TABLE OF CONTENTS

Introduction

Format Identification / Helpful Resources and Guides

Audiotape

Open-Reel Audiotape

Audio Cassette

Microcassette or Mini-Cassette

DAT (Digital Audio Tape)

Recording Cartridges or 8-Track Recordings

Wire Recordings

Handling Considerations for Audiotape

Decomposition Considerations for Audiotape

Sticky Shed Syndrome

Mold, Fungus, Odors

Dirt and Improper Wind

Playback

Storage and Long-Term Considerations for Audiotape

Grooved Media

Vinyl Discs (LPs and 45s)

Aluminum Discs

Shellac and Lacquer Discs

Wax and Plastic Cylinders

Belts
Handling Considerations for Grooved Media

Decomposition Considerations for Grooved Media

- Dirt Deposits
- Scratches and Cracks
- Deformations and Warping
- Delamination

Storage and Long-Term Considerations for Grooved Media

Optical Media

- Compact Disc (CD)
- Mini Discs or Micro Discs
- Digital Video Disc (DVD)
- Blu-Ray
- Laserdisc

Handling Considerations for Optical Media

- The Hub and Outer Edge of the Disc
- Cleaning
- Labeling

Decomposition Considerations for Optical Media

- Fingerprints
- Decomposition from Extreme Temperature

Long-Term Storage and Archival Considerations for Optical Media

- Videotape
VHS, S-VHS, VHS-C

2” Open-Reel Quadruplex Videotape

1” Open-Reel Videotape

½” Open-Reel Videotape

¾” U-matic Videotape

Betamax

Betacam

Digital Betacam (DigiBeta) and Betacam SX

D1, D2, D3

Video8, Hi-8, Digital8

DVCPro, DVCam, MiniDV

HDCam and HDCam SR

Handling and Playback Considerations for Video

Labels

Mold, Fungus and Odors

Crystallization

Tape Pack and Wind

Recording Standards

Oxide Type

Playback

Long-Term Storage and Archival Considerations for Videotape

Motion Picture Film

Film Gauges
Film Bases

Handling and Inspection of Motion Picture Film

Next Steps and Inventory
The purpose this Identify Guide is to give you guidance and help you navigate through what you might find when you open up a random box or pull items off the shelf in your home or at your place of work. After reading through this guide, you should have a better understanding of how to identify formats, how to identify different forms of damage and decomposition and, most importantly, how to document your findings by putting labels on the media itself and by creating an inventory, which you can keep and distribute to any potential collaborators.

FORMAT IDENTIFICATION

This part of the guide is laid out by media type and format. You will see visual examples of each format with a little bit of history, damage and decomposition that the format is prone to as well as advice and insight into how best to handle each particular format. It is important to note that this is by no means the most exhaustive format guide out there. In fact, we recommend perusing some of the other work out on the subject. Some of the following format guides are more suitable for beginners; while some are more detail-oriented for archival professionals.

HELPFUL RESOURCES AND FORMAT GUIDES

Preservation Self-Assessment Guide (PSAP) Format ID Guide
University of Illinois Urbana-Champaign

Archival Formats
National Archives and Records Administration

Indiana University

Care and Handling of CDs and DVDs (2003)
Council on Library and Information Resources
National Institute of Standards and Technology

Texas Commission on the Arts

National Film Preservation Foundation
AUDIOTAPE

Audiotape is the designated term for sound on magnetic tape. Audiotape was developed in the 1920s and 1930s and became commercially produced in the United States during the 1940s and 1950s. Recording on audiotape proliferated in the 1960s, and exploded in popularity during the 1970s through the 1990s with the dawn of personal recording.

When you are rooting around your collection, audiotape will come either in the form of a cassette or open-reel. You might also find a Digital Audio (or DAT) tape or even a tape cartridge. In professional audio settings, you might find larger audio formats like ½”, 1” or even 2” open-reel audiotape. For the most part, however, audiotape typically comes in the form of audiocassettes (about 1/8” tape with) or open-reel audio about ¼” in tape width.

Audiotape was used to record any and all manner of sound. On a cassette or open-reel tape you can find anything from personal dictation to interviews and oral histories to lectures to sound effects to a smattering of different songs.

OPEN-REEL AUDIOTAPE

Physical characteristics:

- Mostly ¼” tape, but can be larger
- Wound around a hub on a reel that can vary in width: 2”, 3”, 5”, 7” and 10.5”
- Handle the tape by its hub.

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0
The tape itself is made up of a base, a binder and sometimes a back coating. The base is what holds the tape together. The base can be acetate, polyester or PVC. Hold your tape up to a light. If you can see through it, you more likely have an acetate tape. If you cannot see through it, you probably have polyester. Acetate is often older and is especially prone to decomposition. As such, it may be more of a priority for you to preserve. If a tape with an acetate base is breaking down, you will probably smell vinegar. Acetate tapes from the 1940s and 1950s can be especially smelly and decomposed. Polyester is often newer and not as susceptible to breakdown at this point in time, thus it may not be quite as major a priority for you to preserve.

Regardless of an open-reel audiotape’s base, playback equipment can be hard to come by and will likely be a big stumbling block to preservation. In order to play an open-reel tape, you need to know its speed. Look for clues on the case or in the notes. Make sure you put the tape back in its box or container when you’re done with it. Do not leave it sitting on the tape machine. If you can, avoid touching the tape itself.

**AUDIO CASSETTE**

Physical characteristics:
- Mostly 1/8” inch tape inside a tiny cassette enclosure about three inches long.
- Standard audiocassette – if you grew up in the 1980s or 1990s, you are likely very familiar with this format.

“Audio Cassette Front” Photo by Wikimedia user Asim18. Image available under a Creative Commons License [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0)

Used for both professional and amateur recording, the audiocassette came to be seen as the standard commercial audio format, becoming especially popular in the 1970s through the 1990s. Because of its commercial availability, it was used a lot for personal, convenient
purposes. Cassettes are made with a polyester base, but are not considered a preservation or high fidelity medium. They have a slow playback speed, which limits their dynamic range and frequency response.

**MICROCASSETTE OR MINI-CASSETTE**

Physical characteristics:
- Just over an inch long
- Looks like an standard audiocassette but much smaller

The microcassette was introduced in 1969. Due to its portability, it was used primarily for dictation and amateur recordings. Some journalists were using this format as late as 2013 due to its ease of use, even in the face of recordings on mobile phones. You might have tapes like these from your old answering machines from your telephone.
DAT (DIGITAL AUDIO TAPE)
Physical characteristics:
- Small cartridge about two inches in length, which houses a 4mm magnetic tape inside.
- Looks like a little MiniDV tape, but will probably say DAT across it

Introduced by Sony in 1987, DAT tape or Digital Audio Tape is a magnetic tape that stores audio digitally. Recordings on DAT tape can be at, below or even above the sample rate of a CD. DAT tapes consist of a magnetic layer and (for the most part) a polyester base, which makes it seem like it might be more durable. However, DAT tapes have proven to be fairly unstable over time, exhibiting data dropouts and compatibility errors between machines. For example, if you recorded onto a DAT tape on one machine, you might have trouble playing that tape back with another machine). Finding a working DAT machine can also be very difficult.
RECORDING CARTRIDGES OR 8-TRACK RECORDINGS

Physical characteristics:
- Width for both of these formats is ¼”.
- Tape inside a cartridge – might look like an old videogame

If you work in a broadcast or archival setting, you might find recording cartridges or 8-track recording cartridges. The recording cartridge format is particularly susceptible to decay especially since it is commonly found in working settings, where it will have been susceptible to heavy use. The 8-track recordings will mostly be commercial in nature. These formats were used in the 1960s and more heavily in the 1970s. 8-tracks were used in the 80s as well. Note that while they look the same, recording cartridges cannot be played back on 8-track machines.
WIRE RECORDINGS
Physical characteristics:
- Stainless steel wire wound around a spool

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0

This was an alternate form of recording introduced in the 19th Century, but developed further during WWII. While wire recordings have low sound quality, they are not susceptible to the same types of damage as open-reel tapes. If you have these recordings they are probably from the 1940s through the 1960s. One setback you are likely to find with this format is trying to find a machine that will play it back.
HANDLING CONSIDERATIONS FOR AUDIOTAPE

Handle a tape by its reel or cartridge

Refrain from touching the tape if you can help it; grease from your fingers can hinder getting the best sound when you playback. Likewise, over-handling can potentially speed-up degradation.

Remember: be gentle and don’t drop the tape if you can help it

DECOMPOSITION CONSIDERATIONS FOR AUDIOTAPE

STICKINESS OR STICKY SHED SYNDROME
Audiotape consists of base, binder and occasionally a back coating. Often, the binder breaks down and can make a tape difficult to play. This can happen seemingly on its own over time, but tapes become particularly susceptible to stickiness when you store them in humid areas or expose them to water. When the binder breaks down, we call it sticky shed syndrome.

A tape with sticky shed syndrome can clog or seize in the tape transport when you try to play it back; it can even break your deck.

MOLD, FUNGUS, ODORS
You might find mold spores on your tape, especially if it has been stored in a damp, more humid climate. You might notice that your tape smells like dirty socks (especially if it is a tape with an acetate base). If you notice visible mold or fungus, take your tapes to a specialist, especially if you wish to salvage the content on those tapes.

DIRT AND IMPROPER WIND
Excessive dirt or dust might be visible to your eye when you look at the tape. You might notice that the tape is poorly wound. You might notice stepping or popped strands or cinching or a flange pack. If you can, make sure your tape is properly rewound. Make sure that it is stored vertically on the shelf, not on its back. This will help to preserve a good wind.

PLAYBACK
It is worth noting the importance of playback equipment to the life of your audio content. To hear what is on the recording, to transfer it to digital or another format, you have to have a working tape deck – and you have to have a deck that will play back your media at its required speed (if you have open-reel formats). Without functioning playback equipment, the tape is unusable.
Most audiocassettes are designed to have a mode in which they can be recorded over, and a mode in which they cannot. Look for a tab or button on the tape and make sure that it is set to non-record mode.

Keep your precious audiotapes away from magnetized surfaces – amplifiers, televisions, metal countertops, etc. Magnetized surfaces can de-magnetize tapes.

Stand your tapes vertically on the shelf to ensure a proper wind, which will help you in playing the tape back later.
GROOVED MEDIA

When you think of grooved media, think of either flat discs or cylinders with grooves in them. Think of sound that is played back by running a needle or stylus through the groove.

Grooved media varies in size and speed and has different coatings and substrates, which may include: aluminum, lacquer/acetate, plastic and even cardboard. When you are looking around your own collection, you are likely to find commercial recordings on vinyl.

Here is a general note about grooved media: if you find anything that is not a vinyl disc and you think it could have special content on it, you should take it to a specialist because the playback specifications and eccentricities of older grooved media make it a huge risk for you to try to play back on your own.

VINYL DISCS (LPs and 45s)

Physical characteristics:

- Generally strong and do not degrade quickly
- Flexible and will not crack in the way that some shellac or lacquer recordings will, but because they are made of a soft material, they can scratch easily.
- Comes various sizes, most commonly 12”, 10” and 7”

“45rpm” photo by Wikimedia user Liftarn. Image available under a Creative Commons License [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0)

Vinyl is common, especially for commercial recordings. Vinyl is common, especially for commercial recordings. In use since the 1940s, vinyl recordings can have different playback speeds (78, 45 or 33 1/3 rpm). Dust and dirt can cause them to skip during playback.
ALUMINUM DISCS
Physical characteristics:
- Obscure and are easy to identify due to their silvery, metallic surfaces.
- Because they are aluminum, they are generally sturdy and are not considered preservation risks, but they can be damaged during playback.

Aluminum discs are a rare type of instantaneous disc, used for one-off recordings. This means that if you have them, they will have unique content on them. These recordings also require a specific stylus for playback, so be careful if you find one of these discs in your collection.

SHELLAC DISCS AND LACQUER DISCS
Shellac discs were in use from the early 1900s through the 1950s. Lacquer discs were in use from the 1920s through the 1970s.

Physical characteristics (shellac):
- Shellac does not flex like vinyl does and can easily crack and break.
- Can come in the same sizes as vinyl discs (12”, 10” and 7” – but they can also come in a larger 12” size)
- Be careful playing back shellac discs because they can require their own stylus.

Modified from “Schellackplatte” photo by Wikimedia user Mediatus. Image available under a Creative Commons License CC BY-SA 3.0
Physical characteristics (lacquer):
- Will contain unique content since the audio is recorded directly onto the discs.
- Because they are encased in a laminate, these discs can swell and delaminate if exposed to water or high humidity. When they swell, you can lose information.
- Discs can come in a multitude of different sizes 7″, 8″, 10″, 12″, 13″, 16″

WAX AND PLASTIC CYLINDERS
This is the earliest recorded sound format. Just due to the historical significance and rarity of the format itself, your cylinders are worth holding onto. Cylinders require a very specific player in order to be listened to. Dates of use for wax cylinders are 1880 – 1915; dates of use for plastic cylinders are 1900 to 1929. Wax cylinders are more prone to scratches than plastic ones.

Image found via the National Archives and Records Administration’s Audio Guidance: Identifying Audio Formats guide.

Physical Characteristic:
- These small, nearly 4″ long tubes are the predecessor to the grooved disc.
- Unbelievably fragile and particularly prone to scratches
- Susceptible to warping and can get scratched, which can hinder your ability to play them back
BELTS

Dictabelts, memobelts and magnabelts are a difficult format to categorize. Physical characteristics: Used primarily as a means of personal dictation, there are magnetic belts without grooves (magnabelt) and there are belts with grooves (dictabelt, aka memobelt).

Physical characteristics:

- Belts will look different than the other forms of grooved or magnetic media that you might find. They will look like small, grooved bands.

Image found via the National Archives and Records Administration’s Audio Guidance: Identifying Audio Formats guide.
HANDLING CONSIDERATIONS FOR GROOVED MEDIA

If you decide to play a disc, do not leave it on the turntable, make sure you put it back in its case, otherwise you are leaving it susceptible to dust.

Handle your discs and cylinders along the edges. You do not want to risk foreign substances entering the grooves.

DECOMPOSITION CONSIDERATIONS FOR GROOVED MEDIA

DIRT DEPOSITS
Remember that grooved media requires a stylus to run through its grooves in order to be played. If pieces of dirt seep into the grooves it can cause popping and interruptions during playback.

SCRATCHES AND CRACKS
Playback of grooved media can be stymied by unwanted scratches that affect the stylus’s proper running through the groove. Scratches can cause interruptions, skipping and popping during playback. Shellac discs are prone to becoming brittle and cracking. Some discs are so fragile that they can break apart. If you notice that your grooved recording is cracked, flaking or peeling and its content is important, you should take it to a specialist. Trying to clean it on your own might make the problem worse.

DEFORMATIONS AND WARPING
Grooved media made of vinyl or wax can become deformed or warped in extreme temperatures and from improper storage. For example, if you leave a vinyl disc in a place where part of it is being pushed back or squished, it can bend, warping the record’s sound during playback.

DELAMINATION
Changes in temperature and humidity can also cause delamination. Delamination might look like your disc or cylinder has a sunburn that is bubbling or peeling. With lacquer discs, the delamination might occur if the disc itself is swelling.

STORAGE AND LONG-TERM CONSIDERATIONS FOR GROOVED MEDIA

Your discs should be stored right side up. Do not to lay them flat and stack them atop each other. When you put your discs on a shelf, make sure none of them are being bent or pinched.
Try to ensure that discs stored in cardboard cases do not become coated in cardboard dust. If you are worried about the cardboard case dusting into the media, make sure you put the record in a sleeve of acid free paper as a protective barrier.

Grooved media should be stored in relatively normal temperatures – not too hot, not too cold and certainly not too humid. Your grooved media will probably be most comfortable where you are most comfortable.
OPTICAL MEDIA

*Optical media* has been around since the late 1970s and early 1980s, but proliferated in the 1990s and 2000s. *CDs* and *DVDs* have been used primarily for quick and easy access to music and movies, but have started to decline in use given the rise of digital files and the ability to play content from phones and personal devices. Because they are designed for short-term use, CDs and DVDs are not considered suitable for preservation.

Still, optical media can carry valuable information. Old mix CDs might give you an idea of how you felt at a given point in your life. Many musicians and filmmakers will have their work on CD or DVD. While CDs and DVDs might not be ideal for preservation, they can often hold valuable, unique content and as such can be worth giving archival consideration.

**COMPACT DISC (CD)**

Physical characteristics:

- 4 ½” in length, with a small hub or circle in the middle
- CDs can be manufactured with the ability for their data to be re-written. CD+R or CD-RW formats will degrade faster than a CD that is not re-writable (CD-R or commercial music CDs).

CDs were in an incredibly popular means of consuming popular music from the late 1980s to the early 2000s, but have since seen a decline with the rise in popularity of MP3s.

Pay attention to the labels on your CDs. They can clue you into content that might be important to you from a preservation standpoint.
MINI DISCS
Physical characteristics:
- Encapsulated in a small enclosure (that looks almost like a floppy disc)
- Inside the enclosure, is a tiny disc – roughly 2 ½” long, or about half the size of a normal CD.

Modified from “Mini-Disc” photo by Wikimedia user Maksim. Image available under a Creative Commons License CC BY-SA 3.0

In use from about 1992 – 2013, these discs were easily re-writable, even though they never really took off in the United States (they were more popular in Japan). You might find valuable content in your archives on this disc, especially if you work in the field of journalism since they were a popular way to record interviews.
DIGITAL VIDEO DISC; DIGITAL VERSATILE DISC (DVD)

Physical characteristics:

- DVDs are the same size as CDs (about 4 3/4” in length with a small hub in the middle).
- Like CDs they can be re-writable (DVD-RW). DVD-RW will degrade more rapidly.

![DVDs](image)

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0

You might have commercial DVDs. You might have home movies; you might have student films. Reading your labels as well as the manufacturer’s label will be important. DVDs began in 1995 and continue to be in use to this day.

BLU-RAY

Physical characteristics:

- Blu-Rays are the same as DVDs, except they play high definition video.
- Note that you can play a DVD in a DVD player, but you cannot play a Blu-Ray in a DVD player.

Blu-Ray technology was invented in 2007. It was in a format war with High-Definition DVD until it won out as the dominant format. Media can be burned to Blu-Ray with external burners (BD-R and BD-RE).
LASERDISC
Laserdiscs were mostly commercial in nature, so it is unlikely you will have any family or amateur-produced content on LaserDisc. You might find instructional videos on Laserdisc. Given that Laserdisc started in the very late 1970s and is considered the pioneering optical media format, you may wish to hold onto your Laserdiscs.
Also known as: Laservision, DiscoVision, Reflective Optical Disc, etc.

Physical characteristics:
The size of a standard LP or record, this format looks like a giant DVD.

Modified from “LDDVDComparison-mod” photo by Wikimedia user Ubcule. Image available under a Creative Commons License CC BY-SA 3.0
HANDLING CONSIDERATIONS FOR OPTICAL MEDIA

THE HUB AND OUTER EDGE OF THE DISC
Handle discs only by the outer edge or center hub. Do not touch the surface of the disc, particularly the back of the disc because that is where the data is stored. The back of the disc is the part that the laser reads when you stick the disc into a machine.

CLEANING
If you get fingerprints on your disc and are having trouble playing it, you might try water or alcohol (or some even claim Windex) with a microfiber cloth, gently dabbing the solution on the cloth, then gently rubbing it across the back of the disc.

LABELING
The data layer (the back of the disc) is connected to the top layer (the front of the disc), meaning that your marker for labeling your CDs or DVDs can bleed through to the data layer and cause damage if you are not careful. Do not use a ballpoint pen for labeling your optical media. If you are particularly concerned about the content of the disc, you should abstain from writing with a Sharpie marker on it. You can write on the hub if you have trepidation about the marker bleeding through.

Do not put adhesives or stickers on your disc if you are interested in keeping the content of the disc for the long-term.

DECOMPOSITION CONSIDERATIONS FOR OPTICAL MEDIA

FINGERPRINTS
The biggest threat to optical media is the way by which improper handling can leave fingerprints or scratches on the disc, rendering it unplayable.
DECOMPOSITION FROM EXTREME TEMPERATURE
Additionally, discs can become damaged and unplayable if left in extreme temperatures or direct sunlight for too long. Discs can lose their data in a matter of hours if stored in very intense heat or direct sunlight.

LONG-TERM STORAGE AND ARCHIVAL CONSIDERATIONS FOR OPTICAL MEDIA

Jewel and plastic cases are acceptable.

Store optical media upright like you would videotape or grooved media.

Anything you can do to keep discs from pressing into each other in storage is optimal. Refrain from stacking many CDs or DVDs on top of each other when they are not in cases. Keep from putting more than one disc on a hub in a jewel or plastic case.

Avoid direct sunlight. The cooler and dryer the temperature, the better.
VIDEOTAPE

*Videotape* is the designated term for video recordings on magnetic tape.

Videotape ranges in size from a tinier MiniDV tape to a very large 2” open-reel tape. Video was developed for Broadcasting during the 1950s.

Videotape is not an archival storage medium. It was developed for short-term use. The anticipated lifespan of video gets shorter and shorter as the years go by. Obviously, the more ideal your storage conditions and the better stock of tape you have, the longer it will last (different brands of tapes are more susceptible to damage given how they were manufactured). Regardless of storage condition and tape brand, videotape is still not a good format for long-term preservation of moving images. You should not wait to reformat, or transfer your tapes to a more stable medium – especially if they have important content on them.

Unlike film, you cannot see the image on the videotape itself. Rather, the tape itself looks thin and magnetic. When you play a tape, the machine reads the surface of the tape and constructs an image from its signal. Be sure not to confuse videotape with audiotape. Sometimes they can look similar. Because you cannot discern the content of a particular tape by just looking it, it is important to make sure you label your tapes with great specificity.

Keep in mind: a huge factor in preserving videotape is having the correct playback machine for the format that you have.
VHS
A VHS tape is probably what comes to your mind when somebody mentions the word “videotape.” VHS dates back to the 1970s. It eventually became the dominant format for the commercial video market, beating out its greatest format competitor, Betamax. VHS players were common fixtures in American homes throughout the 1980s, 1990s and early 2000s.

Physical characteristics:
• VHS comes in cassette form about 7 ½” long and 4” tall and 1” thick.

S-VHS is a variant of VHS, but is more superior in terms of picture quality. If your cassette says S-VHS on it, you can still play it in a VHS player. However, if you have regular VHS, you will not be able to play it in an S-VHS deck.

You might also notice a tinier version of VHS called VHS-C. This type of VHS was used mostly for home and amateur videos. For VHS-C you will need a special deck or a tape adapter, which makes the VHS-C the size of a normal VHS.
2” OPEN-REEL QUADRUPLEX VIDEOTAPE

This format dates back to the 1950s and the beginning of broadcasting, so you are unlikely to find it in your home. 2” Quad tapes will be more likely found in archives and broadcast settings and have long been considered obsolete.

Physical characteristics:
- This open-reel format is precisely 1-foot in diameter.
- The tape itself is 2” wide.
- Often found in a big, blocky case and will be heavy when you hold it.
1” OPEN-REEL VIDEOTAPE
Developed during the 1960s, 1” as a format is more likely to be found in broadcast settings. During 1980s and 1990s, it was an especially common format for video preservation masters. Like 2” quad, playback equipment for 1” tape is hard to come by and the format has long been considered obsolete.

Physical characteristics:
- This is an open-reel format that can come in a variety of diameters, but its defining characteristic is that the tape itself is 1” wide.
- There are three types of 1” videotape (Type A, Type B, Type C). Type A did not adhere to broadcast standards; type B never caught on in the United States. If you find a 1” reel in your collection, odds are that it’s type C.

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0
½” OPEN-REEL VIDEOTAPE
Physical characteristics:
- Defining characteristic is that the tape itself is ½ an inch wide
- Open-reel format that can also come in two different diameters (5” or 7 ½ inches)
- Keep in mind that there are two different types of half-inch tapes – AV and CV. They look the same, but will need to be played back on different decks. AV is much more common than CV. AV (aka EIAJ) is the standardized version of ½” videotape and grew in popularity through documentary filmmaking and video art during the 1970s because it was portable.
- Beware: this format is prone to suffering from sticky shed syndrome.

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0
¾” U-MATIC VIDEOTAPE
The earliest videocassette format, U-matic tapes were a common broadcast or edit mastering format in the 1970s through the 1980s. They were also used in the educational and industrial markets. They are a big preservation risk, prone to sticky shed syndrome. Likewise, finding working U-matic decks can be problematic. If you care about the content on your U-matic tapes, consider getting them reformatted or digitized sooner rather than later.

Physical characteristics:
- These cassettes come in two different sizes. The smaller of the two is called “U-maticS.” U-maticS was intended for use in smaller, more portable recorders and will say “U-maticS” or “U-maticSP” on the tape.
- Regular sized U-matic is about 8 ½ inches by 5 ½” while U-maticS is about 7 by 4 ½”.

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0
**BETAMAX**

Started in 1975, this format was in use as a capture and commercial format through the late 1980s. Betamax was famously locked in a war for commercial market dominance with VHS.

Physical characteristics:
- About 6” long, 3 ¾” wide and 1” thick – a Betamax tape will fit in the palm of your hand

![Betamax Image](https://example.com/betamax_image.jpg)

Image modified from a photo by Lori Dedeyan; [Materials from UCLA Library Special Collections](https://library.ucla.edu/). Image available under Creative Commons License [CC BY-NC-SA 2.0](https://creativecommons.org/licenses/by-nc-sa/2.0/)

**BETACAM**

Physical characteristics:
- Tape will be 11” by 7” or you might find BetacamSP (smaller at 6” by 4”)
- This format was considered more professional in quality than Betamax and was used in broadcast settings.
- Betacam is flexible in that it can be played in a Digital Betacam deck (and Digital Betacam decks are still relatively easy to find).

![Betacam Image](https://example.com/betacam_image.jpg)

Photo by Lori Dedeyan; [Materials from UCLA Library Special Collections](https://library.ucla.edu/). Image available under Creative Commons License [CC BY-NC-SA 2.0](https://creativecommons.org/licenses/by-nc-sa/2.0/)
DIGITAL BETACAM (DIGIBETA) AND BETACAM SX

Physical characteristics:

- This format looks and feels almost exactly like a regular Betacam tape.
- Pay attention to the inscription on the tape. It will likely say “DigiBeta” or “Digital Betacam.” If you have your content re-mastered to videotape (rather than a digital file), it is likely it will be re-mastered to Digital Betacam.

This format was started in the 1990s. Keep in mind that while you can successfully play Betacam in a DigiBeta deck, you cannot play DigiBeta in a Betacam deck. You might come across “Betacam SX” in your collection. BetacamSX was developed as a cheaper alternative to Digital Betacam.

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0
**D1, D2 and D3**

These formats were developed as a cost-effective alternative to Digital Betacam. Used mostly in the motion graphics and animation fields, these tapes store uncompressed digital video and are somewhat of a rarity. They mostly went out of use when Digital Betacam became the defacto standard for broadcast.

Physical characteristics (D2):
- 6 ¾” long, 4 ¼” wide and 1 1/3” thick (or in a larger format: 10” long, 5 7/8” and 1 1/3”)

Physical characteristics (D3):
- 8 ¾” long, 5” wide and 1” thick

Modified from “Panasonic D3 Casette (rotated cropped)” photo by Wikimedia user Ubcule. Image available under a Creative Commons License [CC BY-SA 3.0](http://creativecommons.org/licenses/by-sa/3.0/)
VIDEO8, HI-8, DIGITAL8
Video8 was put on the market in 1984. Hi8 was put on the market in 1989. These formats were in use until the late 2000s. Digital8 was started in 1999 and is still occasionally used today. Digital8 tapes require their own playback machines, or camcorders to be played back, meaning you cannot play them in Video8 or Hi8 decks.

Physical characteristics:
- Each of these tapes is roughly 3 2/3” long, 2 3/8” and ½” thick
- Video8 and Hi-8 were popular in the professional and consumer markets (lots of people recorded home movies on these formats).

With Hi-8 and Video8, beware of Metal Particulate and Metal Evaporate tape. Metal Evaporate tape was meant for higher performance, but it tends to degrade more rapidly (and be more difficult to play) than Metal Particulate. You can tell if a tape is Metal Particulate or Metal Evaporate by looking on the tape label. It will say either MP or ME.

Photo by Lori Dedeyan; Materials from UCLA Library Special Collections. Image available under Creative Commons License CC BY-NC-SA 2.0
DVCPRO, DVCAM, MINIDV

Physical characteristics:

- DVCPro, DVCam and MiniDV are composed of magnetic particles, a binder and a polyester base – though they are ALL used to carry digital video.
- DVCPro comes in larger and more medium-sized cassette form. The larger ones are used in edit bays and the smaller ones are used in cameras for production.
- MiniDV is a very tiny version of DVCPro.

![Image of DVCPRO tape](https://example.com/dvcpro_image.jpg)

Image found via the Preservation Self-Assessment Program (PSAP). Photo by Flickr user DRs Kulturarvsprojekt. Available under Creative Commons License [CC BY-NC-SA 2.0](https://creativecommons.org/licenses/by-nc-sa/2.0/)

DVCam comes in two different sizes (the larger sized DVCam is the size of the smaller DVCPro whereas the smaller DVCam is the size of MiniDV). While you can typically play MiniDV in a DVCPro deck, you cannot typically play DVCam in a DVCPro deck. DVCam often requires its own deck. In general with these tapes, watch out for damage in playback because the tape inside is often small and thin and thus easily susceptible to wear and tear.

![Image of DVCAM tapes](https://example.com/dvcam_image.jpg)
DVCPro and MiniDV developed in 1995 and remained in heavy use through the late 2000s. DVCam was introduced the year after, 1996 and were also in heavy use through the late 2000s.

**HDCAM and HDCAM SR**
HDCAM is comparable to Betacam and DigiBeta, but used for storing high definition video. Sometimes this format is used for making master or intermediate copies of film content. HDCAMSR was introduced in 2003 with increased bit rate capacity and higher particle density composition. It can be used in the production of HD television.

Physical characteristics:
The smaller cassette version of HDCAM resembles Betamax.
HANDLING AND PLAYBACK CONSIDERATIONS FOR VIDEO

LABELS
With videotape (as with audiotape), labels become all-important. This is because videotape requires a playback machine to be seen and heard. If you lack a tape machine to playback your videos, your first clue as to whether you want to save or prioritize your content will be your labels.

If you are lucky, labels can tell you the date of your videotape, whether your tape is a master or a clone as well as give you clues as to content. With older formats, it can be a good idea to re-apply labels as they can become faded, flakey and fall off. If, after digitizing your videotapes, you have new insight into their content, make sure to re-label your original tapes with this information.

With magnetic media, it is particularly helpful to record the date of recording, tape number (especially if it is part of a series), format, tape brand, any conditions you notice and your name.

MOLD, FUNGUS, ODORS
Mold can grow on videotapes, especially if the tapes have been stored in damp or humid conditions without proper ventilation. Always look for mold before any in-depth handling of videotape. If you have a suspicious-looking tape case (like it may have been kept in a basement or been exposed to water), be extra cautious when opening it and handling the tape inside. Typically, mold will look like little white (or brown) spores.
CRYSTALLIZATION
You might also notice crystallization – that is to say, a hardening and flakiness of the tape that can sometimes be confused with mold.

TAPE PACK AND WIND
Tapes that are not re-wound after use, or those that are stacked horizontally instead of standing upright, vertically, are subject to pack problems. Over time, the tape pack (the way it is wound around the hub) can become uneven, exposing the tape edges to possible damage and making playback or difficult. Look for:

- Popped strands
- Cinching
- Wide gaps
- Stepping

With pack problems, dirt can also more easily slip into the tape pack. Take out any lose paper that is sitting in the case because particles from the paper can get on the tape and affect playback. Similarly, put away any tape when you are done using it because if you leave it out, dust can seep inside of it.

You can remedy an improperly wound tape by rewinding or cleaning it.

You might notice digital dropout or image loss when you try to play back your DVCam or MiniDV tapes. A good remedy for this is to (if you can) “jog” the tape by fast-forwarding it to the end and rewinding it again. Think of it as stretching or limbering up before a race.
**RECORDING STANDARDS**
If you know it, you will want to take note of the video standard that your recording was created in. If you have analog composite video recordings, they are recorded in one of three major video encoding systems that exist in the world. These systems developed as a means of combining in one signal all the information necessary to broadcast, display and record video.

The three common video standards are:
- NTSC
- PAL
- SECAM

And you cannot play a PAL tape in an NTSC deck. This map shows which countries/regions use each standard.

![Map of video standards](image-url)

Image “PAL-NTSC-SECAM” photo by Wikimedia user Akomor1. Image in the Public Domain.

**OXIDE TYPE**
When you are looking at a tape, you might want to take note of whether the tape is “Metal Particle” or “Metal Evaporate.” In terms of playing back or reformatting your materials, it can help to know this information. Metal Particle tapes are said to look slightly inferior in terms of picture quality, but are rumored to be more durable in the long-term. Conversely, Metal Evaporate tapes are said to look and perform better, but be less durable into the future.

Playing back your tapes can damage them, especially if you are using equipment that is not working properly. This is another reason why if you really care about your tapes and you want
to keep the originals in good working order, you should take them to a reputable professional for reformatting.

**PLAYBACK**

In playback, you might also notice sticky shed syndrome. This is where the binder of the tape breaks down or becomes sticky. This can cause problems with your equipment. One way to mitigate sticky shed syndrome is to “bake the tape.” To bake a tape is to put it in a food dehydrator or a specialized oven for a period of time. This process dries out the tape so that it is less sticky and easier to play. If you are at a point where your tapes need to be baked, you should probably be working with a preservationist who knows how to appropriately handle this process.

![Image of a tape deck](https://via.placeholder.com/150)

Photo by Flickr user DRs Kulturarvsprojekt. Available under Creative Commons License [CC BY-NC-SA 2.0](https://creativecommons.org/licenses/by-nc-sa/2.0/)

Finally, all cassettes are designed to have a mode in which they can be recorded, and a mode in which they cannot. Look for a tab or button on the tape and make sure that it is set to *non-record* mode. With VHS tapes and other formats, there is a tab you pop off to ensure that your content is not recorded over. In more contemporary formats like DVCam or HDCam, it is a switch that you flip. Here are some pictures. See the Texas format identification guide.
LONG-TERM STORAGE AND ARCHIVAL CONSIDERATIONS FOR VIDEOTAPE

Store tapes vertically in viable cases.

As with film, when you handle tapes, you might wish to wear gloves to avoid getting smudges on the tape. This is up to you. Sometimes particles from the gloves can slip into the tape pack, so you might not want to use them, but they can help if you are worried about getting grease from your hands on the tape, or about getting materials from a dirty or moldy tape on your hands.

Strong magnetic fields can affect the signal of the tape, causing it to become unreadable or adding to errors in playback. Common mistakes include leaving tapes on top of or next to a television, computer monitor, speaker or microphone. Motors, transformers, generators and industrial cleaning equipment can also cause demagnetization if a tape is stored in close proximity to them over time.
MOTION PICTURE FILM

Film is the original format for moving images. When people started recording movies, they recorded them on film.

In your hands, film will come wound around a core in the form of a reel. Keep in mind, you might have an open-reel video or audiotape instead of film, but it is very easy to tell the difference. If you have film, you should be able to unwind it a little and hold it up to the light to see images in the form of frames. If you have open-reel videotape or audiotape, you will not see images. Rather, you will just see a flat brown or black color.

When somebody says the word “film” you might think strictly about commercial filmmaking, but some of the most telling and important movies are home movies – films created amongst families and communities that document regular events and streets and towns and peoples’ lives. There is an audience for these movies. They can be particularly relevant to historical societies, to filmmakers and most especially to your family because they document your personal history. If you are an individual using AV Compass to sort through your personal
audiovisual collection, you are most likely to find home or amateur films, though this is not always the case. You or someone in your family might have been a film collector accumulating feature films, cartoons or educational films.

As mentioned, film is transparent. In this way, it is different from video or audiotape. You do not need a projector to see what is on it and to identify it. With film, you can tell right away if it is in black and white or color. You can tell if it is a negative or positive. You can tell if it is silent or has sound. If a film has a soundtrack, it will run down the side of the film as seen in the diagram on page 44.

**FILM GAUGES**

Films have perforations down the side of them. This is what pulls them through a projector. Film comes in many different sized gauges. The term “gauge” reflects the width of the film. Before motion pictures became primarily digital, 35mm was the standard format or gauge shown in movie theaters. Home and amateur films are likely to be found in 8mm, Super8 and 16mm (pictured below). Less common, but occasionally found in certain collections are 9mm or 28mm.

“Film gauge comparison chart” by Ryan Edge. Available through the [Preservation Self-Assessment Program (PSAP)](https://www.loc.gov/psap/) and under a Creative Commons ShareAlike license [CC BY-SA 4.0](https://creativecommons.org/licenses/by-sa/4.0/)
Identifying what gauge of film you have is fairly easy. Projecting and properly inspecting your film is more challenging. If you want to project your film, you need to have a projector and a take up reel for the gauge of film that you have. Projecting your film, especially if the content is valuable to you, is not recommended because projection can cause further damage.

You might have a hard time finding film inspection equipment, but you can talk to a film archive or preservation facility about it. They will often be happy to help and/or make recommendations.

FILM BASES

Film consists of base and emulsion. The base is what holds the film together. There are three types of bases:

**Nitrate or nitrocellulose**, which is highly flammable.
All film stock produced before 1951 is nitrate. Nitrate is ALWAYS 35mm. Often if you unroll your film a little bit to look at the perforations you will see the word “nitrate” printed along the edge of the film.

If the film smells like vinegar, it’s not nitrate, but if it smells like dirty socks, it could be.

Near the edge code is where you will see the words “Nitrate” or “Safety” typically.

Photo by Kathy Rose O'Regan; film from George Eastman House.

If you have 35mm film and it does NOT say nitrate, you should assume that the film is nitrate and take it to a specialist. This is, again, because nitrate is a hazard due to its flammability. It is
not likely that you have nitrate film strewn about your closet, but you should be aware of it just in case. If you find nitrate, contact an archive or somebody who deals with hazardous materials.

It is most likely that your film has an acetate base. This film is very fragile and susceptible to “vinegar syndrome” which gives off a distinct vinegar-smelling odor; it can also smell like mothballs. It will only smell if the film is starting to decay.

If you have film from the late 1990s onward, you might have polyester film. Polyester is thought to be tougher and more stable than its nitrate and acetate predecessors.

HANDLING AND INSPECTION OF MOTION PICTURE FILM

Most films have what is called an edge code imprinted down the side of them. An edge code looks like a shape or combination of two or three shapes. This shape or combination of shapes will tell you what year your film was manufactured or printed. However, just because a film was manufactured in 1966 does not necessarily mean that the content is from 1966. Your film might be a duplicate of an older film, or it might have sat around for a while before getting developed.

“Print-Through Nitrate” photo by Kathy Rose O'Regan; film from George Eastman House.

To know what year the symbols on your film represent, you can consult a number of helpful charts. Edge codes will vary from film stock to film stock. Make sure you consult the correct edge code chart for your particular film stock.
As you inspect your film, check for the following:

- The smell (If your film smells of sweaty socks, it could be nitrate; if your film smells of mothballs, it is likely diacetate film which was a safety film produced between 1910 and 1930; if the film smells of vinegar, it’s acetate)
- **Warping** or **Curling**
- **Shrinkage** (As film decays, it can shrink. There are several ways that you can identify whether or not your film is shrunken, including an app for your ipad.)
- Perforation damage (If perforations on your film are torn or broken, you absolutely should not project it as it can further damage your film and your projector)
- Bad splices (where one piece of the film is attached to another); stickiness near splices
- **Color fading** (Eastman film from the 1950s onward can fade red, though a lot of amateur film formats retain their color well through the years).

If you notice any of the above, you probably should consult with an archivist, preservationist or other expert who can help.
Here are some additional rules and considerations for handling and storing film:

- Some people believe in wearing lint-free cotton gloves when they inspect their film. Gloves are only necessary if you are handling the image itself or its soundtrack. In this case, you would wear gloves to keep from getting oils from your hands on the film. Gloves can be a risk because they can get caught in torn or broken perforations and cause more damage.
- Try not to use tape to splice ends of the film together. Tape is not archival and can cause stickiness to spread throughout the film over time.
- Do not write on the film itself. Put any notes on the container or on leader (blank film) that you attach at the head or beginning of a film reel.
- Store film in a cool, dry place, but not too dry.
- Do not store film in airtight containers. The ideal container will allow for a little bit of air circulation.
- Lay film flat (or horizontal) when you put it on the shelf. Unlike video and audiotape, a reel of film will fair better when it’s stored flat on its back.
NEXT STEPS AND INVENTORY

Preserving your audiovisual collections comes down to more than just being able to identify what format you have and what condition it’s in. You have to be able to record this information somehow so that it is available to you in the future when your formats (and the technologies to play them) become obsolete. If you record what condition something was in at a given point, it will provide you clues as to how to proceed when you are in a position to tackle preservation. The more you know about a given item, the easier it is to make decisions about how to preserve it. AV Compass was created so that you can enter information about your collection into the website and keep track of the data.

Please consult the “Create an Inventory” guide for more help – it will give you specific instructions on how to create an accurate and useful inventory of your collection. Use this Identify guide in conjunction with the inventory tool in order to record more robust information about your collection.