

Audiovisual Formats

A guide to identification



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IDENTIFICATION AUDIO – MAGNETIC

Sound recordings on analog magnetic tape: may be tape cassettes or reels.

1/4 inch audio tape (reel-to-reel)

- Introduced widely in 1948, though earlier prototypes developed as early as 1928
- Used for professionals and amateur recordings
- Either polyester or acetate substrate



1/8 inch audiocassette

- Introduced in 1962
- aka Compact Cassette or Standard Audio Cassette
- Used for professionals and amateur recordings
- Likely polyester or acetate substrate



IDENTIFICATION AUDIO – MAGNETIC

Microcassette

- Introduced in 1969
- Aka mirco-cassette
- Used primarily for dictation and amateur recordings
- Polyester substrate



Minicassette

- Introduced in 1969
- Aka mini-cassette
- Used primarily for dictation and amateur recordings
- Polyester substrate



DETERIORATION, DAMAGE & PRESERVATION CHALLENGES

OPTICAL MEDIA

- Mechanical damage of base layer
 - Scratching, lacquer layer separation, breaking, warping (lack of planarity), loss of transparency all leading to errors in reading
- Corrosion of metallic layer
- Laser rot (discoloration, pitting), pinholes, diminished reflectivity
- Dye fading
 - Recorded areas become less distinguishable from unrecorded areas



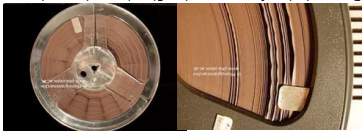
MAGNETIC MEDIA

- Substrate
 - Metal - 1890s-1950s - Physical damage
 - Paper - 1940s-1950s - Brittleness, physical damage (tears, creases...)
 - Acetate - 1950s-1970s
 - Vinegar syndrome, shrinkage, brittleness, lubricant loss, physical damage
 - Polyester - 1960s - present
 - Binder hydrolysis (sticky shed syndrome), lubricant loss, physical damage

DETERIORATION, DAMAGE & PRESERVATION CHALLENGES

MAGNETIC MEDIA continued

- Detonation
 - Most common problems due to chemical changes, breakdown of backing and binder layers as well as poor handling.
 - Loss of magnetic properties over time
 - Loss of lubricant
 - Signal loss
 - Need to adjust tracking, clean tape heads, bake with care
 - Sticky shed (not commonly found in cassettes)
 - Polyester urethane binder hydrolyzes and flakes off - keep RH low!
 - Print through/ghosting
 - Damage from poor handling
 - Demagnetization
 - Low probability but is possible
 - Mold
 - Mechanical damage
 - Playback equipment obsolescence
- Life expectancies: on average 50 years but 10 years for in-use media



Damaged edges from poor pack Shrunken and warped

DIGITAL

Sony Digital Audiotape (DAT)

- Introduced in 1987
- Most common digital magnetic audio format
- Similar in shape to audiocassette, but thicker
- Used for professionals and amateur recordings
- Likely polyester substrate



WIRE

IDENTIFICATION AUDIO – MAGNETIC

- Introduced in 1939
- Small spool of fine metal wire
- Spools about 2 1/2" diameter, 5/8" thick
- Used primarily for dictation and amateur recordings
- Superseded by magnetic tape recording in 1950s



DISCS

- Introduced in 1895
- AKA gramophone, phonodisc records
- Used primarily for professional, but amateur and dictation recordings exist
- The dominant form of domestic audio in the 20th century
- Various coatings and substrates. See following examples



CYLINDER

IDENTIFICATION AUDIO – GROOVED MEDIA

- Introduced in 1877, manufactured through the later 1920s
- Used for professional and amateur recordings
- Foil, wax and celluloid substrates
- Black is most common color; also brown, blue and beige
- Name of the recording often inscribed on the beveled edge of the cylinder



IDENTIFICATION AUDIO – GROOVED MEDIA

DISCS continued:

Shellac Based

- Manufactured between mid 1890s and 1950s
- 10" and 12" diameter are the most common sizes
- Brittle and will shatter if dropped
- 78rpms
- Commercially produced



Nitrate or acetate coated, metal or glass based

- Manufactured between mid 1890s and 1950s
- Used as instantaneous recording discs, likely unique objects
- AKA acetates, instantaneous discs, lacquer discs
- 16" diameter



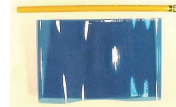
Vinyl based

- Introduced in 1948
- 33 1/3rpms, 45rpms & 78rpms
- 7", 10" or 12" diameter
- thinner and lighter in weight than shellac or coated discs

IDENTIFICATION AUDIO – GROOVED MEDIA

BELT

- Introduced in 1947
- AKA Dictabelt or Memobelt
- 3.5" wide 12" circumference
- Color: red (1950-1964), blue (1964-1975) or purple (1975 onwards)
- Used primarily for dictation and amateur recordings



DETERIORATION, DAMAGE & PRESERVATION CHALLENGES

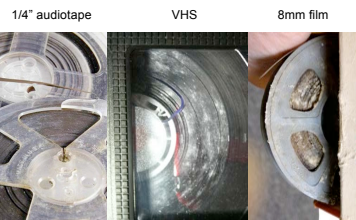
FILM continued:

Polyester film:

- Overall highly stable
- Subject to biological decay (mold*) and physical damage.

*BEWARE MOLD!

Mold affects most audiovisual materials.
Here are a few examples:



Be extremely cautious when handling moldy collections.
Take all the necessary precautions to protect yourself by wearing protective respiratory equipment, gloves and goggles.

DETERIORATION, DAMAGE & PRESERVATION CHALLENGES

AUDIO – GROOVED MEDIA

Cylinder

- Extremely Fragile
- Wear with playback
- Mold (on wax)
- Cracks



Disc

- Fragile
- Wear with playback
- Instantaneous – specific problems
- Delamination (cracking, flaking)
- Palmitic and Stearic acid deposit (exuding plasticizer)
- Substrate fragility



SHELVING & ENCLOSURES

Discs – Grooved:

- Handle with cotton gloves by edges and label areas only
- Don't flex!
- Store vertically ("on edge")
- Store in acid-free, buffered sleeves

Discs – Optical:

- Air quality important to slow corrosion of metallic layer in optical media
- Avoid touching disc surfaces
- Hold discs by gently grasping the outer edges or placing a finger in the center hole
- Never bend or flex discs
- Remove a disc from its container by pressing down on the center hub to release
- Clean discs with a soft, non-abrasive, lint-free cloth; use distilled water only if absolutely necessary
- Wipe discs radially (from center to outer edge)
- Inspect discs periodically for signs of deterioration

IDENTIFICATION

OPTICAL DISCS – Audio & Moving Images



- Introduced in 1989
- Variations of CDs: R/RW/ROM
- Used for professional and amateur recordings
- Typical capacity 700MB / 80min of audio



- Introduced in 1995
- Variations of DVD: R/RW/ROM, etc.
- Used for professional and amateur recordings



LaserDisc

- Short-lived consumer video disc format (late 1970s-1990s)
- Looks like a DVD or CD but larger and heavier
- Will usually be in a cardboard sleeve like an LP

DETERIORATION, DAMAGE & PRESERVATION CHALLENGES

FILM

Nitrate film:

- Highly flammable
- Subject to deterioration of the film base (discoloration, stickiness, odor)
- Deteriorates rapidly after onset of decay
- Becomes more unstable as it decays.
- Subject to biological decay ("mold")



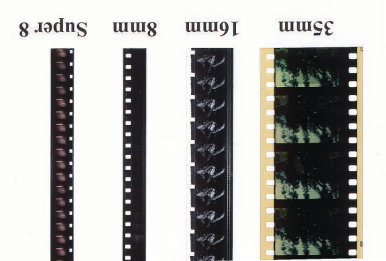
Acetate film:

- Subject to deterioration of the film base (discoloration, warping, vinegar syndrome, brittleness)
- Deteriorates rapidly after onset of decay; and can catalyze deterioration of nearby films as it begins to decay.
- Subject to biological decay ("mold")



IDENTIFICATION

MOVING IMAGES - FILM



35mm

- Introduced in 1895
- Primarily used by professionals but amateur recordings exist

- Nitrate, Acetate and Polyester substrates

- 35mm wide, perforations on both edges.

- Silent or sound, color or black and white
- Negative, positive, composite.



IDENTIFICATION MOVING IMAGES - FILM

16mm

- Introduced in 1923
- Used by amateurs and professionals
- Acetate and Polyester substrates
- 16mm wide, perforations on one or both edges
- Silent or sound, color or black & white
- Negative, positive, sound only (either magnetic or optical), composite.



8mm

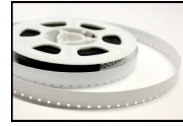
- Introduced in 1932
- Used primarily by amateurs, but commercial productions were made available on this format for home use.
- Acetate and Polyester substrates
- 8mm wide, perforations on one edge*
- Color or black & white.
- Usually silent, but magnetic sound available
- Negative, positive, composite



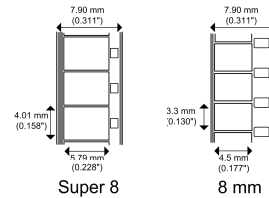
IDENTIFICATION MOVING IMAGES - FILM

Super 8mm

- Introduced in 1965
- Used primarily by amateurs, but commercial productions were made available on this format for home use.
- Acetate and Polyester substrates
- 8mm wide, perforations on one edge*
- Color or black & white.
- Silent or sound (mostly magnetic, rarely optical)
- Negative, positive, composite



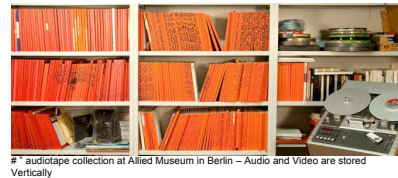
* Super 8 and 8mm are both 8mm wide, but the perforation of Super 8 is smaller.



SHELVING & ENCLOSURES

Video & Audio – Open Reel:

- Handle with cotton gloves by reel hub and reel edge only
- Avoid flexing flanges
- Enclose in original boxes or suitable archival box
 - Store "on edge", upright – vertically
 - Unslotted reels are preferred
 - Enclosures that can vent
- Always fasten the end of the tape down with a piece of artist's tape to the edge of the flange. The tape will warp over time if this is not done.



audiotape collection at Allied Museum in Berlin – Audio and Video are stored Vertically

Video & Audio – Cassettes:

- Handle cassettes with care
- Break out copy protection tabs to avoid accidental erasure during playback
- Store case "on edge" – vertically
- Store in original cases or suitable archival case
- Labeling should be in ink rather than pencil, as graphite dust from the pencil could interfere with the reading of the disk or tape.
- Only remove items from their protective packaging for immediate use.
- Tapes should be wound to the end of one side after use.



1* Type C videotape in original containers, vertically



Ends not taped down and poor storage conditions, cause warping



VHS tapes with and without protection tabs



Betacam SP tape wound to the beginning

SHELVING & ENCLOSURES

Film = Flat
Video (and audio) = Vertical

Film

- Containers should be rigid; provide a measure of protection from dust, fire, and water; if plastic, should be polypropylene or polyethylene; if cardboard, should be lignin-free and pass the PAT.
- Cores, reels and cans should all be of archival quality.
- Store film cans horizontally to prevent warping.
- 35mm and 16mm should be stored on cores, 8mm & Super 8 should be stored on reels.
- Never seal film cans unless freezing.
- If freezing in a consumer grade frost-free freezer, be sure to seal the can and place it within two separately sealed moisture proof containers (i.e. a freezer bag). Try to remove as much air as possible from the enclosures. Only freeze materials that are severely deteriorated.
- Always fasten the end of the film down with a piece of artist's tape. The film will warp over time if this is not done.
- Film should be stored Flat – "F" is for Film and Flat"



Film Vaults at the Academy Film Archive in Los Angeles, CA – Film is stored Flat



Mix of 8mm and 16mm films poorly stored



Polypropylene film cans and cores



8mm & Super 8 should be stored on reels



16mm & 35mm should be stored on cores

IDENTIFICATION
MOVING IMAGES – VIDEO (Magnetic)

Sound recordings on analog magnetic tape: may be tape cassettes or reels.
Many formats, especially cassettes, will have format names on the object.



- VHS
- Introduced in 1976
- Variation: S-VHS
- Used for professional and consumer recordings
- Cassette, 1" tape width

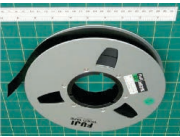


- 3/4" Umatic
- Introduced in 1971
- Variation: " Umatic SP
- Used for professional and amateur recordings
- Cassette, " tape width

IDENTIFICATION
MOVING IMAGES – VIDEO (Magnetic)



- 2" Quad
- Introduced in 1956
- In use through early 1980s
- Used for professional recordings
- Open reel, 2" tape width



- 1" Type C
- Introduced in 1978
- In use through 1990s
- Used for professional recordings
- Open reel, 1" tape width



- 1/2" Open Reel
- Introduced in 1965
- In use through later 1970s
- Used for professional and consumer recordings
- Open reel, 1/2" tape width

IDENTIFICATION MOVING IMAGES – VIDEO (Magnetic)

ANALOG continued:

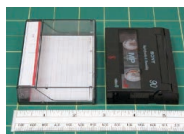
BetacamSP

- Introduced in 1986
- Variation: Betacam, introduced in 1982
- Used for professional recordings
- Cassette, 1/2" tape width
- Cassette & case is usually grey and/or black



Video8

- Introduced in 1986
- AKA 8mm
- Variation: Hi8, introduced in 1989
- Used primarily for amateur recordings
- Cassette, 5/16" (8mm) tape width



Other Analog video formats to look out for:

- Betamax

IDENTIFICATION MOVING IMAGES – VIDEO (Magnetic)

DIGITAL

Video recordings on digital magnetic tape will be in cassettes
Many formats, especially cassettes, will have format names on on the object.

Digital Betacam

- Introduced in 1993
- AKA DigiBeta
- Used for professional recordings
- Cassette, 1/2" tape width
- Cassette & case is usually blue and/or grey



MiniDV

- Introduced in 1995
- AKA DV or DVC
- Used for professional and amateur recordings
- Cassette, 1/4" tape width



Other Digital video formats to look out for:

- D2
- D3
- DVCam/DVCPPro
- Digital 8

ENVIRONMENTAL CONDITIONS

Deterioration of audiovisual material is often dependent on temperature and relative humidity (RH).
Remember to take special precautions when moving materials from cold or freezing environment with low RH to room temperature. Avoid condensation by either placing the materials in a "staging" room or moisture proof container.

Film – Acetate Base:

- Cold, dark storage ideal, frozen best for deteriorating elements
- Ideal: <40° F, 30-40% RH (for every 10° F rise, the deterioration rate doubles.)

Film – Nitrate Base:

- Cold, dark storage ideal
- Frost-free freezer (in a double enclosure)
- Ideal: <40° F, 30-40% RH (for every 10° F rise, the deterioration rate doubles.)
- NFPA Guidelines for nitrate motion picture films:
 - 5-150 rolls: steel cabinets w/ build-in sprinkler system and outside venting
 - Larger volume: compartmentalized vaults w/sprinkler system and outside venting
 - Check for requirements for NFPA compliance
- Consider depositing materials with a certified nitrate conservation facility.

Film – Polyester Base:

- Cool, dark storage ideal, cold is fine
- Ideal: <54° F, 30-50% RH

ENVIRONMENTAL CONDITIONS

Audio – Acetate & Polyester Base:

- Cold ideal, cool fine
- Do Not Freeze
- Ideal: <40° F, 30-50% RH
- Acceptable: <54° F, 30-50% RH

Video – Acetate & Polyester Base:

- Stable at room temperature (<68° F) but for long-term storage, use cool temperatures (<54° F)
- RH between 30-50% with a lower RH as the temperature goes up.
- Do Not Freeze

Discs - Optical & Grooved:

- Room temperature (<68° F) OK for optical media, but cool (<54° F) or cold (<40° F) storage better.
- 30-50% RH
- DO NOT FREEZE!