

Basic Instructions for Printmaking with Solarplates

Solarplates™ consist of a thin layer of photo-sensitive polymer applied to a steel backing. The polymer will harden every place that UV light touches the plate, while unexposed areas remain soft and water soluble. After the plate is exposed, it is rinsed with water and re-hardened. Then the plate is ready to be inked and printed.

Safety

Always work in a well-ventilated area and wear protective clothing. An impermeable apron, nitrile gloves and safety goggles are recommended while developing plates. Sensitive individuals may want to add a mask. Complete safety information can be found in *Printmaking in the Sun* by Welden and Muir.

The Exposure Unit

As the name implies, Solarplates can be successfully exposed outdoors with sun light. Even on cloudy days, there is enough UV light present to expose the plate; it just takes longer.

If you have access to one, a vacuum exposure table (the sort used for photo etching) is perfect for exposing plates indoors. If not, McClain's carries a Solarplate Light Box for purchase, or you can make your own exposure unit (or light box). *Printmaking in the Sun* by Dan Welden and Pauline Muir has complete directions for making your own.

To get a good, crisp exposure it is very important that the plate and image be in direct contact with each other. To do this you will need a contact frame which can be purchased from McClain's, or you can construct one yourself.

To make a contact frame, place a 1/2" thick piece of foam rubber on a 3/4" plywood base and top with a plate of clear glass about 1/4" thick. Do not use Plexiglas since it scratches easily and often has a UV protective coating. Use rubber-tipped clamps to compress the frame together at all four corners.

Preparing Your Art

Original art must be made on a transparent material (mylar, transparent acetate or glass) so light can reach the areas to be hardened. Any line or mark made on the transparent material will appear dark with intaglio printing, or white with relief printing. In other words, for intaglio prints the transparency needs to be a positive. For relief prints the transparency needs to be a negative. Remember that relief prints will also print in reverse compared to your original drawing. Use an opaque black medium (Sumi or India ink, Sharpies, litho crayons, etc.) to draw the image onto transparent film.

You can also photocopy photographs, physical objects or existing drawings; or print digital art or scans directly from your computer onto transparent film. Use the photocopier's or printer's highest output setting for the best detail.

It is also possible to paint or draw directly on the Solarplate. Work quickly indoors away from florescent lights to avoid hardening the polymer prematurely.

Most computer printers and photo-copiers do not produce a really dense, high contrast transparency. While this is usually not a problem with intaglio prints, for best results with relief prints have a transparency of your art work made by a typesetting firm.

Exposing the Plate

Exposure times will vary depending on the density of the image and the amount of UV light available. Denser images require a longer exposure time. Images of average density exposed in bright sunlight in the middle of the day need around two minutes of exposure time. Even cloudy days can produce enough UV radiation to expose the plate, but exposure times may take up to 30 minutes. Small test strips can be cut from a plate using a sharp box knife or paper cutter; use these strips to experiment with exposure times until you are satisfied with the results. It is a good idea to keep a record of these experiments for future reference.

Exposing for Relief Prints

Away from the sun, place the Solarplate on the foam of the contact frame with the emulsion side up. Place the transparency with the inked side down against the Solarplate and clamp together. Expose to the sun.

Exposing for Intaglio Prints

Double expose the plate to an Aquatint Screen and to the transparency of the art.

Aquatint Screens are a semi-transparent film covered with minute, randomly sized and placed dots. A plate that is partially hardened from exposure to the screen will hold ink when it is wiped and show a wide range of tonal values.

Some people like to expose several plates at a time with the Aquatint Screen so they are ready to use as needed. Other people feel that exposing the plate to the transparency first and the Aquatint Screen second results in a slightly sharper image. The following directions are written with exposing to the Aquatint Screen first, but feel free to do either way.

Away from the sun, place the Solarplate on the foam of the contact frame with the emulsion side up. Place

the Aquatint Screen matte side down against the Solarplate, and clamp together. Expose to the sun for at least the same length of time you will use to expose the Solarplate to the transparency. If your image has large, dark areas, you may need to expose it longer. Bring the plate out of the sun and replace the Aquatint Screen with the transparency, inked side down. Expose to the sun again.

Developing the Plate

Wash the plate in a running stream of cool tap water (about 68°F). Use a very soft nylon or natural bristle brush (like a mushroom brush) to gently rub the plate. The unexposed polymer will wash away. The longer the plate is in the water, the deeper the bite will be. For intaglio prints, 30 – 45 seconds of washing is recommended. A relief print needs to be washed for around 5 minutes to remove all of the polymer surrounding the image.

If dark areas of the image on an intaglio plate wash away completely, probably the plate has not been exposed to the Aquatint Screen long enough. It is a good idea to experiment with test strips until you are satisfied with the exposure times.

Because the backing on the Solarplate is steel, a steel pan with a vinyl-coated sheet magnet (available at McClain's) can be used to hold the Solarplate flat and in place while it is being washed.

After washing, blot the plate quickly with newsprint, changing paper three times.

Hardening the Image (Post Exposure)

Place the Solarplate in the sun for five to ten minutes to finish the hardening process. If the plate is still sticky after this time, continue exposing it until the stickiness is gone.

Inking

Either water-based inks such as Akua Kolor or Akua Intaglio, or oil-based relief or etching ink, can be used. A piece of vinyl coated sheet magnet larger than the Solarplate and mounted on a board will hold the plate steady for inking. For relief prints, use a brayer to roll the ink over the plate. With an intaglio print, use a piece of matboard or plastic scrapper as an ink knife to spread a thin layer of ink on the plate (a metal knife can scratch the image). Wipe with tarlatan if using oil based ink; inexpensive cheesecloth works just as well with Akua Intaglio ink. Do a final wipe with newsprint.

Printing

Dampen or soak the paper, then blot between towels. Run through a press at high pressure.

Relief images on Solarplates can be printed by hand using a baren or spoon; the resulting print will be softer and the ink coverage may not be as uniform as it would be with a press.

Cleaning and Storing Solarplates

Plates can be cleaned with mineral spirits, vegetable oil or mineral oil. Leaving a thin film of oil on the plate will protect it. Store wrapped in black plastic or a similar light-resistant material, since long-term exposure to light will continue to harden the plate.

Troubleshooting Guide from Dan Welden, the originator of Solarplate printmaking.

What went wrong?	Why?	Solution
When washing out the plate, everything washed away	Insufficient exposure	Increase exposure time
When washing out the plate, not enough washed away	Too much exposure	1) Decrease exposure time 2) Increase washing time 3) Wash in area without daylight
Plate Sticky	Insufficient post-exposure	Post-expose again
Not enough detail in print	Image on transparency not opaque enough; transparency placed upside-down on plate	1) Use more opaque image-making materials 2) Turn transparency emulsion to face emulsion on the Solarplate
"Open-bite" effect	Image too dense	1) Longer exposure 2) Shorter washout & blot with fabric before washing to bottom of polymer layer 3) Use double exposure technique with screen

Scratches in plate	Washout brush may be too rough	Use brush with softer bristles
Water spots on plate	Water residue not dried quickly enough after washout	Blot immediately and dry with hair drier after washout
White spots on plate	Acetate & photocopy characteristic	1) Better contact with vacuum may help; however, there may not be a solution 2) Try heavier weight acetate 3) Dust emulsion side of film with talc 4) Change the brand of acetate
Black spots on plate	Drawing dust or dirt	Brush transparency or clean exposure glass
Drawing material transfers to plate	India ink, certain pencils combined with pressure and heat	Dust drawing with talc or baby powder
Circumference of plate shows irregularity in tone	Exposure unit with vacuum frame	1) Use slightly smaller transparency and trim Solarplate 2) decrease the bleed on the vacuum
Parts of plate are blurred or ill-defined	Contact between plate & transparency too tight or too rigid or shifting may have occurred	1) Use more efficient clamps or vacuum or use different transparency 2) Use backing foam or cloth
Plate curls when stored	Improper storage	Store plate flat with a thin layer of oil or kerosene in plastic weighted with books etc.

Double exposure guidelines and trouble shooting:

Since the double exposure technique is one which requires much more experimentation, it is important to understand the principle of the aquatint screen. When exposing the plate to the screen each exposure unit differs as does the sun. Therefore, TEST FIRST! Expose a small plate to the screen in a step scale with varying times. Wash out the plate and print it. If you find, for example, that it works with 90 seconds, you might try exposing your artwork for the same amount of time. If you have a dense artwork give it longer; a thin artwork would necessitate shorter times.

When washing out, there is no apparent artwork on the plate	Screen is so fine, it may not be visible	Blot dry with newsprint and examine again
When washing out, there was open biting	The screen was not exposed long enough, or was not placed emulsion side down	Expose the screen longer Turn transparency emulsion to face emulsion of Solarplate
The print was too light	The work was over exposed; the screen may have been placed upside down	Do another exposure with shorter timing, place the screen emulsion against the Solarplate emulsion
The print was too dark	The work was under exposed	Do another exposure with longer timing



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