



Film Preservation Unit

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Saving Your Precious Memories

FILM, VIDEO & CD/DVD DISK PRESERVATION

Moving images of your past are precious memories that hold a wealth of information for your family and future generations. These precious memories are stored on a variety of media that require care with regard to storage and inheritance.

This information package has been collated to provide an example on how best to care for your film, video and disks. Preservation techniques, when applied, can provide longevity for your particular media, whether it is film, video or disk, thereby ensuring that your memories will last a significant amount of time.

No matter how well cared for your film, video or disk is, if it is not passed on to family, or an organisation that promotes migrant heritage, then it is still at risk of being lost forever. Attached at the end of this document is a page that can be removed and stored with your film, video or disk, giving instructions to your estate as to what action you would like taken following your death. This page can be used or you can produce one of your own, either way, leaving some form of instruction with your media at least will prevent it being lost forever and ensure that it is available for future generations so they may share your precious memories.

Migration Heritage Project Inc.
March 2007

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Disclaimer

The following information has been compiled to provide examples of guidelines to preserve images stored on film, video or CD/DVD disk. The Migration Heritage Project does not endorse any one method or authority. These guidelines are for information only and have been collated in this information document for ease of access by the reader who may not have access to, or knowledge of access, to preservation guidelines. Information contained in this document has been sourced from:

National Library of Australia
www.nla.gov.au

National Archives of Australia
www.naa.gov.au

Preservation information is also available from the National Film and Sound Archives
www.nfsa.afc.gov.au

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Protecting and handling motion picture film

Issued August 2006

Motion picture film records moving images. The methods and materials used to make motion picture film have changed and developed since film production began in the late 1800s.

Types of motion picture film

Motion picture film can be either black and white, or colour.

It comes in a range of gauges (or widths). The most common are 8 mm, 16 mm and 35 mm.

A number of different components make up motion picture film. These include:

- negatives;
- magnetic film soundtracks; and
- projection or release prints.

Composition of motion picture film

Motion picture film consists of a thin plastic base coated with a layer of gelatine emulsion. The emulsion contains the image, made from either silver particles (in black and white film) or colour dyes (in colour film). The emulsion is the matte side and the base is the shiny side of the film.

There are three types of bases used to make motion picture film:

- Early filmmakers produced motion picture film on a cellulose nitrate base. This type of film is highly flammable. Nitrate-based film was widely used until the 1940s.
- Motion picture film made with a cellulose triacetate base is known as acetate or 'safety' film. It dates from the 1940s, and does not have the combustible qualities of cellulose nitrate motion picture film.
- Polyester-based motion picture film is thinner and stronger than acetate film. It cannot be torn.

Deterioration of motion picture film

All materials degrade over time. Although this deterioration is inevitable, correct handling and care can slow down its progress.

Motion picture film is at risk from three types of deterioration: chemical disintegration, biological decay and mechanical damage.

Chemical disintegration

The different plastics used to construct motion picture film are at risk from different types of chemical disintegration.

- Cellulose nitrate film is very unstable. It can react with water in the air to form nitric acid. As it deteriorates, nitrate film develops a sticky or greasy surface, a dark yellow or brown all over staining, and a strong bitter or acrid smell. It can self-ignite in some circumstances, and is difficult to extinguish once it starts to burn.
- Cellulose triacetate film is vulnerable to 'vinegar syndrome', where the plastic reacts with water in the air to form acetic acid. This produces a vinegar smell, which gives the reaction its name. Vinegar syndrome-affected film shrinks, starts to 'wave' so that the film will not lie flat, and develops a white powder on the edges. The emulsion cracks so that the image appears fragmented, and can flake off from the base.

Colour motion picture film is also at risk from colour fading.

Biological decay

Film stored in warm, humid conditions is likely to develop mould. This type of decay can result in serious damage to the emulsion layer of motion picture film, and therefore the images recorded on the film.

Mechanical damage

Motion picture film is at risk of damage from being played or recorded.

- Mishandling motion picture film during winding or projection can tear or break motion picture film.
- Winding or projection can cause old splices to come undone.
- Improper threading of motion picture film during projection can result in perforation damage.
- Contact with dirt or other contaminants can scratch motion picture film.

Preserving motion picture film

As with any item, correct handling and care of motion picture film will give items the best chance at longevity.

Handling

- Film is fragile. Handle all motion picture films with care.
- Handle film by the edges, and avoid touching the emulsion. This image-holding layer of the film is easily damaged.
- Return films to their protective packaging when finished using them.
- Ensure that all playback and recording equipment is clean and in good working order before using it, to minimise mechanical damage.

Nitrate-based film and acetate film affected by vinegar syndrome pose a threat to health and safety. Care should be taken when handling such film.

Nitrate-based film is classified as a hazardous material. It must be stored separately from other collection materials, in a designated area that firefighters can identify. Although the National Archives does not store this type of film, the Archives can be contacted for further advice.

The fumes produced by both deteriorating nitrate film and vinegar syndrome-affected film are toxic. If a sweet odour or vinegar smell are coming from a film, do not open the can. Exposure to these gases can cause throat, eye and skin irritations.

Protective packaging

- Store motion picture film in clean, acid-free plastic cans to protect the records from dust, dirt and other contaminants.
- Before enclosing motion picture film in protective packaging, ensure that the item is free from dust, mould and other contaminants.

- Wind motion picture film as flat as possible around the core or reel to a medium tension, so that the film can 'breathe' but is not loose in the can. Any ridges or irregularities in the wind will expose the film to possible damage. The end of the role should be taped down to ensure the film does not unwind or unravel.
- Label every film can clearly and prominently to ensure easy identification and protect the item from further handling.

Storage environment

It is very important to store motion picture film in an area free from fluctuating temperature and relative humidity levels.

Warm and humid conditions, as well as changing temperature and relative humidity levels, can cause chemical disintegration and biological decay. Storing motion picture film in cool, dry and stable conditions may prevent or slow down the progress of these types of deterioration.

Cold storage (10°C and below) is the only way to increase the stability of motion picture films which have started to deteriorate. Cold storage is also the best way of keeping unblemished films in good condition. Ideally:

- black and white film should be kept in temperatures between 15°C and 18°C, and at 35% relative humidity; and
- colour film should be kept in low temperatures (less than 8°C) and at 35% relative humidity.

If cold storage is not possible, the storage area should be kept clean and be well ventilated to prevent the build up of acidic gasses produced by vinegar syndrome affected film. These gasses speed up the progress of this type of deterioration.

Materials degrade quicker when exposed to ultraviolet light. Fluorescent tubes, which are low in ultraviolet light, should be used wherever possible in storage areas. Lights should be turned off whenever possible. Storage areas should not have windows, but if they do they should be covered with curtains or blinds.

Storage equipment

- Store motion picture film horizontally on shelves which are above the floor (to prevent water damage in case of flooding) and sheltered from the ceiling (to prevent water damage from fire sprinklers).
- Store motion picture film on coated metal shelving. Wooden shelving can release harmful vapours, contribute to the spread of fire and harbour insects.

Copying

To minimise deterioration due to handling and use, make copies of important and frequently used films for reference purposes.

Video and DVD production bureaus which undertake film to video and film to DVD copying are located throughout Australia. Contact details for these service providers may be found in local telephone directories.

Further advice

Please contact the National Archives if you require further advice on protecting and handling motion picture film.
www.naa.gov.au



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PRESERconVERSATION

The Proper Care and Feeding of Videotape

Videotape has a much shorter life span than most people know. In fact, a videotape that is over 15 years old almost certainly needs careful attention, and most tapes over 20 years old need professional help. If your collection consists mostly of professional productions or films that are still in print, the least expensive protection is usually purchasing another copy. For a locally produced, old, or out of print videotape, proper care is the only way to guarantee the ability to view the tape in the future.

The following recommendations for the storage and preservation of videotape are a combination of manufacturers' recommendations, experience with old and obsolete tapes, and good common sense.

Keep videotape cool and dry... and away from curious fingers

You are better off keeping the tape in a place which has constant temperature and humidity than in a cooler place with lots of traffic. Tapes left for the curious to handle WILL be destroyed, it is only a matter of time.

Keep videotape clean, out of the light, and away from strong magnetic fields.

It may seem obvious, but then again do YOU store any of your video tapes at home on top of the TV? Dirt, humidity, and heat are the main enemies of videotape and can make the tapes impossible to play back in very short periods of time.

Protect your tapes from physical damage

Cardboard sleeves provide little protection for either the cassette or the tape inside. Often these cases are made of materials that deteriorate over time. Protect your investment with a higher quality case such as those used in video stores. These cases are inexpensive, reusable, and will last many years.

Always label your tapes.

Unless a tape is properly labelled, the only way to know the content is to play the tape, and if the tape cannot be played back without restoration, how do you know whether the contents are valuable enough to justify restoration cost?

Give your tapes some "exercise"

Tapes need to be fast forwarded and rewound periodically. The recommended interval for doing this varies according to temperature and humidity, but a good rule of thumb for normal air conditioned environments is every 6 months to 1 year.

It is also a good policy never to leave a tape stopped in the middle of the cassette. Always rewind the tape fully.

When in doubt, make a copy.

If you only have one copy of a tape, NEVER lend that copy. Copies are inexpensive to make and are your only absolute protection against the loss of the program. Often lost information on damaged tapes can be professionally recovered if you have made copies, even if the quality is lower. Ideally keep copies in different places, and make copies at different times so that they do not all age together.

Make sure the machine works BEFORE you insert a tape.

The biggest cause of damage to tapes is machines in bad condition. If you are uncertain about a machine's condition, insert a tape that is not valuable to ascertain that condition. If a tape is damaged, do not insert it into a videotape recorder, the tape may damage the machine.

Know when your tapes need professional help.

Damage to a tape that is caused by well meaning people "trying to help" may be permanent. It may be wise to seek help from a professional organisation such as the National Film and Sound Archive.

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Protecting and handling optical disks

Issued April 1999 Revised May 2004

Types of optical disks

The term 'optical disk' describes a range of disk types where the stored information is read optically, ie by a laser.

There are three main types of optical disk:

ROM disks contain information that cannot be changed or added to by the user (ROM stands for 'read-only memory'). CD-ROM and DVD-ROM are the most common types of ROM disk.

WORM disks are also known as read-write optical disks (WORM stands for 'write once, read many'). The most common form of WORM disk is CD-R (recordable). CD-Rs are blank when sold. Users can record information on them, but it cannot be deleted or changed. Recording onto the disks requires dedicated hardware.

Rewritable optical disks – also known as EO (erasable optical) disks – allow the user to record information on a disk, erase it, and replace it with new data. The most common forms of rewritable disks are CD-RW and DVD-RW. They are used when information is being regularly revised, edited or updated. As with WORM disks, recording onto rewritable disks requires dedicated hardware.

Composition of optical disks

Optical disks are comprised of between three and five layers of plastic and metal. Depending on their construction, they are more or less susceptible to damage.

Optical disks all have a stable polycarbonate plastic base on their reading side. The base layer strengthens the disk and maintains the depth between the data and the laser that reads it. As the laser must read through the base layer, any damage – such as scratches, dirt, oil from fingers – can interfere with retrieving data from the disk.

Data is stored on the disk in the form of marks or pits that either absorb or reflect the light from the laser beam.

On ROM disks, data is moulded as pits in the polycarbonate layer. A metal layer is on top to reflect the laser. It is usually aluminum, but can be silicon, silver or gold.

Recordable (WORM) disks use a photosensitive dye layer sandwiched between the polycarbonate and metal layers to capture and store data.

Rewritable disks have a phase-changing film between the polycarbonate and metal layers. To erase and rewrite data, the laser beam heats the film, changing its light transmission properties.

On DVDs, above the data and metal layers, there is another polycarbonate layer. The data is thus stored in the centre of the disk.

CDs have only a thin lacquer layer on the label side to protect the metal layer. Because the metal is very close to the surface of the CD, it is very susceptible to damage on this side.

Deterioration of optical disks

The critical portion of an optical disk is the data layer. Although in theory it is well protected, in fact it can be damaged. In addition, because optical disks are a very dense form of information storage, small amounts of degradation can cause significant information loss. There are many sources of potential damage to disks.

- Solvents can affect the lacquer layer and subsequently the metal layer on a CD.
- Damage to the polycarbonate plastic layer is a common cause of optical disk failure. Because they are read optically, any marking that interferes with the light path, e.g. scratches or surface deposits, can cause problems such as skipping or repetition of tracks. Some deposits, such as fingerprints, may cause etching of the plastic surface and can lead to irreversible damage.
- The polycarbonate plastic layer has a tendency to 'flow' over time. This means that the plastic layers may slowly lose their shape, making them difficult to read.
- Inks used to print information on the label surface may corrode the plastic or lacquer layer and subsequently the metal layer.
- CDs are particularly prone to damage to the 'label' side from writing implements. Sharp points can easily damage the lacquer and metal layers, making the disk unreadable.
- As with all record media, temperature and humidity – particularly dramatic and sudden changes – can cause degradation.
- Corrosion of the metal layer can result in a disk becoming unreadable. Certain metals, such as gold, are more resistant to corrosion than others.

Handling and care of optical disks

- Handle disks by the outer edge or the centre hole only, do not touch the surface of the disk.
- Disks should not be bent or flexed.
- Do not write or mark in the data area of the disk (the area the laser reads). Write on the clear 'hub' area of the disk or, preferably, on the packaging that contains the disk.
- If you must label the disk itself, use a water-based felt-tip permanent marker to mark the label side of the disk. Do not use adhesive labels as the adhesive can damage the disk.
- Keep dirt or other foreign matter from the disk.
- If an optical disk becomes dusty, dirty or fingerprinted, it may be possible to clean it before permanent damage occurs. Take great care. Gently remove loose dust using a non-abrasive photographic lens tissue, or very soft brush. Oily dirt deposits and finger marks can be removed using CD/DVD-cleaning detergent, isopropyl alcohol, or methanol. The solution should be applied sparingly to the disk surface and wiped off with a tissue. The cleaning motion should never be circular (along the tracks). Always brush from the centre of the disk outwards. If a scratch is created while cleaning, it will do less damage cutting across the tracks than along them.

On the label side of a CD, the data layer is very close to the surface. The following points are therefore important.

- Do not scratch the label side of the disk.
- Do not use a pen, pencil, or fine-tip marker to write on the disk.
- Do not write on the disk with markers that contain solvents.
- Do not try to peel off or reposition a label.

Protective packaging

Optical disks usually come with their own rigid plastic case, known as a jewel case. These cases are reasonably dustproof and are suitable for long-term storage as they are usually constructed of an inert plastic. Disks that do not have a jewel case should be individually enclosed in a sleeve, bag or envelope made of an inert plastic such as polyethylene, polypropylene or Tyvek®.

Store disks in their packaging (or cases) to minimise the effects of environmental changes. Remove a disk from its protective packaging only for use and return it immediately after use.

CDs should not be stacked or packaged in groups so that they lean against each other. The pressure may lead to warping or deformation. Jewel cases are the ideal enclosure because they support each disk at the hub and deflect any impact from other items. Store disks upright (book style) in plastic cases designed for CDs and DVDs. Disks stored horizontally for a long time (years) can warp.

Open a recordable disk package only when you are ready to record data onto it. Check the disk surface before recording to make sure that it is clean and in good condition.

Environment

Optical disks should be stored at temperatures between 4°C and 20°C and relative humidity (RH) 20 to 50%. For long-term storage, 18°C and 40% RH is suitable. But for archival storage, temperature and RH should be lower. In these conditions the natural deterioration of the items can be slowed. It is important that these environmental levels are stable. Fluctuations will increase the speed of media degradation.

Do not expose disks – especially recordable ones – to prolonged sunlight or other sources of ultraviolet light. Fluorescent tubes are low in ultraviolet light, so use them wherever possible in storage areas. Storage areas should not have windows, but if they do, they should be covered with curtains or blinds.

Reformatting and migration

Two major factors threaten long-term preservation of optical disks: the instability of the media, and the likelihood of technological obsolescence. CDs made today may be in excellent condition in 30 years. But if the machines to play them or the software to interpret them have been superseded, the data may be inaccessible. The cost of recovering data from obsolete media and data formats can be high. It is essential to have a strategy to migrate data from the optical disk media onto newer media before it becomes obsolete.

The best prospect for long-term retention of information on optical disks seems to be regular copying or data migration. This entails copying the information on the disk to a fresh WORM or rewritable disk or to another format such as digital tape (or another new technology format that may be developed). If this is done regularly, the information should survive indefinitely.

Ensuring that the data on the disk is readable is more problematic. As computer programs are upgraded, older formats become unreadable. This is especially the case with proprietary data formats. The best response to this problem will depend on your resources and software environment. However, two solutions are to:

- upgrade the data to newer formats when you migrate the data to new media; or
- use open or International Standard data formats.

Further advice

Please contact your local National Archives of Australia office if you require further advice on protecting and handling optical disks.

www.naa.gov.au

Saving Your Precious Memories

PLEASE DO NOT THROW AWAY Your Family's Heritage

**In the event of my death
please make arrangements to keep this film for the future generations**

This film should be given to a member of the family who will keep and preserve the film so that our precious memories won't be lost forever.

Alternatively, if no-one is in a position to keep the film, please arrange for the film to be given to an archive or library.

Further advice or information for the distribution of this film can be obtained from Migration Heritage Organisations who are dedicated to the preservation and recording of migrant stories.

Signed: _____

Date: _____