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Obsolete on Arrival: The Short Life of Wire Recording

For two short periods in history, wire recording held the fascination of the world. As a new technology for recording sound at the turn of the 20th Century, the first example of magnetic recording, these convenient, technologically advanced recorders were poised to replace the supposedly outmoded mechanical recorders. Yet, within the short span of twenty years, from 1900 to 1920, the format entered an early period of obsolescence, outclassed by the very machine it was meant to improve upon, the phonograph.

Resurrected twenty years later, in the wake of World War II, the wire recorder entered an era of unprecedented success, taking its place as the most popular and convenient sound recorder. But even as this newly popular machine reached its peak, the technological advancement that would eventually be its replacement was in development.

By the end of the 1950's, wire recording was an obsolete technology, with only approximately 15-20 years as a preferred recording medium. Replaced by magnetic tape, which dominated the market for nearly twice as long, wire recording became a curio. The technological advancement of tape recording was not the sole reason for the medium's demise. This magnetic recording format, the first of its kind, was victim to colossal corporate mismanagement and the whims of a fickle marketplace looking for the next technological novelty. This paper will examine the simple mechanics of wire

recording and trace the troubled history of the manufacture and commercialization of the original magnetic recording format in order to illustrate the causes of wire recording's rapid obsolescence.

Wire Recording – The Basics

To understand the scientific processes at work in wire recording, it is best to begin with the simplest theories of applied magnetism, as the technological concepts of wire recording are the basis for all magnetic recording to follow.

Magnetism, by definition, is a property of materials that respond to a magnetic field at an atomic or subatomic level. All materials are attracted or repelled by magnetic force, although this reaction is in most cases unnoticeable. Substances that display attraction to a magnet are paramagnetic; ferromagnetic materials, such steel or iron, are those that display an extremely strong magnetic attraction. [1]

In wire recording, there are two forms of magnetism at play: permanent magnetism and electromagnetism. Permanent magnetism occurs when a ferromagnetic material is subjected to a magnetic field, becomes magnetized, and retains that magnetism, giving off its own magnetic field. The properties of a permanent magnet are displayed by a hysteresis loop[2], where (b) is the retentive magnetization after the influencing magnetic field is removed and (c) is the magnet's coercivity, the reverse field needed to return magnetization to zero.[3] In a recording medium, in this case steel wire or

[1] Marvin Camras, *Magnetic Recording Handbook* (New York: Van Nostrand Reinhold Company, 1988): 15.
[2] See Figure 1.
[3] C. Denis Mee and Eric D. Daniel, eds., *Magnetic Recording Technology*, 2nd ed. (New York: McGraw-Hill, 1996): 1.2.

plated bronze wire, a high retentivity is desired, to better hold the magnetic record. Low coercivity ensures the record will not be erased if subjected to a strong enough magnetic field.

With a highly retentive recording medium to store the sound record, a wire recording requires another element, an electromagnetic, to generate the magnetic field to magnetize the ferromagnetic material. An electromagnet is created by the flow of electrical current through a coil of wire. The coiled wire, becoming magnetized, generates a magnetic field while the current is active.[4] This field is dispersed in a highly concentrated point in the electromagnetic head, either between the pole pieces—as seen in early wire recorders—or in a gap in the record head in later models.

In wire recording, the ferromagnetic wire is passed through the electromagnetic head, introducing the record material to the concentrated magnetic field. When speaking through a microphone, the strength of the electric current supplied to the electromagnetic coil fluctuates correspondingly with the reverberations of the microphone or other sound transmitter (radio, telephone, etc.). This fluctuation in electrical current, and subsequently the electromagnetism, is analogous to the magnetism generated in the wire record; the magnetized wire stores a record of both the frequencies of the signal source and the amplitude of that signal.[5]

With each variation in electromagnetism, the wire is permanently magnetized creating a multipole magnet, with corresponding magnetic fields between each subsequent north and south poles. As magnetized electrons travel from north to south

[4] Camras, *Magnetic Recording Handbook,* 16.
[5] Phil Van Praag, *Evolution of the Audio Recorder* (Waukesha: EC Designs Inc., 1997): 8.

poles through a magnetic field they generate magnetic flux. The strength of the magnetic flux is analogous to the frequency of the audio waves transmitted through the microphone of the recorder.[6] In playback, the magnetic flux influence the strength of the changing field of the electromagnet, thus altering the voltage of the current supplied to the receiver or speaker. This fluctuating voltage converts to sound waves when transmitted through the speaker mechanism[7] recreating the sound previously recorded.

A major difficulty with the earliest wire recording mechanism was a distortion level that affected the clarity of the sound during playback. While it was an improvement over the highly distorted sound of wax cylinders, it wasn't until the discovery of high-frequency, or AC, bias that wire recordings were reproduced with clarity. By adding a high-frequency current to the recording signal, the high-frequency element agitates the recording element and increases its sensitivity, bettering the mediums ability to capture the fluctuating frequencies of the desired sound recording.[8]

The wire recording machine of the medium's most popular period—1945-1952—were compact, intended for use professionally and in the home. A recorder housed the complex machinery in one unit that could be transported easily. Wire spools were available in varying sizes for recording times of 15-60 minutes at a play or record time of 24 inches per second.[9] The wire passed from the supply spool, across an oscillating recording head onto the take-up spool. Playback required rewinding the wire onto the supply spool and threading it back to the take-up.

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[6] Camras, *Magnetic Recording Handbook*, 27-29
[7] Camras, *Magnetic Recording Handbook*,2.
[8] Ibid., 45.
[9] Bob Pooler, "Wire Recorder," *Video Interchange*, Last modified October 8, 2009, http://www.videointerchange.com/wire_recorder1.htm.

An oscillating head was necessary to prevent the snagging and tangling of wire as it passed from supply to take-up spools. Wire often snapped or tangled because of the fine gauge of the wire used. The oscillating head ensured an even wrapping of the wire on the take up spool and alleviated the tension caused by the wires tendency to twist[10] as it was transported.

Wire breaks were a typical occurrence and could be corrected in two ways. The simplest method is knotting the two broken ends together and cutting the excess wire.[11] This method removes a piece of the recorded sound, but does not require additional tools to correct the damage. Splicing of wire could also be achieved using a soldering iron to join the two ends. The culpability of wire to snag, tangle, or break was one of the factors detrimental to the medium's replacement by magnetic tape.

The basic concepts of magnetism discussed above were nebulous when the groundbreaking concept of magnetic recording was invented. What became the standard method of recording audio, video and data for years originated as one man's negative reaction to Edison's cylinder phonograph.

Oberlin Smith and the Invention of Magnetic Recording

Magnetic recording's conception followed fast on the heels of the telephone and phonograph. In 1878, shortly after the Edison's invention of the phonograph, Oberlin Smith, a contemporary of Edison's and founder of the Ferracute Machine Company[12],

[10] Van Praag, *Evolution of the Audio Recorder*, 60-63.
[11] For an example of proper knot tying technique see Figure 2.
[12] Eric D. Daniel, C. Denis Mee, and Mark H. Clark eds., *Magnetic Recording: The First 100 Years* (New York: The Institute of Electrical and Electronics Engineers Inc. Press, 1999): 7.

paid a visit to Edison's laboratory to examine the cylinder phonograph. Smith responded poorly to the harsh noise that was an inevitable element of mechanical sound recordings; the conceptualization of magnetic recording was his solution. A memorandum, written by Smith in September of 1878, introduces the idea of using wire and a magnetizing mechanism to make a record of sound:

> While talking into the mouthpiece, the varying intensity of current (caused by the varying condensation of the carbon) produces zones, or spots, of magnetism in the whire which vary in length and strength in accordance with the length and amplitude of the sound vibrations…The "talker" consists of the same reels; the same or another helix, batter &c.; a Hughes microphone and a Bell telephone. The magnetic wire, being passed through the helix, induces a delicate series of currents of magnetoelectricity which pass through the microphone and are given out as sound vibrations by the telephone; or *otherwise.*[13]

Smith's concept is uncanny in its prediction of future magnetic recording techniques, although the inventor was ultimately unable to successfully demonstrate his theory.

One year later in 1888, Smith published a report on the extent of his work in the journal *Electrical World.* In this article, titled "Some Possible Forms of Phonograph", Smith outlines, "two or three possible methods of making a phonograph…" Smith provides detailed descriptions of a helix-based recorder[14] and prescribes possible materials for ideal recording wire: "The probable construction of *C* would be a cotton, silk or other thread among whose fibres would be spun (or otherwise mixed) *hard steel* dust, or short clippings of very fine steel wire hardened." For playback, a Bell receiver replaces the mouthpiece and the imbued thread is run back through the helix to transmit the sound recording.[15]

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[13] Daniel et al., *Magnetic Recording: The First 100 Years*, 8.
[14] See Figure 3.
[15] Oberlin Smith, "Some Possible Forms of Phonograph," *Electrical World* (September 8, 1888): 116.

Smith admits his inability create a fully functioning example of his proposed mechanism. He offers his postulations to the, "numerous experimenters now working in this field…" and asks that if an inventor should succeed where he has failed that they give, "…due credit for [Smith's] share in the matter."[16] Smith is now recognized as the inventor of magnetic recording, but it would be ten years after this publication before the world would see the first successful implementation of his magnetic recording theory.

Valdemar Poulsen's Telegraphone

Valdemar Poulsen, born in Denmark in 1869, was a self-taught engineer working with the Copenhagen Telephone Company when he invented wire recording technology. The son of a prominent lawyer, Poulsen failed to pass the entrance examination at the Technical University of Denmark, but was able to gain employment at the telephone company through the influence of his father.[17] Working as an engineer, Poulsen's knowledge of telephone and telegraph technology grew. In 1898, frustrated by a caller's inability to record a message when the receiving party did not answer, Poulsen began to explore the possibility of recording messages with telephone technology.

Poulsen's first breakthrough came in his own discovery of magnetic properties. During his initial period of experimentation, Poulsen made marks on a tuning fork with a small magnet and dipped the fork in iron fillings. Noticing the particles remained in the pattern of his magnet markings, he hypothesized that similar magnetic records of the human voice could be placed on a wire.[18]

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[16] Smith, "Some Possible Forms of Phonograph," 117 .
[17] Daniel et al., *Magnetic Recording: The First 100 Years*, 15.
[18] Camras, *Magnetic Recording Handbook*, 1.

This theory was confirmed, when later that year, Poulsen successfully recorded his voice on a wire. The first wire recording mechanism used a telephone microphone feeding electrical current through a simple magnet. This electromagnet was guided across the steel wire as the inventor spoke into the telephone microphone. To play back the message, the electromagnet was re-wired to a telephone receiver, creating a faintly audible reproduction of the sound recorded on the wire. Poulsen also discovered at this time that the wire could be erased by running a stronger magnet across its length with no detrimental effects to a new recording.

Demonstrating his new invention, Poulsen fastened a piece of steel wire to two ends of his laboratory. Attaching a trolley-like contraption, which held the electromagnet "stylus" and the telephone microphone, he would then guide this mechanism down the length of the steel wire while speaking into the microphone. Upon attachment of the telephone receiver, spectators were treated to a faint reproduction of Poulsen's voice as they guided the trolley down the piece of wire.[19] Poulsen had successfully created and demonstrated the first magnetic recording technology.

In December of 1898, Poulsen applied for a patent of his new machine, which he had named the "Telegraphone." Poulsen's original telegraphone model,[20] used in his patent applications, shows a drum style mechanism, mounted vertically inside a bell jar. The recording wire is wrapped around a hollow cylinder inside the jar and rotates as the recording and reproduction electromagnetic tracks along the wire. By the end of 1899,

[19] Camras, *Magnetic Recording Handbook*, 1.
[20] See Figure 4.

Poulsen secured patent protection in 38 nations[21] and prepared his innovative technology for commercial use as a telephone recorder.

Not wasting any time in introducing his telegraphone to the public, Poulsen formed his own company, Aktieselskabet Telegrafonen Patent Poulsen, and took his invention to the Paris Exhibition of 1900. With the help of his research collaborator, Peder O. Pederson, Poulsen created prototypes of three magnetic recording prototypes to be presented at the exhibition: a drum-type wire recorder, a reel-type wire recorder, and a steel tape recorder. The drum-type wire recorder uncannily resembled an Edison phonograph. Similar to the design proposed by Poulsen in his patent applications, this telegraphone featured a hollow cylinder with wire coiled around it mounted horizontally. As a hand crank rotated the cylinder, the electromagnetic stylus tracked along the wire recording the sound transmitted through a connected telephone line or a microphone.

The reel-style telegraphone was similar to the model that became the standard decades later. Wire was wound on two separate spools; as the wire transferred from the feed spool to the take up, it passed through a stationary electromagnet. At a rate of three meters per second, this model could provide a recording of approximately 45 minutes.[22] Steel tape telegraphones, a precursor to magnetic tape recording to come, displayed the same concepts as the spooled wire telegraphone, with a spool of heavy steel tape passing through a fixed electromagnetic head. Steel tape later became a popular recording medium in radio and even, for a short period of time, motion picture presentation.

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[21] Mark Clark and Henry Nielsen, "Crossed Wires and Missing Connections: Valdemar Poulsen, The American Telegraphone Company, and the Failure to Commercialize Magnetic Recording," *The Business History Review* 69, no. 1 (Spring 1995): 7.

[22] William Charles Lafferty Jr., "The Early Development of Magnetic Sound Recording in Broadcasting and Motion Pictures, 1928-1950," PhD diss., Northwestern University, 1981: 17.

The telegraphone was a massively popular exhibition at the Paris Exhibition and won a Grand Prix honor.[23] It was such a hit, the presenters even convinced Austro-Hungarian Emporer Franz Joseph to make a short recording.[24] Following the exhibition, it appeared the telegraphone was the recording technology of the future. Positive reviews in publications across the world touted Poulsen's invention as a technological revolution. In 1903, the American Telegraphone Company was founded to distribute the technology throughout the United States, but the company's inability to successfully commercialize the machine stunted the popularity of the medium for years to come.

The American Telegraphone Company

In the years following the founding of Aktieselskabet Telegrafonen Patent Poulsen, Poulsen and Pederson worked to commercialize the telegraphone for use in telephony. Poulsen was adamant that his machine's chief use should be as an answering machine. Finding it difficult to establish a lucrative business in their home country, due to slow industrialization of Denmark, the Aktieselskabet Telegrafonen sought opportunities elsewhere, specifically with the German firm Mix and Genest. The partnership with Mix and Genest proved to be a failure despite the positive reception at the Paris Exhibition, and Poulsen and Pedersen turned their commercial interests to America.[25]

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[23] David Lindsay Morton Jr., "The History of Magnetic Recording in the United States, 1888-1978," PhD diss., Georgia Institute of Technology, 1995: 51.

[24] The recording is now identified as the oldest extant magnetic recording and is currently preserved at the Danish Museum of Science and Technology. An excerpt of the recording is available at http://homepage.mac.com/oldtownman/recording/tapes.html.

[25] Michael Clark and Henry Nielsen's article delves into the interesting personal conflicts that led to the demise of this partnership, 18-20

The American Telegraphone Company was formed in 1903, following some difficult years of investor assembling. In 1905, investor Charles Frankhauser convinced Danish American Telegraphone Company stockholders to transfer their majority into the company's treasury and the American firm sought to commercialize the Telegraphone. No longer courting to the interests of their Danish partners, the American Telegraphone Company chose to market their product primarily in the dictation market with the machine's use as a telephone answering machine a secondary interest.

In dictation, the telegraphone was seen as an improvement over contemporary phonographic dictation machines available. The machine touted an ease of use and clarity unavailable to users of the Ediphone or Dictaphone. Chief among these improvements was the ease of correction. Wire recording allowed the user to simply erase mistakes as opposed to the phonographic cylinder recorders, which required recording over the mistake in wax often with unintelligible results. Telegraphones were advertised as cost savers due to their portability and longer recording times.[26] The telegraphone was unsuccessful in this market due to the reliability of already established wax cylinder dictation machines and the telegraphone's faint playback volume.

Marketing telegraphones as answering machines was a far less successful endeavor. In this period of American telephony, the major power in telephone regulation was AT&T. As the main connection between urban centers through their long distance service, AT&T often used its power to order the policies of local telephone service providers, including what machinery could be used in conjunction with telephone service. In standardizing the equipment to be used with their service, AT&T sought to exclude

[26] Morton, Jr., "History of Magnetic Recording," 61-62.

"foreign" equipment[27], including the telegraphone. Regardless, the American Telegraphone Company strove to convince the market of the uses of their product as a means to record telephone messages. Yet the advertising literature for the product fails to explain who the user of this service would be or, basically, who has need of such a device. Instead the advertising focused solely on the products message recording ability.[28]

By 1917, twelve years after the company began their efforts to introduce the telegraphone to the United States, only one customer remained, the US Navy. The company, initially successful with a high profile sale of fifty machines to the Du Pont Company, was unable compete with the already established and more affordable wax cylinder dictating machines.[29] Under the incompetent management of Edwin Rood, who landed the company in a string of civil and criminal lawsuits,[30] eventually ceased manufacture of telegraphones in the 1920s, beginning a period in which wire recorders all but disappeared in the United States. It was not until 1939, on the verge of World War II, that the engineer Marvin Camras and the Armour Research Foundation would revive the wire recorder and introduce it to the consumer market.

Marvin Camras and the Armour Research Foundation

Marvin Camras was the re-inventor of wire recording, pulling it out of obsolescence for a period of unexpected popularity. Through his efforts at the Armour Research Foundation throughout the 1930's, he successfully fashioned the wire recorder

[27] Morton, Jr., "History of Magnetic Recording," 61.
[28] Ibid., 62.
[29] Daniel et al., *Magnetic Recording: The First 100 Years*, 27.
[30] Camras, *Magnetic Recording Handbook*, 8.

into a portable, consumer-friendly model; the opposite of the industrial models distributed earlier in the century.

Camras, born in 1916 in Chicago, the son of a bookbinder, was an avid electrical experimenter as a child and enrolled at the Armour Institute of Technology (AIT) to become an engineer. His cousin who believed his singing voice to be as good as any professional opera singers sparked Camras's initial interest in magnetic recording. Camras set out to create a recorder that would allow his cousin to compare his voice to the opera singers on the radio. Determining steel tape too expensive, he used wire instead.[31] Camras's work in magnetic recording led to an improved recording head design that enclosed the wire inside the electromagnet, creating a stronger and more uniform signal.[32] This was a vast improvement over the small pole pieces used in early recorders, causing less wear on the recording head and medium.[33] This rudimentary wire recorder intrigued Camras's instructors at Armour, although it spelled the end of his cousin's opera career.

Following his graduation from AIT, Camras took a position with the Armour Research Foundation, with the specific goal of perfecting his wire recording prototype. In 1940, after several months of work at Armour, Camras applied and received patent protection for his new mechanism. It was also during his first years at Armour that Camras re-discovered the theory of high frequency biasing.[34] The combination of Camras's improvements on Poulsen's invention and the introduction of amplification

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[31] Mark Clark, "The Magnetic Recording Industry, 1878-1960: An International Study in Business and Technological History," PhD diss., University of Delaware, 1992: 223-224.
[32] Ibid., 227.
[33] Ibid., 230
[34]Morton, Jr., "History of Magnetic Recording," 341.

technology by Lee de Forest, finally made the wire recorder a viable sound recording medium.

With the United States' entry into World War II, the efforts of Camras's work at Armour Research Foundation shifted towards creating a sturdy, field-ready recorder to be used by the US Navy. Initially, the Navy planned to use the recorders in training exercises and as test instruments for recording underwater sounds. Armour's recorders were subsequently used for on-the-scene recordings of the battlefield and interviews, later rebroadcast over the radio. In designing his machine for military use, Camras was required to meet military performance requirements. His previous design, a wooden model, was given a cast metal case and tested for shock resistance and use in high and low temperatures.[35] The military wire recorder, named Model 50, was licensed out for manufacture to General Electric. It was this model that served as the basis for machine that was to become increasingly popular in post-war America.

During the final years of World War II, as the military demanded more wire recorders from Armour, the company began amassing a network of licensed manufacturers for the building of their machines. By the end of 1944, Armour had six licensees of its products,[36] and in the following years, the group continued to grow. Armour now turned its focus from military manufacturing and turned their focus on the civilian market. To further streamline operations, the company founded a subsidiary corporation in May 1944[37], the Wire Recorder Development Corp. (WRDC), to carry out publicity campaigns and administer product licenses. While Armour provided the

[35] Clark, "Magnetic Recording Industry," 243.
[36] Ibid., 250.
[37] David Morton, "Armour Research Foundation and the Wire Recorder: How Academic Entrepeneurs Fail," *Technology and Culture* 39, no. 2 (April 1998): 222.

technological specifications for creating a wire recorder, the manufacturing licensees hired their own engineers to design their unique recorders for the market.

Separating their business and research ventures allowed Armour to maintain its focus on improving wire recording technology for ease of use by the consumer. In the years leading to the end of the war, as Armour prepared the launch of its civilian recorders, Camras vastly improved the quality of recording heads and discovered better wire recording materials.[38] The positive publicity of the use of wire recorders during the war led to a wealth of potential licensees and by the end of 1945 the WRDC had granted an additional 18 licenses for the manufacture of civilian recorders.[39]

The period of 1945-1952 was the heyday for wire recorders in the United States. Armour Research Foundation and WRDC oversaw the proliferation of this product through fastidious management of their licensees. Designating specific licenses to manufactures allowed Armour to release specific types of wire recorders for separate industries, such as dictation or broadcasting. Armour kept a close watch on the operations of its licensees; distributing bulletins featuring reports on advances in the technology and sending their researchers to licensees to discuss issues and troubleshoot new designs.[40] Through this network of licensees, the wire recorder became a popular product with both the consumer and business markets.

Uses of the Wire Recorder

[38] Clark, "Magnetic Recording Industry," 251.
[39] Morton, "History of Magnetic Recording," 350.
[40] Clark, "Magnetic Recording Industry," 289.

During this period of success for wire recorder, the technology was the most popular medium for recordings of many types. Annual sales of units reached the tens of thousands, with the manufacturer Webster-Chicago[41] one of the most successful.[42] In the consumer market, it was easy-to-use and compact machine, and while the machine was cost prohibitive for most families,[43] the recorder was a desired product in many homes. For business and occupational use, the new models of wire recorder were a vast improvement over the machines marketed at the turn of the century. Where the American Telegraphone Company had failed to acclimate the wire recorder to the business world, the Armour licensees succeeded immensely.

From the time of its invention by Poulsen, the most popular use of wire recording was dictation. Compared to the typical dictation machines prevalent at the turn of the century, such as the Dictaphone or Ediphone, the wire recorder was the superlative machine. Wax cylinder dictation machines were complex, with various mechanisms for recording, amplification, and shaving to erase the previous record. The ability to erase mistakes in dictation and the relatively small size of the Telegraphone was considered a boon for secretarial staffs tasked with transcribing. By the time of the Armour wire recorder, the unreliability and high cost of the Telegraphone were no longer issues, and the wire recorder became a common tool in the office.

The reliability of Armour models led to the proliferation of wire recording for broadcast on radio. Able to record in almost any conditions, the wire recorder first saw

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[41] For an example of Webster-Chicago's Model 80 Wire Recorder, see Figure 5.
[42] Daniel et al., *Magnetic Recording: The First 100 Years*, 43.
[43] A 1949 advertisement for Webster Chicago Model 80, a "complete portable wire recorder," is listed at $149.50. Accounting for inflation, the machine would cost $1,373.84 in 2010.

use by reporters in the battlefields of World War II. Citing the durability and portability of the machine, the Armour wire recorder was immensely popular within the Armed Forces Radio Service.[44] In both radio broadcast and, in some cases, motion picture presentations, wire recorded local sounds became a commonplace element of the news.[45] Following the war, use of wire recordings continued, capturing important national events, such as the Republican National Convention of 1944,[46] for later radio broadcasts.

There is little evidence pertaining to the home-use of wire recording in the years following World War II. While the tangible evidence may be missing, it is easy to assume that wire recorders in the home, for those who could afford it, were quite popular due to the novelty of the machine. Prior to the manufacturing of consumer grade wire recorders, the ability to record sound at home was limited to phonographs that cut 78-rpm acetate discs.

Advertisements of the time, offer an idea of the intended at-home uses of wire recording, mostly addressing the novelty aspect of the recording mechanism. A 1947 advertisement for Webster Chicago's Model 80 Wire Recorder suggests the following uses: recording children's voices, recording radio programs for listening later,[47] dictation by business executives away from the office, note-taking and shopping list creation for housewives, and recording sound accompaniment for home movies.[48] In these suggested

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[44] Morton, "Armour Research Foundation," 221.
[45] Morton, "History of Magnetic Recording," 347.
[46] NYU—Dept. of Media, Culture, and Communication, "Wire recording," *Dead Media Archive*, Last modified April 8, 2010, http://cultureandcommunication.org/deadmedia/index.php/Wire_Recording.
[47] The advertisement even suggests, "judicious us of the erase feature," to eliminate commercials and the compiling of a radio library.
[48] Van Praag, *Evolution of the Audio Recorder*, 69.

applications, the advertisers are unknowingly describing the uses of magnetic recordings following the obsolescence of the format they are trying to sell.

Magnetic Tape and Wire recording Obsolescence

At the same time as wire recording was reaching its peak popularity among the public, magnetic tape peaked the interest of the researchers previously responsible for the improvement of wire records. Magnetic tape recording's antecedents were the many steel tape recorders created throughout the first 40 years of magnetic recording's history. Tape recording, as it is now known, originated in Germany in the 1930's. An independent inventor, Fritz Pfleumer, created recordings using lightweight paper tape coated with a thin layer of magnetic particles. In 1935, his Magnetophone was presented to the world, and while the machine's sound was mediocre, it spurred further research into this possible format.

By the end of World War II, knowledge of tape recording was widespread, but not commercially viable. The Germans advanced tape technology, plundered by the British and Americans, spurred American companies to manufacture their own magnetic tape technology, mainly Armour Research Foundation and its biggest rival the Brush Development Company.

As early as 1939, the Brush Development Company began research into the use of magnetic recording. Under the guidance of expatriated German, Semi Begun, the company pursued the use of steel magnetic tape, but by the end of the war the company turned its focus solely to particle tape based recorders.[49] Released in 1947, the BK-401

[49] Daniel et al., *Magnetic Recording: The First 100 Years*, 40.

"Soundmirror" was the first magnetic-particle based tape recorder available in the United States. Initially, the "Soundmirror" was a success, selling steadily for five years,[50] but sales in the commercial market were low, due to the expensive $230 price,[51] and Brush was unable to sustain a profit, and stopped selling directly to the public.

The competition presented by Brush's magnetic tape and the increased interest of licensees in the new technology, led Marvin Camras and Armour Research Foundation to pursue the creation of their own magnetic-particle based recording system. By 1946, Camras completed an experimental tape machine based on his research in magnetic particle recording.[52] Armour's foray into magnetic tape recording was tentative, as they began to realize that many of their licensees might no longer be bound by their contracts with Armour for the creation of new machines. Magnetic particle recording became competition as the introduction of German technology to the U.S. led to the creation of new recording machine manufacturers and marketers.[53] By the beginning of the 1950's, Armour began to see its licensee program crumble as magnetic tape began to dominate the industry.

A decade after its introduction to the public, magnetic tape effectively replaced wire recording in all functions. With the burgeoning consumer culture of the 1950's, wire recording became the outmoded form of sound recording. The novelty of sound recording on wire became commonplace and never caught on as a hobby as the industry hoped it would. As higher quality, cheaper tape recording options became available, the wire dictating machine was replaced. Particularly detrimental to the medium's prosperity was

[50] Clark, "Magnetic Recording Industry," 274.
[51] Ibid., 280.
[52] Morton, "History of Magnetic Recording," 359.
[53] Ibid., 365.

the trend of high fidelity stereo equipment. As turntables and LP's replaced the radio, the unavailability of pre-recorded sound—music or otherwise—on wire turned consumers away. The consumer's fascination with magnetic particle recording would last for decades compared to the short seven-year period of interest in wire recording.

Wire recording represents only a minor stepping stone towards the greater, and far more popular, technology of magnetic tape. The potential impact of Valdemar Poulsen's initial discovery, tampered by the commercial failure of the Telegraphone, is vital in understanding the origins of magnetic recording, but the wire medium is only a curiosity in the history of magnetic recording. Does the blame for the initial and subsequent short-lived popularity of the medium fall on the companies who failed to manage it commercially? Certainly. But, ultimately, wire recording is another example of the rapid obsolescence of technological advancements in the 20th Century.

Appendix

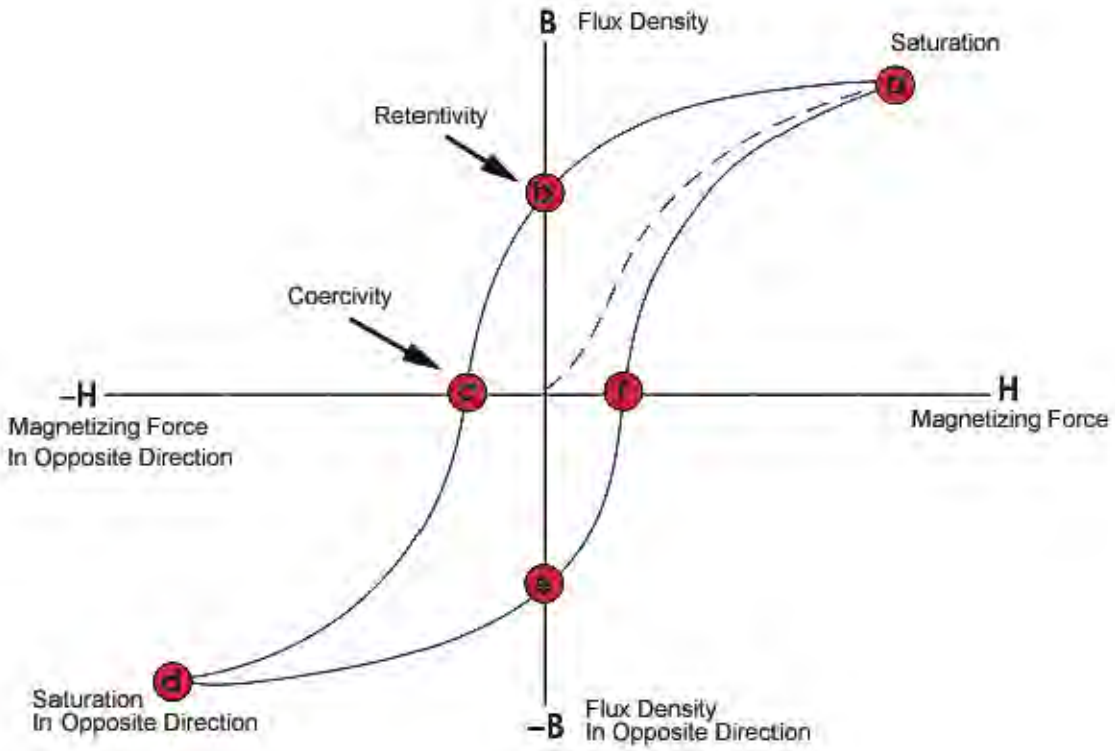

Figure 1[54]

[54] Image via: http://www.ndt-ed.org/EducationResources/CommunityCollege/MagParticle/Graphics/BHCurve.gif

Figure 2[55]

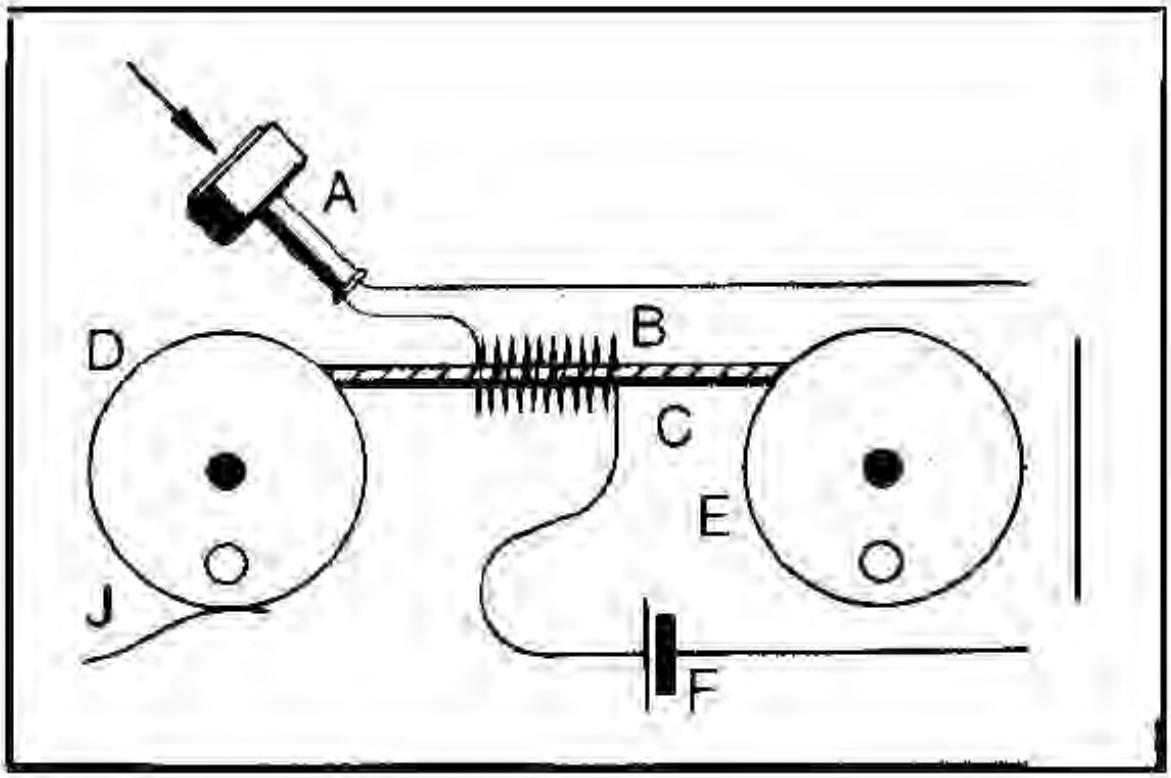

Figure 3[56]

[55] Image via: http://www.videointerchange.com/images/WireSplicing.jpg
[56] Image via: http://homepage.mac.com/oldtownman/recording/images3/88388.jpg

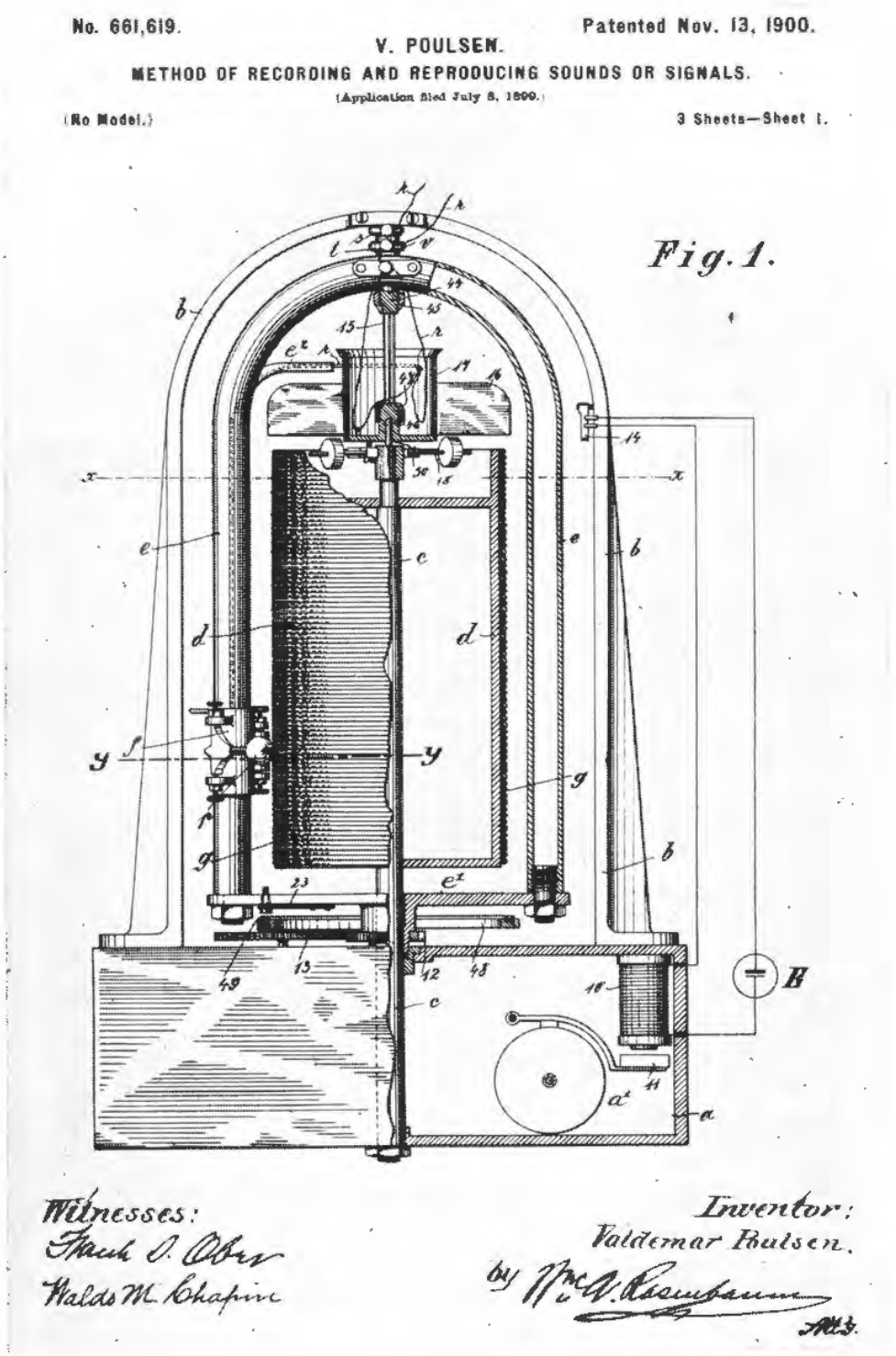

Figure 4[57]

[57] Image via: http://homepage.mac.com/oldtownman/recording/images3/fig011.jpg

QuickTime™ and a
decompressor
are needed to see this picture.

Figure 5[58]

[58] Image via: http://www.webster-chicago.com/80.jpg

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