SCENE SAVERS
Making History Modern

Videotape Transfer

The following guide has been created to help you prepare your videotapes for preservation and access. The intent of the article is not to provide a definitive answer as to what your specific solution should be, since each archive's needs are unique. The intent, rather, is to provide basic information so you can make an educated decision as to how to move forward. In addition to discussing the reasons why tapes need to be transferred, the following will help you identify the source formats and decide what formats to consider for preservation.

Many archives have videotapes in their collection. Often these videotapes include many different formats, some of which may be extinct (such as ½" EIAJ and 2" Quad) while others might be endangered (such as 1", ¾" and VHS). For this document, I am defining extinct as formats for which equipment is no longer manufactured and hasn't been for a long time (more than a decade). For these formats, equipment in good working order is generally difficult to find and transfer can be quite expensive. I am defining endangered as formats for which equipment is no longer being manufactured, but the equipment is still relatively easy to obtain and repair. Finding equipment or facilities to transfer these items is still easy enough that prices haven't started to increase yet, but increases are likely in the future as it becomes more difficult to find working systems.

Why Transfer?

As archivists, many of you understand the importance of transferring this content for preservation. But, you would be surprised how common the belief is that "It's on videotape, I don't need to worry about it, it will last forever, right?" Outside of the archival community, people, including the people who control your budgets, tend to think of forever in terms of their lifetimes. I know this seems obvious, but I am calling it to your attention because it affects your ability to get funding for these projects. In order to successfully obtain financing to preserve these items, you must impress upon these people that videotapes are really quite fragile, much more so than documents or books within the archive. The generally accepted wisdom is that videotapes last somewhere between 10-30 years if stored properly. Makes you feel good about your collection, right? Can tapes last longer? Sure. Do tapes fail sooner? You bet. The challenge is that tapes don't "show" that they are degraded. There is no characteristic odor or change in appearance to indicate that a tape is degrading. So, all you can do is set up a regular schedule and transfer your tapes to ensure the content is preserved for the future (well actually, there are some tests to indicate stickiness and you could try to play the tape to see if it is degrading, however playing it could damage it if it is degraded).

424 SCOTT ST. COVINGTON, KY 41011
859.291.5100
www.scenesavers.com

SCENE SAVERS
Making History Modern

Videotapes can present several challenges for transfer. A common problem is called “interchange”. This happens when a tapes is recorded on one tape deck is played back on another deck. Ideally, all tapes should play fine on all decks for that format, but problems often occur because the initial recording deck was not aligned exactly the same as the playback deck. An easy solution would be to play the tape back on the deck that recorded, but if decades have passed since the tape was recorded, this might be impossible. In order to maximize the chances that the tape can be played, it should be transferred while many decks are still available in the market, so the likelihood of finding a deck that will work is still pretty good. Another problem is called hydrolysis or perhaps more commonly sticky-shed. Sticky shed occurs when the binder on the tape interacts with humidity in the environment and breaks down. In the process of breaking down, the binder becomes “gummy” or sticky, and allows the playback heads in the tape deck to strip oxide off the tape. This will clog the heads and greatly reduce the video signal strength, resulting in with a poor image or no image during playback. Other problems can include outside contamination (water, dust, dirt) and organic problems such as mold and mildew. Special care is required to handle these problems as attempting to play one of these tapes can ruin both the tape and the playback equipment.

What information do I need?

When preparing a videotape project, please consider the following questions:

1. What different formats of videotapes do you have? Please see the following list or visit our web-site at www.scenesavers.com for a format identification guide. Note that this list is not meant to be an all-inclusive list (there were many videotape formats over the last 50-55 years). This is a list of the more common formats you might encounter. Some common formats might be:
    a. ½” EIAJ (an early open reel ½” format). This was an early “industrial” format developed by Sony and others. It tends to have a relatively low image quality and the tapes are usually difficult to play back because of degradation (most likely related to their age). Transfer as soon as possible.
    b. CV. These tapes are similar in appearance to the EIAJ format, but they are not inter-changeable (meaning these cannot be played on an EIAJ machine). CV is very rare and it would be very challenging to find a working machine to transfer the tapes. It might be too late to transfer these. If you can find a working deck, transfer as soon as possible.
    c. Hi-8. Hi-8 was mostly a consumer format, and was relatively inexpensive, so it found its way into many archives. It is becoming a rare format because it was not available for that long and wasn’t widely used in the professional market. Transfer as soon as possible.
    d. VHS, S-VHS. The old consumer standby…was widely used and decks are still available, but professional decks are getting harder to locate.

424 SCOTT ST. COVINGTON, KY 41011
859.291.5100
www.scenesavers.com

e. Betamax. Very rare in today's market. This format was geared toward the consumer market, but VHS took over as the clear winner in their target market. Equipment is still available, but is hard to locate. If you have these tapes transfer as soon as possible.
f. 1" (note there are three common types of 1" videotape, Type A, Type B and Type C. Type C was most commonly used in North America, so if you have 1", you may need to confirm that it is Type C). These tapes seem to hold up well if stored properly, but should be transferred as soon as possible because the equipment is becoming rare. They aren't in danger yet, but could be soon.
g. 2" (also known as 2" Quad or Quadruplex…there were two common types, high-band and low-band.) Very rare to find working equipment. Some facilities specialize in this format, but it is getting increasingly rare and as a result, expensive to transfer.
h. U-Matic (also known as ¾"), U-Matic SP (SP stands for Superior Performance). These decks are still available, but haven't been manufactured in many years (approximately 10-years). Locating parts is also getting increasingly difficult. This format should be transferred as soon as possible.
i. Betacam, Betacam SP. Early "oxide" betacam tapes tend to be difficult to play back. Later tapes, which used a metal recording surface seem to hold up better. Equipment is still relatively widely available, but is no longer being manufactured.
j. Mini-DV, DV-Cam, DVC-Pro. These formats are grouped together because they use the same type of compression to record the video signal on the tape (DV). There are differences between these tapes and the tape decks (they may be, but aren't necessarily interchangeable). These formats are widely used in high-end consumer, news broadcast and lower end professional applications. If your tapes are mini-DV, they should be transferred as soon as possible, as this is a fairly fragile format. Other DV formats should be transferred as part of your regular preservation schedule.
k. Digital Betacam. Widely used, high quality standard definition format. This format is still being manufactured and is widely available, although it is relatively expensive compared to other formats.
l. Betacam SX. A Betacam format that uses MPEG 2 compression to record the video signal to the tape. Designed to replace the Betacam SP format, and will play Betacam SP videotapes.
m. D-1, D-2, D-3, D-5. These were early digital formats. D-1 and D-2 are no longer widely used and are increasingly rare. These formats in your collection should be transferred as soon as possible. D-3 is still used, but mainly in high-end graphics applications where quality is paramount. It is a very expensive format. D-5 is a uncompressed digital format that is still available…more commonly as a high-definition format.
n. HD-D5 HDCAM, HDCAM-SR. These are different formats of high-definition video. HDCAM and HDCAM SR are both Sony high-definition formats. The SR in the name stands for Superior Resolution, as it is of higher quality than standard HDCAM.

2. As you can see, there are many possible formats. Your transfer facility will need to know what they are dealing with to know if it can be transferred.
3. What are the running times of each tape?
4. What formats do you want to transfer to (either videotape or digital file)?
5. What is the average age (in years) of the tapes? Another way to answer this question is when the tapes were recorded?

Options for transferring to videotape:

If you wish to transfer your existing materials to a new videotape, there are several options for you to consider. Transferring to digital file is a topic for another white paper, as there is too much information to be included here. You might question the logic of transferring from one videotape to another for preservation. After all, isn't that just creating another copy that will need to be preserved again in the future?

The challenge is there is no perfect preservation format or storage medium for video. No matter what format you transfer to today, it will need to be migrated and/or transcoded in the future. At least with videotape, you have a format specific deck to play back the video. In other words, if you put that tape into a tape deck made for playing that format, it will play the video as long as the tape is in good condition and recorded properly.

If you wish to transfer your videotapes to new videotapes, you will need to consider what format you wish to make, and whether or not you wish to compile several source tapes onto one new tape, or if you will make one copy for each source. You also need to consider the audio from the source tape. Typically if the source is stereo, the new copy is stereo. If the source is dual mono (as news recordings often are, with "wild" sound on one channel and recorded sound on the other), the new tape should be dual mono. However if the source is mono, you need to consider if you want the new recording to be mono or if you want the mono audio split into two channels to make the new recording dual mono.

The conventional wisdom used to be that if your source tape was analog, you made an analog copy of it. This has changed recently for a couple of reasons. One is because it is difficult to find pure analog video-tapes for which equipment is still being manufactured and two is because the error correction and other capabilities of the digital formats has improved so much that digital can help improve the quality of the current, and future transfers. For archival transfers, there are several criteria you must consider for your videotape copies:

1. Is the format high quality? Is it compressed and if so, how much?
2. Is the format still being manufactured, or are tape decks still being manufactured to play these formats?
3. How expensive are the tapes and videotape players?
4. How easy will it be to transfer these again in the future?
5. Will I lose quality if/when I transfer these again?

What videotape formats should I consider:

Some options to consider when remastering your current collection onto new videotapes include:

Digital Betacam: Digital Betacam has become the de-facto tape based broadcast standard for high-quality standard definition video. It is a high-quality format that uses a fairly robust videotape technology. It is slightly compressed, but due to its widespread use and anticipated life-expectancy, it represents a good choice if you want to transfer your existing materials to a videotape format. Tape decks are still manufactured by Sony.

Betacam SP: This is an analog version of the Betacam format. This format used to be the broadcast standard for tape based materials, but was eventually replaced by Digital Betacam. It offers very high quality if you wish to remain in the analog world, but Sony has stopped manufacturing decks specifically for the Betacam SP format several years ago. There are still decks available that will play Beta SP tapes, including Beta SX and certain types of Digital Betacam decks. Please note that when you make a copy of an analog format videotape, you have some loss in quality (called "generational loss"). The same is true when transferring from an analog tape to a digital format. However, in the future, this loss in quality can be avoided with digital tapes because you can clone a digital videotape, meaning you make an exact copy of the data from the tape. Keep in mind, that if you transfer from one digital format to another, you could introduce artifacts (basically, glitches) into the video or could see a loss in quality.

Betacam SX: Betacam SX was created by Sony as a replacement for Betacam SP. It is a digital version using the same sized cassette as Betacam SP. It uses MPEG 2 as a compression format to record the content onto the videotapes. It uses a 4:2:2 color profile (as compared to DV which uses a 4:1:1 color profile) at 18 Mbps (as compared to DV which is at 25 Mbps). The machines are now out of production, but the format is still used in news-gathering organizations. This is not a likely candidate for preservation, but is included here because you may run into it if you work for a news organization or if you receive an archive collection from a news organization.

DV-Cam, DVC-Pro and Mini-DV: There are several DV formats that might be a consideration for you.

For archival purposes, Mini-DV should not be considered because the tape is too thin. It is typically used to acquire new footage, but is not ideal for long-term storage. All three of these formats are typically recorded (compressed) at a data rate of 25 Mbps, meaning that it is roughly 7 or 8 to 1 compression compared to uncompressed video. This also means that this format probably isn't ideal for preservation unless it was the original source format, but is suitable for access. Note that there are formats of DV that capture at 50 and 100 Mbps, but these are considered specialty formats and are not discussed here. The choice between these formats will likely come down to what capabilities you currently have in-house (which formats can you currently play). There are technical reasons why DVC-Pro may be a slightly better format than DV-Cam, but visually, little or no difference exists in these formats.

High-Definition Formats: One question that commonly comes up is "Should I transfer my standard definition formats to high-definition?" Generally speaking, the answer is no. If your current tapes are standard definition, transfer them to standard definition. There are many different high-definition formats and each broadcaster will want the one they transmit. If the future use of your materials is for editing or re-broadcast, you are better off to allow the future–user to up-convert at that time.