

Care and Handling of Physical Collections for Digital Conversion¹

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When scanning collection material, it is the goal of the operator to optimize that information capture. In order to achieve that goal, the information and its physical state need to be in the best possible condition. In working with the Preservation Department and following these handling procedures, the operator will ensure that the digital conversion of the information is optimal.

1. Assessment of the Physical Collections

Before beginning a digital conversion project, it is important to involve the Preservation Department. The members of the Preservation Department will determine the condition of the physical object, advise the project coordinator on further steps before scanning, such as cleaning, stabilization, and/or repair, recommend the best type of digital conversion equipment to use, and direct the operator on care and handling procedures. Please see Appendix A of this document for a list of questions that the preservation specialist will take into account before scanning collections.

2. Criteria for Selecting Proper Scanning Equipment

Once the collections have been assessed, and the necessary cleaning, repairs, and stabilization techniques are complete, the scanning equipment needs to be chosen. Choosing the best equipment to complete a digital conversion project will achieve the best image capture while preventing unnecessary damage to the collections. There are three available alternatives for digital capture²:



Flatbed Scanning



Overhead Scanning



¹ Information compiled from Library of Congress, National Archives and Records Administration, and the National Library of Australia's guidelines on digital conversion projects.

² Images taken from Cornell's online Digital Imaging Tutorial.



Document feed (sheetfeed) Scanning

The following points indicate what collections can be scanned safely on each type of scanner.

- Collections that can be inverted safely and scanned on a flatbed scanner include:
 - Copy negatives
 - Photographic prints determined to be in good condition by preservation specialist
 - Flat paper items determined to be in good condition by preservation specialist
 - Collections that are sleeved in polyester film (Mylar, Melinex) so that they may be handled safely
 - Pamphlet and sheet music determined to be in good condition by preservation specialist and can open to 180 degrees
- Collections that must be scanned by overhead scanning equipment include:
 - Bound materials, on a cradle or with wedges, if necessary, for support
 - Photographs adhered to board mounts
 - Any collection item that cannot be pressed flat safely
 - Any collection item that is too large to be turned over safely
 - Any collection item that is larger than the dimensions of the flatbed scanner
 - Any collection item needing to be scanned by an overhead scanner, as determined by preservation specialist

About Document Feed (Sheetfeed) Scanners

Document feed scanners are a convenient, quick method of capturing digital information from business cards to working drawings in an architectural firm. It is also a way of retaining information within collection material that is about to be lost due to poor condition; an example of this situation is scanning leaves of a brittle volume in order to create a physical replacement. Document feed scanners were created for expediency without regard for the original document; these scanners should not be used on permanent, physical collections for a number of reasons.

Document feed scanners operate through a series of un-powered and powered rollers that create tension on the document in order to feed it through the scanning apparatus without slippage or skewing. The light sensor and light source remain stationary while the

document is moved in front of them for digital capture. There are problems that can arise with such an operation. This type of tension function requires parameters in paper thickness; if the paper does not match these parameters, being either too light or too heavy, the document could tear or become jammed in the rollers. Some scanners contain a paper guide assembly that can assist with predicting paper thickness, but this is not an exact science. This type of scanner expects new, pristine papers and can cause damage to the original document if there is a crease, tear, or another anomaly to upset the tension mechanism. Many manufacturers of such scanners include a disclaimer that they are not responsible for damage resulting from using the scanner for “fragile” and “damaged” documents. The damage that is seen in polyester sleeves after going through the scanner should indicate the reason for concern with this scanning method.

3. Preparing the Scanning Surface

Once the type of scanning equipment has been selected for the digital conversion project, the scanning surface should be cleaned and dried. For dry dust removal, use a soft brush, blower brush, or canned air on the scanning surface. For wet cleaning, aerosols or ammonia-containing cleaning solutions should not be used; these products include chemicals that can react with certain organic collections, such as films and photographic materials. A 50% distilled water and 50% isopropyl alcohol solution is recommended for cleaning with lint-free cleaning cloths.

4. Specifications for Scanning³

Lighting Considerations

Two considerations need to be made when considering light levels for digital conversion: heat gain and exposure to radiating energy. Proper color temperature (around 3500 degrees Kelvin) is needed in order to achieve a true-color scan, but halogen lamps produce too much heat, causing problems for collection items, such as rapid dimensional changes and desiccation. The recommended alternative is high frequency, low wattage fluorescent lamps, which give the correct color temperature with little radiant heat.⁴

These lamps need at least 15 minutes to reach their maximum intensity. These lamps should be fitted with UV-filtering sleeves to eliminate the ultraviolet component; UV is not necessary for the eye to perceive color and does not affect color temperature.

Because total light damage is accessed through the intensity of the light source and the length of exposure to the light source, it is important to limit both as much as possible. Precautions – such as covering the item when it is not being scanned – should be taken whenever possible to reduce exposure time.

³ Information taken from John E. McIntyre, “Protecting the Physical Form,” (paper presented at the Joint RLG-NPO Preservation Conference: Guidelines for Digital Imaging, University of Warwick, September 28-30, 1998), <http://www.rlg.org/preserv/joint/mcintyre.html>. Information from other sources is footnoted.

⁴ The National Library of Scotland conducted tests on their digital conversion system of two cowls each with three single-ended fluorescent Biax L lamps and a high frequency ballast. Each lamp generated an output of 40W. Temperature, UV, and lux meters were placed on the capture surface and the lighting system turned on at its highest level. Readings taken every 10 minutes over 4 hours indicated a temperature rise of only 1° Celsius and a change in relative humidity of only 1-2%. Light levels

Flatbed Scanners

There has been a rule of thumb that is often stated when it comes to the amount of light exposure a scanned object receives when scanned on a flatbed scanner: “the equivalent of one day on display under proper lighting conditions.” In a 1998 Technical Feature article in the RLG DigiNews, author Timothy Vitale, Paper and Photograph Conservator, backed up this often-quoted rule with facts. After testing seven flatbed scanners, he discovered that most scans would be 1-15 lux, which is a “miniscule fraction of the useful life of an artwork or document.”⁵ Interestingly, he suggested to cultural institution professionals to focus instead on the physical protection of the item to be scanned: “Issues associated with a document's physical protection during scanning, such as damage to spine or friable paper should be of greater concern to librarians, archivists, or curators when flatbed scanners are used for digitization. Digital cameras may be a better tool for digitizing material with high sensitivity to physical damage.”⁶

Book Supports/ Cradles

Some form of support/ cradle will be necessary in order to reduce risk of damage to bound item being scanned. Many scanning systems are coming equipped with book supports that present a page at a time to the scanning device (such as the Minolta PS 7000 in the Digital Conversion Facility). Here are some questions to ask when considering proper support for your bound item.

Supporting the form:

- Horizontal platforms – are they split-level, e.g. adjustable depending upon openability of the volume?
- Is support needed at an angle, e.g. tight binding?
- Will book wedges be a sufficient support?
 - If not, what other type of support is needed?

Environmental Concerns

Ideally, digital conversion should achieve the best scan possible, which requires a stable, clean environment. Some considerations that should be made in the scanning setup and laboratory:

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5. Handling Procedures for All Library Materials

The following bullet points provide guidance for handling most collection materials.

- Be observant, careful, and use common sense.
- No food or drink at work spaces.
- Wash hands before handling materials, especially after eating to make sure they are clean at all times.

⁵ Timothy Vitale. “Light Levels Used in Modern Flatbed Scanners,” *RLG DigiNews*, 2, no. 5 (October 15, 1998), <http://www.rlg.org/preserv/diginews/diginews2-5.html#technical>

⁶ *Ibid.*

- Do not use collection items as a writing surface.
- Remove paper clips, pins, and string carefully. Replace metal clips and pins with plastic paper clips.
- Nitrile gloves may be used to handle most items, when appropriate. This will protect paper and other materials from grease, oils, and dirt on bare hands. Gloves, however, can make fine work like turning pages or handling glass negatives difficult – use discretion.
- Do not use pens, markers, or sharp objects near collections.
- When marking pages or use a placeholder, use a piece of clean, white paper; do not use self-stick notes or other adhesive papers or plastics.
- Keep materials in their original order.
- Prepare workspaces and surfaces before beginning work.
- Have sufficient space cleared to handle safely all steps in the procedures, roughly six times the dimension of the materials being scanned.
- Keep surfaces clean and uncluttered.
- Do not place objects on top of library collections.
- If library collections are to be stacked, limit stack sizes and heights.
- Do not place items on the floor, near windows, or on radiators.
- When you leave the area, close books and cover documents with paper or mat board.
- Place a sign stating “Object Below” so other people are aware of the collections materials.

6. Handling Procedures for Scanning Bound Collections

- Support the sides of volumes with weak bindings and/or that can be opened less than 120 degrees.
- Do not force the spine open or apply hard or abrupt pressure to open pages.
- Use a “book snake” or cloth weight to hold volume open to particular page.
- Do not wet fingers to turn pages.
- Turn pages carefully from the top, upper corner of the page. Lift the upper corner and support the page with your whole hand to turn the page.

7. Handling Procedures for Scanning Flat Collections (Manuscripts, Documents, Works of Art on Paper)

- Support single sheet materials with a more rigid support, such as mat board, corrugated “blue” board, polyester sheeting, or acrylic sheeting
- Keep one hand under the material. If the material is too large or awkward, please see “Handling Procedures for Oversized Flat Collections.”
- Do not use flatbed scanner for flat collections with relieved (raised) surfaces, such as resin/ wax seals or embossed surfaces.
- Do not attempt to repair torn flat collections. Contact the Conservation Laboratory to arrange treatment.
- Do not blow on flat collections to remove dust or dirt. Use a soft brush, blower brush, or canned air to remove loose dust or dirt.

- If the collection item is brittle or fragile, use a polyester film folder for scanning. Sleeves can be obtained from the Preservation Department. Keep in mind that polyester film has a static charge: open the folder all the way before inserting the item into the folder. **EXCEPTION:** art on paper that has friable media (charcoal, pastel, soft graphite) **should not** be placed in polyester film sleeves.

8. Handling Procedures for Scanning Photographs, Negatives, Transparencies, and Slides

- Wear nitrile gloves when handling photographic materials
- Photographic emulsions are scratched easily and should be protected when handled. Polyester film sleeves are helpful for this purpose. Sleeves can be obtained from the Preservation Department.
- Do not try to flatten curved or curled photographs. If this problem inhibits scanning, contact the Conservation Laboratory to arrange treatment.
- Do not attempt to repair flaking emulsions. Contact the Conservation Laboratory to arrange treatment.
- Do not attempt to repair torn or broken photographs or negatives. Contact the Conservation Laboratory to arrange treatment.
- Do not blow on photographic collections to remove dust or dirt. Use a soft brush, blower brush, or canned air to remove loose dust or dirt.
- For scanning negatives and slides, use a negative holder to keep the film in place while scanning.
- Do not use flatbed scanner for photographic collections with relieved (raised) surfaces, such as embossed surfaces.
- Do not use any water-based solvents such as window cleaner or film cleaner on photographic material. Improper cleaning of photographic materials can cause serious damage such as permanent staining, abrasion, and loss of binder or image.

Glass Negatives/ Slides

- Glass negatives and slides should be placed on a mat of soft material.
- Do not leave glass negatives/ slides on the light box for a long period, as it may soften the gelatin emulsion.

Cellulose Nitrate and Cellulose Acetate Film/ Negatives

- Wear nitrile gloves or house items in polyethylene sleeves so they can be handled safely.
- Work in a well-ventilated area.

9. Handling Procedures for Scanning Oversized Flat Collections

- Follow Handling Procedures for Scanning Manuscripts, Documents, Art on Paper
- **Recommended:** Oversized items should be scanned using a scanback digital camera on a copy stand setup situation, OR a flatbed scanner the same size as the object being scanned, OR using a microfilm intermediary for scanning.

- Make sure there is sufficient space to handle and work with the oversized material.
- Two people should move the material on a rigid support board (e.g. mat board, blue board). If it is lightweight paper, another rigid support board can be placed on top to prevent the paper from blowing off the lower support while moving.
 - If the library material is brittle or fragile, place it inside a polyester sleeve before scanning. Sleeves can be obtained from the Preservation Department.
- Library material should be sufficiently supported while being scanned, meaning it should be on a rigid support that supports the entire piece. No part of the material may overhang the platen or copyboard.
- If the material needs to be turned over, it should be placed between two rigid boards and flipped over while holding the “sandwich” together.
- Acceptable: oversized flat collections to be scanned on a flatbed scanner that is not the same size as the material.
 - Oversized flat collections should not be scanned on a flatbed scanner without support. If the collection item can only be scanned on a flatbed scanner, the collection item should be supported overall while portions are scanned on the flatbed.
- Not Recommended: document feed scanners, as these do not sufficiently support the material and can cause damage, even if placed in a polyester sleeve. Please see Section 2, “Criteria for Selecting Proper Scanning Equipment,” Section Subtitle, “About Document Feed Scanners.”

10. Handling Procedures for Scanning Sound Recordings

- Phonodiscs
 - Handle all phonodiscs by their edge
 - Never flex the phonodisc
 - Never set one phonodisc directly on top of another
 - Never touch the grooved playing surface
 - Avoid dropping or sudden shock
 - Phonodiscs should be stored inside a polyethylene sleeve inside an acid free record container, upright on its edge.
 - Phonodiscs are heavy. All shelving and work surfaces should be able to safely support their weight.
- Reel-to-Reel Tapes
 - Handle reels by their edge and center hub only
 - Never touch the recording surface
 - Never squeeze the sides of a reel, it can damage the edge of the tape
 - Never place cassette tapes on top of CRT (cathode ray tube) monitors or near electric motors
 - Avoid strong magnetic fields

- Tape should be evenly packed on a reel before it is played. If the pack or wind is uneven, wind the tape onto another reel and rewind it onto the storage reel.
- After avoid shuttling the tape back and forth over a single area if possible
- Tapes should be stored vertically in acid free boxes
- Cassette Tapes
 - Tape should be evenly packed or wound before it is played. If the pack or wind is uneven, forward and rewind the tape before playing it
 - Store cassettes vertically never flat on their edge
 - Never place cassette tapes on top of CRT (cathode ray tube) monitors or near electric motors
 - Avoid strong magnetic fields
- Historic Recording Media
 - Wax Cylinders⁷
 - Handle by inserting index and middle finger into the center hole and spreading fingers apart to prevent slipping
 - Store upright on its edge
 - Avoid extreme changes in temperature, as this can cause cylinders to crack
 - Do not touch grooved area of the cylinder
 - Wire Recordings
 - Ensure wire is wound evenly on its spool
 - Avoid tangling wire
 - Store in acid-free box
 - Avoid extreme moisture as corrosion can be a problem
 - Avoid strong magnetic fields

11. Handling Procedures for Scanning Moving Images

- Wear nitrile gloves when handling film materials.
- Moving picture film
 - Reels should be handled by their outer edge and hub only
 - Handle film wound on cores by placing a finger through the hub and resting the weight of the reel in the palm of your other hand
 - Handle film by the edges only
 - Films should always be wound evenly on a reel or film core with the emulsion side out
 - Never leave paper labels or paper notes inside a film can
 - Store film in polyethylene plastic cans flat on shelving
 - Stack and store cans of the same size on top of each other
 - Film is heavy. All shelving and work surfaces should be strong enough to support the weight of the film.
- Video Cassette

⁷ Taken from Library of Congress' web site: <http://www.loc.gov/preserv/care/record.html>

- Tape should be evenly packed or wound before it is played. If the pack or wind is uneven, forward and rewind the tape before playing it.
- Never place videocassettes on top of CRT (cathode ray tube) monitors or near electric motors
- Store cassettes vertically on their edge – never flat
- Avoid strong magnetic fields

12. Handling Procedures for Optical Media

- CDs/ DVDs⁸
 - Handle discs by the edge or the center hole
 - Keep dirt and other foreign matter away from the disc
 - Store discs upright in plastic cases made for CD/DVD
 - Return discs to storage cases immediately after use
 - Open a recordable CD/DVD only when you are ready to record to the disc
 - Store discs in a cool, dry, dark, dust-free environment
 - Clean discs with a clean cotton fabric in a straight line from the center hole – NOT in a circular motion
 - Avoid sunlight and ultraviolet light
- Mini-Discs (magneto-optical)
 - Keep discs away from strong magnets
 - Keep dirt and other foreign matter from entering the disc
 - Store discs upright in plastic cases made for Mini-Discs
 - Avoid sunlight and ultraviolet light

13. Objects

⁸ Information taken from Fred R. Byers, *Care and Handling of CDs and DVDs: A Guide for Librarians and Archivists* (Washington, DC: CLIR & NIST, 2003), <http://www.clir.org/PUBS/reports/pub121/contents.html>. More detailed information about care and handling of CDs and DVDs is available in this publication.

Appendix A: Questions for Assessing Collection Items for Digital Conversion

- Paper
 - Is it actually paper? Could it be parchment or vellum?
 - Is the paper brittle?
 - Is the paper torn?
 - Are there large tears across text/ image?
 - Are there large losses in the text/ image?
 - Are there folds/ creases that obscure text/ image?
 - Is the paper dirty?
 - Are there adhesives/ tapes that obscure text/ image?
 - Is the media friable?
 - How light sensitive is the media?
 - Are there attachments that inhibit scanning, such as seals?
- Bound Materials
 - Do any of the leaves exhibit problems as listed above in “Paper”?
 - Is the binding intact or damaged?
 - Does the volume open to 180 degrees?
 - If not, how far does the volumes open?
 - Are there detached leaves?
 - Are there foldouts or overlapping elements?
 - Are the pages stuck together?
 - Are the pages uncut?
- Photographs and Photographic Negatives
 - Is there flaking or cracking of the image?
 - Are there tears or breaks across the image?
 - Are there losses in the image area?
 - Are there adhesives/ tapes that obscure the image?
 - Is the photograph lifting away from its mount/ backing?
 - Does the photograph/ negative lie flat?
 - Is the photograph/ negative dirty?
 - How light sensitive is the photographic media?
- Multimedia (Sound, Film, Electronic)⁹
 - Is the item intact?
 - Does the item have visible dust or accretions?
 - Are there visible scratches on the item?
 - Is there any evidence of flaking/ friable media?
 - Is there mold/ mildew on the item?
 - Is the item deformed/ warped/ curled?
 - If film, any evidence of “vinegar syndrome”?
 - If reel film or tape sound recordings, any evidence of bad splices or torn sprockets?

⁹ Physical condition attributes taken from Yale University Archives Film Evaluation Form.