PRESERVE

AV
COMPASS

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This **Preserve Guide** will give you instruction in the storage, digitization (or reformatting) and long-term maintenance of your audiovisual collection.

STORAGE OF TAPES, FILMS AND DISCS

When we refer to audiovisual preservation, we typically mean caring for both the original physical media and having the content copied to a more contemporary format. Making copies or digitizing your original materials can help you access and save your content for the future. However, if you have the capability to hold onto your original analog or physical items (your tapes, films, discs, etc.), doing so can be beneficial for a number of reasons. The physical format of the materials sometimes tells us about a time, place and people as much as the content stored on it does. The other reason to hold onto the original item is that you never know when a newer, more sophisticated technology will develop that allows for a truer, more nuanced way to capture an image or sound from your original format. You will want to be sure your original materials are around and usable when that day comes.

Here are some basic tips for storing your original analog audiovisual materials as well as any duplicates made from them. You will want to keep your materials in a cool, dry place. If you are just one individual and you are storing your audiovisual materials in your home, you will likely be unable to reach optimal archival conditions. Not to worry. Care for your media as you would care for yourself. You would not fair well spending inordinate amounts of time in an attic or a basement exposed to heat, chill and dampness. What makes you think that your media will do well in these conditions for years at a time? If you can, try to devote a small space to storing your materials. A spare closet or cabinet space is ideal. You can even store your media under your bed if you keep that area relatively free of dust.

Here is a small checklist that you might consider using when determining a good spot to store your materials in your home.

- Is the environment clean? Is it free of dust, dirt, food, pests and pollutants?
- Is it out of direct sunlight?
- Is it fairly cool?
- Is it dry?
- Is it unlikely to come in contact with water? Make sure the first rung of any shelf you place your media on is at least five inches off the ground.
- Is the room free of radiators, open windows, televisions and/or any machinery that might adversely affect the signal of magnetic media? Sitting tapes on top of television sets for a prolonged period of time might demagnetize them.
- Will the media be receiving frequent handling or playback?
- In the unlikely occasion that you come across nitrate film in your collection, put it in a freezer and call an archive that has the capacity to handle nitrate and absolutely do not

smoke around it. For more information consult Kodak's [Storage and Handling of Processed Nitrate Film](#).

Bear in mind again: tapes, grooved media and optical media should be stored right side up; films should be laid flat on the shelf. "V" is for vertical. "F" is for flat.

Film is stored flat

Video is stored upright

If you are donating your materials to an archive or repository, it can help to ask for a visit to view the storage conditions there (keeping the above checklist in mind if you have concerns). You must remember, however, that if you donate your materials to an archive, you are *giving* your materials over to their care and you do not get a say in how the items are stored once you relinquish them.

Here are some basic tips for finding a repository where you might donate your audiovisual collection:

- Find the archive's collecting policy. This can often be found on an archive's website. This policy will tell you what types of materials the archive might be amenable to taking in. Using this policy, you can discern whether or not your materials fit within the mission of that archive. If you cannot find the collecting policy online, try calling the archive.
- Have an inventory or inspection report that you can send the archive. This will help to give them a sense of whether your collection is right for them.
- Knowing the copyright status of your collection can work in your favor, especially if you yourself hold the copyright.
- Remember that some archives will not feel equipped to take in audiovisual materials.
- Remember that an archive is not a dumping ground for your collection. Archives exist to serve particular communities and researchers.
- You cannot dictate how your materials are stored once you give them over to an archive.

- A donation is different from a deposit and you cannot get your materials back once you donate them to an archive. A deposit means that you essentially loan your collection to the archive, but you can take it back at any point. Most archives will not be interested in deposits.
- Be sure to sign an official agreement with the archive when you donate your materials

Is it better to donate your collection to an archive or to try to hold onto it yourself? The answer depends on the content, size and format(s) of the collection as well as your capabilities and goals for preservation. Try to pursue what you think will serve the materials best.

DIGITIZATION AND DIGITAL PRESERVATION

When you reformat (or digitize) your materials, you are transferring your content to a more current format so that you can continue to access it in the event that the original item becomes unplayable (meaning it becomes damaged or you cannot find the equipment to play it).

At present, the standard way to reformat or make copies of an old analog or physical media item is to create a digital file (or files) from it. Think of digitization as a conversion process. With video and audio, you are transferring an analog signal to a digital one. With film, you are transferring visual information (image and soundtrack) to digital information.

When you look at a film, a tape or a disc, you can see (at least to a certain extent) visually whether or not it is damaged, scratched or broken. With damaged or obsolete digital *files*, the damage will not necessarily be visible to the eye. The problem is that files can be just as susceptible to damage and obsolescence as original/physical objects, maybe more so due to software dependencies and the short lives of hard drives.

For this reason, as outlined in the AV Compass videos, you cannot simply digitize your content and consider yourself set for the long-term or for life. This is because it is important to remember that preservation is an active process. This idea is especially relevant to "digital preservation."

The idea of digital preservation is the proper storage of digital files and continued assurance that they remain accessible and uncorrupted. When a file becomes corrupt, you might be rendered completely unable to open it much less play it. How do you ensure that your content, once digitized, remains accessible into the future? Much of it comes down to your being diligent, making efforts to back up your files and check in on them.

And no, uploading your movie to YouTube or Vimeo is not a viable long-term preservation solution.

Here we will outline basic concepts, so that it becomes a little easier to comprehend.

WHAT IS A DIGITAL FILE OR FILE FORMAT?

A file (or file format), be it a "video" or "audio" file, is how we store digital video or digital audio on our computers, external hard drives or via cloud storage.

A video or audio file format is comprised of several components:

The wrapper / container is the case or container that holds the digital data together. Think of it like the binding of a book that holds together the pages of content or the shell of a video case that holds the tape inside. The wrapper or container is represented in the file name with ".mov" or ".avi" or ".mp3," etc., providing you an indication of what kind of computer and what kind of software is typically used to play the file.

- .MOV files are indicative of QuickTime (and are more frequently used with Mac computers)
- .AVI files are indicative of Microsoft (and are more frequently used with PCs)
- Other audio file wrappers you might come across: .MP3, .AIFF, .WAV
- Other video file wrappers you might come across: .MP4, .MKV
- A quick perusal through Wikipedia's entries about [video](#) and [audio](#) file formats can be useful in gaining further understanding

Inside the wrapper is the digital data itself, which is known as the ***"bit" or "data" stream***. A data stream can be thought of as just that – a stream or flowing line of data (or perhaps a conveyor belt). The data rolling down the stream represents your video or audio. It consists of a complex sequence of 1s and 0s, which a computer reads and puts together to create your film or song. A video file contains both video and audio data streams. An audio file contains only an audio data stream.

Another vital part of the digital video or audio file is the ***codec***. Codecs are used for encoding data or bit streams for storage, playback, editing, conversion and more. Think of the codec as the computing language your video or audio data stream is written in. Your computer understands the language and is able to play the file back for you. Depending on how your file is encoded you might need to transcode (or translate, or convert) your file if you wish to play it on a different computer for a different purpose. For example, you might have an .mp3 file that you desire to use in your editing software to make a documentary, but you have to convert the file to AIFF for Final Cut Pro to recognize it.

Codecs can be either lossy or lossless. ***Lossy*** codecs are used to ***compress*** a file, making the file smaller in size and more manageable so it is easier to upload and move around. ***Lossless*** codecs are used to keep a file ***uncompressed*** so that the file retains all of the information present in the original data stream or all of the data captured from an original analog source. While uncompressed files can be massive in size, requiring terabytes of storage space, you

should strive to obtain a digital ***master file*** from your original analog or physical media sources.

Think of your master file as you would think of your master video or audio tape or original film negative. It is the source which retains the most information and the source from which you make subsequent copies. Because the purpose of a master file is to serve as the authoritative digital version of your video or audio work, it is crucial that this file possess as little compression as possible. When you digitize your audiovisual materials, either on your own or with the help of a vendor, creating uncompressed files is best. The problem with uncompressed master files is that they are large and often expensive to store.

If your goal is editing or broadcasting, you might choose to work with a ***mezzanine file***. Mezzanine files are mid-sized, only slightly compressed and easier to work with in digital editing software. Mezzanine files are often high quality enough that serviceable copies can be made from them. In some circumstances, a mezzanine file can serve as your master file.

Compressed ***copies*** or ***derivatives*** made from master or mezzanine files are called ***access files***. Small in size, these files are ideal for playback and uploading to the web. Access files can be put on DVD and watched on personal devices. These files are ideal for everyday use (think .MP3 and MP4 files), but are not recommended for preservation purposes. If you have analog or physical media that you are seeking to digitize, consider making a master file first, then access files from that master file. DVDs and access files are not a viable preservation solution because they are highly compressed and you are losing a lot of your original data.

What kind of files do you need for your purposes? There is no one specific file standard for preservation of audiovisual files. Consider what you will be using the files for; consider the hardware and software that you will be using. At the very least, aspire to get a master file and copies or access files from that master file, which you can use in your day-to-day activities.

PRESERVING DIGITAL FILES

What does it mean to preserve a digital file? The goal of preserving digital files does not differ wildly from the goal of preserving analog materials. Ensuring the continued usability of audiovisual content is the primary objective.

Labels are similarly of critical importance to preservation of digital files. A good *file name* is transparent and gives you an indication of a file's content before you click to open it, helping you to find what you are looking for when you comb through your computer or storage device.

Here is information that is helpful to include in a file name:

- Date (written out as one string of numbers. January 4, 2006 would be written in the file name as 20060104)
- Unique Identifier
- Name of Creator
- Title or a brief description of the content
- Collection name
- File type (Master, Mezzanine, Access, etc.)
- Format or wrapper type (.mov, .avi, .mkv, etc.)

Do not include slashes, backslashes, commas, spaces, arrows, quotes, question or exclamation points, colons or semi-colons. Use underscores or dashes instead of spaces. The main reason for this is many computer programs do not recognize files with special characters like question marks or colons. Sometimes files with special characters will even register as corrupt files. Keeping special characters out of your file names can also be to your advantage if you put your video or audio files online as you will be able to make the file name part of a URL without a problem.

Good file naming practice also specifies that file names should ideally be under 40 characters.

Good file names:

> 20060104_av5-1_San_Francisco_Pride_Parade.mov
> 19990102_South_Dakota_Trip_Tape1_Master.mov

Bad file names:

> Jared's baseball game.mov
> Firsttapefrommybabyshower.avi
> January 6, 2008-randomfootage.mov

Since you cannot see damage or corruption of a file (the way you can with physical media), digital preservation becomes an act of checking in on file authenticity and integrity.

Authenticity is the idea that a file is what it purports to be – that if a file name says "20141113_San_Francisco_Street_Parade_1973.mov" you do not open the file to find footage of a birthday party from 1995 or that if the file purports to be in color, you do not open it to find footage in black and white.

How do you verify a file's authenticity? On a basic level, you can ensure a file has not been tampered with or mislabeled by checking it against its metadata. ***Metadata*** is any technical or content description of the file. Some of this information becomes ***embedded*** within the file at its time of creation (for example: the format, the runtime, the date of creation, the file size and more). Additional information can be manually embedded into the file to help you identify the content and know how and when the file was created, which can help to inform your preservation decisions.

The other aspect of the digital preservation equation is maintaining ***file integrity*** or ***fixity***. Integrity and fixity refer to the file itself. Checking file integrity means answering the following question: is the file uncorrupted and unchanged from what it was when it was originally created? Checking file integrity is important when a file is created, ingested, transcoded, copied, moved and every once in a while just for good measure. Checking your file's integrity is helpful in that it can let you know when something is wrong with your computer, hard drive or capture software. You can use integrity checks to hold your vendor, or the preservationist who digitizes your content, accountable.

We check file integrity with what is known as a ***hash function*** or ***checksum***. A hash function such as MD5 or SHA generates a string of numbers and letters that represent the file. We call this string of numbers a ***hash value*** or ***checksum***. Every time you run a hash function, the resulting string of characters will remain the same as long as the file is unchanged or uncorrupted. If the file is altered or corrupted in any way, the string of characters will be different. Checksums and hash functions are a useful way to monitor files into the long-term. You can usually ask a vendor who digitizes your analog media to generate checksums for the resultant files.

STORING DIGITIAL VIDEO AND AUDIO FILES

Knowing your digital storage aspirations and capabilities is an essential part of articulating and implementing your preservation plan. Storage is one of the more costly aspects of any digitization project. As such, any collaborators, preservationists and funders that you work with will be interested in the storage solution you choose for your files. Here are some ways in which digital video and audio files can be stored.

External hard drives are commercially available from many retailers. Often no bigger than the palm of your hand, certain personal hard drives can hold terabytes of content. Hard drives vary in size, speed and storage capability. A hard drive houses a hard disk, which stores all of your files and folders. When you plug your hard drive into a computer, you can access your files.

RAID (Redundant Array of Independent Disks) is similar to a hard drive. RAID storage layers multiple disk drives into a single entity, offering the safety of content redundancy across drives or the capability of recovering a file if the RAID fails. RAID storage is much more expensive than a single hard drive and can be used for projects larger in scope and more professional in nature. RAID is a more accessible form of the storage arrays that larger archives use for their data archiving projects.

Cloud storage typically sees files hosted and maintained by a managing company. You ingest your files into the company's system and pay the company to store your files across multiple servers and likely across multiple locations. Before deciding on a cloud storage option, be sure to research the subscription or membership fees of each company, noting that some companies will require you to pay a fee for retrieving or downloading your content from them. Think of selecting a cloud storage vendor as you would selecting an archive to which you would donate your collection. Having an understanding of the storage company's policies for long-term growth and for disaster recovery can prove helpful in making a selection.

LTO (Linear Tape Open) or Data Tape is a magnetic media format geared towards the storage of digital data. Data tape resembles a cross between a videotape and a floppy disk, but works in much the same way that a hard drive works, allowing you to store up to 1.5 terabytes per tape. You write files to the tape using a specific drive. Keep in mind that writing data to an LTO or data tape can be costly. Additionally, LTO tape is only backwards compatible twice, meaning that newer versions of LTO tape might not be able to read data from older LTO tapes. Storage on data tape is recommended primarily as an option more for larger archives, not smaller, personal archival projects.

In any digital preservation project you undertake, no matter how much content you have, what formats you have or what storage options you choose, you should absolutely be mindful of the following ideas:

Back-up: This means having additional copies of your content on multiple hard drives so that if one drive fails or if one of your files becomes corrupted, you can still access the content in another place.

Similarly, **geographical separation** is important to consider. This means keeping copies of all of your content in a location some distance away from where the originals are stored. Maybe you have a relative or friend who lives across the country you can exchange your important files with. This ensures that your content is safe in the event of an environmental disaster at your home or archives. You might consider storing your materials on your own hard drives and additionally uploading them to cloud storage.

Remember that hard drives have a shelf life of only five years and are prone to failure without warning. Because of this, it becomes important to **migrate** your files to a new hard drive every couple of years, especially if the content is important to you.

REVIEW OF KEY CONCEPTS

If you can answer yes to the following questions, you are doing an adequate job of keeping up with the preservation of your video and audio files.

- Do you have master or preservation files that you keep strictly for the purpose of saving your content?
- Do you have access copies (or DVDs) of your preservation files that you are able to use for practical, everyday purposes?
- Do you have a means of monitoring your files to see if they become changed or corrupted? Are you able to run checksums on your files?
- Are your files properly stored on hard drives, data tape or in the cloud?
- Do you have back-up copies of your master or preservation files on a separate storage device?
- Do you have at least one hard drive with your files in a separate geographical location?
- Do you have a plan for migrating your files to new storage devices every five years?

Are you seeking to have your analog or physical media transferred to digital files by a preservationist or vendor? If so, here is a list of considerations and tips for finding the right preservationist for your project and making the most of the process.

- First, know what you are trying to transfer. What formats? How many items do you have? What is the approximate length of each item? If you have an inventory or have created an inventory with AV Compass, you can bring this to vendors and they will be better equipped to give you a price estimate for their services.
- Know your goal for the content. Are you trying to make a documentary? Do you need video files for a presentation you are giving, etc.?
- Know your technical setup and capabilities. Will you be accessing your newly made files on a Mac or PC? Will you be using any particular editing software?
- Know your storage plan. Do you have a hard drive or raid array? Will you be putting your files in the cloud and/or uploading them online?
- Know the history of your items. Have they been stored in a hot and humid attic for the past ten years? A preservationist will benefit from knowing information like this.
- Be prepared to discuss logistics, i.e. – how you will get your physical media to the vendor for digitization and how they will get the media back to you when the project is complete. Also, be prepared to discuss payment.
- Feel encouraged to discuss the digitization process with the vendor. What software and hardware do they use to capture content? Does somebody watch the content as it transfers? Do they take notes as they capture? How do they normally communicate with clients (phone, e-mail, etc.)? Ask questions of the vendor.

- Remember: allow the vendor enough time to ensure quality transferring and preservation work. In preservation, projects that are given ample time for completion are often of better quality.
- Remember: any digitization through a preservationist or vendor will work better as a partnership or collaboration rather than merely a transaction of service.

HELPFUL GUIDES TO DIGITAL ARCHIVING AND PRESERVATION

Activists' Guide to Archiving Video
WITNESS

Digital Preservation
Library of Congress