



Conserve O Gram

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Preservation Reformatting: Selecting A Copy Technology

Preservation copying of audio-visual, electronic, and textual documents allows park staff to maintain a balance between collections use and preservation. Once reformatted, researchers use the copies while fragile originals remain in storage. Learning to select an appropriate copy technology is an essential part of every archivist's, curator's, and librarian's preservation training. Although not all parks will develop the on-site capability to perform all of the techniques described below, this information will help parks contract for services. This *Conserve O Gram* describes the reformatting processes so that parks can make informed judgements on the proposals and work of contractors.

Characteristics of a Good Duplication Technology

Selecting a copy technology should be based on copy permanence, cost and time, quality, and use.

Permanence. Longer-lived copy formats are the most economical. Photographic, xerographic, and microform copies can last a century if created and stored properly. Electronic (digital) and magnetic records, including videotape, diskettes, and audiotape, last 5 to 20 years. CD-ROMs last about 10 to 20 years. If access is an issue, first digitize the documents then copy them to a permanent medium such as silver halide computer output microfilm or still photographic images. Do not discard the original unless it is identified by a conservator as posing a threat to the collection or staff, for example severely deteriorated nitrate film.

Reasonable Cost and Time. When shopping for copies allow for the following:

- *Playback and storage equipment*, such as for magnetic, digital, and microform copies

- *Copy tests*, such as residual chemistry and resolution tests for photographs/microforms, and data inspection for digital records
- *Permanence treatments*, for example microform/photograph toning with polysulfides
- *Future system requirements*, for example data migration for electronic materials as software/hardware changes
- *Creating preservation master, duplication master, and service copies*
- *Staff costs and time* including the following:
 - Locating the items, replacing them with separation sheets, and removing them from the files
 - Researching captions and catalog numbers
 - Preparing contract, loan, and packing lists
 - Packing and scheduling the items for shipment
 - Unpacking, inspecting, and testing all returned copies for completeness, quality, and chemistry
 - Returning materials that fail inspection
 - Housing, labeling, and filing the duplicate(s) and originals
 - Answering order-related questions

Microfilming and xerographic copying on acid-free paper are the most inexpensive copy formats for collections of a consistent size and format. Digital copies are generally more expensive as they have a shorter life and require recopying and inspection every five years. Digital data must also be recopied each time the software and hardware changes. In some situations digital copying may be funded by a partner, such as a digital publisher. In these cases plan to produce permanent microfilm from temporary digital copies.

Cost Recovery Procedures: When setting up cost recovery fee schedules for copy work remember that staff labor costs will run 100% or more of the copy production cost unless you spot check only a percentage of the images. First determine the actual costs of copy work at your park. Then document staff costs (see above),

factor in outside costs, write a fee schedule, and test your schedule before implementing it.

Good Copy Quality. Quality includes the following factors that indicate how well the duplicate matches the artifactual and informational qualities of the original.

- **Condition:** The object's condition not only plays a major factor in determining its priority for duplication, but also helps determine what equipment and formats are capable of capturing the appearance of the original. (See *Conserve O Gram 19/10, Prioritizing Materials for Duplication.*)
- **Size:** With photographic and microform copy processes, the closer the copy to the original document's size, the higher the quality. For some materials, such as architectural drawings and maps, maintaining exact size and scale may be crucial. Oversize and odd-size materials, such as panoramas, are difficult to reformat. Some recordable CD-ROMs reproduce larger images (4" x 5" or more) poorly. **NOTE:** Archivists in your state library or archives may recommend a reputable firm that can provide this service.
- **Good Color, Contrast, and Tonality Reproduction:** Images with low contrast and a long range of tones, such as some 19th-century monochrome prints, copy better with sensitive film emulsions and microfilm than they do with xerography and current digital or magnetic media techniques. High contrast materials have more duplication options ranging from xerography and digital to photography.

Color xerography and color dye bleach photographic prints, for example Ilfochrome, are all excellent ways to produce long-lived color copies. Color slides, for example Ektachrome and Kodachrome, fade and lose color balance rapidly *unless kept permanently in cold storage*. Copy slides should be used for reference.

- **Good Focus:** Soft-focus or poor resolution materials require more sensitive reformatting systems such as microfilm or photographic copies. Sharp high-contrast materials copy easily in most technologies.

- **Good Reproduction Detail:** Images with detail in both highlight and shadow areas require more sensitive copy systems such as photographic or microfilm copies or huge digital files. Handwritten items with fine variations in line and density also require these more sensitive technologies.

Copy Use. Before selecting a format, determine how the copies will be produced (in house or outside) or used (CD-ROM, books, slide shows). Develop clear guidelines on the types of copy services to be provided to researchers and follow them consistently. Electronic and magnetic records, motion picture film, and microfilm all require playback equipment. Museums that lack playback equipment, upgrade and repair funds, and staff familiar with technology should be cautious in setting up copy programs dependent on these technologies.

Museums that need frequent and speedy searching capabilities will prefer CD-ROMs and digital records as access tools over microfilm, xeroxes, and photos since digital data can now be transferred to microfilm. Producing permanent copies (print-out hard copies or microfilm) must be an obligatory second step in all digitization projects. If researchers frequently require publication-quality copies, the duplication possibilities narrow to photographs and very high quality digital images.

Reformatting Options

The major categories of reformatting options are electronic records and textual and audio-visual records.

Electronic Records. Electronic data is short-lived and requires data capture, data migration to each new generation of hardware and software, and data verification after each transfer. Digitization offers three advantages: 1) increased searchability; 2) easier and faster distribution of data; 3) an enhanced ability to manipulate images and text (e.g., correcting contrast and color balance, removing stains, and enhancing image sharpness). Once digitized, electronic data is vulnerable to destruction by misuse or a poor environment. Due to its short life and fragility, digitization is not a substitute for taking care of the original item since most originals will long outlast digital copies. It is

now possible to copy files from short-lived digital to long-lived microform or paper copies.

The following are common formats of electronic records:

- *Floppy diskettes* deteriorate to the point of information loss within 5 to 10 years.
- *Computer tape* lasts between 5 to 20 years if played and checked annually.
- *Tape cartridges* last 10 to 20 years.
- *CD-ROM* stands for *Compact Disk Read-Only Memory*. Read-only means that the data can not be changed. While CD-ROM recording media may last 100 years, the laminated plastic disk containing the data deteriorates (delaminates) after 10 to 20 years. CD-ROMs require special equipment to play. Recordable CD-ROMs are easily damaged by light and by either removing or marking on their labels.
- *Printouts* are often the most stable way to preserve an electronic record; however, they lose the searchability of databases. Select printers that use pigments instead of dyes.

Textual and Audio-Visual Records. These include microforms and photographic negatives, prints, and slides.

- *Microforms* come in different film types (color, diazo, vesicular and silver halide); functions (preservation master negative, copy negative, and usage copies); and formats (aperture cards, card jackets, microfiche, and roll microfilm). Silver halide microfilm produced to American National Standards Institute (ANSI) standards is long-lived and high quality. Diazo, vesicular, and color microfilm are shorter-lived. The larger the microfilm image in relation to the original, the sharper and clearer the image. Well labeled (targeted) roll microfilm is searchable and preserves the arrangement of the materials copied. Microfilm's disadvantages include awkward searching, viewing, and printing systems. Microfilm can be digitized.

Microforms come in the following format:

- **Aperture cards** are computer punch cards with a single frame of microfilm inserted. Often used for images, they are quite searchable, but not as long-lived due to the adhesives and punchcards used.
- **Card jackets** are frames of microfilm inserted in a plastic sleeve or jacket. More easily

searchable than roll film, they are also more short-lived due to the frequently poor quality adhesives and plastics used.

- **Microfiche** are 4" x 5" sheets of clear plastic with a header at the top for cataloging and multiple frames of microfilm sitting in grids underneath. More searchable than roll microfilm, they are also less long-lived.
- **Roll Microfilm** is a continuous roll of microfilm, much like motion picture film, which can be internally and externally indexed. This is the most permanent version of microfilm when produced to ANSI standards out of polysulfide-toned silver halide film.
- **Photographs** come in many formats (negative, copy negative, interpositive transparency, slide, and print); sizes (contact print to enlargement); tonalities (black-and-white, color, and monochrome) and processes (ambrotypes to zylographs). Black-and-white silver gelatin photographic negatives, transparencies, slides, and prints which are sulphur-toned are long-lived. Stable color processes include Ilfochrome or Ultrastable Color prints.

Photographic duplication formats include the following:

- **Original Negatives** are archival preservation masters and should be placed in cold storage.
- **Copy Negatives** are duplicate negatives used for actual print production purposes. Copy negatives should be produced from the interpositive process, tested and inspected.
- **Interpositive transparencies** are produced as a tool for producing more copy negatives. These images should *not* be used for reference.
- **Slides** are one-of-a-kind 35mm transparencies (no negative exists). They are copied for reference use and the originals are then placed in cold storage.
- **Prints** are produced from negatives. Original vintage photographs, particularly signed images, are treated with the same respect as negatives. If no negative exists, one is produced from the vintage print via the interpositive process. The negative goes into cold storage. Ideally, use copies of original prints for reference.
- **Magnetic tape consists of videotape and audiotape.** These short-lived magnetic media last 5 to 15 years before significant information loss. Common preservation problems include tape breakage, flaking of the electrostatic coating, and print-through (one layer of tape sticking to another). Magnetic

tape should be rewound yearly to prevent sticking, copied onto high quality tape stock with a polyester base to ensure survival, and checked regularly to determine if they are deteriorating (see *Conserve O Gram 19/8, Preservation of Magnetic Media*). Purchase the largest format tape your equipment can accommodate.

Magnetic tape comes in the following formats:

- **Cassettes** are the most troublesome tape format. The more long-playing the tape, the thinner the tape stock. Thin tape stock is more apt to break, tear, or stretch. When choosing tape stock for copies, look for short-playing (30 minute) tapes which have screws allowing access to the interior for splicing.
- **Reel-to-Reel** magnetic tapes are longer-lived than cassettes due to their thicker base. Ideally, store them on cores in archival film cans and copy them onto new stocks of reel-to-reel tape. Check all copies for completeness.
- **Videodiscs** are laminated plastic disks that are short-lived, generally delaminating after 10 to 15 years. They serve best as a distribution tool, rather than as an archival storage technology. They also require special equipment to play and are impossible to update.
- **Xerographic copies** are also known as xeroxes, electrostatic copies, or photocopies. When produced on acid-free paper using a well-functioning machine (the toner is fusing correctly) these copies can be long-lived and stable. Master xerographic copies should be produced, from which additional copies can be made so as to avoid exposing original documents to handling and excessive light.

The following charts summarize the formats discussed above. Use the charts to help determine which copy technology to select based on park resources and needs.

Electronic Records					
Copy Format	Permanence	Cost	Time	Quality	Use
Diskette	Low	Moderate	Moderate-High	Low-Moderate	High
Tape Cartridge	Low	Moderate	Moderate	Low-Moderate	High
Printouts	Moderate	Moderate	High	Low-Moderate	Low
CD-ROM	Low	Moderate	Moderate	Low-Moderate	High
Microfilm	High	Moderate	Moderate	High	Moderate

Textual and Audio-Visual Records					
Copy Format	Permanence	Cost	Time	Quality	Use
Microfilm	High	Moderate	Moderate	High	Moderate
Digital	Low	Moderate	Moderate-High	Low-Moderate	High
Photographs	High	Moderate	Moderate	High	Moderate
Videotape	Low	Moderate	Moderate	Low-Moderate	Low
Videodisc	Low	High	Moderate	Low-Moderate	High
Xerographic	Moderate	Low	Low	Low	Low

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