



# Conserve O Gram

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## Archives: Reference Photocopying

Modern researchers have become accustomed to collecting photocopies of archival documents in the course of their studies. They request copies to use at another time or place, to minimize notetaking, or to retain nuances, designs, or images difficult to transcribe. Yet it is up to the staff person in charge of the collection to consider the physical risks of photocopying an individual document, to decide when copying can safely be allowed, and to establish for researchers a fair and consistent policy. This *Conserve O Gram* outlines some of these considerations.

### *Light and Heat*

Exposure to the light in an electrostatic (or xerographic) copy machine, like all exposure to light, can cause damage to documents. So photocopying, like exhibition, is a type of consumptive use. Copy machines expose documents to very high light levels (usually several thousand footcandles) for very brief periods of time. These exposures can be compared to exposures at lower light levels for longer periods of time, such as might occur during exhibition. The resulting damage is permanent.

The quantity of light exposure on objects can be described in terms of footcandle (fc) hours or footcandle minutes: the irradiance level times duration. For example, the total exposure on a document exhibited at 5fc (the National Park Service maximum recommended exhibit light level for paper materials) for one hour could be expressed as 300fc minutes (5fc times 60 minutes). How does this compare with photocopy machine exposure? Most small office copiers employ fluorescent or tungsten lamps, while

high speed copiers generally employ xenon lamps. Each of these machine types displays a wide variability in light intensity levels. The following are very rough average exposure levels for Xerox® Corporation machines.<sup>1</sup>

fluorescent scan machines	80fc minutes per copy
tungsten scan machines	175fc minutes per copy
xenon flash machines	50fc minutes per copy

An average Xerox tungsten lamp machine, then, exposes documents to a quantity of light comparable to about 35 minutes of exhibit exposure at 5fc for each copy produced. This is clearly a very modest degree of light exposure, and for most documentary materials, many copies would need to be made to cause observable damage.

Note that the footcandle unit provides information only about the visible portion of the light spectrum (400-700 nanometers). The following chart gives average relative energy distributions for fluorescent, tungsten, and xenonlamp Xerox machines, taking into account that the glass platen absorbs light below 325 nanometers.<sup>1</sup>

#### Fluorescent Tungsten Xenon

300-400 nm (ultraviolet)	2%	1%	5%
400-700 nm (visible)	97%	9%	60%
70-10,000 nm (infrared)	1%	90%	35%

Footcandles are a useful way to describe light levels from fluorescent copier lamps, because most of the energy from these lamps falls in the visible range. However, roughly 90% of the tungsten lamp's energy falls in the infrared and not the visible range. Exposure of documents to high levels of infrared energy does not cause

significant direct photochemical damage, but rather the effect of this energy is through the heating of the copied object.

Tungsten lamp copiers, however, do not actually heat documents to higher levels than fluorescent lamp machines. This is because fluorescent lamp copiers are generally fitted with heaters designed to maintain a stable light output. For Xerox copiers, tungsten and fluorescent machines expose documents to a comparable 120-130°F platen temperature. Recent models of xenon copiers are cooler at a maximum of about 100°F.<sup>1</sup> While increased heat does accelerate deterioration in paper, such brief exposure to temperatures of 100-130°F constitutes only a very low level of risk.

Based on these figures, it is clear that a limited number of exposures will not produce significant damage in a document or photograph. However, light damage is cumulative and irreversible and all unnecessary exposure of important documents should be avoided. Repeated copying, particularly of faint images or light-sensitive materials such as watercolors, albumen photographs, or cyanotypes, should be kept to a strict minimum. A master photocopy, from which additional photocopies can be made, should be made for any document frequently copied (see *Conserve O Gram 19/4*).

### **Handling**

Unquestionably the greatest danger to documents in photocopying is in the handling. The following guidelines should be carefully observed.

- All photocopying should be done by the responsible park staff, not by researchers.
- Do not use copiers with a movable platen.
- Be certain the platen is clean before copying historic papers.
- Before copying, remove staples, paper clips or other fasteners if this can be done safely (see *Conserve O Gram 19/5*). If a fastener cannot be removed, take care not to fold or break sheets by bending them around fasteners.
- Never stream-feed historic documents into the copier. Always place them on the glass by hand, one at a time.
- When copying documents in which the arrangement is significant, it is important that no information about the location or relationship of the original papers is lost. Researchers must not remove selected documents from files, but should identify items to be copied by, for example, inserting legal-size strips of paper to mark locations. Brief copying instructions can be noted on these strips.<sup>2</sup>
- Books considered part of the historic collection, including published volumes, bound ledgers, diaries, letterpress volumes, and scrapbooks, should generally not be copied on standard copiers. Acceptable book copiers are those that allow the book to be opened no more than 100°.

Examples are the Xerox® 5042 Booksaver, the Selectec Bookmaster series from University Copy Services, Inc., 2405 Bond Street, University Park, IL 60466, and the Óce Library Copiers from Óce Business Systems, 1351 Washington Blvd., Stamford CT 06902. Although book copiers are preferable, even they can cause damage to bindings. Bound volumes considered to have historic significance should usually be reproduced by microfilming.

**NOTE:** Beyond physical considerations, park staff must consider both copyright restrictions (Copyright Act, Title 17, United States Code),

and any specific collections restrictions that may have been placed on papers by the donors. Refer to NPS *Museum Handbook*, Part I (Rev 9/90), Chapter 2, and Part II (under revision), Appendix N.

### Conclusion

Reference photocopying must always be done with the well-being of the original document in mind. Making a single photocopy of a document or photograph constitutes only a small exposure to the damaging effects of light and heat, effects that are multiplied in repeated copying. Documents being copied are far more likely to be damaged by handling. Park staff is encouraged to produce master photocopies from which to make additional copies for materials that are frequently requested, and to exercise its right to refuse to photocopy materials if doing so will damage them. If photocopying is considered unacceptable, encourage the researcher to study the material fully on-site, or offer to reproduce it photographically (including microfilm) if this will pose less hazard. Researchers will generally respect a fair and reasonable policy aimed at the preservation of historic papers.

### Notes

1. The discussion of light and heat in this leaflet is based on performance of Xerox Corporation copiers using data provided by Donald Wiedrich, Xerox Corporation, Webster, NY. Other manufacturers have not been consulted, and no implication should be drawn that these figures are representative of other copier brands.
2. Mary Lynn Ritzenthaler, *Archives and Manuscripts: Conservation*, Basic Manual Series (Chicago: Society of American Archivists, 1983) p. 60.

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