

# PRESERVING OUR MUSICAL HERITAGE

## A Musician's Outreach to Audio Engineers\*

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Historically we have been imprinting sound onto one medium or another for over 110 years. The first person to capture sound in the field was the ethnographer Jesse Walter Fewkes who, on March 15, 1890, walked out into a field in Maine to record a Passamaquoddy Indian harvest song.<sup>1</sup> His medium was wax; his recording device of choice (there were no others at the time) was an Edison wax cylinder, very similar to the Singer pedal sewing machine, in which one drives a belt with repeated foot movement. Since that fateful day we have imprinted sound on tin, wire, glass, acetate, and magnetic tape. Each of these media has its own set of problems: impurities in manufacturing, innate poisons in the substances, exposure to air, and improper storage conditions that lead to decay and rot. Ultimately the death knell is sounded for all of these recordings. Thus digitization and preservation become a race against time for the serious musical archaeologist and preservationist. Will the race be won? Perhaps, if we can:

- 1) Inventory our collections.
- 2) Make the difficult aesthetic choices on what to preserve.
- 3) Identify the technologies that will enable affordable preservation.
- 4) Communicate the technical innovations to the music and library communities in understandable form.
- 5) Expand preservation grant programs that will focus on our sound and music heritage.

Only when the situation is understood by the multiple communities involved

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<sup>1</sup>“Song of Salutation,” recorded in Calais, Maine, on 1890 March 15 by Jesse Walter Fewkes, Archive of Folk Culture.

do we have a chance of winning or even matching strides with the ravages of time—a most worthy opponent. And a worthy opponent deserves a well-planned strategy and fearless commitment to the fight.

Although the Phonogrammarchiv in Vienna is the world's oldest sound archive,<sup>2</sup> we need to look to the film industry for examples on how to create public awareness of preservation issues. They have the lead on the audio field as far as public awareness and industry consciousness of preservation are concerned. The American Film Institute was created in 1967 to advance and preserve the art of the moving image.<sup>3</sup> By 1984 the National Center for Film and Video Preservation<sup>4</sup> was created, and from that came the National Moving Image Database, the Film Foundation, and the Digital Archive. As of 2001, the National Film Preservation Foundation (NFPF) offers three types of grants supporting film preservation and access projects:

1) *Access Grants*: The goal of this U.S. federally funded program is to pre-

<sup>2</sup> Austrian Academy of Sciences, Phonogrammarchiv, Dietrich Schüller, Ed. (2000); <http://www.pha.oeaw.ac.at/>.

<sup>3</sup> President Johnson signed the National Foundation of the Arts and the Humanities Act of 1965. The legislation created the National Endowment for the Arts, which established the American Film Institute as an independent nonprofit organization dedicated to: preserving the heritage of film and television, identifying and training new talent, and increasing recognition and understanding of the moving image as an art form; <http://www.afionline.org/>.

<sup>4</sup>The National Film Preservation Foundation (NFPF) is a nonprofit organization created by the U.S. Congress to save America's film heritage. Working with archives and others who appreciate film, the NFPF supports preservation activities nationwide that ensure the physical survival of film and improve access to film for study, education and exhibition; <http://www.filmpreservation.org/about.html>.

sent, interpret, and make accessible preserved films in archival collections and, in doing so, demonstrate the cultural and historical value of American film and film preservation. Of particular interest are projects that bring preserved films to new audiences or communities.

2) *Laboratory Grants*: These federally supported grants fund laboratory preservation work on endangered films.

3) *Partnership Grants*: These grants distribute preservation services generously donated to the NFPF by laboratories and postproduction houses that work in partnership with the archival community.

These programs are useful models for the audio community. They function on multiple levels to:

- Increase public awareness.
- Fund scientific and technical research in the field of preservation.
- Provide funding for preservation.
- Provide funding for training in preservation technologies.

Recently U.S. House Resolution (H.R.) 4846 established the National Recording Registry in the Library of Congress to maintain and preserve recordings that are culturally, historically, or aesthetically significant, and for other purposes.<sup>5</sup> The Audio Engineering Society (AES) will have a representative on the registry board.

We are just beginning to make other inroads. The American Folklife Center of the Library of Congress is entrusted with the digitization and preservation of the largest collection of indigenous music in the world. It is a daunting task, but a great challenge. With over one and one-half million hours of recorded material, the job is to identify the most endangered collections for

<sup>5</sup>Library of Congress, HR4846; <http://thomas.loc.gov/bss/d106query.html>.

preservation, restore them, and then, with intellectual property and copyrights willing, give access to the world through the Internet. Specifically, the Endangered Music Project<sup>6</sup> at the Library of Congress identifies, transfers, and subsequently digitizes the most endangered of their recordings for commercial release. Another innovative project is Save Our Sounds, a joint Library of Congress–Smithsonian initiative funded by the Save America’s Treasures Program.<sup>7</sup> Save Our Sounds engineers:

- Restore and preserve original recordings.
- Make digital and archival copies.
- Put select recordings on the Web and into CD form.<sup>8</sup>

Leadership is a critical factor: we have to assume responsibility for our own world; no one else will. We are archaeologists, preservationists, activists, but mostly, we are lovers of sound. We must also be you, the audio engineers, who can design and build the tools we need. We must also be you, who can implement the technologies to distribute the music so that it will be accessible to future generations. We all must become teachers. Our first job is to educate ourselves, our governments, and the public at large to pull together and preserve this wellspring, this talking book of folk song.

What is folk song? Folk song is the celebration of life in sound. As you know, most of these aural traditions have recorded their history in song and dance. So, in essence, these are perhaps humanity’s greatest invention and also a repository of all the dreams, the history, and the hopes of the past, the present, and the future. These sonic masterpieces become valuable beyond measure. To allow their demise would be unacceptable. Can we stand together and declare as one—this shall not be lost without a fight. This is why you, the engineers, are so critical to this cultural quest—once these recordings are lost, they are lost forever. We, the engineers and preservationists and lovers of sound, will be the ones held accountable and responsible for the future of this legacy. We must

protect this resource. Without our voices and music and art, we are bankrupt as a society.

The sure way to success is not only to educate ourselves and the public, but to be proactive in this project. Whenever we have the attention of our elected representatives and agents, we must bring up this subject, present the facts, and secure their support. We must become lobbyists for the archives. We are their voice, and we must tell their story to everyone who can listen.

Can preservation and digitization be good business? Indeed, and the Grateful Dead is a good example. For nearly 30 years we recorded almost every show, over 2400 performances. Now we are at a point where many of our tapes are decaying, and so we are in the process of preparing for mass digitization. Of course, when we talk of the digitization process, it is not just a simple “let’s-throw-it-into-the-digital-domain.” Proper analog-to-digital conversion, Sonic Solutions preparation (see Fig. 1),<sup>9</sup> and careful handling and storage of the source tapes will be necessary to provide for an uplifting and accurate view of these memorable artifacts.

A number of prized tapes in the Grateful Dead vault (Fig. 2) were recorded during the years between 1976 and 1981. Much of the magnetic tape<sup>10</sup> manufactured during that period of time has exhibited a problem called shedding. When those tapes are played, they will either squeal loudly as they pass through the tape guides, or they may not play for longer than a few seconds. The problem is mainly due to the use of the polyurethane binders that were introduced with the Ampex 406/456 series of tapes. With the stress of time and humidity, the binder absorbs moisture. The urethane reacts with moisture, migrates to the surface of the tape, and becomes a

<sup>9</sup> Sonic Solutions is the Grateful Dead digital audio workstation. From here all sound-file editing and manipulations as well as metadata documentation can be done.

<sup>10</sup> The Grateful Dead has had problems specifically with Ampex 206/207 and Ampex 456. Scotch 206/207 which was also in use at that time has not exhibited a shedding problem.

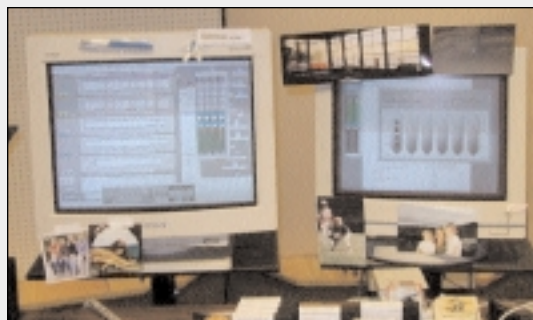


Fig. 1. Sonic Solutions digital audio workshop.



Fig. 2. Early vault at Grateful Dead Productions.

sticky residue. The end result is that the tape is unplayable.

The situation can be corrected very simply by baking. We have a custom-built convection oven (Figs. 3 and 4) that keeps a constant temperature ( $\pm 1/10$  of a degree over a specified time). We can bake a number of tapes at a time (four 10-inch reels of 2-inch tape or ten 7-inch reels of 1/4-inch tape). We bake them for 12 hours at 130° F, with 30-minute warm-up and cool-down times. The oven does not really need to be very elaborate. Any commercial convection oven and timer can be used. The temperature and time of baking can be varied slightly, although it is safer to go longer with a lower temperature.

Jeffrey Norman at Grateful Dead Productions (GDP) used the recommenda-



Fig. 3. Convection oven used for “baking” at Grateful Dead Productions.

<sup>6</sup> <http://lcweb.loc.gov/folklife/tyko.html>.

<sup>7</sup> [www.saveamericatreasures.org](http://www.saveamericatreasures.org).

<sup>8</sup> [www.saveoursounds.org](http://www.saveoursounds.org)



**Fig. 4.** Tapes inside convection oven at Grateful Dead Productions.

tions of Fred Layn,<sup>11</sup> who was an Ampex product manager and then sat on the ANSI (American National Standards Institute) board. Norman has achieved a 100% success rate with the current setup.

The benefits of the baking process will last approximately 30 days, but it is best that the tape be used as soon as possible after baking. In a very few instances, a second baking may be necessary under a particularly difficult condition, but so far we have been able to retrieve everything we attempted. We have also been able to rebake months after the initial baking (and thus after the benefits have worn off), but we do not know how many times the process will work. We always back up to as high a resolution as possible, as well as making reference CDs and/or DATS.

GDP engineers also take a number of other steps in the preservation process. These steps include:

- Restoration and optimization of playback equipment.
- Climate-controlled storage.
- Triage of endangered materials.

All analog tape is played on a fully restored Ampex ATR 102 two-track tape machine. This machine has been restored by Mike Spitz of ATR Service Co., York, PA, USA. This system has the ability to handle fragile tapes and fulfills the sonic requirements.

All masters are stored in a climate-controlled vault (Fig. 5). The vault is a 2000-ft<sup>2</sup> double-insulated, sheetrocked, and air-conditioned secure room. The temperature is maintained at 69° F degrees, and a relative humidity of less

than 50%. The entire room is protected by an Inergen fire-suppression system. (Oxygen is replaced by an inert gas and thus fire is extinguished without water damage.)

Currently new masters, that is, masters to be sent to manufacturing, are created on a Sony CDW-900E through the Sonic Solutions workstation. They are HDCD (high-definition compatible digital) -encoded 16-bit, 44.1-kHz CD-Rs. Once masters are created

(usually several sets), the project is archived to DA98 (through a Prism 2024T bit splitter) with 24-bit, 44.1-kHz sampling.

We are also in the process of preparing for mass digitization. When archiving a tape that is not currently intended for public release (or sale), our standard procedure is to identify the most fragile tapes and back those up first. Ironically, in this digital age these are the earliest digital forms (DAT and PCM). They are backed up as audio files to DA98, DAT, and CD-R through an Audio Alchemy dejitter box, which ensures accurate times between samples. When we get our final archiving system completed (see next paragraph), we will archive as data files. When that system is complete, analog tapes will be archived to 192 kHz, 24 bit.

Currently we believe the best method would be to use our 192-kHz, 24-bit converter and the Sonic Solutions workstation to create WAV data files, not audio files. These can then be stored on LTO (linear-tape open) cartridges or on some optical medium such as DVD-R. During the process, a number of CD, DAT, and MP3 versions can be created for listening and for downloading purposes.

Once the body of work is digitized, individual songs as well as entire shows can be custom burned for our audience. If someone wants 800 versions of “Truckin” or “Drums in Space,” or even just audience applause, they will be able to customize their own perfect performance. This accomplishes several things: it preserves our legacy to our children’s children and the audience at large and it advances the technology and

moves the medium forward toward greater interactivity. It preserves an important personal record.

This is a very personal body of work. The Grateful Dead’s musical legacy encompasses the group’s personal experiences as well as a record of our spiritual journey on this planet. And we are only one band. There are countless other musicians and composers who have vaults of their own and who need to preserve their aural gifts and history. They need an affordable, easy-to-use technology, repository, and distribution system. That is why audio engineers are so important. CDs will be made, downloads will be delivered with high-level streaming, people will get what they want, and musical history will be served accurately.

The Internet was given to us for this service. Unlike other methods of distribution, the Internet allows for economical pathways for these low-volume recordings. This is a new model. In the old model, record companies would need huge inventories of recordings to flood the pipeline. With the Internet, custom orders can be made in 24 hours. Indigenous music will have the advantage of the new economic realities of the twenty first-century music distribution system. It has the ability to cross-pollinate and cross-access from dance to music to historical text to in-depth liner notes. This rich confluence will happen through Internet access.

In the digitization process, preser- ➔



**Fig. 5.** Vault at Grateful Dead Productions.

<sup>11</sup> Personal Communication.

vation and access go hand in hand. Why preserve if there is no access? You should be aware that there are repositories of indigenous music in the attics of homes, museums, libraries, and warehouses all over the world, and through Internet digital distribution we can link all of these far-flung outposts and create a world archive and database. We can cull the world's archives to identify the most important and valuable collections and make them available. This will also correct the current duplication of effort, as many of these archives are holding duplicates and triplicates of the same or similar materials.

The process described here is not a simple one. Not all cultures have the same concepts of access. In some cultures, music can only be accessed by way of an intermediary source, whether it is a person or an institute set up by that particular culture. Many cultures are very protective of their most prized possessions, their oral history in song and story.

Affordable technology must be developed and made available for all archive markets, whether they be national institutions, musical groups, schools, individual collectors, scholars, or other interested parties. The AES should be the leader in this timely movement. AES members must provide the guideposts to the future. You must give a portion of your time and energies to this task. It is not only the right thing to do, but also good business in that it will provide a greater service to the world. This is not just another bottom-line business operation. It never was and never will be. I remember when this indigenous or tribal music was considered less than real music. It was called race music, third-world music—all derogatory terms to designate subclasses of popular or classical music. I quote virtuoso pianist and folk-song collector Percy Grainger from 1933: "I firmly believe that music will someday become a 'universal language.' But it will not become so as long as our musical vision is limited to the output of four European countries between 1700 and 1900. The first step in the right direction is to view the music of all peoples and periods without prejudice of any kind, and to strive to put the world's known and available best music into cir-

culatation. Only then shall we be justified in calling music a universal language."

People are beginning to understand the value and worth of centuries of music making and instrument building, both being recognized as bona fide cultural treasures. This is a good thing. We have the opportunity to balance the ledgers with indigenous cultures by addressing issues of authorship, copyright, and ownership so that we may repatriate to these cultures the music that was appropriated from them during colonization, war, economic pressures, and missionary invasions. This will allow different cultures to reclaim their music, to utilize it in their educational systems, and perhaps even to generate revenues from its distribution. Again, the Internet is a powerful tool that can help provide these corrections to history and put this music in its rightful place.

We know we have over 100 years of recorded sounds, which translates into many petabytes of data.<sup>12</sup> Librarians, archivists, and private collectors face

many challenges. These include:

- Identifying what recordings to save.
- Establishing the aesthetic and technical criteria for preservation.
- Specifying the process so that engineers can estimate the cost of preservation.
- Organizing to get volume discounts for collections.

Some of the engineering challenges include:

- Publishing lists of resources of playback equipment.
- Maintenance of playback equipment.
- Establishing reasonable rates for public archives and libraries.
- Developing metadata standards for improved retrieval.

Restoration can be a good business if managed intelligently. It is also a cry from the heart.

<sup>12</sup> E. Cohen, "Folk Heritage Collections in Crisis," in *Preservation of Audio* (U.S. Library of Congress, Washington, DC, 2000 Dec.1).



## THE AUTHOR

Mickey Hart is best known for his nearly three decades as an integral part of an extraordinary expedition into the soul and spirit of music, disguised as the rock and roll band the Grateful Dead. As half of the percussion tandem known as the Rhythm Devils, Hart and Bill Kreutzmann transcended the conventions of rock drumming. Exposure to these exotic sounds fueled Hart's desire to learn about the various cultures that produced them.

His tireless study of the world's music led Hart to many great teachers and collaborators, including his partners in Planet Drum, which received the Grammy® for Best World Music

Album in 1991—the first Grammy awarded in this category.

Hart's lifelong fascination with the history and mythology of music is documented in three books: *Drumming at the Edge of Magic* (written with Jay Stevens and Fredric Lieberman), *Planet Drum* (with Fredric Lieberman and D.A. Sonneborn) and his 1999 offering, *Spirit into Sound: The Magic of Music* (written with Fredric Lieberman).

In 1999 Hart was appointed to the Board of Trustees of the American Folklife Center at the Library of Congress where he heads the sub-committee on the digitization and preservation of the center's vast collections. This has evolved into the fund raising effort "Save Our Sounds," of which Hart is currently chairman. In 2001 Hart was appointed by James Billington, the Librarian of Congress, to a seat on the Recording Preservation Board.