NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR

Conserve O Gram

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Care Of Archival Digital And Magnetic Media

Basic procedures for the care of archival audiotape, videotape, and electronic (digital) magnetic tape are provided in this *Conserve O Gram*. See also *Conserve O Gram* 19/8, Preservation of Magnetic Media, for additional guidance on tape structure, degradation processes, and preservation recommendations.

To Care for Your Digital and Magnetic Media You Must **Do This...**	**Don't Do This...**
Preserving Magnetic Media • Expect magnetic media to last 10 to 30 years when properly stored. • Remember that transcripts, scripts, and printouts can support, but not replace, original magnetic materials.	• Don't play the preservation master or the original for reference.
Selecting Media • Back-up magnetic media onto longer-lived media. • Choose PET (polyethylene terephthalate or Mylar brand) tapes with iron oxide pigments, not metal particulate (mp) or chromium dioxide (CrO_2) pigments. • Use reel-to-reel tapes, rather than cassettes for master copies.	• Don't reformat originals onto audiotape cassettes, chromium dioxide tapes, floppy diskettes, and rewritable CD-ROMs. • Don't *sound engineer* preservation copies to remove ambient noise because the noise may contain information and atmospherics that increase the value of the recording.
Reformatting—How Many Copies • Produce three copies for all magnetic media: preservation masters, duplication masters, and reference copies. • Recopy magnetic media at least every five years. • Store copies separately.	• Don't forget to store deteriorating originals, such as acetate-backed tape, separately from copies. • Don't forget to label all copies as such.
Prioritizing for Copies • Prioritize magnetic media for reformatting as described in *Conserve O Gram,* 19/10, Reformatting for Preservation and Access: Prioritizing Materials for Duplication. • Inspect and verify all copies after reformatting records and confirm that all data were copied.	• Don't attempt to reformat deteriorated magnetic media yourself; hire professionals. • Don't use system back-up tapes as your preservation master.

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Storing Digital and Magnetic Media • Store originals at 5°C (40°F) ±2° and 20% RH ±2%, no lower. • Keep usage copies at 15-23°C (60-74°F) ±3° and 25-55% RH ±10%. • Allow the media to acclimatize in its sealed container if storage and usage areas vary more than 15°F warmer or cooler: 4 hours for every 15°F difference. • Keep media away from magnetic fields (including machinery motors), high temperatures and RH, smoke, food, and light exposure in secure storage. • Remember that media stored at high humidities can become sticky or moldy and leave a residue on the recorder. • Avoid storing tapes at high, low, or cycling temperatures because they can stretch or become deformed.	• Don't store media flat (horizontally) or outside of their containers. • Don't store media for long periods (more than 5 years) without copying and verifying the copies. • Don't store media without air conditioning to filter out damaging pollutants. • Don't store original acetate-backed tape with other media; instead place it in a Ziploc bag within a frost-free freezer after copying. • Don't store media where it will suffer shock, such as on mobile shelving.
Retensioning (Rewinding or Refreshing) • Rewind magnetic tape at a controlled tension and speed on a regular basis (every 3 years). This redistributes tape stresses and avoids tape sticking and transfer of information from one layer to another. • Leave and store tapes in a *tails out* or not-rewound format after playing.	• Don't rewind tape at high speeds or under great pressure. • Don't leave a jagged tape pack with tape sticking up or indented within the pack.
Handling • Avoid handling original magnetic media. • Use copies of media for reference and other projects. • Wear clean, lintless cotton gloves when handling the media. • Return media to their containers when not in use.	• Don't play original media; use copies. • Don't handle tape roughly; most tape failure is physical, due to thin, weak media and poor handling.
Transporting • Package valuable original magnetic media on edge in bubblewrap, if you must transport them. • Deliver original magnetic media by hand instead of mailing or shipping.	• Don't ship original tapes through the mail, UPS, or FedEx.
Maintaining Playback Equipment • Maintain playback equipment in perfect condition, paying attention to head alignments and tape drives. • Clean equipment regularly, particularly playback and recording areas. • Clean the heads if tapes begin squeaking, jerking, or jumping in the equipment when played. Copy the tapes immediately.	• Don't use originals for reference. • Don't play media on dirty, damaged, or out-of-sync playback equipment as it can scratch media, distribute dirt across the media surface, tear or stretch media, and produce poorly wound tape packs that stress media.

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Maintaining Copies of Hardware/Software • Obtain two of any essential equipment. • Maintain current versions of software and transfer (migrate) the media as necessary because much software has limited backward compatibility.	• Don't forget to maintain software and hardware for electronic records so that you can use your copies in future. • Don't play original media.
Cleaning Tapes • Clean the outer surface of the tape pack. • Have the tape cleaned by a professional recommended by the National Media Laboratory (Building 235-B-30, St. Paul, MN 55144; Internet at http://www.nml.org), if there is dust, dirt, or mold between the layers of a tape; or use a tape winder/cleaner at a slow speed.	• Don't unwind tapes for cleaning unless essential; instead clean the outer surface of the tape pack. • Don't use magnetic media cleaners frequently (weekly).
Identifying Common Preservation Problems • Be aware that magnetic media fail most commonly for the following reasons: - high curl of the tape causes the tape not to run through the equipment - high friction due to tape stickiness causes the tape not to run through the equipment - tape adhesion failure (the oxide information layer falls off) - tape cohesion failure (the binder sheds and flakes off) - head build-up due to flaking binder building up on tape heads and destroying the signal	• Don't forget to control the tape storage environment, rewind tape packs smoothly and slowly, and keep tapes in a cool, dry area. • Don't use system back-up tapes as your preservation master.
Recovering from Disaster • Hire a private contractor to attempt a data retrieval and recovery operation if damaged older electronic or magnetic records must be salvaged; or bring in experts, such as the National Media Laboratory, to assist with the process. • Avoid all high (>21°C [70°F]) or low temperature (<5°C [40°F]) disaster recovery procedures because they may lead to tape stretching or distortion.	• Don't forget to put magnetic media salvage and recovery into your Emergency Operation Plan. • Don't ignore possible assistance during salvage operations from local experts, such as state libraries and archives with conservators.
Recovering from Floods • In an emergency, air dry, dehumidify, or vacuum dry magnetic media. • If tapes are contaminated with water, use soapy water at room temperature to remove debris, then rinse with distilled water and air dry.	• Don't freeze dry, vacuum thermal dry, or vacuum freeze dry magnetic media in case of an emergency; instead air dry, dehumidify, or vacuum dry them.
Recovering from Organic Contamination • If contaminated with organic debris, immerse the tape in tap water, rinse in a mild (10%) HCl solution, rinse in tap water, rinse in distilled water, and air dry. Avoid all rapid changes in temperature. • Use professionals in the disaster salvage and recovery process. Contact the National Media Laboratory.	• Don't air dry tapes in high humidity environments or spaces with mold or direct sunlight.

To Care for Your Digital and Magnetic Media You Must **Do This...**	**Don't Do This...**
Recovering from Mold or Smoke Damage • Clean a tape if it becomes moldy or smoke damaged, copy it, transcribe it, and then clean the copier.	• Don't allow smoke or mold damaged tapes to sit uncleaned and uncopied. Copy them fast.
Recovering from Sticky-Tape Syndrome • Ask for conservation help in *tape baking* if tapes become sticky due to high humidity. • Bake a reel-to-reel audio, video, or computer tape to decrease stickiness and allow copying by placing the tape in a 122°F oven for 8 hours to temporarily firm up the sticky binder. Copy the tape within three days of baking.	• Don't forget to immediately copy valuable acetate-backed tapes (may smell like vinegar and light can be seen through the tape windings); paper-based tapes; brittle, flaky, or sticky tapes; and tapes that have damaged edits.

References

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