MAGNETIC WIRE RECORDINGS

MAGNETIC WIRE RECORDINGS:
A MANUAL INCLUDING HISTORICAL BACKGROUND, APPROACHES TO TRANSFER AND STORAGE, AND SOLUTIONS TO COMMON PROBLEMS

BY GRETCHE K Ing(1998)

PREFACE

In this manual I have compiled an introduction to and history of magnetic wire recording technology, a description of common problems associated with it, and “how to” instructions for transferring magnetic wire recordings to modern media. This information will be valuable to anyone interested in learning more about this dead media.

In the course of my research, I found some information on the history of wire recordings, but very little on the processes involved in transferring them. The information in this manual comes from the hands-on experience of private collectors, librarians, and sound archivists. Their cooperation has been valuable throughout my research, so I am very appreciative for the time they spent answering my questions.

I would like to thank David Morton for allowing me to include the timeline he compiled about the history of magnetic wire recordings and for all his help. I would also like to extend my gratitude for the assistance given to me by John Howell, Judith A. Gray, and Gerald D. Gibson at the Library of Congress, Michael Biel, John Gibbs at the University of Washington, Graham Newton, Stig L. Molneryd at the Arivet for ljud och bild, Jim Lindner at VidiPax, Neal McChristy, Barry Coward at FAME, Albrecht Haefner of IASA, and the Archives of Traditional Music at the University of Indiana. I would also like to thank Laurel Sercombe, my instructor at the University of Washington, for inspiring this project.

CONTENTS

PART ONE
A Brief Introduction to Wire Recordings .................................................................

How does a wire recording work? -- What is the difference between stainless steel wire and stainless steel recording wire? -- What were wire recordings used for? -- How did wire recordings compare to other formats? .................................................................

PART TWO

A Brief History of Wire Recorders (Link to David Morton's website). ................

PART THREE

Transferring Wire Recordings .............................................................................

Some thoughts on building a new machine, adapting a tape player, and transferring acoustically -- Patching a wire recorder into a dubbing machine -- Cleaning the head -- Adjustments -- Threading the take-up reel -- Playback -- Rewinding -- Storage -- Transfer ..........................
PART ONE: A BRIEF INTRODUCTION TO WIRE RECORDINGS

VALDEMAR POULSEN (1869–1942)
INVENTED THE TELEGRAPHONE IN AUGUST 1898

HOW DOES A WIRE RECORDING WORK?

Vlademar Poulsen invented the Telegraphone, the first wire recorder, with "strung-out piano wire and a primitive electromagnet connected to a microphone" (Jorgenson:1988:7). By passing the electromagnet over the wire as he spoke into the microphone, Poulsen created the first wire recording. All magnetic recordings (whether wire, tape, or disc) follow the same principle. As magnetic material is drawn past the recording head, it becomes and remains magnetized (Read 1952:31).

WHAT IS THE DIFFERENCE BETWEEN STAINLESS STEEL WIRE AND STAINLESS STEEL RECORDING WIRE?

"Fidelitone," a maker of wire recorders, compiled a list of the differences between wire used for recording and wire used for other applications (Read:1952:185). Their comparison is summarized here:

1) Recording wire is manufactured for recording purposes only, whereas regular wire has many applications.

2) Recording wire is produced from "selected stainless quality alloy rods" and has no physical or chemical defects (ibid.). Regular wire is manufactured from "stainless steel rod that is 'mine run' and has inherent properties" (ibid.).

3) In recording wire the magnetic and electrical traits of the wire are positively controlled whereas they are not in regular wire.

4) Recording wire is produced for use by "non-professionals -- those using wire recorded in homes, schools, offices, etc." (ibid.). Regular wire is manufactured for professional use by "craftsmen manufacturing coils, springs, watches, metal cloth, etc." (ibid.).

5) Test methods differ for each kind of wire. Recording wire is checked for satisfactory operation in playback and recording modes, whereas regular wire is tested for its strength and chemical properties.

6) Recording wire is cleaned in its final stage of production, whereas regular wire is not.

WHAT WERE WIRE RECORDINGS USED FOR?

The United States army used wire recorders for entertainment and reporting purposes. The army made records of air battles and the 13-day struggle for Saipan (Wilson 1950:Nos. 134, 136). Marines recorded the landing operation on Bougainville (No. 139). Wire recordings were marketed for offices as dictation and telephone answering machines, for office management, correspondence, and for conference recording (ibid.: No. 98). For homes, their use ranged from recording records and radio to letters to soldiers away from home and letters from soldiers to home. Wires were also used in store windows, showroom displays, for voice test, and to attract audiences to booths at sales conventions (No. 199). Wire recordings were used in Vancouver, British Columbia, for exterminating rats (No. 338).

HOW DID WIRE RECORDINGS COMPARE TO OTHER FORMATS?
Early this century ethnomusicologist Carl Stumpf expressed genuine joy over Poulsen's telegraphone in his article "Tonsystem und Musik der Siamesen." He felt that the telegraphone had "considerable advantage over the phonograph in its ease of operation, its ability to capture high and low range, its clarity, and the increased duration of recording time it allowed" (Tuttle:1996:14). Manufacturers of wire recorders echoed Stumpf's praise in the advertising of their devices. Wiremaster proclaimed that "the wire will not break, no matter how often or how abruptly the motor is switched from 'play' to 'rewind'... [and] may be replayed or erased countless times without affecting the quality of the recording" (Audio Engineering:April 1948:34). The Pentron Corporation asserted that cost was the most attractive aspect of its wire recorder, named "Sonograph." When "comparing cost, it is noted that wax dictation cost about 40 cents per hour, disc dictation cost about 6 to 12, whereas the Sonograph cost only .005 cents per hour" (Audio Engineering:March 1950:27). Oliver Read includes a thorough comparison of magnetic recording wire and magnetic recording tape in his book *The Recording and Reproduction of Sound*, examining everything from physical characteristics and cleaning the heads to editing and storing of each medium.

---

### PART TWO: A BRIEF HISTORY OF WIRE RECORDERS, COMPILED BY DAVID MORTON


### PART THREE: TRANSFERRING WIRE RECORDINGS

Transferring wire recordings can be approached many ways. Someone without a wire recorder may wish to adapt a tape player to extract the sound from the magnetic wire recordings. However, this method will not do justice to the wire recording because of the differences in the way the heads are designed on tape recorders. I proposed this idea of building a machine or adapting a tape player and received some interesting answers.

David Morton: "An older tape recorder (of the reel to reel type) could probably be modified to run at 2.5 feet per second (the normal speed for wire-- most tape recorders ran at 7.5 inches per second or slower). But the heads would be a problem. Tape recorder heads will work with a flat, ribbon-like medium where the recording is physically spread wide and thin over the surface of the tape. Tapes themselves are made of a plastic base with a magnetic coating, so the recording is only on the surface of one side of the tape. Wires are recorded all the way through and all around. Wire recording heads are V-shaped, and the wire runs in the crotch of the V. The magnetism from the head completely penetrates and surrounds the wire. Further, both types of heads are precision-made products. Nowadays tape heads are cranked out on machines, but very precise machines. To build one by hand requires a jeweler's lathe, a loupe, and a lot of patience. These heads are no longer available for sale, either. On the other hand, wire recorders are still readily available from collectors for low prices -- typically 75-150 dollars in fine, working condition. Any archive contemplating a transfer project could hardly even consider building a wire recorder for less than that."

Michael Biel: "It would be very difficult for someone to start from scratch and build their own mechanism to play wires. It is a fairly complicated machine. But it would be no trouble to bypass the original amplifier in a wire recorder and connect the head directly to a modern amplifier. But the input circuit would have to be designed to take the exact level and impedance that was generated by the original head, and there would have to be a recalculation of what the original equalization curve of wire recording was. It probably would not work with a stock amplifier--Theoretically it would be best to rebuild a new amplifier to get the lowest noise specs, but if you only have a small number of wires to dub then it would be an expensive exercise for just a few items. With dozens or hundreds of wires it might be worthwhile. The old amps from those machines were very noisy, and are much worse now that their parts have aged so much."

Jim Lindner: "Again, there are some things that one can do themselves and others that require outside expertise and equipment, this is one that needs to be done by expert help and with very specific unique equipment. So although it [building a new machine] may sound like a good idea, in fact it is better to send it to the experts for these types of things - this is true for lots of things in the sound area such as transcription recordings, wax cylinders, dictation belts and other esoteric formats."

However, someone that does have a machine could place a microphone next to the amplifier. This method would record the sound acoustically, but the quality of the recording would be very poor. Perhaps the best method is the one incorporated by most of the individuals that I spoke with, which patches the wire recorder into a dubbing machine. If the wire recorder does not have a patch cord you have to record acoustically.
However, you can try to find a chord that matches your plug. Consider the following information, provided by David Morton, regarding the availability of these chords.

“There were two or three types of audio plugs commonly in use in the late ‘40s, one of which is no longer available new, one of which is tough to find, and one of which is still used. Without boring you with the gory details, the totally unavailable one is a plug with a screw-on fitting. The one that is tough to find, but still available has two or three prongs. The easy to find has a single prong right in the middle.”

The following information may sound rather simple, but there are certain steps that should be followed when working with magnetic wire recorders. Below are step-by-step instructions covering the processes involved in transferring magnetic wire recordings.

**Cleaning the head**

Be sure the groove of the record-playback head is cleaned. Original manuals suggest using a stiff brush (such as a toothbrush) or a cloth moistened with tetrachloride, but rubbing alcohol can be substituted.

**Adjustments**

Most models suggest adjusting the brakes properly before playing the wire spool. This will prevent the wire from running loosely during rewind. In many cases the wire recorders found today are not accompanied by the instructions for this adjustments. Trying to find an original instruction booklet can be a impossible task, but antique technology shops might have what you need. I suggest referring to the Sam's Photofact Folder created for your model. These folders, published by Howard Sam's & Co., contain instructions for adjustments, as well as lubrication information, parts list, and schematics which may be helpful.

**Threading the take up reel**

**Step 1:** Turn on the machine, most models take a few minutes to warm up.

**Step 2:** Next, turn the take up reel until the head assembly is at the top of its travel.

**Step 3:** Leader should be added to the wire if it is not already. Thin nylon fishing line or linen thread are typically used to attach or thread the wire to the take up reel. Some wires have a plastic leader that is wider than the inside of the flanges and has serrated edges to act as a self-threading leader that will attach itself to the take up reel. Michael Biel suggests that if this is used make sure it is perfectly flat around the whole spool because it otherwise would affect the speed consistency.

**Playback**

*Please refer to Step 1 of “Transferring” before playing your wire recording.*

**Step 1:** Turn the record/listen/play switch to the desired mode. For different machines this process will involve different steps. For example the Webster model 80 involves only switching the “record-listen” switch to “listen” and adjusting to volume.

**Rewinding**

**Step 1:** Turn switch to rewind. Be sure that wire winds evenly on the spool, consider this illustration which accompanied a Webster model 80 wire recorder.

Consult the “Trouble Shooting” section of this manual for solutions to problems that can occur during rewind.

**Storing**

**Step 1:** After proper rewinding, the spool should be stored in an acid-free paper box in a temperature and humidity controlled area. There is no standard temperature or humidity, but most collectors store their spools at a temperature between fifty-five to sixty-five degrees Fahrenheit and a relative humidity of thirty to forty percent.

**Transferring**

Deciding on the media you want to transfer the wire recording to is entirely up to you. Cassette tapes are most often used by individuals who would like to play the recordings on their home stereos. However, many
archives transfer their recordings to 1/4" inch reel-to-reel tape. Most wires play for one hour, which fits one 10 1/2" spool of 1/4" tape (1.5 mil) at 7 1/2 IPS.

Step 1: Patch the wire recorder into a dubbing machine before you play the recording. Record the wire even if you are only checking to see if you adjusted the machine properly. This recording is a safety net for any number of mistakes that can happen during the initial play-back.

Step 2: Dub the recording and do not worry about the speed at which the wire is playing-back because speed adjustments can be made on the dubbing machine.

Step 3: Date and label all transfers. For future reference consider keeping notes about the process and a brief description of the recordings content.

PART FOUR: TROUBLESHOOTING

The common problems associated with magnetic wire recordings usually have simple solutions. I have proposed many kinds of problems with this media and received some interesting responses from people who have had these experiences.

Rust

Up until World War II, recordings were made on steel wire which can rust. Although these recordings are rare to find, rust can be a factor if you happen upon these recordings. I inquired about solutions to rust on magnetic wire recordings and although many of the people I spoke with never had this problem I did receive some interesting answers. Below is the best information I received concerning this problem.

David Morton: "First of all, you should make absolutely sure that it is rust and not just some kind of dirt. It's actually quite unusual to find one of the wires that was not made of stainless. Unwind a loop or two and scratch at it a bit with your fingernail or try just wiping it. If it is rust, you have a couple of options. If the rust is bad, you may just be out of luck. The wire is so fine (about .004 inches) that a little rust will weaken it too much to repair. If it's just on the surface, you can remove it through abrasion-- try super fine steel wool, or perhaps something even finer.

The rust actually won't seriously affect the playability of the wire, but it is more abrasive than the unrusted wire, so that it will wear the recorder heads out quickly. It may also flake off and build up on the heads if you try to play it, but that can of course be removed. You'll have to use your own judgment of course, but if you've got a really precious recording that you want to play, and the spool of wire has a localized patch of rust that is extensive enough to have weakened the wire in spots, you may still be able to salvage the recording. The speed of the wire is so high (2ft/sec) that it is possible to cut out a bit of it, tie a knot in the wire, and have a recording that is almost as good as new. However, this is very tedious work."

Print-through

Print-through is most often associated with magnetic tape, but some of the individuals that I spoke with reported this problem with wire recordings. Stig L. Molneryd defines print-through as unwanted sound and/or background noise in a magnetic recording caused by the signal transferring from one level to the next in a tightly wound spool.

Jim Lindner: "Print-through is the transfer of an area of high magnetic energy to a low area-- once it has occurred it is irreversible. Storing tails out will help somewhat, but is actually more effective with magnetic tape because the physical proximity is far away-- when everything is stored on a reel in a wire the proximity is very, very close which makes for very bad print-through no matter what you do-- but I agree that it is better to store tails out."

Breaks, tangles, and snarls

These are the most common problem associated with wire recordings; however problematic, their solutions are fairly simple.

Michael Biel: "Snarls and tangles are my worst problem. I am not sure if there is a cure for these because it is impossible to know what is the TOP layer of wire to try to unravel. If you start unwrapping an under-layer it makes things worse. Patience is the only answer."
If a wire does break the most often implemented solution is to join the two broken ends into one secure knot. Remember that most wire recorder run at two feet per second, so a knot will only cause the loss of a small amount of the recording.

**BIBLIOGRAPHY**


Read, Oliver. 1952. The Recording and Reproduction of Sound. Indianapolis: Howard Sam's & Co.


The University of Washington acknowledges the Coast Salish peoples of this land, the land which touches the shared waters of all tribes and bands within the Suquamish, Tulalip and Muckleshoot nations.

School of Music · University of Washington · Music Building, Box 353450 · Seattle, WA 98195
Telephone: (206) 543-1201 · Email: musinfo@uw.edu

Copyright © 2013-2020 University of Washington · Privacy · Terms · Site Map · Contact Us

Source URL: https://music.washington.edu/magnetic-wire-recordings