

Endangered Archives Programme

Guidelines for the preservation of sound recordings

The following guidelines are based on two documents published by the International Association of Sound and Audiovisual Archives (IASA), TC03 and TC04. **Applicants must familiarise themselves with TC03**, which is available to download from IASA's website free of charge, prior to submitting their proposal as there will be implications for the resources that will be required to complete the project. TC04 will be sent by the EAP Office to successful applicants with their award documentation.

1) TC03, *The Safeguarding of the Audio Heritage: Ethics, Principles and Preservation Strategy, Version 3* (Schuller, Dietrich Ed., 2005).

Available online in English, German, French, Chinese, Russian, Swedish, Spanish and Italian) from <http://www.iasa-web.org/tc03/ethics-principles-preservation-strategy>

2) TC04, *Guidelines on the Production and Preservation of Digital Audio Objects* (Bradley, Kevin Ed., 2nd Edition, 2009).

TC03 “concentrates on the principles while TC04 provides detailed explanations of the practical consequences of TC03” (from TC03 introduction). TC04 is the most recent and most comprehensive guide to Best Practice in audio archiving, and is available online in English and Catalan from <http://www.iasa-web.org/tc04/audio-preservation>. Printed editions in English, Spanish and Italian are available from here <http://www.iasa-web.org/audio-preservation-tc04>.

The British Library Sound Archive will be pleased to provide further clarification on any points in these guidelines or the IASA documents, on request.

1. General

A central requirement of the Endangered Archives Programme with regard to audio materials is the retrieval of the information held on their original carriers to the same, or better, fidelity standard than was possible when they were recorded.

2. Technical expertise

Applicants must ensure they have sufficient technical expertise available within their project team to enable the project to be completed successfully to the appropriate archival standard. The team should either include an audio engineer, or relevant training should be organised. The cost of training can be requested within the grant proposal.

3. Primary and secondary information

Audio documents consist of both primary and secondary information. Primary information consists of the sonic content, otherwise known as the “signal” or “essence”. Secondary information consists of all other associated information on the content and nature of the recording and associated carrier, and can take many different forms. It may for example include pre-existing catalogue metadata, visual material, label information etc.

In addition to the accurate retrieval of the audio material mentioned above, it is also essential that secondary information gathered is accurate and detailed enough to authenticate the primary information, and to meet the needs of current and future users. Digitisation projects inevitably result in the separation of the accessible audio content from its original carriers, and so **the systematic gathering of secondary information is of vital importance.**

4. Degradation and obsolescence

Unlike traditional paper-based documents, audio documents require technological equipment and expertise in order to be accessed. For this reason, we are required to preserve not only the audio documents themselves, but the entire system required to ensure sustainable access to them. This system can include the audio carrier, replay equipment, all necessary spare parts, and expertise in operating, maintaining and repairing the equipment for as long as is required. **Successful digitisation projects must therefore plan and budget for the resources to maintain all elements of this system for each audio carrier, for at least as long as that carrier is being actively used for the project.**

5. Selection of best copy and co-operation

All practical attempts should be made to ensure that, where multiple copies of a recording exist, the best available copy is digitised. It may be that by co-operating with other repositories, an optimised set of audio recordings can be digitised while avoiding the duplication of effort which would occur if each repository digitised its own material separately.

6. Cleaning and restoration of original carriers

In many cases it will be appropriate to carry out gentle cleaning or other restoration work prior to digitisation, in order to optimise the information retrieved from the carrier. **This possibility should be explored and budgeted for**, and the British Library Sound Archive will be happy to advise on this prior to submission of an application.

7. Optimal signal retrieval

In order to retrieve audio information to the highest possible standard, **modern, well-maintained equipment must be used**. Any imperfections in older recordings will not be compensated for by using the original recording machine to replay them; they are more likely to be multiplied.

“When replaying historical formats, replay parameters (speed, playback equalisation, track format etc) must be chosen objectively and be based upon knowledge of the given historical format.” (from IASA TC03)

8. Unmodified transfer to a new target format

“It is mandatory that transfers made from old to new archive formats be carried out without subjective alterations or ‘improvements’ such as de-noising etc. It is essential that the full dynamic range and frequency response of the original is transferred.” (from TC03)

Subsequent alterations to the sound may be made to suit the various needs of users, but the unaltered original digital transfer **must** be retained as the Preservation Copy. It is a condition of award of the Endangered Archives Programme that the Preservation Copy, along with associated secondary information (metadata), must be submitted to the EAP Office.

9. Improvements in transfer technologies

It is to be expected that technological advances will allow improved digital transfers to be made in the future. For this reason, the original sound carriers and associated replay systems should be preserved after digitisation of their contents. However, given the time, effort and expense of digitisation, it cannot be assumed that an opportunity to re-digitise material will arise in the future, and so **all transfers should be carried out to the highest standards possible.**

10. Digital target format and resolution

Resolution: All audio transferred from analogue carriers should be digitised with a minimum sample rate of 48 kHz (96 kHz recommended), and a 24 bit word length. All audio transferred from digital carriers should retain the sample rate and bit depth (word length) of the original digital audio.

File format: All audio materials should be digitised and saved in linear, PCM (Pulse Code Modulated) datafiles, in the WAVE (.wav) format. A refinement of the WAVE standard, known as Broadcast Wave Format (BWF) may be used. This differs from the standard WAVE file in that additional text information may be embedded in the datafile alongside the audio. No other file formats will be acceptable, and no form of compression or data reduction may be employed in creating, storing or transferring Master files. Subsequent versions of audio files created for access or other purposes may however use compression algorithms if desired.

11. Digital archiving principles

All digitised information is held on some form of physical carrier, which, like analogue carriers, will have a limited and unpredictable lifespan. Provision must be made therefore, for the digital data to be actively managed, so that it can be safely and reliably stored and copied, according to a predefined plan.

Copying of files will initially be necessary to create multiple backup duplicates, as it is essential that at least two digital preservation copies be kept, in addition to copies used for access. As a further safety measure, archival copies should be stored in more than one location.

Subsequently, datafiles will periodically need to be copied to a new carrier, in anticipation of either the degradation of the original digital carrier, or the obsolescence of some aspect of the digital system in which the data is held.

In order to verify that the integrity of data has not been compromised, either through degradation of the carrier on which it is held, or through imperfect copying to a new carrier, **an md5 checksum** (otherwise known as a “hash” or “digest”) **must be generated for each file at the time it is created and stored alongside it.** Whenever a datafile is copied, the checksum should also be copied and verified. The verification process involves recalculation of the checksum, after which the new and old versions of the checksum are compared. Any difference between the two can be taken as evidence of corruption of the datafile. Further information on checksums can be found on Wikipedia. Several software programmes to generate and verify md5 checksums are available for free, for example <http://sourceforge.net/projects/fsumfe/>.

Note that datafiles should be periodically checked in this way to verify the integrity of their content in any event, whether or not they are being copied.

12. Metadata

In addition to submission of audio datafiles, comprehensive secondary information must also be supplied at the same time for each audio file. The EAP [Listing Guidelines](#) give instruction on the descriptive and technical information needed. The Guidelines require the lists to be submitted in the [Listing Template](#). An additional computer (and/or database software) may be required to compile the metadata, while the sound recordings are being transferred. **Where this is the case, this should be budgeted for.**

13. Submission of files to the British Library

The Preservation Copy of the files should be submitted on a USB Hard Disc Drive (HDD), with each file having an associated md5 checksum. The checksums, calculated at the time the audio is initially digitised, should be verified again once copied to the HDD which is to be submitted. A record of this verification should also be retained on the HDD. Any files which cannot be verified on receipt of the HDD by the British Library must be recopied and submitted again. The project will not be considered complete until all materials have been received and successfully verified by the British Library.

Suggested Equipment

To carry out audio digitisation projects successfully, it is essential that well-maintained, professional equipment should be used wherever possible, and it will often be necessary to purchase some or all of this as part of the project.

It is not possible to produce a list of equipment which will be appropriate for all projects. However, below are some general suggestions for the type and level of equipment that may be necessary for projects involving the digitisation of analogue disc or tape, which may be helpful in planning and budgeting. Where brands or models are specified, these are mostly intended as indications of the level of quality necessary. In some cases however, such as styli for coarse groove discs, there is only one manufacturer. We have in most cases given website addresses where specific suppliers have been suggested. These may be contacted to ascertain costs, prior to submitting a proposal. No suppliers have been suggested for tape-based projects, as it is now extremely difficult or impossible to obtain new replay equipment for ¼” reels and cassettes. The peripherals are of a more general nature, and may still be obtained from a variety of sources. Where no supplier is known, the British library Sound Archive may be able to advise.

It needs to be stressed that the digital capture equipment listed below does not in itself constitute an archival repository. It is only intended to capture, hold and backup data for short durations while digitisation is taking place. For medium- and long-term archiving, a more robust archival strategy will be required.

Power supply:

Some form of Power conditioning, such as a UPS (Uninterruptible Power Supply) unit may be necessary. Please ensure that all equipment will work correctly with the frequency and voltage of your local power supply.

Analogue disc replay equipment

Coarsegroove (shellac assumed)

Disc cleaning Machine	Nitty Gritty Record Master and cleaning fluid http://www.nittygrittyinc.com/Record_Master.htm
Turntable	KAB Modified Technics SL 1200 Mk5 SE With the following modifications: 1) 78 rpm speed 2) Outboard power supply 3) Tonearm fluid damper www.kabusa.com
Cartridge	Shure M44-7 (inc with KAB Technics turntable, or http://www.shure.com/ProAudio/Products/DJPhonoCartridgesAndNeedles/us_pro_M44-7_content)
Styli	Expert x3 (2.8, 3.5 & 4.0 CT) info@expertstylus.co.uk
Preamp	Elberg MD12 MK2 vadlyd@vadlyd.dk (Acoustic only: Tracer CTP-1000 flat preamp: http://www.tracertek.com/ctp1000.htm)

Microgroove (vinyl assumed)

Disc cleaning Machine	Nitty Gritty Record Master and cleaning fluid http://www.nittygrittyinc.com/Record_Master.htm
Turntable	KAB Modified Technics SL 1200
Cartridge	Shure M44-7 (inc with KAB Technics turntable, or http://www.shure.com/ProAudio/Products/DJPhonoCartridgesAndNeedles/us_pro_M44-7_content)
Styli	Shure N44-7 (inc with KAB Technics Turntable, or http://www.shure.com/ProAudio/Products/Accessories/us_pro_N44-7_content)
Preamp	Alice Phonopak 2

If transferring other types of analogue discs, eg lacquers (AKA acetates, instantaneous discs), metal discs, flexidiscs etc, contact BL Sound Archive.

Analogue tape replay equipment

¼” tape open reel:

2nd hand Professional replay machine, capable of replaying tape at appropriate speeds
Azimuth adjustment tool (appropriate type will depend on replay machine – most likely a screwdriver or hex wrench)

Head Demagnetiser

External NR decoder (Dolby A, SR etc) where necessary (rarely required, though)

Connectors (ideally balanced) as necessary

Peripherals:

Isopropyl alcohol

Demineralised water

Cotton buds

¼” Splicing block

¼” Splicing tape

¼” Leader tape

Razor blades

Cassette tape (standard speed and track configuration assumed):

2nd hand Professional replay machine, with any required Noise Reduction decoders (Dolby B, C, S; DBX Type I, II etc)

Azimuth adjustment tool (appropriate type will depend on replay machine – most likely a screwdriver or hex wrench)

Head Demagnetiser

Connectors (ideally balanced) as necessary

Peripherals:

Isopropyl alcohol

Demineralised water

Cotton buds

1/8” Splicing block

1/8” Splicing tape

Razor blades

Digital capture equipment

Codec: Apogee Rosetta 200 with X-Firewire 400 interface	http://www.apogeedigital.com/products/rosetta200.php
PC (high performance, with Firewire 400 interface, such as ADS Pyro 1394 card) Audio editing software (Wavelab, or other, as preferred) Metadata software (Excel/Word) (loaded on separate PC) MD5 checksumming software	www.adstech.com http://www.steinberg.net/128+M52087573ab0.html http://sourceforge.net/projects/fsumfe/
External USB RAID6 store	
Additional external HDD, for delivery to BL	
Audio monitoring – Headphones, or amplifier and speakers	

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