Canadian Conservation Institute
Institut canadien de conservation

CCI Notes 16/4

Care of Black-and-White Photographic Prints

Introduction

Black-and-white photographic prints are found in most museums, art galleries, and archives. There are many kinds of prints, each with its own format, process, imaging materials, image tone, base material, surface gloss, and texture. This Note is concerned with prints on paper or on resin-coated (RC) paper for which the image-forming substance consists of microscopic particles of silver. With the exception of pictures dating from the beginning of photography (the so-called salted paper prints from the late 1830s to the mid-1860s), the image silver is embedded in a thin layer that may consist of albumen, collodion, or gelatin. Gelatin has been used almost exclusively for the past 100 years.

Photographic prints with silver images fall into one of three categories, according to the nature of the support material:

1. salted paper prints on a paper base not specifically formulated for photographic purpose; they have no distinct image layer in a binding medium
2. fibre-base prints, made by a handful of manufacturers from the 1860s to the present
3. contemporary resin-coated prints (or RC papers) introduced in the late 1960s

Prints in the last two groups have an image layer coated on one side of the paper support. These photographs are often collectively referred to as "silver prints."

Little is known about the properties of early salted paper prints. These prints are more sensitive to agents of deterioration than are later materials. Because of the absence of a distinct image layer, they are liable to suffer from abrasion. Also, the silver particles that form the image are susceptible to an oxidation reaction that leads to discoloration of the picture.

Fibre-base silver prints are made on a paper base that ranks among the highest in quality and permanence. They are sometimes referred to as baryta papers.[1] Like all photographic records that contain elemental silver, the image is susceptible to discoloration if exposed to aggressive chemical reagents even though it is on a stable support. This group of prints may be subdivided into those printed on printing-out papers and those on developing-out papers. Each is manufactured and processed differently, which results in differences in size and shape of the silver particles in the image. Consequently, images on printing-out papers — which include salted paper prints, albumen prints, collodiochloride papers, and certain silver gelatin prints — are more susceptible to image deterioration caused by chemical attack than are photographs on developing-out papers.

Although RC prints are developed-out, they possess special properties related to the plastic coating on either side of the paper base. This enables them to be processed in a few minutes and to yield dry, flat prints. However, they are considered less suitable for preserving images over extended periods of time (i.e. hundreds of years) than are conventional baryta papers.

Preservation and Storage

Uniform low relative humidity (RH), a constant temperature, and the absence of reactive pollutants in the atmosphere are key requirements for long-term preservation of photographic prints. Excessively dry conditions cause prints to curl up tightly. If this has occurred, exposing the curled prints to high RH will allow them to relax and unfold. Properly processed prints on fibre-base paper are essentially stable when exposed to dry heat. Nevertheless, avoid such conditions because of the possible presence of aggressive chemicals such as hydrogen sulphide, peroxides, ozone, and sulphur dioxide. The combination of any of these with either high RH or high temperature will lead invariably to discoloration of the image.

According to recommendations published by the International Organization for Standardization, RH levels between 30% and 50% are acceptable for storing photographic prints. RH should never exceed 60%, and

recent research indicates that 30–35% RH is optimum. Temperature may range from 15°C to 25°C, but must never exceed 30°C. Avoid daily fluctuations of more than 4°C. Cold-storage conditions, even below 0°C, are beneficial to the longevity of photographic prints.

In all of the CCI Notes on the preservation of photographic images, the suggested storage conditions are those recommended by the International Organization for Standardization. While these are useful guidelines, they are not etched in stone. They are reviewed by the corresponding committees about every 5 years. In addition, studies have been published on the modifications and possible improvements of these guidelines. For some fascinating discussions on storage conditions for photographs, see Johnsen (1994), Mecklenburg et al. (1994), McCormick-Goodhart (1996), and Reilly (1996).

Since photographic prints are usually kept in the dark for long-term storage (i.e. in envelopes, boxes, or albums), exposure to light is not a problem in their preservation unless they are put on display.

It is best to air-dry black-and-white photographic prints that have been immersed in water (e.g. during a flood or as a result of efforts to extinguish a fire). They can also be frozen safely as a conservation measure, and can be kept frozen until they can be freeze-dried in a vacuum chamber. However, a treatment cycle consisting of freezing, thawing, and vacuum-drying is not recommended because gelatin layers may block and stick.

Handling

Photographic prints are often used for study and research. Always wear protective lintless nylon or cotton gloves when handling prints. Sleeve or matt prints to prevent damage to their corners and edges.

The appearance and integrity of the surface of a photographic print are major factors in its aesthetic value. Surface properties are described in such terms as *gloss*, *matte*, *lustre*, and *texture*. They, along with the image tone, are inherent characteristics of a photographic print. Disturbing or destroying these delicate surface qualities will change the aesthetic value of the print.

Inscriptions written in ink are liable to fade when photographs are on display, and will invariably bleed and become illegible if they are accidentally immersed in water. If identifying information must be written on a photograph, write it on the back, as close to the edge as possible, using an HB pencil. For best protection, place each print first in an uncoated polyester sleeve (e.g. made of polyethylene terephthalate such as Melinex 516) and then in a paper envelope. Write all necessary documentation on the envelope before inserting the print. Do not staple or attach other documents to photographs with paper clips. Do not bend, fold, or roll photographs.

Minimal Cleaning

Accumulated surface dirt can be removed in most cases with a soft brush. If the print surface appears to be intact, dry clean it using a special cleaning pad. Do not wash photographs in water unless the stability of the gelatin layer has been confirmed. Do not attempt chemical treatments in aqueous solutions because they could remove retouching.

Display

Prepare photographic prints for exhibition carefully. Physically support valuable prints by hinging them to a museum-quality board and matting them with a window mat, in much the same way as works of art on paper. The window mat acts as a spacer to prevent the print surface from coming into direct contact with the cover glass. Without the window mat, moisture could cause the print and the glass to stick together. For details of this and of other techniques for mounting works of art on paper, refer to CCI Notes 11/5 *Matting Works on Paper*.

Many fine-art photographers have dry-mounted their prints in the past and continue to do so. There is no evidence that dry-mounting photographic prints causes the silver image to degrade. Although it produces well-mounted, perfectly flat prints, dry-mounting has the disadvantage of being, practically speaking, irreversible. Manufacturers claim that dry-mounted prints can be dismounted by reheating them in a press, but this procedure is not safe for prints.

All photographic prints including silver gelatin prints, salted paper prints, albumen prints, and contemporary RC papers are susceptible to damage caused by the ultraviolet (UV) component of light. Therefore, when displaying photographic prints, maintain the UV level below 75 μW/lumen. Never expose photographs of any kind, whether black-and-white or colour, to direct sunlight.

There is no published evidence that light alone causes black-and-white photographic images to discolour or fade. *Well-processed* silver gelatin photographic prints on *fibre-base paper* are essentially stable to light. Therefore, they may be displayed for several weeks or even a few months at what would normally be considered, in a museum context, very high light levels (approximately 800 ± 200 lux) without danger

of deterioration. This, however, is not true for salted paper prints, albumen prints, and contemporary RC papers, which are much more sensitive to light.

It is reasonable to assume that paper prints from the early days of photography were processed less scrupulously than more recent prints, which benefit from the knowledge that some residual processing chemicals contribute to the deterioration of silver images. Albumen prints are prone to changes in density[2] upon prolonged exposure to light. Quantitatively expressed, density changes appear in the form of fading, discoloration, or staining. RC prints are also susceptible to changes caused by light while they are on display. Most fine-art photographers are aware of the limitations of RC papers and use fibre-base papers that allow their prints to be exhibited safely. Recommended light levels for exhibiting salted paper prints and albumen prints vary from 5 lux to 100 lux.

In the absence of firm guidelines for exhibiting potentially vulnerable photographs, use innovative methods to protect them while on display. For example, drape a black felt cloth over a photograph on display; the viewer must lift the felt to see the picture. Alternatively, design an exhibition case fitted with a hinged cover so that when the viewer opens the cover a light above the case switches on automatically.

Monitor densities of prints by measuring highlight areas, mid-tones, and shadow regions. Compare density readings of photographic prints before and after an exhibition period. This is particularly useful for prints on loan to other institutions. Complete condition reports, including such density measurements, are the only sure way to determine whether or not the image has changed.

Endnotes

1. Fibre-base prints contain a layer of barium sulphate (baryta) between the image gelatin layer and paper base. The baryta layer increases paper whiteness and smooths out the paper surface.

2. Density is a number on a logarithmic scale that expresses the degree of blackness of a print. For positive prints, this is known as the "reflection density" and is measured by a reflection densitometer. Negatives have "transmission density," which is measured with a transmission densitometer. Density measurements can be performed easily and quickly, and do not harm the photograph.

Suppliers

Note: The following information is provided only to assist the reader. Inclusion of a company in this list does not in any way imply endorsement by the Canadian Conservation Institute.

Soft brushes, special cleaning pads
(e.g. Cleaning Pads for Draftsmen and Artists from Faber-Castell):
local art stores

General conservation supplies and print and negative storage sleeves:

ARCHIVAL PRODUCTS.ca
Division of B.F.B. Sales Ltd.
2957 Inlake Court
Mississauga ON L5N 2A4
Canada
tel.: 905-858-7888 or 1-800-667-2632
fax: 905-858-8586 or 1-800-616-0342
www.archivalproducts.ca

Carr McLean
461 Horner Avenue
Toronto ON M8W 4X2
Canada
tel.: 416-252-3371 or 1-800-268-2123
fax: 416-252-9203 or 1-800-871-2397
www.carrmclean.ca

Conservation Resources International
5532 Port Royal Road
Springfield VA 22151
USA
tel.: 703-321-7730 or 1-800-634-6932
fax: 703-321-0629
www.conservationresources.com

Talas
20 West 20th Street, 5th Floor
New York NY 10011
USA
tel.: 212-219-0770
fax: 212-219-0735
www.talasonline.com

Woolfitt's Art Enterprises Inc.
1153 Queen Street West
Toronto ON M6J 1J4
Canada
tel.: 1-800-490-3567
www.woolfitts.com

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