

Conservation of Photographic Images

by Sakda Siripant



Conservation of photographic images means storage, handling and exhibition techniques which insure that the photographs remain in their current state of preservation.

The conservation begins with proper storage. Even with satisfactory processing, the prints cannot be properly preserved without adequate storage conditions. The environmental conditions and construction

materials specified are known to have an important bearing on the storage of photographs. Next to environmental control for storage is the proper handling. When filing processed films, plates, or papers it is customary and good practice to enclose them in acid free envelopes, sleeves, folders, or other forms of enclosure to protect them against dirt and mechanical damage. Proper handling facilitates identification and servicing.

STORAGE ENCLOSURES

Storage enclosures for photographic prints and negative are available in a variety of materials and formats. To choose the proper enclosure requires a knowledge of the possible alternatives.

Paper enclosures are opaque, and protect an object from light. However, paper makes viewing difficult since it requires the removal

of the prints from the enclosure. Hence the subsequent abrasion and fingerprint marks on the image. Nevertheless paper enclosures have numerous advantages. They are porous and therefore protect the photographs from moisture and detrimental gases. They are also easy to write on and generally less expensive than plastic enclosures.

Although processed prints are usually acidic (with pH of about 5.5) it would be desirable for storage papers to have a pH of 7 and above. "Museumboard" sold as 100 percent rag, acid-free mount (or matt) board, has proved long-term stability.

Plastic enclosures have the great advantage of allowing an image to be viewed without being removed from the enclosure. This greatly reduces the chance of abrading, scratching, and fingerprinting the photograph. Plastic enclosures seal the object from the atmosphere. Since most chemical deterioration in a photograph is catalyzed by the presence of moisture and sulphides in the atmosphere, such protection will prolong the life of the image. Plastic enclosures however can trap moisture and cause ferrotyping of the image. It is, moreover, very difficult to write a label, or title on them.

Negatives, prints and colour slides should be kept in acid free paper, mylar, polyester or polyethylene or polypropylene folders or jackets or sleeves to protect them from dust, dirt and other pollutants. PVC and epoxy plastic enclosures should be avoided, because they emit harmful fumes.

Like all photographic materials, slides have their own particular storage requirement. Any storage system should fit in with one's work habits and needs. Slides should be preserved in slide guard pages made of poly-

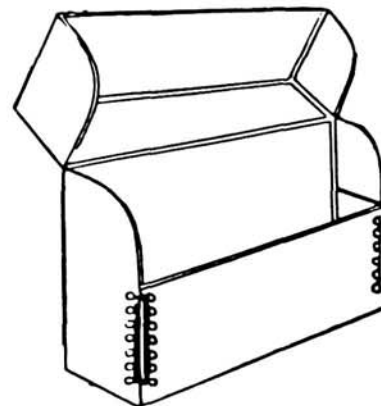
propylene of polyester, polyethylene and triacetate. Slide guard pages can be kept in binders or folders to be filed in drawers.

Mylar folders are recommended for archival protection of negatives and transparencies, sheet films as well as unmounted prints. Sheet films and unmounted prints should be preserved in storage boxes made of acid-free paper and acid-free glues such as methyl cellulose, polyvinylacetate. If the sides of the boxes are wood-reinforced, the boxes must be lined with white, acid-free buffer paper of Tyvek to protect the contents from acid migration.

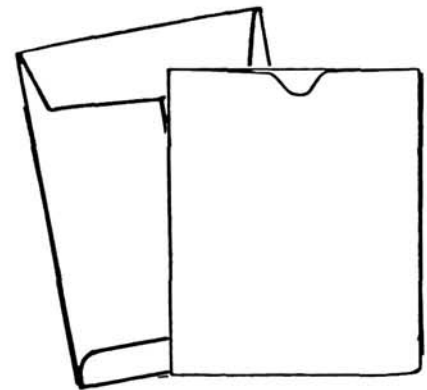
To protect and arrange history photographs, the three-ring binder or album should be used. Protective sheets for both sides of the page in

an album should be made of polypropylene sheets. Mounting corners should be made of polyester with a self-adhesive backing. Double-sided tapes of 3M code 415 and Filmoplast are recommended.

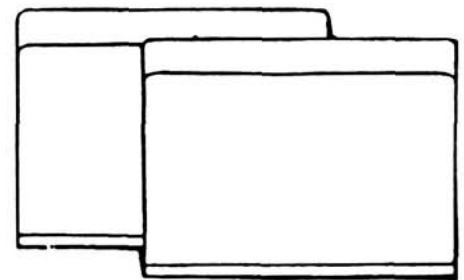
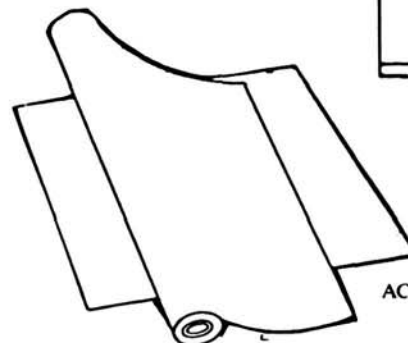
To laminate a print by spraying lacquer on its surface affords a good protection. However, since lacquer usually consists of liquid polymer dissolved in an organic solvent, care should be taken to avoid such harmful solvents as butylalcohol, ethylacetate and methylisobutyl ketone.

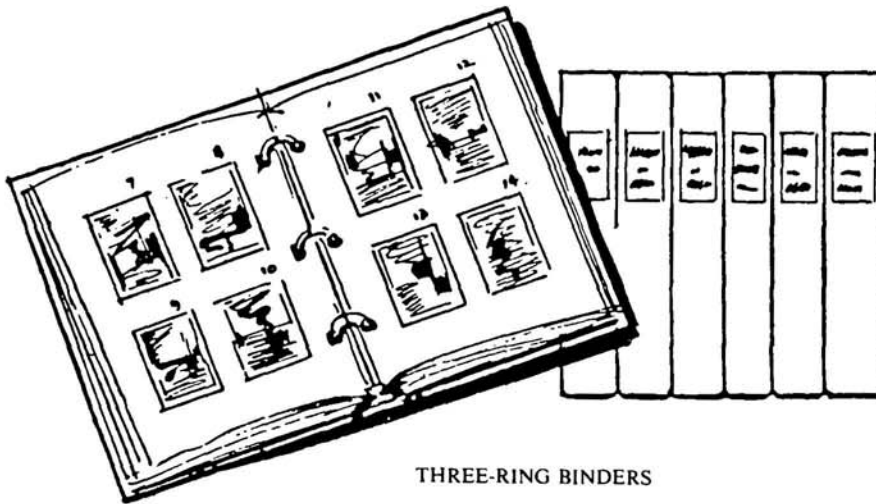


DOCUMENT STORAGE CASES



ACID-FREE ENVELOPES

ACID-FREE REINFORCED
FILE FOLDERSACID-FREE INTERLEAVING
OR PACKING TISSUE



THREE-RING BINDERS

STORAGE HOUSING OR CONTAINERS

Films and prints should be stored in closed cabinets or drawers or on open shelves in vented containers made of anodized aluminium, steel with baked-on nonplasticized synthetic resin lacquer or stainless steel. The use of wood, particleboard or pressboard is *not recommended*, because they can produce detrimental fumes. Interiors of these cabinets should have vents to permit a free circulation of air so that humidity and temperature conditions can be uniformly maintained and the accumulation of undesirable gases can be prevented.

STORAGE ROOMS

The walls of the storage rooms shall be designed to prevent condensation of moisture on interior surfaces and within walls, especially during periods of low exterior temperatures. Provisions shall be made against physical damage of prints by fire, mechanical force, or by water from floods, leaks, sprinklers, and so on. Good housekeeping is essential. Cabinets, drawers, and shelves for storing

prints shall be in air-conditioned rooms, or vaults. It is recommended that storage rooms include an area for the inspection of prints. The inspection area should be maintained at the same temperature and humidity as the storage room, to avoid curl or distortion of the materials.

The value of long-live photographic prints makes it advisable to provide a storage room or vault separate from temporary storage facilities, offices, or work areas.

ENVIRONMENTAL CONDITIONS

Environmental conditions which have effects on photographic materials are numerous. A few will be mentioned here.

Humidity

The optimum limits for the relative humidity of the surrounding air are 30% to 50% but a daily cycling between these extremes should be avoided. Relative humidities above 60% shall be avoided. A high moisture content of the air is conducive to mold growth, which can completely destroy the image in time. Moreover, the higher the moisture level, the

greater is the effect of residual chemicals. Lower than 30% relative humidity will minimize chemical deterioration, but can cause emulsion brittleness and print curl in the material being stored. These latter effects can, however, be partially reversed by reconditioning at the proper humidity level.

Temperature

Probably the most important aspect of temperature is its effect on relative humidity, since a temperature variation may bring it beyond acceptable range. Photographic papers should definitely not be stored at the temperature above 30°C (80°F) for a prolonged period. This high temperature will accelerate the reactions which degrade the image. A temperature at the range between 15°C (59°F) and 25°C (77°F) is acceptable, but daily cycling greater than 4°C (7°F) shall be avoided.

Air-Entrained Impurities

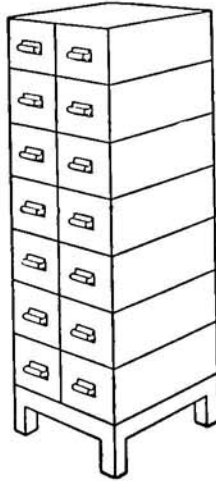
There are two kinds of air entrained impurities: air entrained solids and gaseous impurities.

Air-entrained solids are dust and other airborne solid particles which interfere with legibility when deposited on photographic paper. Also, reactive dusts may cause fading or staining of the emulsion.

Solid particles shall be removed by mechanical filters from air supplied to housings or rooms used for long-term storage. These are preferably of dry media type having an arrestance rating of not less than 85% as determined by the stain test of ASHRAE 52-68. Filters shall be of the non-combustible type, meeting the requirements of Class I construction as defined by American National Safety Standard for Air Filter Units, B124-1971 (UL900-1971).



NEGATIVE FILE FOR 4x5 FILM



NEGA-FILE



Gaseous impurities are the most frequently encountered impurities, especially in industrial and urban atmospheres. These are nitrogen oxides, sulfur dioxide, and hydrogen sulfide. They will react with the silver in the emulsion and thereby fade the image. They may also cause staining and decomposition of the base material. The peroxides released by bleached wood, glues, and varnishes that may be used in the manufacture of storage cabinets can cause substantial fading of the image.

Great care should be taken to eliminate these gaseous impurities from the long-term storage environment because even very small concentrations may cause extreme damage. Suitable means for removal of gaseous impurities are available, such as air washers operating with treated water for elimination of sulfur dioxide, and activated charcoal for the absorption of sulfur dioxide and hydrogen sulfide. These require consistent control and, in the case of activated charcoal, proper recycling.

Light

Exposure to direct sunlight may lead to deterioration, especially in



PORTABLE NEGATIVE FILES

poorly processed prints. Staining and fading may result. Light sources containing high levels of ultraviolet radiation should be avoided. Tungsten lights and ultraviolet-free fluorescent lamps are recommended for viewing or exhibiting.

Air-Conditioning Requirements

Properly controlled air conditioning may be necessary for maintaining humidity and temperature within the limits specified, particularly for long-term storage, where the requirements are more stringent than for short-term storage.

Dehumidification is required in storage areas such as basements and in tropical countries. Because of their location they have inherently low temperatures and frequently exceed the upper humidity limit.

Humidification is necessary if the prevailing relative humidity is less than recommended in 1, or if physical troubles are encountered with active files. If humidification is required, a controlled humidifier should be used. Water trays of saturated chemical solutions should not be used because of the serious danger of over humidification.

PRINT HANDLING AND INSPECTION

Handling

Well-planned filing systems and proper handling of photographic prints are important. Many classes of prints are viewed frequently and, to avoid damage, critical handling and filing requirements must be imposed. After each use, prints should be inspected for damage or other signs of deterioration. Good house-keeping and cleanliness are essential. Prints should be handled by their edges, and the wearing of thin cotton gloves by the handler is good practice. Worn enclosures should be replaced.

Inspection

Monitoring and inspection of stored prints are important. Infrequently used prints and inactive files should be inspected at 2-year intervals. If deviations from recommended temperature and relative humidity ranges have occurred, inspection should be made at more frequent intervals. A random sampling plan established in advance should be used, and a different lot should be inspected each time. If signs of deterioration are noted, corrective action should be taken. Indications that the filing materials are deteriorating should be noted and specific action should be taken. The atmosphere in the area used to inspect prints and to seal the enclosures should be within the limits specified about humidity and temperature.

PROPER MOUNTING AND FRAMING MATERIALS AND EXHIBITION LIGHTING

In order to protect collections from damage during exhibition, mounting and framing materials and proper exhibition lighting are keys for success.

Mounting and Framing Material

In the display of valuable photographs, a key ingredient is the board used for mounting and matting. Acid-free paper board is recommended.

The best method of mounting is dry mounting with thermoplastic sheets such as Kodak dry mounting tissue. Cold mounting with the use of 3M's Positionable Mounting Adhesive works well only with RC paper which is sensitive to high heat. Rubber cement or white glue should not be used for mounting because they are harmful to photographs. Methyl cellulose glue or photo-mount adhesive of Scotch brand is recommended.

To display photographs permanently in frames, aluminium frames meet the high visual and preservation standards of the museum, archives and galleries. UV absorbing plastic should be placed in front of the photograph and humidity non-absorbing plastic should be placed at the back of the photograph.

Exhibition Lighting

Radiant energy from the sun is emitted over a very wide range of wavelengths. However, most wavelengths shorter than about 292 nm. or longer than about 2500 nm are absorbed by the atmosphere before they reach the earth's surface. Currently, concern is expressed that the ozone layer of the atmosphere, which contributes to this shielding effect, may be undergoing destruction by man-made aerosols. If this is true, art works are certainly potential victims of increased radiation. Further protection against high-energy radiation striking in-door display objects is offered by ordinary window glass. This material filters from daylight most UV light that is shorter than about 310 nm. in wavelength.

The light emitted by a 150 Watt tungsten lamp (or by four 40 Watt deluxe cool white fluorescent lamps covered with UV absorbing Mylar sleeve*) and located six feet or more from prints will be the intensity and colour quality for minimizing light fading while providing enough illumination of satisfactory colour distribution for proper appreciation of colour and tone quality.

CONCLUSION

This is the era of information explosion. A principal component of this information explosion is the image. An image is herein defined as a picture record in contrast to textual record, the latter consisting of written or printed records.

New types of images are appearing at a rapidly increasing rate. Today, the most common imaging technologies are (1) photographic (based on silver halide) (2) graphic arts, (3) analog electronic (videotapes) and (4) electrophotographic. Other imaging technologies that are making their appearance include digital electronic (magnetic and optical disk), electro-mechanical (ink-jet) and thermal. In each of these categories there are many variations on the basic technology. For example, within the photographic category there are black and white silver images, dye images, dyed screen, lenticular and pigmented relief images.

This enormous proliferation of imaging technologies has resulted in a formidable challenge to the image conservator and the archivist to preserve those images of historical value that are being produced by these diverse methods. ■

*UV absorbing Mylar sleeve of Fluorescent Bulb Jackets can be obtained from the Solar Screen Co., 53-11 105th. Street, Corona, New York 11368, (212,5928222)