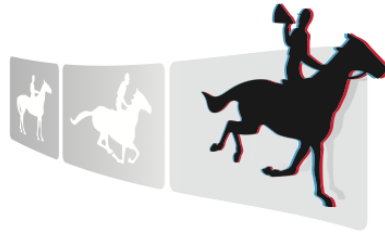


KEEPING AUDIOVISUAL CONTENT ALIVE



PRESTO  
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## Tutorial: Conservation of analogue AV content



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## Introduction

Conservation is a vital part of all preservation strategies. Even if the next step in a preservation plan is a transfer to new media, there has to be something – ideally in pristine condition – to be transferred. Digitisation and transfer processes actually occupy a tiny proportion of the lifetime of an object. For the majority of the time, the main issue is conservation.

Conservation can be defined as the preservation of an object using all effective means to keep the object in its original state or as close to that as possible, for as long as possible.

When planning for conservation, there are several key factors that should be taken into account, all having to do with the physical object. The work undertaken should be documented as well as possible to keep track of the history of the object.

This document focuses mainly on the preservation of analog media -- materials on film, audiotape, and videotape; the concerns for conserving digital files are different, and covered in other Presto-PRIME deliverables.

## 1. Protecting the masters

The master copy is the original item that needs conservation. In order to keep it as close to its original state as possible, it needs to be protected and its use needs to be minimised. When dealing with materials on film, videotape, or audiotape, copies of the original, used on a more frequent basis, help minimising the use of the master.

Of course, for many collections, rather than copying film to film, it makes sense to digitise material, and it is reasonable to expect the practice of copying from audiotape to audiotape, and videotape to videotape, will gradually disappear over the next few years. But in the interim, it is important to follow well established guidelines for these materials, and these are detailed below.

Ideally, once in a great while, like 20 years, a master will be taken from storage and used to make a new sub-master. That doesn't mean that masters should be ignored for 20 years – condition checking should be done every year, but on a sampling basis.

Audio and videotape collections have an advantage here, as they can make new sub-masters in-house for a relatively low cost – so they have no excuses for subjecting master material to risk by using it for regular playback, or loaning it out.

A proxy is just a copy. A plan for protecting masters by the use of proxies should have several layers:

- Master material, used only to make sub-masters – at very long time intervals (like 20 years)
- Sub-masters, used to make distribution or access copies.
- Distribution and access copies: the daily working copies of the collection. These are replenished as needed by making new copies from the sub-master.

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A sub-master should last 20 years – meaning it has to be able to make 20-years' worth of access copies before it is worn out. If the collection requires so many access copies that the sub-master wears out too soon, then a fourth layer could be added (something like Distribution Master) – so only distribution masters are made from sub-masters, and access copies (by now fourth generation) are made from the distribution master.

Many archives cheat – and once they have an access copy, they make another copy of that when it

starts to wear out. This is clearly unsatisfactory, as the quality will go down and down and bring the collection into disrepute.

Other archives regularly use master material for ordinary access. This practice should be avoided. It amounts to throwing the archive out the window – piece by piece. It is an unfortunate fact of life for analogue media that every use of an item causes at least a small degradation – and every use has a risk of very large degradation and damage. The digital world has solutions to this problem, but in the analogue world the master copy should be protected as the absolute priority of the collection.

## 2. Handling, packaging and shelving

This is about the immediate environment of a physical item: what encloses it, what it sits on and how – and how humans manipulate it.

### 2.1 Handling

Items should have protective packaging, and the item should be kept inside the packaging except when actually being used (played). Only trained staff should handle material when it is out of the packaging.

Obviously, materials out of the archive should never be left exposed to the sun or chemical pollution, or to physical damage. This is easier said than done, which is why master copies should never leave the controlled area. There are detailed guides to the handling of wax cylinders, disc recordings (shellac and vinyl), open reel materials, audio and video cassettes – and of course film.

### 2.2 Packaging

Every item should be in a package, for prevention of physical damage and for environmental protection (from water damage and dust, and possibly also for humidity control. There are rather exotic techniques for putting material into sealed bags in

a dry environment – to provide a low-humidity microenvironment. Such measures are not universally accepted (a sealed bag may accelerate vinegar syndrome, for instance).

There are also standards for packaging, and so proper, approved packaging should be used for all items in the collection. Packaging should be replaced when damaged (or when it goes rusty, as in film cans). The newer film storage packaging is plastic and cannot rust.

### 2.3 Shelving

Shelving doesn't have to be expensive and fancy, but it does have to have the right size for the material, and there needs to be enough of it!

One of the major problems with shelving is when too much material is packed too tightly, and so items are damaged when pulled out or wedged in. Material should also be placed properly on the shelves. Usually this means upright, not flat – except for film – and oriented so that the packaging will not admit water coming from above (the usual direction to worry about, because if water comes from below that means the whole building is flooded and it doesn't matter which way up the cases are stacked).

## 3. Environmental conditions

The immediate environment of the physical item is very important to its conservation. There are several factors contributing to an optimal situation:

### 3.1 Temperature control

In general, audiotape and videotape should be stored below 20° C, and the humidity should not exceed 40% relative humidity. (See references at the end of the document for more information on environment control.)

Film has more specialised requirements: Nitrate film is flammable, and subject to special rules. Most countries have fire safety laws governing the handling and storage of nitrate film.

Film that is susceptible to colour fade needs to be kept at a very low temperature, around 0° C.

Film that is beginning to show vinegar syndrome needs to be kept away from other materials, as the acetic acid will damage everything in the collection if not stopped. It also needs storage a very low temperature, around 0° C, to slow down the chemical change until some remedial action can be taken (like making new masters, or digitising at very high quality).

### 3.2 Humidity control

Dry is better than wet, as long as it isn't too dry. The recommendations suggest 30 to 40% relative humidity, for materials being stored at temperatures between roughly 10 and 20° C.

At very low temperatures humidity is less an issue, and it is very difficult to maintain 40% relative humidity as temperature goes down toward zero, because the air's ability to hold water goes down as temperature goes down. So: as the temperature goes down, relative humidity goes up. This is why we get dew in the cool morning. What nobody should get, if at all possible, is dew in the archive! If material is kept cold, then some care must be taken when material goes into or out of 'cold storage', to minimise thermal stress and also to prevent formation of dew inside the packaging.

### 3.3 Stability of the environment

Temperature and humidity are important, but a stable environment is equally important. When temperature changes, materials expand or shrink. Films of acetate, wound hundreds of layers deep on a reel or cassette, can generate immense pressures when undergoing temperature changes, and these can distort and permanently damage the materials. The international standards for temperature and pressure also include standards for stability.

Stability has two components: the sophistication of the environmental controls (the cooling and drying equipment) – and the time constant for

change of the storage area. A big area, well insulated and with a lot of material in it will change temperature slowly, and so be easier to stabilise. A small room or a nearly empty room – with thin walls -- will heat up quickly once the air conditioning fails. It may be far more cost effective to improve insulation than to invest in sophisticated controls for the chiller and dehumidifier.

## 4. Condition monitoring

Condition monitoring is the process of monitoring the condition of an object by looking at parameters indicating a developing failure. In order to predict maintenance activities needed in the future, it is necessary to monitor the condition of parts of your collection.

Life expectancy can be predicted, but predictions are generalities, and there is no substitute for direct examination of media. Unfortunately the only aspect of audiovisual media that is well developed for automatic monitoring is measurement of acetic acid level, for which there is a wealth of information and various forms of test materials.<sup>1</sup>

**In order to predict maintenance activities needed in the future, it is necessary to monitor the condition of parts of your collection.**

There are test strips that can be used on materials once they've been removed from their containers, and there are containers that incorporate indicators, for continuous monitoring.

For large collections where use of such tests and containers would be very time consuming and expensive, it is perfectly feasible and (usually) satisfactory to use a sampling approach, and apply the test strip evaluation and the special containers to a statistically representative sample of the collection.

There has been research on other methods of condition monitoring, in the PrestoSpace project, as well as others listed in the references section.

Video tapes (and to a lesser extent audio tapes) are prone to a considerable number of degradations, which have a direct impact on the playability, on the risk incurred by the playback machine, and on the urgency for transfer. The two main types of degradation are the tendency to head-clogging, and the 'sticky-shed syndrome', which tends to block the tape in the VTR. The causes of such degradation are currently unknown, even if hypothesis such as polymer hydrolysis and lubricant migration are the most advanced causes. A real study on what actually take place is required before trying to detect and correct the problem.

## Conclusion

Whether your conservation plan is part of a larger preservation plan, including digitisation, or stands on its own, the issues named above are essential. Use your collection map create a plan addressing all factors and you will have a good starting point for conservation of your collection.

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<sup>1</sup> See, for example, the Association des Cinémathèques Européennes page on the topic at <http://www.acefilm.de/22.html>

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