

TECHNICAL SPECIFICATION

Audio archive system –
Part 2: Audio data preservation

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AUDIO ARCHIVE SYSTEM –

Part 2: Audio data preservation

FOREWORD

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62702-2, which is a technical specification, has been prepared by technical area 6: Storage media, storage data structures, storage systems and equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
100/2461/DTS	100/2519/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

A list of all parts in the IEC 62702 series, published under the general title *Audio archive system*, can be found on the IEC website.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

Sound recordings such as music, speech, and storytelling are an important human heritage and should be preserved whenever possible. However, we were unable to record and preserve sounds until Edison achieved the first recording in 1877. Although various technologies were invented later, most of them have a limited lifespan with respect to audio archiving because storage and sound quality deteriorates when it is transferred to the next generation storage device.

The progress of LSI technology made it possible to digitize recorded sound. The digital recording is very suitable for audio archiving because the migration is performed by copying digital data.

There can be various recording materials for this purpose, they are optical disks, magnetic disks, magnetic tape and non-volatile memories such as phase change memory.

This Technical Specification specifies physical and logical aspects for a standard of audio archives of various storage types which are typically used for audio archives in markets.

The IEC 62702 series currently consists of:

Part 1 which specifies the minimum requirements on physical aspects of optical disks for digital sound recordings. Part 1-1 specifies DVD optical disk, Part 1-2 specifies BD optical disk.

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Part 2 which specifies the minimum requirements for digitization of content, format of digitised content, content information and media inspection.

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AUDIO ARCHIVE SYSTEM –

Part 2: Audio data preservation

1 Scope

This part of IEC 62702, specifies the requirements for digitization of audio data for audio preservation.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62227, *Multimedia home server systems – Digital rights permission code*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

audio archive

archive that consists of audio data preservation

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3.2

audio data preservation

data of audio stored in physical media for preservation

3.3

AIP

archival information package

3.4

dissemination

distribution of preserved audio content to users

3.5

objective media

media whose storage is based on impartial criteria

4 Objective media inspection

4.1 Criteria of the objective media

In order to objectively determine whether recorded audio content should be digitised and migrated to an archival media for long term preservation, the following criteria should be applied.

- Evaluate the availability of the media and its playback means in the long term with consideration to the format of the media; whether the media specification is internationally

standardized or publically accessible and available. If the availability is limited in its lifespan, i.e. less than the archive system's target term, then the media is worth preserving.

- Evaluate the degradation of the media. If the degradation of the media causes degradation of the reproduction, of sound, or if playback is difficult, then the media should be preserved.
- Evaluate the continuity of the organization that possesses the media to determine whether the media should be preserved.

4.2 Criteria of the archival media for preservation and dissemination

To determine what kind of media should be used for archival media for preservation and dissemination media, the following criteria should be applied.

- For archival media, evaluate the long term availability, durability and energy efficiency. However, it depends on the policy of the archive organization.
- For dissemination of media, evaluate the media format of availability, popularity, availability of reproduction devices or software. Copy protection or rights management systems are considered if the content is copyrighted. If rights management systems apply, see IEC 62227.

5 Digitization of audio content

5.1 Condition and environment

The objective media has its own original characteristics of reproduced sound quality. The condition and environment including digitise equipment should be determined to guarantee the original sound quality of audio content. The sound quality factors are:

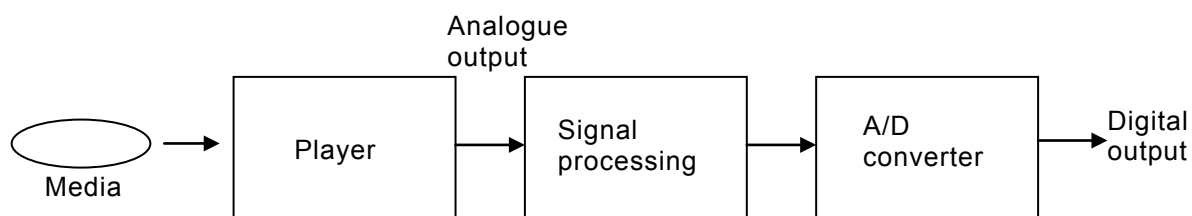
- S/N ratio;
- frequency characteristics,
- frequency deviation (jitter, wow-flatter).

5.2 Digitization method

5.2.1 Content of analogue media

5.2.1.1 System

The digitization of analogue signals of analogue media is described in Figure 1.



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Figure 1 – Digitization of analogue signals

There are various types of signal processing methods with respect to the analogue output signal. The choice of method depends on the policy of preservation. If all signals are preserved exactly as they are, signal processing is not applied. Signal processing is used to enhance or modify audio signals. For noise reduction, or any compensation for noise of the audio signal of content, see Annex C.

5.2.1.2 Digital signal format

The player of the analogue media reproduces analogue signals. An analogue to digital converter digitises that analogue signal to digital data. The basic format of analogue to digital conversion is described in Table 1.

Table 1 – Digital signal format

Codec	Liner PCM
Sampling frequency	48 kHz or 96 kHz
Bit length	24 bit
Channels	Same as the analogue content

The sampling frequency depends on the content frequency characteristic. For instance, LP analogue records have a frequency response over 30 kHz that may be utilized for a 4 channel application, in this case 96 kHz sampling is recommended.

5.2.1.3 Audio file format

The file format for digital signals is is described in Table 2.

Table 2 – File format

File format	BWF
	RIFF/WAVE

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5.2.1.4 Information of time code or address

Content of analogue media may not have a time code or address information. Mostly playing time information is provided separately by other media. Playing time, or start and end time or address of an audio track may not be provided. However, after digitization, the time code or address can be embedded in digitised content or provided separately. All information concerning time code or address of audio track of analogue media should be provided.

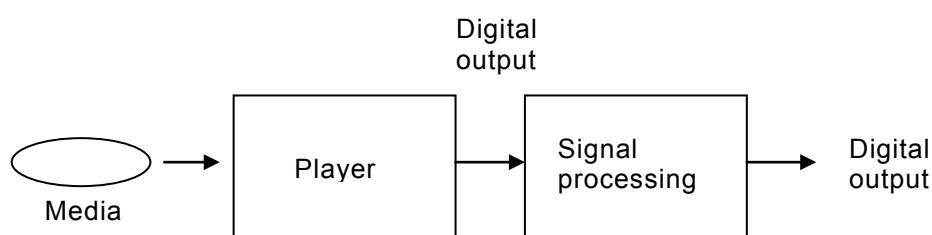
5.2.2 Content of digital media

5.2.2.1 System

The player of the digital media reproduces analogue and/or digital signals. If the available player has only an analogue signal output, a digital signal before an A/D converter in the player should be used as a reproduced signal. In case an available player has a digital audio signal output or interface, a reproduced signal is obtained from that.

If players have only an analogue signal output, the system is the same as the analogue system described in 5.2.1.1.

For players with digital signal outputs, the system is described in Figure 2.



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Figure 2 – Digital signal capturing

The signal processing of output signals is the same as described in 5.2.2.2.

Examples of digital signal capturing are provided in Annex A.

5.2.2.2 Format

The basic format of digital signals is described in Table 3.

Table 3 – Digital to digital conversion format

Format	Linear PCM
File format	RIFF/WAVE
Sampling frequency	Same as the source digital content
Bit length	Same as the source digital content
Channels	Same as the source digital content

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5.2.2.3 Audio file format

Digital signals are stored in the file format as described in Table 4.

Table 4 – Audio file format

File format	RIFF/WAVE
	BWF

6 Inspection of digitised file and recorded media

Digitised content data is stored in the file format. Before recording to a media, the file should be inspected to ensure that digitization is completed without any defects or degradations.

The data format is WAVE or BWF, the digitised audio data is given in data chunks.

- The file format is verified.
- The data chunk is reproduced and it is ensured that the audio signal is completely digitised by a human hearing check or signal comparison of the reproduced audio signal and original audio signal.

When the file is recorded to a media for preservation, then the media should be inspected to ensure that the recording is completed. The disk media inspection is described in Annex B.