Though it seems akin to stenography, shorthand differed in a couple ways. First, shorthand involved handwritten notes whereas stenographers generally keyed dictation on a machine. And second, shorthand, in comparison to stenography, had a slightly slower response time to the dictator.[15] In essence, shorthand was the singular step between the dictator's spoken thoughts and orders, and the secretary's production of a hard copy document.

As explained by Lucy Mae Jennings in her 1978 guide to secretarial work, "a large portion of the secretary's role centers around assisting the executive in the communication aspect of his or her position…[and] the secretary frequently provides the communication link between people and machines."[16] But the dynamic of dictation

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[15] Wallace B. Bowman and Mary Ellen Oliverio, *Shorthand Dictation Studies*, 3rd edition (Cincinnati, OH: South-Western Publishing Company, 1961).

[16] Lucy Mae Jennings, *Secretarial and Administrative Procedures* (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1978), 5.

Figure 8: Secretary organizes and takes notes while the dictator records a phone conversation on the Gray PhonAudograph. Photograph printed in *Effective Secretarial Practices: A Collegiate Textbook for Training of Secretaries and A Handbook for Practicing Secretaries*, by Esther Kihn Beamer, J. Marshall Hanna, and Estelle L. Popham, published in 1956 in Cincinnati, Ohio by South-Western Publishing Company.

sessions dramatically changed with the introduction of the Audograph and similar dictation machines (figure 8). The most obvious aspect of the sessions that dictation machines affected was shorthand. The frequency of shorthand use in a face-to-face transaction with a dictator slowly dropped. And transcription specifically no longer referred solely to the typing of handwritten notes. Secretarial instruction and practice books slowly redefined transcription. Conceptually, it expanded from typing previously written shorthand notes, to include typing a document straight from the dictator via audio recording. This is not to say that shorthand dictation sessions stopped altogether. Norma Curchack and Patricia A. Parzych, authors of the 1977 book *Secretarial Training for the Changing Office*, observed, "Despite the fact that the end of the need for handwritten shorthand has often been forecast, the ability to write expert shorthand at high speeds and to transcribe it perfectly seems to command the highest respect and the greatest monetary reward from many employees."[17] In a 1983 secretary's handbook, authors Lillian Dorris and Besse May Miller concurred, "Although many managers dictate by machine, and some write out their letters in longhand, most secretaries must be prepared to take dictation at least on certain occasions."[18] It is apparent from textbooks two and three decades after the rise of dictation machines that shorthand expertise was still a valuable skill for secretaries and a commodity for the dictator.

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[17] Norma Churchack and Patricia A. Parzych, *Secretarial Training for the Changing Office* (New York City, NY: Harcourt Brace Jovanovich, 1977), 81.

[18] Lillian Dorris and Besse May Miller, revised by Mary A. DeVries, *Complete Secretary's Handbook*, 5th edition (Englewood Cliffs, NJ: Prentice Hall, Inc., 1983), 94.
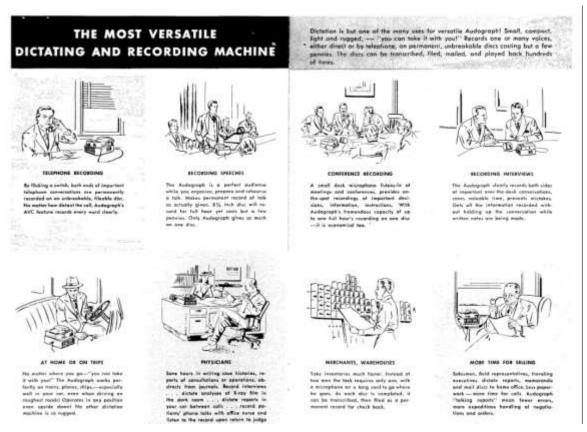
Figure 9: Product brochure from the Gray Manufacturing Company, demonstrating the mobility of the portable Audograph, c. 1954, from the Governor Clement Papers, Tennessee State Library and Archives, Nashville, TN.

The decrease of shorthand dictation sessions and the reconceptualization of transcription brought to the forefront a completely new situation for the relationship between the dictator and the secretary, caused by the absence of in-person transactions. Dictators became marginally less dependent on the presence of secretaries because dictation could take place inside and outside the office (figure 9). In a 1978 textbook titled *Machine Transcription and Dictation*, editors Joyce Kupsh, Donna Anderson, Lois Meyer, and Ruth Moyer observed, "Portable [dictation] units offer a convenient method for traveling executives to handle dictation; in fact, they are more convenient than the telephone since they can be used while driving or flying, or at any time a thought needs to be recorded for future reference."[19] The Gray Manufacturing Company emphasized this aspect of mobility for the dictator in product brochures and advertisements. In particular, Gray capitalized on the idea that the recording discs were small and durable enough to be mailed. The discs and other recording media created an indirect transaction between the dictator and the secretary. Before the prolific use of portable machines, dictators and secretaries interacted directly. The ability to easily record audio removed the secretary from the dictator. With this technology, the secretary's place in dictation moved behind-the-scenes.

The removal of the secretary from the dictator heightened her role in other aspects of secretarial duties. In particular, a secretary's job as a records manager expanded. The creation of a hard copy audio recording—the Audograph discs—involved a new level of trust and discretion. The secretary's increased awareness of private or secret information

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[19] Joyce Kupsh, Donna Anderson, Lois Meyer, and Ruth Moyer, *Machine Transcription and Dictation* (New York City, NY: John Wiley & Sons, 1978), 89.

can be attributed to the creation of an informal record before the official document came

to fruition through transcription. The machine recordings involved the creation of

records other than the final work product, posing a security risk to the information given

by the dictator to the secretary for transcription.

Besides the heightened security awareness, secretaries acquired new types of

records to file for protection and future reference. The Gray Audograph produced two

work products: the disc, as described above, and the index strip. However, Gray

developed a method by which secretaries could identify an individual disc, the content on

it, and the length of the recording. The information came by way of a paper record called

an index strip, which the machine produced simultaneously with the disc (figure 10). The

index strip, which Gray described as a "connecting link between the dictator and the

secretary," was inserted on the front of the Audograph machine and moved sideways as

the machine recorded.[20] During dictation, the dictator indicated on the index strip all

information needed by the secretary to transcribe the disc. M. Fred Tidwell, author of *A

Training Course for the Audograph Secretary*, explained the index strip thusly:

> You will notice a series of holes punched along its entire length with numbers
> beginning with zero and extending to 30. These numbers indicate the actual
> recording time in terms of minutes. When you add a zero to these numbers, you
> have the estimated number of lines typing.
>
> Directly below these numbers you will see a single black line extending the entire
> length of the strip. Perforations above the line signify the completion of a letter, a
> memorandum, or some other form of dictation. Perforations below the line
> indicated change of thoughts, instructions, or corrections. You will have as many
> separate items as there are holes punched above the black line.[21]

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[20] Tidwell, 17.

[21] Ibid, 17-18.

Secretaries not only transcribed the information on the disc according to the index strip

information, upon finishing their transcription, they also wrote the information on a

sleeve in which the disc was kept for storage (figure 11). With the appropriate

information, the Audograph discs could be stored and retrieved by secretaries with ease.

In addition to extended records management duties, secretaries had a new task.

They became product researchers and advocates for office equipment. This was evident

in both Audograph product brochures and advertisements, and in secretaries'

instructional texts (figure 12). One such text from 1970, *The Administrative Secretary:*

Resource, stated, "Dictating and transcribing machines differ in size, function, and

recording medium. If she has a choice, the secretary selects the equipment that will best

suit her needs and those of her employer, taking into consideration any budgetary

restrictions."[22] This statement in part acknowledged that secretaries were responsible for

steering the executive towards a product, dependent in some part on the secretary's

preference. Other instructional texts, like *The Professional Secretary from A to $*,

published in 1974, observed, in reference to the recording units, "you [secretary] may

have to demonstrate their [machines] effective use to them [executives]…but most of the

time these components are out of your province and out of your sight…."[23] This text

suggested that secretaries not only chose products, but also tutored the dictators in how to

run the dictation machines. Other texts made it clear that secretaries were also responsible

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[22] Ruth I. Anderson, Dorothy E. Lee, Allien A. Russon, Jacquelyn A. Wentzell, and Helen M.S. Horack, *The Administrative Secretary: Resource* (New York: McGraw-Hill Book Company, 1970), 174.

[23] *The Professional Secretary from A to $* (Cranford, NJ: Didactic Systems, 1974), 123.

Figure 10: Index strip inserted into the Audograph machine. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives in Nashville, TN.

Figure 11: Disc Sleeve from a Tennessee State Legislature joint convention at which Senator John F. Kennedy spoke. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

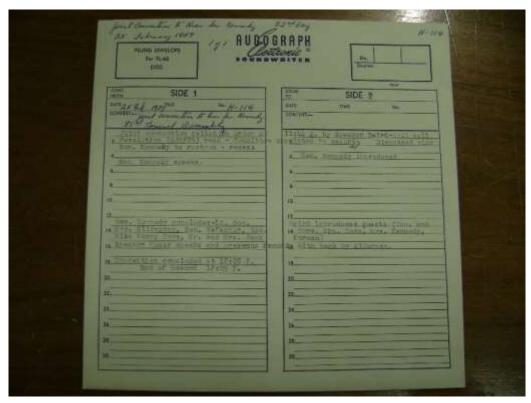Figure 12: Product brochure from the Gray Manufacturing Company, featuring executives and secretaries discussing the Audograph's attributes. C. 1954, from the Governor Clement Papers, Tennessee State Library and Archives, Nashville, TN.

for machine repairs. It can be assumed that because of their working relationships with executives, their understanding of office financial accounts, and their knowledge of the mechanics and politics of the office setting, secretaries were in a prime position to suggest and advise on new technology.

The shift in the secretarial culture regarding technology and its impact on daily tasks and professional relationships was perhaps most evident in the materials with which secretaries were educated. A survey of approximately thirty-five textbooks, guides, and other instructional materials from the 1950s, 1960s, 1970s, and 1980s, reveals that discussion concerning new technology, and specifically portable dictation machines like the Gray Audograph, slowly penetrated and altered traditional methods for secretarial duties.[24] In the 1950s text, five years after Gray started production on the Audograph in 1945, there was some discussion of dictation machines, but most of it focused on traditional studies on behavior and shorthand dictation and transcription techniques. Discussion of electronic machines seemed limited to statements that secretaries must learn to operate them. The 1960s texts still emphasized traditional techniques. However, there began to be a greater conversation about the advantages of dictation machines in the work place, particularly as a timesaver for secretaries. The 1970s texts indicate that businesses had fully integrated dictation machines into the daily routines. By this time, and by the time Gray stopped production in 1976, professionals had developed new techniques for dictation and transcription to meet the electronic need. Publications

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[24] For a good example that discusses new developments in technology from the perspective of changing education, see "New Methods of Training in the Business School," which discussed new developments in technology from the perspective of changing education. Found in *The Secretary*, Vol. 18 (June 1958), 13.

included more discussion on the problems of dictation devices, such as the weak or

garbled sound and, sometimes, difficulty in judging the length of the recording. By the

late 1980s, the dialogue included traditional secretarial methods, electronic age secretarial

methods, and the rise of personal computers and more sophisticated word processors. The

texts of the 1980s also engaged in arguments about whether the machine or the secretary

was better suited for dictation. Auren Uris, author of *Mastering the Art of Dictation*

(published in 1980), observed, "For the foreseeable future, people will be dictating to

both stenographers [and secretaries] and dictating machines. The trend is clear—the use

of word processing systems is proliferating, and by comparison, the relative number of

professional stenographers is declining…Neither is better, each has advantages and

disadvantages."[25]

Secretarial culture shifted according to new technology. That the Gray Audograph

and similar portable dictation machines were largely responsible for changes in daily

tasks, professional relationships, and education over a four decade period is easily

comprehended when one takes into consideration that communication comprised a great

portion of secretaries' occupation. But the Gray Audograph was not only representative

of the changing environment in which office secretaries and executives operated, it was

an example of the evolution of record-making. The Gray Audograph dictation machine

was a testament to the need for diligence in maintaining records and the daily creation of

information.

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[25] Auren Uris, *Mastering the Art of Dictation* (Houston, TX: Gulf Publishing
Company, 1980), 68.

A significant example of this evolution in record-making was the Tennessee

General Assembly's recording program. Before the use of audio-recording machines, the

state's legislature, much like secretaries in an office setting, relied on notes written by

clerks to record sessions of the General Assembly. According to Greg Yates, the

Coordinator of Legislative Recordings at the Tennessee State Library and Archives

(TSLA), legislative meetings were originally recorded in temporary journals. In these

temporary journals, a recorder noted new actions and business of the Tennessee State

Senate and House of Representatives. Eventually, the temporary journals were published

for long-term records-keeping and TSLA kept the originals. This method of

documentation completely changed with the introduction of dictation machines.

The staff at TSLA made the case for audio-recordings of the Tennessee State

Legislature in 1954. Now an advocate of the new technology's use in the state

government, such as the office secretary to the executive, TSLA became responsible for

finding a sound-capturing machine that exhibited reliability, permanence, ease of use,

cost effectiveness, and could produce a clear and accurate recording.[26] Yates noted that

TSLA had previously, for one year in the early 1950s, utilized the Edison Voicewriter to

record sessions of the legislature. Much like the Gray Audograph, the Edison Voicewriter

recorded on discs which could be easily and permanently stored. However, TSLA did not

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[26] For a detailed description of machine requirements, see Memorandum from William T. Alderson, William L. Daniels, and James E. Pike to Dr. Dan M. Robison, Subject: Report and recommendations on equipment for recording the sessions of the Tennessee General Assembly, and for other purposes, December 13, 1954, Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, Nashville, TN.

continue its experimental use.[27] In 1954, when talk of recording the state legislature

resurfaced, an in-depth discussion of the best choice of recording media ensued.

As previously stated, the state government and TSLA (like any other business)

required the recording system used for the legislature to exhibit certain qualities:

reliability, permanence, usability, and economy. In a discussion of recording media, John

H. DeWitt, then president of the famous Nashville country radio station WSM

Incorporated, advised in a letter to Tennessee State Librarian Dr. Daniel Robison:

> that magnetic tape recording would not be the most economical method and in
> addition presents some question of permanence…that a machine similar to the
> ones used for business dictation would not only be less expensive, but a more
> satisfactory solution to the problem. I understand from Mr. Quarles that the state
> has arranged to place microphones on the legislators' desks in orders that each
> one may be heard over the public address system. Since a system of this type will
> be installed it will be a simple matter to attach to it a recording machine which
> could be run by one of the secretaries which in turn would obviate the necessity of
> having a recording expert.[28]

DeWitt went on to suggest that the state government consider the Gray Audograph and

the Dictaphone. Although Dictaphone was indeed considered, evidence suggests that the

two major competing companies for the job were the Gray Manufacturing Company and

Edison.[29]

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[27] Staff at TSLA did not know why it was discontinued, only that it was experimental.

[28] John H. DeWitt, Jr. to Dr. Daniel Robison, Nashville, October, 6, 1954, in Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, TN. TSLA also considered wire recorders and tape recorders, For more information about the recording media considered and their advantages and disadvantages, see Memorandum from William T. Alderson, William L. Daniels, and James E. Pike to Dr. Dan M. Robison, Subject: Report and recommendations on equipment for recording the sessions of the Tennessee General Assembly, and for other purposes, December 13, 1954, Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, Nashville, TN.

When compared side-by-side, it seemed the Gray Audograph outperformed the Edison Voicewriter by far in terms of reliability and usability.[30] The Audograph ranked higher than the Voicewriter for portability, simplicity of operation, assembly, power for recording at a distance, access for repairs, and ruggedness of materials. It also scored higher for the recording length of a disc (thirty minutes in comparison to the Voicewriter's fifteen), voice quality of the recording, and constant groove velocity. The Audograph also had automatic switchover between units at the conclusion of a disc, whereas the Voicewriter was a manual. Overall, TSLA deemed the Gray Audograph best for "suitability for conference recording" and "suitability for legislative recording."[31]

By December of 1954, an official recommendation for two Gray Audograph Dual Monitoring Recorder units, with dictation-transcriber capabilities in both units, was given to Dr. Dan M. Robison, then Director of TSLA.[32] And in January of 1955, both the Tennessee State Senate and House of Representative passed joint resolutions that enacted the use of devices for the permanent recording of state legislature proceedings.[33] The

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[29] Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, Nashville, TN.

[30] "Comparison Sheet," Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, Nashville, TN.

[31] Ibid.

[32] Memorandum from William T. Alderson, William L. Daniels, and James E. Pike to Dr. Dan M. Robison, Subject: Report and recommendations on equipment for recording the sessions of the Tennessee General Assembly, and for other purposes, December 13, 1954, Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, Nashville, TN.

[33] House Resolution 24 and Senate Resolution 6, Record Group 34, Box 1, Folder 12, Tennessee State Library and Archives, Nashville, TN.

Tennessee State Legislature's transition from written journals to the use of the Gray Audograph serves as a momentous example for the evolution of records-creation for two reasons. First, it provides a framework with which the dictation machines could be measured technologically, especially concerning novelty and use of materials, and the scientific process of capturing sound for a price which rendered the machine extremely accessible. And second, it provides a framework by which the growth of records management could be measured. Was the new sound-capturing technology reliable and permanent? Tennessee state government, and many businesses, believed it was.

CHAPTER III

FOUNDING THE LEGISLATIE RECORDING PROGRAM AND CONFRONTING
NEW PROBLEMS OF RECORD-KEEPING

The establishment of a legislative recording program for the Tennessee

government showed a sense of heightened historical and political awareness. From the

institution of the recording program in 1955 and over the next decades, TSLA witnessed

an increase in the use of the legislative records. According to TSLA staff member Vince

McGrath, from the 1950s through the mid-1980s, patrons mostly consisted of legal staff

and legislators looking for political intent in the record, to which legislative historians at

TSLA would generally only give the recordings for the third and final readings of bills

and their amendments. But at the end of the 1970s and more consistently through the

1980s, TSLA began to record committee meetings in addition to floor sessions.

Typically, committees invited TSLA to record meetings, but by 1987, all committee

meetings were regularly recorded.[1] Committee meetings offered more discussion on bills

than floor sessions. Sporadically through the 1990s, TSLA began to record subcommittee

meetings, which added another layer of debate in the legislative record. Since 2006,

TSLA has recorded every subcommittee. It is reasonable to assume that this increase in

information lent to a further influx in legislative researchers. Legal staff and legislators

still comprised the majority of patrons to utilize the legislative records, but there was also

increased interest in other government departments and private practice lawyers through

the 1980s and 1990s. TSLA now receives several research requests each day for

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[1] According to McGrath, the last committee to agree to regular recording of meetings
was the Senate Judiciary Committee.

legislative history. The influx in patronage seems to coincide both with the increase of

information and with technological changes that made capturing audio records easier. In

order to keep up with the demand, and fulfill its mission to serve the Tennessee

government and citizens "by acquiring, organizing, preserving, and making accessible

public and historical records and other resources," TSLA adapted to suit the needs of

both the researchers and the collection.

The Tennessee State Library and Archives' recording program for the State

Legislature serves as an example of the successful use of record-making equipment, and

the difficulties and opportunities which arise when that machinery is surpassed by newer

technology. TSLA acknowledges, "The recordings of the legislature mean little to the

public unless the product is conveniently accessible to the researcher."[2] Accessibility can

only be achieved through availability of resources and the preservation of material. The

following examines the establishment of the program and the trials TSLA faced as it

worked to promote better, more accessible methods of recordkeeping within the

Tennessee General Assembly.

PROGRAM BEGINNING AND GROWTH

The search for a consistent recording system began in the early 1950s. In 1951,

TSLA recorded sessions of the General Assembly on the Edison Voicewriter – a rented

device which recorded sound to a red plastic "Diamond" disc. The Edison was run by

private firm, Aubrey Epps Calculating and Office Service, under the direct supervision of

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[2] Greg Parsons to Ken Fieth, Subject: Information for Dr. Gleaves, February 17, 1986, Folder "History of Program – 1988" courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

TSLA.[3] The use of the Edison was experimental on the part of TSLA.[4] In general, these recordings yielded poor results. Poor acoustics in the House and Senate Chambers and scattered microphones produced recordings of irregular quality.[5] Excess noise in the chambers was captured on the recordings.

A new public address system was installed in the legislative chambers in 1954 under the direction of the Tennessee Legislative Council. The new system drastically improved upon the previous Edison equipment. It included microphones at the desk of every senator and house representative. These microphones could be turned on and off via a control panel when members of the General Assembly spoke on the floor.[6] It also included outlets into which a recording device could be plugged.[7] The ability to turn the individual microphones off and on eliminated extra sound in the chambers during recording.

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[3] Report written by Aubrey Epps Calculating and Office Service, September 21, 1951, Folder "History of Program – 1988," courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

[4] Letter from Greg Parsons to Ken Fieth, February 17, 1986, Folder "History of Program – 1988," courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

[5] "A recording program: TSLA's recording, history services," *Archivist*, Society of Tennessee Archivists.

[6] Ibid.

[7] "Legislative Recording by the Tennessee Archives," *American Archivist*, Society of American Archivists (Vol. 19 no. 1, January 1956), 12.

The Council began discussion of a more permanent recording system late in 1954, and

> feeling that the recording of legislative proceedings was properly a function of State government rather than a private firm, called on the State Librarian and Archivist to investigate various methods of recording and to make recommendations on types of equipment and procedures which could be used to record the legislative proceedings. If this recording was to be done by the State, it was felt that it would properly be a regular function of the State Archives.[8]

The result of the State Librarian and Archivist's research on equipment that exhibited reliability, permanence, ease of use and cost effectiveness, and yielding clear and accurate recording, was the dual unit Audograph system described in the previous chapter. The road to this decision, however, did not wholly consist of the machine's qualities. TSLA had to justify the need for a permanent system of recording and the need to consistently record every meeting and debate, rather than just special sessions. What preceded the Senate and House resolutions to record sessions of the General Assembly was a dialogue concerning purpose, importance, and legal restrictions of use.

The most basic reason for recording the General Assembly was recalled by TSLA Senior Archivist William T. Alderson in a two-year report (1955-1957). He stated, "…it was our feeling that we ought to use our equipment between sessions to record events that might be important to future historians."[9] He reported that in two years, April 1955 – March 1957, TSLA recorded while the General Assembly was in session, and in between sessions they recorded Democratic and Republican conventions and special hearings

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[8] Ibid, 13.

[9] William T. Alderson, "Report on the Archives Sound Recording Project," Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

ranging on a wide variety of topics such as different commissions and administrations, employment, courts, transportation, and education.[10] In more specific terms, archivists wanted to capture the debate between the decisions. The stenographer journals in previous years recorded only the product of the debates: the resolutions of the General Assembly and the number of yeas and nays. This left much to be desired for future researchers. In a 1986 letter explaining the purpose of recording, TSLA legislature recorder and then coordinator of the Legislature Recording Program, Greg Parsons stated, "The purpose of the Program is to maintain a permanent record of Legislative proceedings, including House and Senate Floor debates and standing committees as well as subcommittees, study committees, etc. These records are to be open to the public for study and research."[11] Recording the sessions and meetings in between captured the discussions and opinions of individuals, leaving no question or postulation in the mind of a researcher as to the intent and interest of Assembly members. The ability to recall exact phrases and opinions of individuals in the legislature implies that the government is not a cut and dry law-making machine, rather a forum of discussion.

In late 1954, upon TSLA establishing the mission of recording, the General Assembly, particularly the Speaker of the House James L. Bomar, asked State Librarian

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[10] Ibid, 1-2. More specifically, Alderson mentions Financing the Game and Fish Commission; Administration of the Workman's Compensation Law; Merit System, Job Classification and Pay Scales in State Government; District Juvenile and Family Courts; Forestry and Forest Fire Council; Aviation; Segregation and Treatment of Sex Offenders; and the Tennessee White House Conference on Education.

[11] Greg Parsons to Ken Fieth, Subject: Information for Dr. Gleaves, February 17, 1986, Folder "History of Program – 1988" courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

and Archivist Dan M. Robison to research the use and restrictions of verbatim recording

in other states.[12] Robison found in a "bulletin on 'Legislative Broadcasting and

Recording' issued by the Illinois Legislative Council in 1952, six states besides

Tennessee were listed as keeping a full record of their 1951 legislative proceedings,

either by stenographic reports or by electrical recording."[13] He sent letters to those six

states – Connecticut, Maine, New York, North Dakota, Pennsylvania, and West Virginia

– in an effort to learn how they recorded their respective legislatures and how they

restricted the use of the records. In each letter, Robison referenced the bulletin from

Illinois, and asked three questions:

1. Are there restrictions on the use of such records either during or after the
   legislative session?

2. To whom is delegated the authority to say how they may be used, especially
   when the legislature is not in session?

3. Is there a time limit beyond which all restrictions are removed?[14]

Ultimately, in asking these questions Robison hoped to understand how the states

protected General Assembly members from irresponsible use of the records and prepared

the records for research.

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[12] Dan M. Robison to James L. Bomar, December 7, 1954, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

[13] Ibid, Attachment No. 1.

[14] Dan M. Robison to librarians and archivists of Connecticut, Maine, New York, North Dakota, Pennsylvania, and West Virginia, November 24, 1954, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

Within a month of sending the letters, Robison received replies from five of the six states. Connecticut, North Dakota, and West Virginia used stenography or shorthand to record their legislature meetings. Connecticut kept transcribed copies of the stenographic records in the State Library without restriction of use with the exception that they may not be removed from the library. North Dakota stated that their stenographic records were kept but not formally published unless the floor requested to publish part of a debate in the journals. Their records also had no restrictions on use. West Virginia used stenographic records and tape recordings primarily to prepare the formal journals, with transcriptions preserved in the House of Representatives. Their records were released upon the request of the delegate who spoke and only then with the approval of the rules committee. Maine also used tape recordings and stipulated that the recordings were used by legislature reporters to supplement their shorthand notes. They also mentioned that the matter of restricted use had not risen and therefore had not been discussed. From Pennsylvania, Robison received a referral from the State Librarian to the Official Reporter of the House of Representatives, from whom he never received a reply. In addition to Pennsylvania, New York was the only other state that did not respond.[15] From these responses, Robison concluded in a letter to Speaker Bomar in December 1954 that those states had not settled on any one policy of restricted use.[16] It appeared that if they were to continue to establish a permanent policy on recording the General Assembly

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[15] Dan M. Robison to James L. Bomar, December 7, 1954, Attachment No. 1, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

[16] Dan M. Robison to James L. Bomar, December 7, 1954, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

electronically and the future use of those records, Tennessee would be the first state to do so.

In the same letter to Speaker Bomar, Robison outlined five suggestions for the restricted of use of Legislature recordings.[17] First, he considered that during the legislative session, the archives staff could play back recordings to members of the house upon their request or to any citizen who the Speaker of either house gave written permission. Recordings could not be transcribed without written permission from both the Speaker of the respective house and the delegate whose speech would be transcribed. Second, Robison suggested that after the legislative session ended, archives staff could play back recordings to both houses and any citizen who had written permission from the Secretary of State, who acted as Executive Director of the Legislative Council. Restrictions on transcription were the same as during the legislative session, with the exception that written permission would come from the Secretary of State rather than the Speaker of either house. Robison's third suggestion was exceptions to the first two restrictions. Members of the Legislature could, without written permission, have his own words transcribed. And, with the written permission of the Speaker or Secretary of State, a member's words could be transcribed upon his death. Fourth, Robison suggested a time limitation on restrictions. The records would be considered as having research value only after a set period of years, at which time they would become public and accessible without restriction except those imposed by the archives for safekeeping.[18] And finally,

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[17] Ibid, Attachment No. 2.

[18] Ibid. He suggested 6, 8, 10, 15, or 20 years, but there is no indication of a definite decision on a timeframe.

Robison proposed that those wanting a sound or written transcription of the recording would pay a fee which would represent the cost to the state for making such transcription. These five suggestions were written into House Joint Resolution No. 24.

Senate Joint Resolution No. 6 and House Joint Resolution No. 24 enacted the use of recording devices to record the General Assembly.[19] Senate Joint Resolution No. 6 first recognized the modern practice of using audio recording devices, the importance of an official record of proceedings and benefit of the recordings for research, and the State Archivist as the keeper of State records. It then authorized, with the concurrence of the House of Representatives, the State Archivist and TSLA staff to record the proceedings of the Assembly and allow for the storage, withdrawal, use, and distribution of the records discriminately according to restrictive regulations. Further, those restrictions would be determined and reported to the General Assembly by a committee comprised of two senators and three house representative in conference with the State Archivist.

House Joint Resolution No. 24 concurred with Senate Joint Resolution No. 6, and described in detail the restrictions set forth by the committee. The restrictions were those suggested by Robison, with minor alterations: all written permissions would come from the Speaker of the house from which the recording originated; should an Assembly member die, written permission must also come from the deceased executor, administrator, personal representative, or close relative; and the time limitation was set to fifteen years. However, in a 1965 letter to the Speaker of the Senate, Jared Maddux, State

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[19] Tennessee General Assembly, Senate Joint Resolution No. 6 (Nashville, January 6, 1955) and House Joint Resolution No. 24 (Nashville, 1955), Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

Librarian and Archivist Sam B. Smith stated, "…this resolution [House Joint Resolution No. 24] passed both bodies but was not signed by the Governor: thus, the full procedure of this resolution was never implemented."[20] Over that ten year period, unwritten rules evolved that TSLA followed regarding the General Assembly recordings. The result was two simple rules. The first did not require permission from the Assembly for persons wanting to listen to or take short notes on the recordings. The second required permission from the Speaker of the house from which the recording came, and sometimes permission of the member who spoke, for persons wanting a verbatim transcription, whether in writing or on sound records.

Resolutions No. 6 and No. 24 do not appear to have changed much in the twenty years following their passing. However, in 1972, a TSLA staff member Cleo Hughes wrote a memorandum suggesting amendments to Senate Joint Resolution No. 6.[21] Besides some semantics in phrasing, Hughes suggested three important changes. The most obvious amendment was the insertion of the restrictive regulations in House Joint Resolution No. 24 into Senate Joint Resolution No. 6. The restrictions were not those which Robison specified, nor those which were written into Resolution No. 24. Rather, they were a reflection of those use regulations, but seemed indicative of the evolution of

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[20] Sam B. Smith to Jared Maddux, February 8, 1965. Note: Resolutions generally are formal expression of the opinions and wishes of the General Assembly and do not require the approval of the Governor. Joint resolutions require the approval of both houses and after approval must be filed with the Secretary of State. See the Tennessee government website for a full description of the process by which resolutions are adopted by the general assembly: http://www.capitol.tn.gov/about/billtolaw.html

[21] Memorandum from Cleo Hughes to Katheryn Culbertson, December13, 1972, Folder "History of Program -1988," courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

the unwritten rules mentioned by Smith. Nevertheless, they still described procedures for transcriptions and the responsibilities of recorders and transcribers. The merging of the Resolutions was intended to notify the Assembly that there were actually set rules for the recordings and their use. Second, Hughes proposed a change to second statement of Resolution No. 6, "Whereas, it is important that an official record of the proceedings of the Senate and the House be made for the protection of its members and the benefit of the students and other persons interested in the field of history and government…."[22] He dropped the "student" and "history" to imply that the records would be open to all interested researchers.[23] And finally, and perhaps most importantly, Hughes added a new opening statement. He proposed adding "Whereas, Tennessee is distinguished by pioneering in the field of legislative sound recording, being the first state to formally sound record its own proceedings for permanent preservation…" in order to be more informative and appeal to "lingering frontier spirit."[24]

Smith's statement recognizing Tennessee's achievements in recordkeeping seemed to confirm Robison's observation eighteen years before concerning the six states which Robison consulted. If those states had set procedures for recording their legislatures, they were not nearly of the capacity of those of Tennessee. The government

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[22] Tennessee General Assembly, Senate Joint Resolution No. 6 (Nashville, January 6, 1955), Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

[23] Memorandum from Cleo Hughes to Katheryn Culbertson, December13, 1972, Folder "History of Program -1988," courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

[24] Ibid.

of Tennessee and TSLA received widespread recognition in the archival community,

particularly stemming from a 1956 article in *The American Archivist*, a publication of the

Society of American Archivists (SAA), titled "Legislative Recording by the Tennessee

Archives," written by William T. Alderson.[25] The article explained why TSLA decided to

start the recording project and the process by which they chose the Audograph as

recording equipment and installed it. Of the article Robison wrote to the Tennessee

General Assembly, "It is appropriate that the project should receive this nationwide

publicity, since Tennessee has the distinction of being the first state in the Nation to make

such recordings for permanent preservation."[26]

The article, detailing the success of the recording project, indeed reached other

institutions. The State Archivist of Utah, Everett L. Cooley, referenced the article and a

financial report to the Tennessee State Library and Archives Commission in a letter to

Robison the month after the SAA published the article. Cooley and the Utah State

Historical Society were interested in using audio equipment to record the Utah General

Assembly.[27] The article also appears to have reached and affected Vermont, which was

given reference in William T. Alderson's 1957 "Report on the Archives Sound Recording

Project."[28] In another instance, about a year after the article's publication, Robison

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[25] "Legislative Recording by the Tennessee Archives."

[26] Dan M. Robison to the Tennessee General Assembly, March 5, 1956, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

[27] Everett L. Cooley to Dr. Dan M. Robison, February 7, 1956, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

[28] William T. Alderson, "Report on the Archives Sound Recording Project," Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

exchanged correspondence with the British Institute of Recorded Sound. The British Institute requested a copy of a day's recordings of Tennessee Legislature proceedings in order to better understand legislative processes.[29] Robison's enthusiasm at the idea and good will prompted him to send the recording to England free of charge. And at home in Tennessee, Alderson reported "Our program of legislative recording appears to have become an accepted procedure in the eyes of the General Assembly," with seeming satisfaction.[30]

PRESERVING ACCESS TO LEGISLATIVE RECORDS

The new Audograph system was not without flaws, and its preservation became a consistent challenge to accessibility of the records, and thereby the mission of the archive. The same 1956 article that described the state's achievements also mentioned some problems with the installation of the system. While Alderson did not go into detail with most of those issues, he did describe one instance. He noted that the new system required more energy than the electric wiring in the state capitol could produce. The wiring on many occasions became overloaded, with no control of the voltage which coursed through the Audograph machines. The problem was resolved with the purchase of voltage regulating equipment, without which the Audograph's disc would sometimes turn at abnormally low speeds. Alderson wrote, "This did not make the recording unintelligible, but did cause a rather humorous change of sonorous bass voices into

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[29] Dan M. Robison to Patrick Saul, July 31, 1957, Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, TN.

[30] William T. Alderson, "Report on the Archives Sound Recording Project," Record Group 34 Box 1 Folder 12, Tennessee State Library and Archives, Nashville, Tennessee.

Donald Duckish tenors when the disk was played back at normal speed."[31] To further correct this occurrence, independent wires were led directly into the Audograph units in 1957.

Issues with the Gray Audograph system of recording did not end in 1957 – they continue today, though in a new form: physical deterioration and obsolescence. These problems began in the mid-1970s. In 1974, TSLA decided to transition from using the Audograph to using dual-cassette tape equipment by a manufacturer called Lanier, which featured an automatic switchover much like the dual-Audograph units TSLA employed. Greg Parsons, a legislature recorder, said of the cassette equipment in 1986, "The sound quality was much improved over the Gray Audograph, and, because the new equipment is light-weight and portable, the Archives staff began recording committees in addition to the Floor Debates."[32] Two years later, in 1976, the Gray Manufacturing Company discontinued production, rendering the Gray Audograph machine and disc an obsolete medium. This was not necessarily a problem at the time because the Audograph machines owned by TSLA were in working condition. However, in the early 1980s there was a small demand for Legislature proceedings recorded on Audograph discs that exceeded TSLA's use of the machine and Gray's operation, so when TSLA began to duplicate the cassette tapes in the late 1980s as backups for the originals, they decided to duplicate the Audograph discs, too.

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[31] "Legislative Recording by the Tennessee Archives."

[32] Greg Parsons to Ken Fieth, Subject: Information for Dr. Gleaves, February 17, 1986, Folder "History of Program – 1988" courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

According to Greg Yates, the present day coordinator of Legislature recording, the duplication of the Audograph discs began with Greg Parsons in the late 1980s and continued up through the early 2000s. From 1951 to 1974 (includes both Audograph and the experimental Edison), TSLA produced 5,760 audio discs.[33] Those discs now occupy four, five-drawer filing cabinets in the TSLA stacks. The discs were copied to cassette tapes because that was the popular and most reliable recording medium at the time. TSLA keeps the originals for two reasons. First, they are kept because of basic rules of archival practice. Originals are more trustworthy and less likely to have been tampered with. They are also primary examples of business transactions, and act as a history of how institutions recorded business. Second, originals are kept as insurance. If the new medium to which a record is duplicated becomes unusable – magnetic tape, for instance, if not kept in the proper controlled environment can be prone to breakage, stretching, fading, and distortion – the original can be used again to create another duplicate. This is, of course, assuming that the original itself does not become unusable. With the duplication of the Audograph records, TSLA staff faced two separate preservation issues: the machine and the disc.

Having worked with the Audograph collection at TSLA for about twenty years, Yates maintained that preserving the machines mechanically was far more difficult than preserving the discs. TSLA currently possesses three machines, two of which are original

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[33] Ibid, 2.

Figure 13: Top Interior, featuring the motor on the right side. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

Figure 14: Bottom interior. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

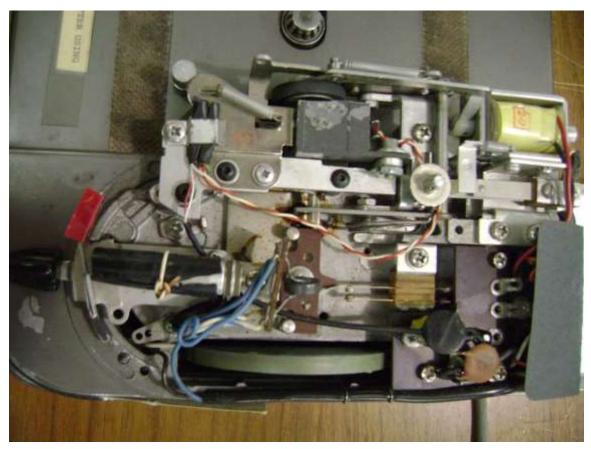Figure 15: Top of Audograph with casing around the stylus removed. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.
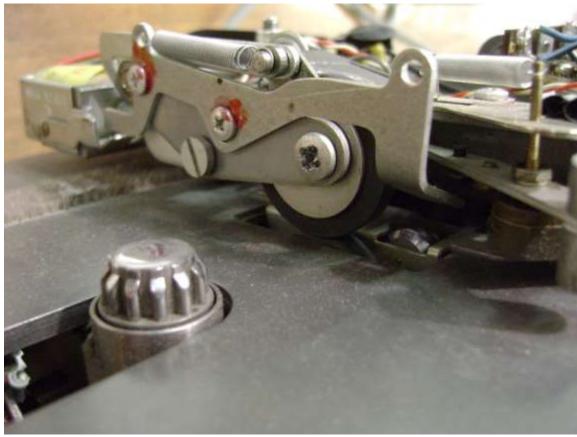
Figure 16: Close up of the star-shaped spindle and pucks. The stylus is hidden on the other side of the pucks. Photograph by Heather Adkins. Gray Audograph is property of the Tennessee State Library and Archives, Nashville, TN.

to TSLA, and at least one of which is slightly modified. As stated in the previous chapter, the unit ran on a rubber belt and motor system. Many of the parts – the tubes, the electronics – in the machine, if broken could be replaced quite easily, or else fitted with similar pieces (see figures 13 and 14). Some parts, however, like the stylus, cartridge, spindle, or just about any other moving piece would be almost impossible to replace. The Audograph was a proprietary design, meaning many of its parts were unique to the machine, so if the machine were to break, a part either would need to be replaced with the exact same piece of equipment, or some feat of ingenuity would need to take place in order to keep the unit running.

The stylus, or needle, and the system which holds the disc seems to be the most temperamental part of the machine (see figures 15 and 16). Mary Lynn Ritzenthaler wrote in *Preserving Archives & Manuscripts*, "Because of differences in stylus, construction, and recording grooves, modern equipment is often unable to reproduce sounds from older recordings accurately…damage during playback is also a real possibility if needles are too sharp or accidentally skid across the grooved surface."[34] The size of stylus was unique to the Audograph machine, as was the star-shaped spindle design. The stylus, though hard to find, is not irreplaceable. It is more a matter of finding the correct size and cartridge to fit the machine and disc. As previously stated, TSLA has at least one modified unit. That unit contains a phonograph stylus rather than an original Audograph stylus. The recording and playback system is unlike a phonograph or turntable, in that the disc moves rather than the arm holding the stylus and cartridge. An

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[34] Mary Lynn Ritzenthaler, *Preserving Archives & Manuscripts* (Chicago, IL: Society of American Archivists, 2010), 169.

Audograph disc sits mounted on the spindle, and is gripped by two rubber wheels called pucks, one below and one on top of the disc directly contacting it. The pucks sit next to the stylus, which never moves. The pucks turn the disc and the disc winds from the inside to the outside, and as it does so, the spindle slides horizontally in a slot away from the stylus. This manner of recording and playback makes it nearly impossible to play Audograph discs on other machines.

The center to outside playback is supposed to keep the recording surface moving at a constant linear velocity under the stylus. However, the recording and playback from inside to out actually causes an Audograph disc's rotation speed to steadily and constantly decrease. From the center, a disc starts at about seventeen revolutions per minute (rpm). By the middle of the disc, it slows to fifteen rpm, and when it reaches the outside it is at about thirteen rpm. This is another reason why Audograph discs cannot be played on other recording machines. Other units which play from the outside and move inward cannot maintain the correct speed without constant monitoring, if at all.

The Audograph discs are easy to maintain under the right circumstances, but "like all composite materials, discs are subject to physical and chemicals stresses and instability."[35] There is some disagreement as to whether the discs are embossed or cut.[36] Both methods of analog recording degrade differently. Cutting, popularly used on heavier

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[35] Ibid.

[36] Greg Yates, coordinator of Legislature recording at the Tennessee State Library and Archives in Nashville, TN maintains the discs are cut while recording. Martin Fisher, Curator of Recorded Media at the Center for Popular Music in Murfreesboro, TN maintains that the Audograph discs, like the Edison discs, were embossed. Fisher processed the 1951 Edison discs during his one year tenure at the Tennessee State Library and Archives. Online resources have varied and conflicting responses.

materials, involves the stylus chipping a groove along a disc. If kept in an uncontrolled environment, a cut disc could very easily break. Embossing, popularly used on softer materials, involves a slightly blunt stylus pressing a groove into a disc. If kept in an uncontrolled environment, embossed grooves can relax, resettle, and possibly even out over time. To maintain the integrity of a disc, whether embossed or cut, Ritzenthaler suggested lifting discs on the outside edges with the fingers of both hands without touching the grooved surfaces, and shelving them a vertical position without slant to avoid warping.[37] TSLA works to maintain such conditions to retain stability of the discs' physical material and the audio record on them.

Ritzenthaler further suggested, "A solution that alleviates the need to maintain a museum of playback equipment is to transfer the contents of…discs to master reel-to-reel tape, from which use copies can be made."[38] Part of Yates's job as a Legislature recorder involved duplicating records on the Audograph discs. He transferred the audio recording from the discs to another medium: cassette tape. Cassette tapes, or magnetic tape and reel-to-reel, are non-proprietary mediums. This means that while they are machine dependent for recording and playback, they are not specific to any one brand of machine. The original discs are kept in the event that a cassette becomes warped or unusable, at which point a new cassette is made.[39] The cassette use copies are easier for researchers to handle and require less staff management and equipment use. When transferring the

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[37] Ibid.

[38] Ibid. 169-170.

[39] TSLA has only used digital formats to record the Legislature or have specially requested usable copies since circa 2008.

recording from the disc to the cassette, Yates ran the sound through an equalizer and

adjusted the speed and tone to get the best and clearest sound possible.[40] Running the

sound captured on the Audograph discs through an equalizer helped him quickly create

clear audio records for research use. The emphasis on clarity and speed suggests that

TSLA highly values researcher access.

　　　Through the process of duplication, Yates transcribed the information on the

index strip that is made during the original recording and the information on the sleeve in

which the disc is stored. Similar records, typed logsheets, are kept for the cassette tapes

produced after the use of Audograph recording ended. The transcription of this brief

material, or logsheets, aids researchers in finding the information they want relatively

quickly on the cassettes, usually marking a topic change at a specific time. TSLA does

not provide transcriptions of the entirety of the recordings for three reasons. First, it

would be incredibly time consuming for staff as there are thousands of Audograph disc

recordings. Second, there is a high risk of human error in transcription, especially when

the recordings are not always completely comprehensible. And third, storage of the

transcriptions would become a problem. If the transcriptions were in paper format, there

would not be suitable place to store them in the stacks, as the TSLA constantly receives

paper records. If the transcriptions were in digital format, there would be a necessity of

maintaining a digital storage unit such as a hard drive, and, perhaps more frustrating,

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[40] There is some debate over the use of an equalizer. Martin Fisher does not use an equalizer because he claims it cuts out the highs and lows of the recording, thereby not transferring the recording in its entirety. There are some digital programs that can automatically tune sound recordings once the recording is digital, which, to some extent, should better maintain the integrity of the recording.

sustaining a useable digital format in which to open and read the transcriptions. The index strip and disc sleeve transcriptions that are duplicated remain with the cassettes for referral.

Over the two decades of duplication, despite machine maintenance and constant demand for records, the legislative recording project underwent changes. With the switch to the use of cassette tapes in 1974, there was an influx of recording. Between 1975 and 1986, cassettes totaled 13,043, with an average 896.5 generated per year.[41] Up until 1984, the archives staff recorded the Legislature on a part-time basis. However, starting in 1984, to accommodate the increasing workload, an official Legislative Recording Program was created as a separate unit.[42] The "new" program in the archives consisted of four people: Greg Parsons as coordinator and three full-time recorders. These recorders became liaisons between the General Assembly and TSLA. The transition from project to program suggests an increased awareness of and reliance on TSLA to preserve legislative records and provide access to them. This is a responsibility TSLA continues to uphold in the digital world they in which they record today.

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[41] Greg Parsons to Ken Fieth, Subject: Information for Dr. Gleaves, February 17, 1986, Folder "History of Program – 1988" courtesy of Greg Yates, Tennessee State Library and Archives, Nashville, TN.

[42] Ibid.

CHAPTER IV

DIGITAL AUDIO AND OBSOLESCENCE: OPTIONS FOR A SUSTAINABLE
FUTURE

The electronic formats common today may be unreadable by the technology of tomorrow.
-Tennessee State Library and Archives[1]

The ideas of permanence and sustainability are double-edged swords in regard to

digital records. On the one hand, digital formats offer an easy, straightforward method by

which to create an infinite number of records. From the creator-consumer's standpoint,

the usability of digital formats is ideal for business. From an archival managerial view,

digital formats are incredibly accessible. Digital records have revolutionized the way

archival institutions conduct outreach, activism, and exhibitions by engaging with

audiences at a distance and reaching people in such a way that brings historical record to

their level of understanding. Digital records also provide an outlet for self-advertisement

for archives by allowing institutions to display their collections on the internet. On the

other hand, digital formats bring a certain amount of abstraction to archival science.

Digital records are not physical entities, rather they are stored *on* physical mediums that

are subject to environmental conditions and every day wear, just as traditional analog

records are. They are also more transferable across physical mediums, making it harder to

identify and validate original records. The lack of physical form and the ease of transfer

across mediums also means digital formats are more unstable and unpredictable.

Furthermore, because digital mediums are young in the world of record-keeping, it is

difficult to accurately suppose their lifelines, much less sustainability. Digitally-born and

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[1] Tennessee State Library and Archives, "Collection Development Policy Statement,"
(September 2008 revision), 2.

digitized audio records, which represent a substantial portion of the current generation of electronic records, are therefore just as susceptible to obsolescence as their forbearers. Because of this, archival institutions have and must continue to enact policies that work to preserve and keep accessible digital audio records.

THE LEGISLATIVE RECORDING PROGRAM TODAY

The Tennessee State Library and Archives legislative recording program switched to digital recording in 2008. According to Greg Yates, Coordinator of Legislative Recording at TSLA, the change was an internal decision, like that of the move from Audograph disc to cassette tape.[2] Their decision was driven by two factors. First, cassette tape technology was becoming obsolete. The equipment was hard to find, and it was difficult to repair. Second, the sound-capturing industry itself was going digital. These two circumstances made the shift in technology unavoidable from an archival standpoint. With that said, however, TSLA still utilizes the cassette tapes on which they have already recorded several decades of the General Assembly, and makes copies using blank cassette tapes for patrons.

With the slow closing of the cassette tape market, TSLA sought for an alternative recording system. They decided to use a Digital Court Recording (DCR) software program produced by BIS Digital, Incorporated.[3] According to BIS, the DCR system is a

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[2] Greg Yates, e-mail message to Heather Adkins, October 9, 2013.

[3] Business Information Systems Digital, Incorporated was founded in 1982, and focuses in the purchase, sales, and service of digital audio and video recording equipment. They serve over 2,000 courtroom system, corporate and local businesses, hospitals, and federal, state, and local government agencies. BIS Digital, Inc., "About BIS Digital," accessed October 9, 2013. http://www.bisdigital.com/about-bis/

"PC-based, multi-channel digital audio/video recording program designed for court

recording. The DCR embeds notes directly into audio/video files on a PC hard drive and

mirrored location, bypassing analog tapes and organizing records for fast & easy

management and retrieval."[4] This system had been utilized with success by the Tennessee

Supreme Court since 2007. For TSLA, the DCR system seemed easy to record. Using

DCR software, meetings would be recorded directly to a laptop, which was connected

with an I-Mic cable to the PA system in each of the House of Representatives and Senate

rooms. TSLA has used the system successfully since its introduction five years ago.

TSLA's use of the DCR system has been a success for several reasons. The

system's integration feature allows for one "complete" file, which includes both audio

and log sheet. Up until the DCR, TSLA kept two separate records. The "complete" file,

from managerial point of view, lessens space and money needed for digital storage. The

DCR system also allows for quicker access to session and meeting recordings. Patrons,

usually legal staff, searching for intent in the official record no longer need wait for

TSLA staff to search through physical file folders and cassette tapes. A huge asset for

accessing recordings quickly in recent years has been the Tennessee General Assembly

webpage. In about 2009, the General Assembly began using a digital recording system

for the purpose of providing instant access to the proceedings for the general public on

their government website.[5] They had for several years recorded their own sessions,

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[4] BIS Digital, Inc., "DCR," Accessed October 9, 2013.
http://www.bisdigital.com/products/dcr/

[5] Greg Yates to Heather Adkins. Email: October 10, 2013. The Legislature staff uses a
Windows Media format for recording, on top of which they use a Granicus system which
allows them to tag their videos by bill number. This allows users to search the website by

committee meetings, and subcommittees meetings as a separate program from that of

TSLA.[6] The General Assembly's webpage is beneficial to TSLA staff because it provides

quick referral to dates of action and amendments for bills and resolutions. This feature is

especially helpful for General Assemblies since 2009 because it allows TSLA to direct

patrons towards an instant and free way to hear and see floor sessions and committee

meetings. However, if a patron wants their own copy of a recording, the webpage allows

TSLA staff to quickly locate a specific digital recording according to date of action,

committee, and floor session. The DCR system further aids access by allowing digital

recordings to be easily transferred from one digital storage medium to another.

AGENTS OF DETERIORATION

While digital recording is highly beneficial for access, it creates a problem for

preservation. As mentioned above, archivists preserve digital records by way of

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bill number and watch debates, however they have to watch an entire debate to find
details on any specific bill.
Tennessee General Assembly, "General Assembly Legislation Archives," Accessed
October 9, 2013. http://www.capitol.tn.gov/legislation/archives.html. The General
Assembly website for legislation archives includes searchable Bills and Resolutions,
Public Chapters, and Legislative Record dating back to the 99th General Assembly
(1995-1996). It appears as though only dates of action for bills and resolutions are listed
from the 99th to the 105th General Assembly (1995-2008), and audio and video in
addition to dates of action are available from the 106th General Assembly to the present
(2009 -).

[6] The General Assembly began recording in the early 2000s as a separate program
from the TSLA legislative recording program. The purpose of the General Assembly's
program is instant access for the public. The purpose of TSLA's program is the historic
and legal record. The 2006 Ethics Reform Act (1st Extraordinary Session, Chapter 1,
Section 43 - Not codified) confirms the General Assembly as a body that records and
posts sessions online, and affirms TSLA's role in recording as a separate program. 2006
Tennessee Public Acts, pg. 1483-1484.

preserving physical storage mediums. Material science is continually developing, and tools and techniques for preserving both digital and physical mediums are evolving. As with previous generations of electronic media, digital audio records have several significant agents of deterioration. First is instability of formats and storage media. Most brands and styles of formats and storage have lifelines projected by manufacturers. Many are indefinite and long-term, which speaks to the inherent unknowable stability of digital records. It is possible that a digital record is sustainable long-term, but it is also possible that it could inexplicably disappear, whether due to human error or corrupted medium. However, if archivists can sustain a digital record for an extended period of time on one medium, they will inevitably run into the problem of obsolescence. TSLA's solution for the instability of formats was the creation of file backups and copies in alternate locations. The staff uses the "all in one" DCR format as reference files for quick access, but they keep two files, a WAV file for audio and a TXT file for logsheets, as a precaution. According to Yates, TSLA does this in the case that DCR software becomes obsolete, the legislature meetings can be reconstructed.[7]

The United States Library of Congress suggest seven factors for the evaluation of digital formats which ultimately influence feasibility and cost of preserving digital content when faced with technological changes and obsolescence:

> 1. Disclosure: Degree to which complete specifications and tools for validating technical integrity exist and are accessible to those creating and sustaining digital content. A spectrum of disclosure levels can be observed for digital formats. What is most significant is not approval by a recognized standards body, but the existence of complete documentation.

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[7] Greg Yates, e-mail message to Heather Adkins, October 9, 2013.

2. Adoption: Degree to which the format is already used by the primary creators, disseminators, or users of information resources. This includes use as a master format, for delivery to end users, and as a means of interchange between systems.

3. Transparency: Degree to which the digital representation is open to direct analysis with basic tools, such as human readability using a text-only editor.

4. Self-documentation: Self-documenting digital objects contain basic descriptive, technical, and other administrative metadata.

5. External Dependencies: Degree to which a particular format depends on particular hardware, operating system, or software for rendering or use and the predicted complexity of dealing with those dependencies in future technical environments.

6. Impact of Patents: Degree to which the ability of archival institutions to sustain content in a format will be inhibited by patents.

7. Technical Protection Mechanisms: Implementation of mechanisms such as encryption that prevent the preservation of content by a trusted repository.[8]

Disclosure, adoption, transparency, self-documentation, external dependencies, impact of patents, and technical protection mechanisms, along with quality and functionality factors like rendering, are important for the implementations of administrative policies and future preservation strategies. For digital audio, the Library of Congress suggests qualities like fidelity or support for high audio resolution, support for multiple channels (a feature of the DCR system TSLA uses), and support for "downloadable or user-defined sounds, samples, and patches."[9] The general standards for digital audio are a bit depth of 24 bits and a sample rate of 96 kHz. The National Archives and Records Administration

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[8] Library of Congress, "Sustainability of Digital Formats: Planning for Library of Congress Collections: Formats, Evaluation Factors, and Relationships," accessed October 8, 2013. http://www.digitalpreservation.gov/formats/intro/format_eval_rel.shtml

[9] Ibid.

described the following as acceptable formats for digital audio records: Audio

Interchange File Format (AIFF), Uncompressed Waveform audio format (WAV), Audio

format (AU), Uncompressed Broadcast Wave Format (BWF), Free format Lossless

Audio Codec (FLAC), and Motion Pictures Expert Group (MPEG) 4 Audio Lossless

Coding format (ALS).[10] The Library of Congress advises that choosing a format for

digital content, defining records management policies, and making future plans for

transition involves balancing factors of quality, function, and sustainability and making a

decision that best reflects the interests of the archival institution.

A second agent of deterioration for digital audio is the physical deterioration of

storage media due to mishandling or environmental conditions. There is no singular

method identified to preserve access to physical format digital material; however,

providing a clean and stable environment for storage and careful handling practices will

help extend the lifetime of physical formats. In April 2009, the Association for Recorded

Sound Collections (ARSC) Technical Committee created a comprehensive process and

plan for the preservation of archival sound recordings, specifically for the transfer of

analog material to digital media. They spoke about storing digital files thusly:

> Storing digital files for preservation presents two separate requirements: protected
> interim, local storage before files are ready for transfer to the long-term solution,
> and long-term storage for preservation. Long-term storage demands a careful
> strategy to ensure that the content remains viable over a very long period of time,
> even if it moves to different storage media.[11]

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[10] National Archive and Records Administration, "Frequently Asked Questions (FAQ) About Digital Audio and Video Records," accessed October 8, 2013. http://www.archives.gov/records-mgmt/initiatives/dav-faq.html

[11] Association for Recorded Sound Collections, "Preservation of Archival Sound Recordings," Version 1 April 2009, p. 6, Accessed October 8, 2013. http://www.arsc-audio.org/pdf/ARSCTC_preservation.pdf

The technical team went on to describe some basic principles like the creation of backup copies in separate locations, the implementation of integrity verification like checksums (digits representing the sum of the digits in an instance of digital data; used to check whether errors have occurred in transmission or storage), and the monitoring of storage media. They also noted that knowledge of current digital lifecycles is key to adopting new formats when old ones become obsolete. They went on to say, "Digital preservation requires ongoing active management of the archive including data integrity checking, evaluating obsolescence issues, and planning for the next migration. It is no longer possible to put storage media on the shelf and forget about them. No single type of storage media is perfect for long-term storage of digital files."[12] The team insisted that storage media not be dependent on proprietary equipment, rather it should be widely used. Most storage media they discount for this reason, long-term expense, or lack of reliability.[13] They stated repeatedly that knowledge of current media and a formal migration plan is quintessential to long-term preservation. The team ultimately emphasized that it is possible to have enduring digital preservation plan and program, but because technology is continually changing and becoming obsolete, archivists should work to preserve digital content, not digital carriers.

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[12] Ibid, 7.

[13] For a more extended discussion of data tapes, hard drives, RAID arrays, optical discs, recordable audio CDs, Digital Audio Tapes (DATs), and trusted digital repositories (TDR), see Association for Recorded Sound Collections, "Preservation of Archival Sound Recordings," Version 1 April 2009, p. 7-8, accessed October 8, 2013. http://www.arsc-audio.org/pdf/ARSCTC_preservation.pdf

There is some debate as to whether digital preservation is significantly different from "traditional" preservation. Leslie Johnston, the director of the National Digital Information Infrastructure and Preservation Program at the Library of Congress, concluded in a blog post for the Library of Congress, "Preservation activities are never traditional – there is constant innovation in preservation techniques. Digital preservation is in many ways still developing its tools and techniques, but physical preservation is also evolving."[14] She commented that any kind of preservation deals with the field of material science, and that research into the qualities of physical materials is essential for preservation and sustainability of records. Johnston briefly explored the similarities between born-digital and physical mediums, noting that digital material can be a high risk, but so can physical records if they are mishandled or if they are victim to natural disaster. Either way it would seem there is one chance at preserving a critically degraded item. Johnston further commented on archivists' skill sets. She recognized that skills that are required for "traditional" preservation and digital preservation have some variation, mostly pertaining to an additional expertise in formats, potential risk, analysis, and the auditing of storage and tools for migration. But she concluded, "at the core, the skill set is one of being able to identify risks, analyze collections for risks, make decisions about needed preservation action and take them. There is some specialization in the handling of digital media and files, but that level of specialization in preservation is not

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[14] Leslie Johnston, "Is There Such A Thing as Digital Preservation?" *The Signal Digital Preservation Blog*, August 22, 2013. Accessed August 23, 2013. http://blogs.loc.gov/digitalpreservation/2013/08/is-there-such-a-thing-as-digital-preservation/

uncommon."[15] In the end, Johnston wondered whether there was no longer a difference between "traditional" and "digital" preservation, rather it is all simply preservation.[16]

Perhaps the greatest agent of deterioration, or rather threat, for digital audio preservation is technological obsolescence. As stated throughout this research, technological obsolescence is the result of the evolution of technology. New media takes the place of old media rendering the older media obsolete. Obsolescence is a particularly difficult obstacle because it is nearly, if not altogether, impossible to compile every piece of hardware, software, metadata, and other management necessities for every electronic record. For one thing, there is simply not enough space in any archives to hold every piece of defunct machinery that made an archive's records. With that said, TSLA does seem try to retain the original machinery to play master and original analog sound records because it is so vital to the legislative history program. According to staff, TSLA retains Audograph machines, one phonograph machine, reel-to-reel players, and cassette tape players. However, it should be noted that while TSLA does have the machines to play the original records, not all of the records are in such a condition that they can be used. Physical deterioration of original records coupled with technological obsolescence creates the need for a back-up plan.

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[15] Ibid.

[16] For more information on Leslie Johnston and her career visit her brief biography at *The Signal Digital Preservation Blog*, Library of Congress, http://blogs.loc.gov/digitalpreservation/author/lesliej/

COMBATING OBSOLESCENCE

The International Association of Sound and Audiovisual Archives (IASA)

produced a comprehensive digital planning guide similar to that of ARSC.[17] In it, they

noted factors and timing that motivate digital preservation planning. IASA stated, "The

factors which will motivate a sound archivist to undertake some sort of preservation

action will be the recognition that new software no longer supports the old format, and

the industry as a whole moving to select a new format."[18] This statement referred to the

need to take action when confronted with obsolescence. What actions, then, can be taken

to sustain access to records captured on digital media?

In 2012, a European project titled Digitising Contemporary Art (DCA) identified

today's five most popular methods of long-term digital preservation: technological or

hardware preservation, migration, emulation, encapsulation, and cloud computing.[19] In

the report, the authors identified the reasons for using each method, the risks involved,

and recommendations for implementation. As stated above, TSLA utilizes a version of

technological or hardware preservation in which they try to save the original machine,

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[17] IASA Technical Committee, "The safeguarding of the Audio Heritage: Ethics, Principles and Preservation Strategy," ed. By Dietrich Schuller. Version 3, 2005 (= Standards, Recommended Practices and Strategies, IASA-TC 03). International Association of Sound and Audiovisual Archives. www.iasa-web.org/tc03/ethics-principles-preservation-strategy.

[18] Ibid, section 6.4.3.

[19] Sofie Laier Henriksen, Wiel Seuskens, and Gaby Wijers, "D6.1 Guidelines for a Long-term Preservation Strategy for Digital Reproductions and Metadata," Section 9, Digitising Contemporary Art, 2012. Accessed October 9, 2013. http://www.dca-project.eu/images/uploads/varia/DCA_D61_Guidelines_Long_Term_Preservation_Strategy_20120213_V1.pdf

though mainly as backup for the original documents. In the long run, however, hardware preservation does not completely solve the electronic preservation problem for two reasons. First, it is increasingly likely that technicians for an obsolete technology will disappear as new skill sets for more current technology arise. And second, maintaining the original technology does not integrate data into new platforms. TSLA does not rely on technological preservation, rather they try to utilize original devices when a copy is needed from the original record. DCA commented that in the long-term, technical preservation will be kept because an obsolete format cannot be used without its obsolete playback equipment, but ultimately, this kind of preservation is a short-term solution before records are migrated from one media to another.

DCA recognized migration as one of the most widely used preservation methods, today.[20] The Society of American Archivists defines migration as "the process of moving data from one information system or storage medium to another to ensure continued access to the information as the system or medium becomes obsolete or degrades over time."[21] DCA expanded upon that, noting, migration "focuses on the file itself, not the environment in which the file is rendered."[22] Migration seems most popular and easiest among archival institutions when confronted with technical failure, non-compatible formats and software, derivative copies, expense, change in national standards, and obsolescence. But migration comes with a lot of risk. Common, noticeable errors include

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[20] Ibid, 27.

[21] Richard Pearce-Moses, "Glossary of Archival and Records Terminology," Accessed October 9, 2013. http://www2.archivists.org/glossary/terms/m/migration

[22] Henriksen, Seuskens, and Wijers, 27.

basic layout and font changes, changes in color, or loss of other unique features from the

original records. There could also be sizing issues, lost or misplaced data, or misspelled

links that cause metadata to no longer function. DCA noted that migration becomes

incredibly complex in regard to audio-visual records. With sound-capturing, the audio

stream and codec might need to migrate, as well as the container the digital file is in. And

if the type of codec needed to support a container is not considered, archivists run the risk

that the compression or decompression of a video or audio record becomes impossible.

With that said, migration errors can be avoided with adequate planning, monitoring,

testing, and automation. And a cluttered digital archive can be simplified by

normalization of formats. There are many ways to migrate records, so if everything goes

according to plan, the only issue will be how to keep content true to the original record.

Migration is indeed one of the most used long-term preservation methods, as

many archival institutions today engage in digitization projects.[23] In regard to

preservation of digital records specifically, migration is usually written into archival

institutions' preservation policies. The State of Tennessee, for instance, includes an

annual format review and migration plan involving the categorization of formats as

emerging, current, twilight, or obsolete. Once a format reaches twilight, the creating

agency has three years to transfer the records to a current standard format.[24] Although the

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[23] SAA defines digitization as "the process of transforming analog material into binary electronic (digital) form, especially for storage and use in a computer…digitization may start with information that is in electronic or physical form," Richard Pearce-Moses, "Glossary of Archival and Records Terminology," Accessed October 10, 2013. http://www2.archivists.org/glossary/terms/d/digitization

[24] Mark Bengel, "Electronic Records Policy," submitted to State of Tennessee Public Records Commission, December 2009.

State of Tennessee has these guidelines in its retention and disposition of electronic

records policies, as of yet, TSLA's Preservation Services and Digital Work Group

division does not have a written digital migration or transfer policy.

The Library of Congress also encourages migration, or "transfer." They stated on

their "Preserving the Collections" webpage for audio-visual conservation, "The digital

archive is based on the concept of continual migration and verification. Migration to

progressively higher density storage – meaning progressively greater storage capacity –

will continue indefinitely into the future."[25] Library of Congress also has digital audio-

visual preservation prototyping projects that include the development of approaches for

digital reformatting of sound and video. Audio record prototypes, with participation by

the Motion Picture, Broadcasting, and Recorded Sound Division and the American

Folklife Center, have moved through two phases of research:

> The first phase (1999-2004) made a preliminary assessment of transfer technology (audio workstations) together with a thorough examination of digital-object packaging and METS metadata. The second phase is elaborating on the development of transfer technology and extending the division's use of the MAVIS collection management software into the realm of recorded sound.[26]

This prototype project will undoubtedly aid in long-term preservation research, especially

regarding obsolete digital audio formats.

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[25] Library of Congress, "Preserving the Collections," Audio-Visual Conservation at the Library of Congress, updated August 3, 2007. Accessed October 10, 2013. http://www.loc.gov/avconservation/preservation/

[26] Library of Congress, "Digital Audio-Visual Preservation Prototyping Projects," updated August 31, 2010. Accessed October 10, 2013. http://www.loc.gov/rr/mopic/avprot/avprhome.html. "The projects are in preparation for the division's move to the National Audio-Visual Conservation Center in Culpeper, VA, and they have been under way since 1999." This webpage includes access to documents for phase one.

Emulation, or "the use of one system to reproduce the functions and results of another system," focuses on preserving the original environment in which a digital record was created.[27] This means the original environment in which a digital record was created can be used on newer software and platforms. But DCA warned, "the newer the technology, the more complicated emulation gets. Nowadays emulation is the only option when software or an operating system is obsolete."[28] They advised that an emulator be created before software becomes obsolete because without any reference to rely on, the new system may operate slightly differently from the older system. DCA moved on to say that the biggest problem with emulation is that archivists also must preserve the usability, readability, and documentation of an emulator in order for it to be useful for future systems. However, there are ways to preserve emulators like chaining or layering emulators, emulator migration, and modular emulation. There is also emulation – virtualization, that is a bridge between original or emulated software and future platform that consists of a basic processor and memory written with human and machine-readable language.[29] DCA noted that the increasing complexity of technology will make it more difficult to build emulators. In the long-term, they claimed it as more cost effective and beneficial, contrary to migration, because only a single emulator must be developed for all digital records created on one platform type. DCA further commented that emulation is still new technology and the longevity of emulators is unknown.

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[27] Pearce-Moses, accessed October 9, 2013. http://www2.archivists.org/glossary/terms/e/emulation

[28] Henriksen, Seuskens, and Wijers, 28.

[29] Ibid, 30.

Encapsulation is the "combination of several digital objects into a single unit that preserves the association of those objects."[30] DCA explained it as the digital object being "stored with all necessary components and information needed to preserve and render it in the future…[including] an operating system, the digital object itself, original processing software, and documentation of emulator specifications for hardware and metadata. It also labels the content and describes the sequence of events needed for rendering the object"[31] Essentially, the digital object platform would be independent to allow for long-term storage, but encapsulation was not suggested for digital records in use. Rather, the method is for information that does not need to be changed for a long period of time. There is also more risk of needing to maintain systems that can read what is encapsulated. Archivists must preserve knowledge about a format outside of the encapsulation. Besides that, encapsulation might only need to be migrated after longer periods of time. In theory, because it is used over an extended time, this method could be best for keeping the integrity and authenticity of records longer.

Finally, cloud computing is "the practice of storing regularly used computer data on multiple servers that can be accessed through the Internet."[32] DCA noted that this method is more about storage and access, rather than long-term preservation, although the records would still need to be migrated to new formats. "The cloud" makes it easy to

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[30] Pearce-Moses, accessed October 9, 2013. http://www2.archivists.org/glossary/terms/e/encapsulation

[31] Henriksen, Seuskens, and Wijers, 30.

[32] "Cloud Computing." *Merriam-Webster.com*. Merriam-Webster, n.d. Web. October 10, 2013. http://www.merriam-webster.com/dictionary/cloud computing.

share and edit documents, and "it also eliminates the danger of having the server in one

place, since the cloud hosts servers in many different place. Because the data is stored on

the web, it should be easier to recover any lost data through the company who supplies

the programmes [sic]."[33] However, like any new technology, data loss is still a risk. There

are still questions as to security, privacy, and ownership rights, which is a huge challenge

for archival collections. As of yet, the cloud also does not work as a solitary preservation

method because the bit stream still must be saved and reside on at least one physical

device. DAC did find some preservation uses for the cloud, though, and listed some

technical specifications:

1. The cloud should store files based on the rules of the defined bit preservation…

2. The cloud should implement the CAP theorem…that stands for:

- Consistency (all nodes see the same data at the same time);[34]
- Availability(node failures do not prevent survivors from continuing to operate);
- Partition tolerance (the system continues to operate despite arbitrary message loss).

3. By replacing or adding nodes the cloud will reorder itself to conform the bit preservation rules and the CAP theorem;

4. The cloud should implement a predefined consistency safety, which describes how many nodes can fail before irreparable data loss occurs. [35]

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[33] Henriksen, Seuskens, and Wijers, 31.

[34] "A node is defined as a connection point in a network, either a redistribution point or an end point for data transmissions. In general, a node has programmed or engineered capability to recognize and process or forward transmission to other nodes." Footnote 23, Henriksen, Seuskens, and Wijers, 31.

[35] Henriksen, Seuskens, and Wijers, 31.

DCA claimed that if such preparations were applied to the cloud, cloud computing would surpass existing technologies because it would offer higher preservation standards, better digital content management, lower-priced administration, and better availability.

The cloud revolutionized the concept of creating backups and storing them in separate locations. Foremost, it is a cheap alternative that the average person can use, not just businesses or record-keeping institutions. And it is not only on one's initiative that they may utilize the cloud. The Library of Congress suggests, in regard to personal audio collections, that at least two audio recordings be made, one of which stays on a personal computer, and the other put "on separate media such as DVDs, CDs, portable hard drives, thumb drives or Internet storage."[36] The inclusion of internet storage suggests that the Library of Congress recognizes the use of cloud computing as a viable option. The cloud also allows for immediate and open access to records – a key concept in archival science – that archives and libraries cannot necessarily permit because of copyright or ownership infringement and risk of tampering or loss of data. There is increased vulnerability and loss of control over records. With that said, if data is lost or the server of a cloud vendor goes down, there are back up servers that have copies of digital content. An example of this is iTunes, which has a cloud server that recovers purchased music. The cloud capitalizes on such features as backup and recovery, resiliency and redundancy. Despite its youth and disadvantages, cloud computing has great potential for archival access, and

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[36] Library of Congress, "Personal Archiving: Preserving Your Digital Memories: Keeping Personal Digital Audio," accessed October 10, 2013. http://www.digitalpreservation.gov/personalarchiving/audio.html

possibly in the future, if the cloud incorporates the criteria DCA outlined, it will have greater implications in the field of digital preservation.

Ultimately, long-term digital preservation policies are contingent on the archival institutions that implement them. In concept and on paper, technical preservation, migration, emulation, encapsulation, and cloud computing make perfect sense in their individual ways. But in practice, aside from cost and administration, there are still many unknown variables that can affect the records that archivists are trying to save. As of yet, it is hard to say whether audio and other digital records can ever be sustained in a permanent state or environment, but archivists are constantly working towards this goal. Digital preservation is a continual frontier, and record-keepers are its pioneers.

CONCLUSION

In the field of archival science, obsolescence is one of the few constants. There will always be new technology that is better than its predecessor, and a future one ready to take its place. The best we can do as record-keepers is keep an eye and ear to technological trends and know as much about them as possible so when that inevitable time comes, we are prepared to make educated decisions about what to use next. The legislative recording program at TSLA is an excellent example of the obsolescence phenomenon not only because it presents the trends in material and archival science across a nearly sixty-year period, but because it shows the decision-making process of both the General Assembly and TSLA staff. It reveals a system of record-keeping that is not cut and dry, but continually re-envisioned. In the end, obsolescence is not just about

the Gray Audograph, the cassette tape, or the digital format. Obsolescence is about the

remaking of archival institutions.

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