



# Audiovisual Formats

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## Cassette, Cartridge-Based and Open Reel Video

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### Cassette and Cartridge-Based Video



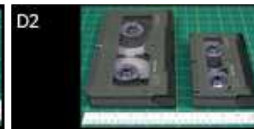
*3/4" Umatic and  
3/4" Umatic SP*



*Betacam and  
BetacamSP (aka Beta)*



*Betamax*



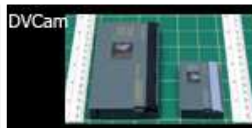
*D2*



*D3*



*Digital Betacam  
(aka DigiBeta)*



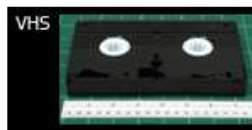
*DVCam*



*DVCPro (aka D7)*



*MiniDV (aka DV or DVC)*



*VHS*



*Video8 (aka 8mm)  
& Hi-8*

### Open Reel Video



*2" Open Reel*



*1" Open Reel*



*1/2" Open Reel*

## 3/4" Umatic and 3/4" Umatic SP



**Description:** Umatic is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Full-size cassettes are 8 5/8" x 5 3/8" x 1 3/16" and small cassettes are 7 1/4" x 4 5/8" x 1 3/16" (Texas Commission on the Arts, 2004). The full-sized cassettes can record up to 60 minutes of content whereas the smaller cassettes hold up to 20 minutes. The picture quality of SP is superior to standard Umatic; however, although the SP tapes can be played back in a standard deck, the improvement in picture quality is lost. Standard Umatic tapes cannot be played back on a SP deck.

**History** Standard Umatic was introduced in 1971 and SP was introduced in 1986. The format was primarily developed for industrial and education markets. In the 1970s and 1980s, it was widely used for electronic news gathering, and up through the 1990s, it was a primary format for many artists, community activists, academic institutions, and production houses. Many artist and community videos are in this format; it was a preferred format for edit masters in the 1980s (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** Older tapes are susceptible to signal loss, while more recent tapes tend to fair a bit better. However, the biggest concern is media and hardware obsolescence (Texas Commission on the Arts, 2004). Tapes are also susceptible to damage from mold, binder deterioration, and other physical and biological issues.

**Risk Level Inherent in Format** Due to media and hardware obsolescence, this format should be considered at high preservation risk.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## Betacam and BetacamSP (aka Beta)



**Description:** Betacam and Betacam SP is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Large cassette cases are 10 5/8" x 6 3/8" x 1 1/4". Small cassette cases are 6 3/4" x 4 3/8" x 1 3/16". Tape cassettes are generally labeled (as "Betacam" or "BetacamSP") in the upper right-hand corner (Texas Commission on the Arts, 2004).

**History** Betacam was introduced in 1982 and BetacamSP was introduced in 1986. BetacamSP has technical advantages over Betacam and is "upwardly compatible"; that is, Betacam tapes are playable on BetacamSP decks, but tapes recorded in BetacamSP ARE NOT playable on Betacam decks. Decks for Betacam are no longer being manufactured, while BetacamSP decks are still in production in limited supply. Most newer decks in the Betacam family, such as Digital Betacam decks, will play BetacamSP tapes (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** Older Betacam tapes are susceptible to signal loss due to age. Tapes are also susceptible to damage from mold, binder deterioration, and other physical and biological issues. Equipment obsolescence is not yet a concern as BetacamSP and Digital Betacam decks are still in production and can play back a variety of Beta cassettes.

**Risk Level Inherent in Format** Playback equipment for this format is still available and the cassettes tend to be durable, so most risk is related to age. This format would currently be considered low risk.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

**Recommended Storage Conditions(+/- 2)**

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## Betamax



**Description:** Betamax is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Cassette dimensions are: 6 1/8" x 3 3/4" x 15/16" with a tape width of 1/2".

**History** Betamax was introduced in 1975 and was in use until the late 1980s. It was a relatively short-lived format that ultimately lost the format war to VHS. It was developed for the consumer, industrial, and educational markets. Although it did not gain widespread consumer popularity, this format was considered to be technically superior to VHS and was used extensively in schools, community media centers, and by artists (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** Due to its age, Betamax tapes are susceptible to signal loss. Tapes are also susceptible to damage from mold, binder deterioration, and other physical and biological issues.

**Risk Level Inherent in Format** Betamax tapes are at high risk due to media and equipment obsolescence.

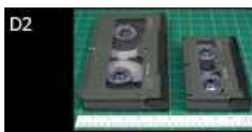
**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

**Recommended Storage Conditions(+/- 2)**

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## D2



**Description:** D2 is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Medium cassettes are 10" x 5 7/8" x 1 5/16" and small cassettes are 6 3/4" x 4 1/4" x 1 5/16" with a tape width of 3/4" (Texas Commission on the Arts, 2004). The cassettes are usually gray with tape identification in the upper right-hand corner.

**History** D2 was introduced in 1988 and is presently still in use. It was one of the first digital formats used for high-end production and has been used as a mastering format in television, advertising, and corporate sectors (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** Physically, D2 is subject to the same concerns as analog tape - stretching, breaking, drop-outs, mold, binder deterioration, and unintended recording. It is unpredictable

how long D2 will remain on the market considering the "format wars" among digital tape and playback equipment manufacturers (Texas Commission on the Arts, 2004).

**Risk Level Inherent in Format** As with most magnetic media, D2 is subject to the threat of obsolescence. It is difficult to determine how long this format will continue to be supported.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

#### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## D3



**Description:** D3 is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Cassettes are 8 1/4" x 4 7/8" x 15/16" with a tape width of 1/2" (Texas Commission on the Arts, 2004). The cassettes are usually gray with tape identification in the upper right-hand corner.

**History** D3 was introduced in 1990 and is presently still in use. It was developed for high-end production, has longer tape times and less cost per tape compared to D2, and has been used as a mastering format in television, advertising, and corporate sectors (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** Physically, D3 is subject to the same concerns as analog tape - stretching, breaking, drop-outs, mold, binder deterioration, and unintended recording. It is unpredictable how long D3 will remain on the market considering the "format wars" among digital tape and playback equipment manufacturers (Texas Commission on the Arts, 2004).

**Risk Level Inherent in Format** As with most magnetic media, D3 is subject to the threat of obsolescence. It is difficult to determine how long this format will continue to be supported. It is not recommended as an archival format. Considering its age and comparative durability, reformatting is not an immediate preservation priority (unless there are obvious signs of tape failure).

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

#### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## Digital Betacam (aka DigiBeta)



**Description:** Digital Betacam is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Large cassettes are 9 5/16" x 5 11/16" x 1," are used in recording and editing decks, and have an available recording length of about 194 minutes. Small cassettes measure 6 1/8" x 3 3/4" x 15/16," are used in cameras, and have an available recording length of 64 minutes (Texas

Commission on the Arts, 2004). The cassettes are usually a light grayish blue in color with "Digital Betacam" printed on the upper right-hand corner and "for Digital" in the upper left-hand corner.

**History** Digital Betacam, which was developed for the professional market, was introduced in 1993. It is still in wide use, especially in industrial and professional sectors (Texas Commission on the Arts, 2004). This format is also used for video preservation masters.

**Prone to the Following Problems** Digital Betacam is subject to the same physical issues as analog tape --stretching, breaking, drop-outs, mold, binder deterioration, and unintended recording. Presently, market share and the production of backward-compatible playback decks seem to suggest a lesser threat to obsolescence compared to other formats. However, as with any newer video format, it is difficult to predict how long it will be supported (Texas Commission on the Arts, 2004).

**Risk Level Inherent in Format** As with most magnetic media, Digital Betacam is subject to the threat of obsolescence; however, its present market share suggests that this threat is low. Digital Betacam is considered the best choice for preservation masters and thus is envisioned as mitigating risks, rather than being subject to them.

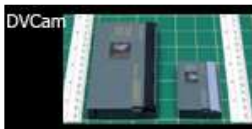
**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

#### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## DVCam



**Description:** DVCam is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Large cassettes measure 4 7/8" x 3" x 9/16", are for use in recording and editing decks, and have an available recording length of about 184 minutes. Small cassettes measure 2 9/16" x 1 7/8" x 9/16", are for use in cameras, and have an available recording length of up to 40 minutes (Texas

Commission on the Arts, 2004) The cassettes are generally bluish gray in color with 'DVCAM' printed on the upper right-hand corner.

**History** DVCam was developed by Sony for industrial, educational, and professional markets and was introduced in 1995. It is presently used extensively for electronic news gathering, cable television, and other field production. It is also used as a mastering format by artists and independent producers, especially for long-form programming (such as documentaries) because the maximum tape length on a single cassette is 184 minutes (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** DVCam is subject to the same physical issues as analog tape--stretching, breaking, drop-outs, mold, binder deterioration, and unintended recording. Presently, market share seems to suggest a lessened threat to obsolescence. However, as with any newer video format, it is difficult to predict how long it will be supported (Texas Commission on the Arts, 2004). The size and durability of DVCam is a concern. However, DVCAM is a higher quality product than older mini formats, such as Hi8; it is comparable to DVCPro.

**Risk Level Inherent in Format** As with most magnetic media, DVCam is subject to the threat of obsolescence; however, its present market share suggests that this threat is low. Although DVCam is not an archival format, reformatting is not an immediate preservation priority, unless there are obvious signs of tape failure.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

#### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## DVCPPro (aka D7)



**Description:** DVCPPro is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Large cassettes measure 4 7/8" x 3" x 9/16", are for use in recording and editing decks, and have an available recording length of about 126 minutes. Medium cassettes measure 3 13/16" x 2 1/2" x 9/16", are for use in cameras, and have an available recording length of up to 66 minutes.

Cassettes are generally dark gray in color with a yellow anti-static cover (Panasonic), black with a yellow anti-static cover (Maxell), or black with a red anti-static cover (Fuji). The DVCPPro logo is usually in the upper right-hand corner, and the tape length is generally listed on the left-hand corner. Panasonic cassettes also designate large cassettes with the letter "L" after the tape length (i.e. 126L) (Texas Commission on the Arts, 2004).

**History** DVCPPro was introduced in 1995, and is presently still in use. The DVCPPro format was developed by Panasonic for industrial, educational, and professional markets. It is used for electronic news gathering, cable television, and other field production, including independent production. One of the first small digital formats, it was initially popular, but more recently has lost ground to other DV products (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** DVCPPro is subject to the same physical issues as analog tape - stretching, breaking, drop-outs, mold, binder deterioration, and unintended recording. The DVCPPro format uses the same tape width and compression rate as DVCAM, but the cassette housing is different and it is not fully compatible with other digital video (DV) products. DVCPPro decks will play MiniDV and DVCAM tapes; however, few DVCAM decks will play DVCPPro tapes. Considering these "format wars," the future of DVCPPro is unknown (Texas Commission on the Arts, 2004).

**Risk Level Inherent in Format** As with most magnetic media, DVCPPro is subject to the threat of obsolescence. Although DVCPPro is not an archival format, reformatting is not an immediate preservation priority, unless there are obvious signs of tape failure.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## MiniDV (aka DV or DVC)



**Description:** MiniDV is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Cassette dimensions are: 2 9/16" x 1 7/8" x 7/16" with a tape width of 1/4". Cassettes are generally labeled in the lower left-hand corner (Sony) or on a sticker on the right-hand side (Panasonic). Note that all MiniDV



designations for Panasonic tapes are on stickers or the packaging, and may be covered with labels that list title or production information (Texas Commission on the Arts, 2004).

**History** MiniDV was introduced in 1995, and is presently still in use. This format was originally called DV, but is now commonly known as MiniDV. It was developed for consumer, industrial, and educational markets. MiniDV is used extensively by artists and community activists, both in the educational sector and in independent production. Its small size and high visual quality make it popular for field acquisition (camera recording) (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** MiniDV is subject to the same physical issues as analog tape--stretching, breaking, drop-outs, mold, binder deterioration, and unintended recording. Presently, market share seems to suggest a lessened threat of obsolescence. However, as with any newer video format, it is difficult to predict how long it will be supported. The size and durability of MiniDV, as with any small, thin tape, is a concern. It has similar issues as Hi8 (Texas Commission on the Arts, 2004).

**Risk Level Inherent in Format** Due to its size and the thinness of its tape, MiniDV is not an archival format. Based on content value, these tapes should be given reformatting priority.

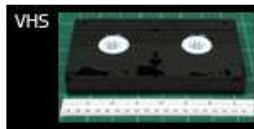
**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

#### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## VHS



**Description:** VHS is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Cassette dimensions are: 7 3/8" x 4 1/16" x 1" with a tape width of 1/2" for both VHS and S-VHS. A VHS (or SVHS) logo is usually imprinted on the cassette in the upper right-hand corner, while the manufacturer's name is imprinted in the upper left. S-VHS tapes have an additional hole on the back of

the cassette (Texas Commission on the Arts, 2004).

**History** VHS was introduced in 1976 and S-VHS was introduced in 1987. S-VHS has a superior picture quality compared to VHS and is "upwardly compatible"; that is, S-VHS tapes are playable in VHS decks but VHS tapes ARE NOT playable in S-VHS decks. The VHS format is currently still in use, although it is fading quickly due to newer, more popular digital formats. S-VHS was largely replaced by digital video by the 1990s.

**Prone to the Following Problems** Older VHS tapes are susceptible to signal loss due to age. Tapes are also susceptible to damage from mold, binder deterioration, and other physical and biological issues.

**Risk Level Inherent in Format** This format is considered at low preservation risk as the media and equipment are still currently available.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

#### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
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## Video8 (aka 8mm) & Hi-8



**Description:** Video8 and Hi8 are magnetic tape-based moving image formats. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). The dimensions for both Video8 and Hi8 are 3 11/16" x 2 3/8" x 9/16" (Texas Commission on the Arts, 2004). Tapes are usually labeled as 8mm or Hi-8mm on the bottom center of the cassette between the two reels.

**History** Video8 was introduced in 1984 and Hi8 came soon after in 1989. Video8 was developed for the consumer market, whereas Hi8 was geared toward consumer, industrial, and educational markets (Texas Commission on the Arts, 2004). Decks for both formats are still in use and are still being produced and marketed. However, digital formats may cause these formats to become obsolete. Hi8 has technical advantages over Video8 and is "upwardly compatible"; that is, Hi8 tapes are playable on Video8 decks, but tapes recorded in Video8 ARE NOT playable on Hi8 decks (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** Both Video8 and Hi8 tapes are prone to stretching. The longer the tape (longer than 60 minutes), the more susceptible it is to damage. Metal evaporated (ME) tapes are especially likely to have durability problems. Digital formats are replacing Video8 and Hi8, so near future obsolescence is a risk. Due to their size, Video8 and Hi8 decks are not as durable as their larger format counterparts and are difficult and expensive to repair. These factors could affect future availability of playback equipment. However, Digital8 decks may offer a playback solution.

**Risk Level Inherent in Format** Although these formats are relatively new, they are especially fragile and are not recommended for long-term storage. ME tapes are especially prone to durability problems. Depending on the intellectual content, it is recommended that these formats receive reformatting priority.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## 2" Open Reel



**Description:** Two inch open reel (or "quad") is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). The reel is approximately 12" inches in diameter. The shipping container for this format is easily identifiable due to its sheer size, at 15" square x 4", weighing up to 20-30 lbs. Two inch open reels may also be found in cardboard boxes (Texas Commission on the Arts, 2004). The containers often hold extensive labeling information.

**History** Two inch quad was introduced in 1956 and was continued to be used until the early 1980s. It was the first video format developed for in-studio use.

**Prone to the Following Problems** Two inch quad is especially susceptible to risks associated with age, hardware, and equipment obsolescence. It is also prone to risks common to other types of magnetic media, such as mold, binder deterioration, physical damage, and signal drop-outs. The tape's original shipping container can also pose a risk. As the spongy container liner decays, it deteriorates into a powder and then a gummy substance that is difficult to clean off of the tape.



**Risk Level Inherent in Format** Two inch quad tapes should be reformatted by a vendor with proven experience with this format. As this format is long obsolete and playback equipment is exceptionally difficult to come by, it is especially vulnerable; based on content assessment, it should be a priority for reformatting.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

**Recommended Storage Conditions(+/- 2)**

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## 1" Open Reel



**Description:** One inch open reel is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). Common containers are made from plastic or sometimes cardboard; they are rectangular or have one curved side with a handle. The containers typically have large labels with program titles, show air dates, record dates, and/or other information related to broadcast television (Texas Commission on the Arts, 2004). One inch open reels are easily identified by their distinctive wide hub. Audio recordings made on 1" tape may be mistaken for videotape.

**History** One inch open reel was introduced in 1978 and was used until approximately the mid 1990s, primarily for in-studio recordings. It was also used for preservation masters beginning in the late 1980s and early 1990s (Texas Commission on the Arts, 2004).

**Prone to the Following Problems** One inch open reel is especially susceptible to risks associated with age, hardware, and equipment obsolescence. It is also prone to risks common to other types of magnetic media, such as mold, binder deterioration, physical damage, and signal drop-outs.

**Risk Level Inherent in Format** One inch open reel tapes should be reformatted by a vendor with proven experience with this format. The media is obsolete and playback equipment is exceptionally difficult to come by, especially in working order. This format is especially vulnerable and, based on content assessment, should be a priority for reformatting.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it.

**Recommended Storage Conditions(+/- 2)**

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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## 1/2" Open Reel

**Description:** Half inch open reel is a magnetic tape-based moving image format. The tape is composed of magnetic particles, a binder, and a polyester base (Forgas, 1997). The most common containers for smaller tapes are approximately 5 1/2" x 5 1/2" x 1" in size and are made of a soft or hard plastic. Larger



reels will be in containers approximately 8 3/8" x 8 3/8" x 1 1/4" in size. The plastic container may also be inside of a separate paperboard sleeve. There are other containers that are approximately the same size but have handles. Commonly used reels are 5" in diameter or 7 1/4" in diameter (Texas Commission on the Arts, 2004).

**History** Developed for the industrial, educational, and consumer markets, half inch open reel was introduced in 1965 and was used primarily for in-studio recording until approximately the late 1970s, when it was gradually replaced by cassette formats. It was also used as a format for preservation masters beginning in the late 1980s and early 1990s (Texas Commission on the Arts,

2004). Smaller reels were used in the first portable video recorders, or "portapaks," and larger reels were typically used for stationary recording and/or video editing.

**Prone to the Following Problems** Half inch open reel is especially susceptible to risks associated with age, hardware, and equipment obsolescence. It is prone to risks common to other types of magnetic media, such as mold, binder deterioration, physical damage, and signal drop-outs. Half inch open reel tapes are known to have problems with sticky shed syndrome (Texas Commission on the Arts, 2004).

**Risk Level Inherent in Format** Half inch open reel tapes should be reformatted by a vendor with proven experience with this format. The media is obsolete and playback equipment is exceptionally difficult to come by, especially in working order. This format is especially vulnerable and, based on content assessment, should be prioritized for reformatting.

**Issues Related to Playback** Each audiovisual medium requires equipment to decode the information held within it. There are two common 1/2" tape versions - CV and AV (EIAJ Type 1). They look the same, but will play back on different decks. CV tapes were manufactured beginning in 1965; AV was introduced in 1969. The tape reels are typically made from translucent plastic. The Sony tape containers are typically black and will say "For helical scan video recorders" (Texas Commission on the Arts, 2004).

#### Recommended Storage Conditions(+/- 2)

Best Temp (degrees F)	Good Temp (degrees F)
40-54 °	55-60 °

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