

GRAMMY MUSEUM® BASIC METHODOLOGY FOR PRESERVATION AND ARCHIVING OF RECORDED MEDIA

BACKGROUND

This document provides a general overview of the GRAMMY Museum's requirements and recommendations regarding preservation and archiving methodology for projects funded by the museum. A panel of experts convenes each year to review this document. As technology is constantly changing, at the writing of this document the following are recommended best practices.

A general response (by applicant) in the proposed project's methodology that states "current or standard methodology will be applied to the project" is not sufficient. Each applicant should detail specific methodology that pertains to the archiving of its unique material, even if that methodology deviates from the recommendations below.

The task of archiving recorded sound involves: identification, assessment, preparation, documentation, preservation and access. During this process, materials are often found to be unstable or compromised in which case the materials must also be stabilized and prepared for preservation by a qualified professional. When considering all these factors *in addition to digitization*, common formulas for calculating the amount of time to allocate for preserving a collection is three to four times the play time for most analog collections. When necessary, content and copyright verification must also be factored into the time estimate to complete the project (see grant guidelines for ownership and rights requirements https://www.grammy.org/files/pages/2016_preserv_guidelines_loi_final.pdf). Resources for assessment, preservation and access are available at the end of this document.

Preservation is a precise process. Professionals experienced with preparation of the source media, destination archival format and processes must be used. It is imperative that during the preservation process the best possible copy of the original source material is captured. All preservation and archiving projects are required to either consult with, or retain qualified specialists with knowledge of current standards of preservation for both planning and execution of the preservation and archiving project. This includes but is not limited to qualified sound archivists, audio engineers and preservation technicians. Also please note, while we understand it is prudent for many institutions to engage students and interns, a qualified supervisor is required to be on hand during the preservation process.

Applicants and their technical staff should be familiar with three documents provided by the International Association of Sound and Audiovisual Archives (IASA)¹.

- IASA TC-03 is recommended for collection managers and non-technical staff overseeing the project. This document gives an overview of basic methodology for archiving and preservation. http://www.iasa-web.org/sites/default/files/downloads/publications/TC03_English.pdf
- IASA TC-04 should be reviewed by technical staff for detailed technical methodology and standards. Collection managers and non-technical staff will also benefit from the first ten pages. <http://www.iasa-web.org/tc04/audio-preservation>
- IASA TC-05 should be reviewed by technical staff for detailed technical methodology and standards. Collection managers and non-technical staff will also benefit from this document. <http://www.iasa-web.org/handling-storage-tc05>

¹ Both of the above documents can be downloaded in various formats here: <http://www.iasa-web.org/technical-guidelines>

The following are a few recommendations and requirements for basic methodology. At the end of this document is a reference list of several preservation and archiving resources.

PARAMETER	IDEAL METHODOLOGY	MINIMUM STANDARD
Sampling frequency and bit rate	Analog to Digital - 192 kHz/24-bit If original source is digital, preserve <i>in the digital domain</i> at original sampling frequency and bit depth.	Analog to Digital - 96kHz /24-bit If original source is digital, preserve <i>in the digital domain</i> at original sampling frequency and bit depth.
File format	Open standard: Uncompressed Broadcast Wave Format (BWF). Allows easy conversion, migration and bundling of audio/video content and metadata.	
Recorded track configuration	<ul style="list-style-type: none"> • Flattened mono files for mono • Flattened interleaved stereo files for stereo recordings • Flattened multiple mono files for multi-channel 	

CONVERSION

- **All media must be monitored individually (1-to-1), either during initial digitization or as a quality control step; monitoring more than one tape, disk, etc. at a time during the archiving process is not acceptable**
- **Do not use Post-processing (including noise reduction) to create digital preservation master files (except for decoding of noise reduction systems such as Dolby or DBX)**
- **Do not use DAT** as an archival medium
- **Do not use individual hard drives** as the primary archival medium
- **Do not use cloud-based storage** as the primary archival medium
- **Do not use internal computer audio converters and sound cards** for analog to digital conversion
- **Do not use lossy compression formats (MP3, AAC, etc.)** as an archival format; however, they may be permitted for website and access² listening copies

Archival copies (also called preservation master files) are to be preserved flat (unprocessed), without any audio manipulation, dynamics, equalization (other than source machine alignment), before noise reduction decoding, if appropriate, takes place to preserve as much of the original sound information as possible. Organizations can provide listening copies that have been “cleaned up,” but these should be noted as such and stored as access audio.

Analog tapes should only be played back on tape machines that match the speed and format of the original recording and that are properly maintained, cleaned and aligned. Alignment of playback machines should be to original recording levels and tones when possible. If analog noise reduction “encoding” (such as Dolby or DBX) is employed on original recording, this should be aligned and “decoded” in the analog domain and captured as part of the archival version. Analog discs should only be

² While there is broad agreement on the term “Preservation Master”, the version of the files readily available for preview are called many things, including access, reference, use, convenience, etc.

played back on turntables with corrected speed and balance, historic playback equalization³, and proper styli for the disc type. If preserving analog discs, please review the ARSC or IASA documents (<http://www.iasa-web.org/task-force/3-technical-selection-criteria>) regarding the current best practices regarding flat (unprocessed) transfers and clearly detail your method in your application.

ARCHIVING

	MINIMUM STANDARD	IDEAL STANDARD
Digital media and Redundancy requirements	<p>Redundant Array of Independent Disks (RAID 1 or greater)*</p> <p style="text-align: center;">OR</p> <p>Automated Media Library (AML)* including continuous checksum monitoring</p> <p style="text-align: center;">AND</p> <p>An open source tape standard such as Linear Tape Open (LTO6/7) using LTFS or TAR software to write the tape</p> <p>Plus well-maintained playback equipment for the digital storage media and/or applications/equipment either properly stored or available for lease. Contents to be validated and migrated every 2-5 years.</p> <p><i>(1 selection from each is required to have a minimum of 2 copies)</i></p>	<p>Preservation master files stored in an OAIS (ISO 17421:2003) Compliant TRAC certified Trusted Digital Repository (ISO 16363). If your institution doesn't have a TDR, store files with a partner organization or service provider.</p> <p style="text-align: center;">AND</p> <p>An open source tape standard such as Linear Tape Open (LTO6/7) using LTFS or TAR software to write the tape</p> <p>Plus well-maintained playback equipment for the digital storage media and/or applications/equipment either properly stored or available for lease. Contents to be validated and migrated every 2-5 years.</p> <p><i>(1 selection from each is required to have a minimum of 2 copies)</i></p>

*If these resources are not currently available to you, you should consider partnering with a trusted digital repository (see page 4 in bold).

METADATA

Please refer to the following documents for an overview of this important subject.

<http://www.iasa-web.org/tc04/audio-preservation>

http://www.ala.org/alcts/sites/ala.org.alcts/files/content/resources/preserv/audio_metadata.pdf

³ Some professionals recommend digitization without playback equalization. This is acceptable if you can defend the choice in your narrative, provided it is clear to the user. If historic playback equalization is applied, you must note the equalization used in your metadata, along with playback speed and stylus size used.

<http://www.avpreserve.com/wp-content/uploads/2012/06/5-Tips-For-What-Not-To-Do-When-Creating-A-File-Naming-Structure.pdf>

LONG-TERM STORAGE, MAINTENANCE AND ACCESSIBILITY

Originals:

Original source materials and playback equipment should always be retained, maintained and stored, whenever possible.⁴ All recorded media—tapes and discs, analog and digital—need a cool, dry, dark, stable climate (60 to 70 degrees F., 30-40% relative humidity⁵). Cooler is generally better, but extremely dry conditions are bad for tapes. Keep media away from wiring, power generators, and other electro-magnetic fields (including loud speakers.) Tapes and discs should be stored “on end,” not stacked, in proper sleeves or boxes. Motion picture film elements, optical tracks or mag, should be stored flat. Do not pack shelves too tightly. Remember when using open source formats that you must also “archive” equipment (hardware and software) that will play archived files and media.

Digital Surrogates:

Long-term preservation includes a digital mass-storage solution located at a secure host. Individuals and small- to medium-sized archives that do not have the capacity for such storage are strongly encouraged to partner with an institution with long-term storage facilities and preservation expertise. Possibilities include universities, state libraries, museums or other institutions that would have an interest in storing and providing access to the archived collection.

When archival copies are made, store a complete second set at a secure, climate-controlled, off-site location. Back up your computer files (documentation, metadata and editing software) and store the backups off-site. It is imperative to maintain a chain of provenance, to maintain authority control and tracking of all extant copies.

Digital preservation requires management. Once a collection has been preserved it must also be checked regularly (2-5 years), including the use of checksums as well as timely migration of the data to new physical carriers to prevent “Data Rot” (http://en.wikipedia.org/wiki/Bit_rot) and format obsolescence.

Applicants should address long-term storage in their overall preservation plan. Collections without long-term storage provided gratis by their host institution or a dissemination partner should discuss how they will maintain access to their collection for their designated user

⁴According to [IASA TC-03](#), “Because of the potential for improvements in primary and secondary information retrieval and the availability of ever increasing digital resolutions, all transfers should be considered preliminary. Hence the original carriers and suitable play-back equipment must be preserved whenever possible.”

⁵Documents are available for purchase here: <http://www.ipisustainability.org/>,
http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=27619
http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=1061957&url=http%3A%2F%2Fieeexplore.ieee.org%2Fexpl%2Fabs_all.jsp%3Farnumber%3D1061957

community for a set period of time. If you do not have access to a Trusted Digital Repository, please refer to the following:

http://www.digitalpreservation.gov/ndsa/working_groups/documents/NDSA_Levels_Archiving_2013.pdf

The preservation plan should also include access or listening copies (on- or off-line) in addition to the preservation master files. Websites are not archives.

Individual external or internal hard drives, while a valuable working medium, are not to be used as an archival medium or for storage.

RESOURCES

These resources are provided as a courtesy to our grant applicants looking for guidance for their preservation and archiving projects. Resources listed are not partners, sponsors, employees or agents of the GRAMMY Museum. The GRAMMY Museum will not be involved with these services or compensation. Applicants are not required to use a resource from this list. It is, however, crucial to the funding of any project that a qualified archivist be identified.

Assessment:

Columbia University Libraries - This survey tool evaluates preservation needs for a wide range of audio and moving image formats. Designed for non-specialist users it provides a mechanism for setting preservation priorities based on the quantities and types of audio and moving image materials, their physical condition and housings, information about existing levels of intellectual control and intellectual property rights, and the potential research value of each collection. Click on Survey Tools at <http://www.columbia.edu/cu/lweb/services/preservation/index.html>

Field Audio Collection Evaluation Tool (FACET) - A point-based, open-source software tool that ranks audio field collections based on preservation condition, including the level of deterioration they exhibit and the degree of risk they carry. It assesses the characteristics, preservation problems, and modes of deterioration associated with the following formats: open reel tape (polyester, acetate, paper and PVC bases), analog audio cassettes, DAT (Digital Audio Tape), lacquer discs, aluminum discs, and wire recordings. <http://www.dlib.indiana.edu/projects/sounddirections/facet/index.shtml>

Audiovisual Self-Assessment Program (AvSAP) - This tool exists to assist cultural heritage institutions with audiovisual materials in their collections and staff who have little to no training in audiovisual preservation. AvSAP is also an excellent tool for those with experience with AV materials and its informational and advisory components can help fill out areas where the AV preservation expert could use some refreshers. Our goal is to help collections managers develop a prioritized preservation plan as well as educate them on extending the lives of their collections with the resources at hand. The scope of material AvSAP covers are: film, videotape (open-reel and cartridge based; analog and digital), audio recordings (extending from cylinder grooved media to disc; analog and digital) and optical media such as CD and DVD. http://www.library.illinois.edu/prescons/projects_grants/grants/avsap/

MediaSCORE & MediaRIVERS - A free, open source media preservation prioritization web application created in a collaboration between AVPreserve and Indiana University. MediaSCORE (Media Selection: Condition, Obsolescence, and Risk Evaluation) enables a detailed analysis of degradation and obsolescence risk factors for most analog and physical digital audio and video formats. MediaRIVERS

(Media Research and Instructional Value Evaluation and Ranking System) guides a structured assessment of research and instructional value for media holdings.

Other resources:

<http://www.avpreserve.com/avpsresources/tools/>

<http://keepingcollections.org/avcc-cataloging-toolkit/>

Technical:

Association of Recorded Sound Collections (ARSC) –

<http://www.arsc-audio.org/> and http://www.arsc-audio.org/pdf/ARSCTC_preservation.pdf

Federal Digitization Guidelines (FADGI) -

<http://www.digitizationguidelines.gov>

International Association of Sound and Audiovisual Archives (IASA) –

<http://www.iasa-web.org/>

Library of Congress (LOC) –

<http://www.digitalpreservation.gov/>

National Academy of Recording Arts & Sciences / Audio Engineer Society (AES) -

<https://www.grammy.org/files/pages/deliveryrecommendations.pdf>

Society of American Archivists (SAA) –

<http://www.archivists.org/>

Sound Directions –

<http://www.dlib.indiana.edu/projects/sounddirections/index.shtml>

The Science and Technology Council of the Academy of Motion Picture Arts and Sciences (AMPAS) -

<http://www.oscars.org/science-technology/sci-tech-projects/digital-dilemma>

Image Permanence Institute for additional long term storage information -

https://www.imagepermanenceinstitute.org/webfm_send/301

Broadcast Wave Format (BWF) -

http://www.ebu.ch/fr/technical/publications/userguides/bwf_user_guide.php

Redundant Array of Independent Disks (RAID) –

<http://en.wikipedia.org/wiki/RAID>

Metadata standards:

METS - <http://www.loc.gov/standards/mets/>

OLAC - <http://www.olacinc.org/drupal/>

Guidelines from the American Library Association on existing metadata standards for audio -
<http://www.ala.org/alcts/resources/preserv/defdigpres0408>

Guidelines from the American Library Association on minimum capture specifications -
<http://www.ala.org/alcts/resources/preserv/minimum-digitization-capture-recommendations>

Guidelines: Embedded Metadata in Broadcast WAVE Files, FADGI Audio-Visual Working Group -
<http://www.digitizationguidelines.gov/guidelines/digitize-embedding.html>

A Primer on Codecs for Moving Image and Sound Archives, by Chris Lacinak, AudioVisual Preservation Solutions -
http://www.avpreserve.com/wp-content/uploads/2010/04/AVPS_Codec_Primer.pdf

PBCore –
<http://pbcore.org/>

PREMIS –
<http://www.loc.gov/standards/premis/>

BWF MetaEdit, broadcast wave embedded metadata editor –
<http://bwfmetaedit.sourceforge.net>