

Webinar October 23, 2013

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What Will be Covered

- Physical properties of media
- Preservation issues
- Formats and identification

Heritage Preservation: Caring for Yesterday's Treasures--Today 2













How Videotape Started



Thank Bing Crosby.

First funded development of audiotape. In 1950 gave \$50,000 to a start-up called Ampex to develop magnetic videotape.

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How Videotape Started

Original market/users: broadcasting

Like other time-based media, formats for the consumer market quickly followed.

NEVER intended as a preservation medium.























Treating Mold

The mold must be carefully removed from the tapes and the tapes immediately transferred.

Have a professional working with proper equipment perform the cleaning. Breathing mold can endanger your health.

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Lubricant

Lubricant helps the tape move through the decks. It will dry out over time; hot and dry environments will accelerate this natural process.

Dry tapes become brittle, and can get stuck in playback decks, damaging the tape.

Treating Lubricant Loss

Tapes can be re-lubricated, but should be done by a professional.

Over-lubrication can cause signal loss.



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Magnetic Particles and Oxidation

Moisture + oxide = rust

"Oxide"-based magnetic particles can degrade in high humidity environments.

Magnetic Particles

Barium ferrite (BaFe). Used in VHS tapes in mid-1990s and Betacam. BaFe has longer LE than MP, but not as efficient for recording.

Metal particulate (MP). Used from BetaSP to the present. Particles are coated for protection against moisture in the air, but not effective when water-damaged.

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Magnetic Particles

Metal evaporated (ME). ME tapes do not have a binder. Magnetic particles are laid down directly to the tape substrate. Found in small-format cassettes (Hi8, Digital8, DVCAM, MiniDV). Thinner magnetic coating, so tapes more fragile. Repeated plays and leaving tapes in "pause" can damage the tape, resulting in particle loss. Archivists follow "5 play rule," then must transfer.





















USE	ТЕМР	RH
short-term storage (content used daily)	68° F	20-30%
medium-term storage (content used up to 10 years before moved or discarded)	59° F	20-40%
long-term storage	50° F	20-50%



Storage General Tips

A higher temperature must be balanced by lower humidity.

 Fluctuations of +/- 5% RH or 7°F within a 24-hour period can cause more damage than consistently high temperature or humidity.

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2" videoreel	³ ⁄ ₄ " U-matic	MiniDV on ME stock
Recorded 1969 (44 y/o)	Recorded 1975 (38y/o)	Recorded 1998 (15 y/o)
Stored at 65 °F / 35% RH since 1969	Stored at 55° F / 50% RH past 10 years; at 80° F / 60% RH previous 28 years	Stored at 78° F / 45% RF for past 5 years; unknown before
Used a few times in first 5 years, then put in deep storage	Heavily used first 15 years	Heavily used first year; occasional use since
Obsolete format, but a few vendors available	Obsolete format, but old equipment and some vendors available	Active format, equipmen available



Format Obsolescence

What does "obsolete" mean?

- Stock is no longer manufactured
- Playback equipment is no longer manufactured and old decks are in limited supply

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Released 1956. Installed at ABC, CBS, NBC. Recorded black and white (color added few years later)

1957: Ampex won Technical Emmy for VTR

1958: Improved model. Wider distribution.

Ampex VRX-1000 (2" Quad)

Cost: \$ 45,000 (\$363,587 today)

Tape: 1 hr @ \$300 (\$2,424 today)

of plays before damage to tape: 30



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¹/₂" Open Reel Summary

Container:Reel-basedActive date range:1967-1977Status:ObsoleteStock manufactured?NoDecks manufactured?NoUsed decks/parts available?Extremely rare







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1" Open Reel Summary

Container:Reel-basedActive date range:1976-1990sStatus:ObsoleteStock manufactured?NoDecks manufactured?NoUsed decks/parts available?Yes

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³/₄" U-Matic (1971) and U-Matic SP (1986)

- Replaced 16mm for ENG
- Small cassette (20 minutes) and large cassette (30 and 60 minutes)
- Unique problem: Some stock batches in the first 10 years (1971-1981) have noticeable dropouts and signal deterioration















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³/₄" U-matic Summary

Container:	cassette	
Tape width:	3⁄4"	
Active date range:	1971-2008	
Status:	Obsolete/Endangered	
Stock manufactured?	No	
Decks manufactured?	No (last: 2008)	
Used decks/parts available? Yes, but becoming difficult		

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Betamax Summary

Container:	cassette
Tape width:	1/2"
Active date range:	1975-1986
Status:	Obsolete
Stock manufactured?	No
Decks manufactured?	No (last: 2002)
Used decks/parts avail	able? Medium rare

VHS (1976)Consumer cassette-based format. Developed by

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- Use: home movies, schools, local government, event documentation
- Tape stock still manufactured today (limited).
 VCRs only part of combo DVD-VHS units.
- Several other formats similar in size to VHS beware!

JVC





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VHS Summary			
Container:	cassette		
Tape width:	1/2"		
Active date range:	1975-2008		
Status:	Current		
Stock manufactured?	Yes		
Decks manufactured?	No (last dedicated deck: 2008); combo units available		
Used decks/parts availat	ole? Yes		

Videocassette Formats: the Betacam Formats

Analog/SD (Standard Definition)

Betacam (1982-1990)
BetaSP (1986-2009)

















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BetaSP Summary

Container:cassetteTape width:1/2"Active date range:1986-2009Status:Endangered (limited use)Stock manufactured?YesDecks manufactured?No; although tapes can be
played in Sony's J30 SDI combo unitUsed decks/parts available? Yes

Videocassette Formats: the Betacam Formats

Digital/SD (Standard Definition)

Digital Betacam (DigiBeta) (1993-2012)

- Betacam SX (1996-2011)
- MPEG IMX (2001-2011)



















BetaSX Summary		
Container: Tape width: Active date range: Status:	cassette ¹ / ₂ " 1996-2011 Current (but decreasing deck support)	
Stock manufactured? Decks manufactured?	Yes No; tapes can be played in Sony' s J30 SDI combo unit	
Used decks/parts avail	able? Yes	



All IMX decks play BetaSX; some decks also play DigiBeta, BetaSP, and Betacam tapes. (Dedicated IMX decks are no longer manufactured)

IMX cases and tapes are **teal/** green.

Tapes come in 2 sizes: Small (12, 22, 32, 60 minutes) and Large (64, 94, 124, 184 minutes)



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MPEG IMX (Betacam) Summary

Container: Tape width: Active date range: Status:

Stock manufactured? Decks manufactured?

cassette ¹/₂" 2001-2011 Current (but decreasing deck support) Yes

No; tapes can be played in Sony' s J30 SDI and HDWD1800 combo units

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Used decks/parts available? Yes

Videocassette Formats: the Betacam Formats

Digital/HD (High Definition)

HDCAM (1997-current)HDCAM SR (2003-current)













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HDCAM & SR Summary

Container:	cassette
Tape width:	1/2"
Active date range:	HDCAM: 1997- ; SR: 2003-
Status:	Current
Stock manufactured?	Yes
Decks manufactured?	Yes
Used decks/parts availab	le? Yes

Videocassette Formats: the Small Formats

<u>8mm</u>

- Developed for camcorder market.
- Cassettes size of audiocassette
- REC/SAVE tabs on spine side
- Superseded by MiniDV

	Video8 (analog)	Hi8 (analog)	Digital8 (digital)
Year introduced	1984	1989	1999
Metal particles	MP	MP and ME	MP and MI
Still manufactured?	No	Yes	Uses Hi8 stock











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- MiniDV (1995) and HDV (2003)
- DVCAM (1995)
- DVCPRO (1995)
- DVCPRO 50 (1997)
- DVCPRO HD (2000)

Tape width: ¹/₄" All are SD except HDV and DVCPRO HD.

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MiniDV Summary			
Container:	cassette		
Tape width:	1/4″		
Active date range:	1995-current		
Status:	Current		
Stock manufactured?	Yes		
Decks manufactured?	Sony combo units: DSR series; HDV/DVCAM VTR		
Used decks/parts availab	Used decks/parts available? Yes		
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DVCAM Summary

Container:	cassette
Tape width:	1/4"
Active date range:	1995-current
Status:	Current
Stock manufactured?	Yes
Decks manufactured?	Sony combo units: DSR series; HDV/DVCAM VTR. Panasonic combo unit: AJ series
Used decks/parts available	e? Yes

DVCPRO (1995), DVCPRO 50 (1997), DVCPRO HD (2000)

Panasonic developed

- DVCPRO: DV @ 25 Mbp/s, 4:1:1
- DVCPRO50: DV @ 50 Mbp/s, 4:2:2
- DVCPRO HD (100): DV up to 100 Mbp/s, 4:2:2

 Used for broadcast news ENG, independent production, oral histories

DVCPRO (1995), DVCPRO 50 (1997), DVCPRO HD (2000)

- All DVCPRO media are interchangeable (e.g., can record DVCPRO50 on a DVCPRO tape).
- Tapes give running time for the format listed on the tape.
- All DVCPRO tapes are MP.

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DVCP	RO Summary	
Container: Tape width: Active date range: Status: Stock manufactured? Decks manufactured? Used decks/parts availa	cassette 1/4" 1995-current Current Yes Yes ble? Yes	
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MII Summary

Container:	cassette
Tape width:	1/2"
Active date range:	1986-1990s
Status:	Obsolete
Stock manufactured?	No
Decks manufactured?	No
Used decks/parts available?	Rare

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Container:	cassette
Tape width:	3/4"
Active date range:	1986-1990s
Status:	Obsolete
Stock manufactured?	No
Decks manufactured?	No
Used decks/parts available?	Rare









D-2 Summary

Container:	cassette	
Tape width:	3/4"	
Active date range:	1988-2003	
Status:	Obsolete	
Stock manufactured?	No	
Decks manufactured?	No	
Used decks/parts available?	Rare	

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Container:	cassette	
Tape width:	1/2"	
Active date range:	1991-2003	
Status:	Obsolete	
Stock manufactured?	No	
Decks manufactured?	No	
Used decks/parts available?	Rare	













D-5 Summary

Container:
Tape width:
Active date range:
Status:
Stock manufactured?
Decks manufactured?
Used decks/parts available?

cassette 1/2" 1994-2010 Endangered Yes No (last deck: 2010) Yes

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D-9 (Digital-S) (1995) Developed by JVC. Called Digital-S; SMPTE changed name to D-9 (1999)

- Competitor to DigiBeta
- Same shell as VHS
- Records DV @ 50 Mbp/s; 4:2:2
- Also HD version (DV @ 100 Mbp/s)







D-9 (Digital-S) Summary Container: cassette 1/2" Tape width: 1995-2010 Active date range: Status: Endangered Stock manufactured? Yes Decks manufactured? No Used decks/parts available? Yes 190















































Blu-Ray Differences from DVD and CD

 The laser is blue-violet (higher frequency) rather than the red used in DVDs -- hence the name "Blu-Ray." (The CD laser is infrared)

- The dye is <u>in</u>organic, and is not affected by UV light. EXCEPT:
- BD-RE LTH uses <u>organic</u> dye (less expensive to produce)

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Problem Areas Impacting Data Readability

- Organic dye (fades in light and heat)
- Metal reflective layer (can corrode from high humidity and pollutants)
- Media obsolescence
- Poor handling (fingerprints, scratches)
- Writing on the media (ink and scratches)
- Erasing files on RW/RE discs

Optical Media Conservation

Life Expectancy (LE): between 2 to 100 years, depending on metal layer, dye, quality of writing/recording, and storage environment.

What can be done to extend LE?

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Get the Content Off!

As with any AV media, focus on preserving the **<u>content</u>**, not the physical object.

Copy files from optical media to HDDs or servers.

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