

# Lithography

## Positive Working Litho Plates

---



Test plate exposed with a drawing on matte polyester film.

### Creating Your Image

---

Images created on transparent or semi-transparent materials will work provided that the image is opaque enough to block the ultraviolet light that exposes the image to the plate. The following is a list of materials that can be used:

#### Hand Drawn Images

Substrate: Matt Polyester Film (Frosted Mylar), Textured Polyester Film, or other Transparent or Translucent Film.

Materials: Stabilo Pencils, Micron Pens, Technical Pens, Ebony Graphite Pencils, India Ink, Gouache, Acrylic Paint, Litho Crayons, Photocopier Toner.

#### Digital / Photo Images

Inkjet Transparencies, Laserprints on Frosted Mylar, Photocopies/  
Laserprints oiled for translucency.

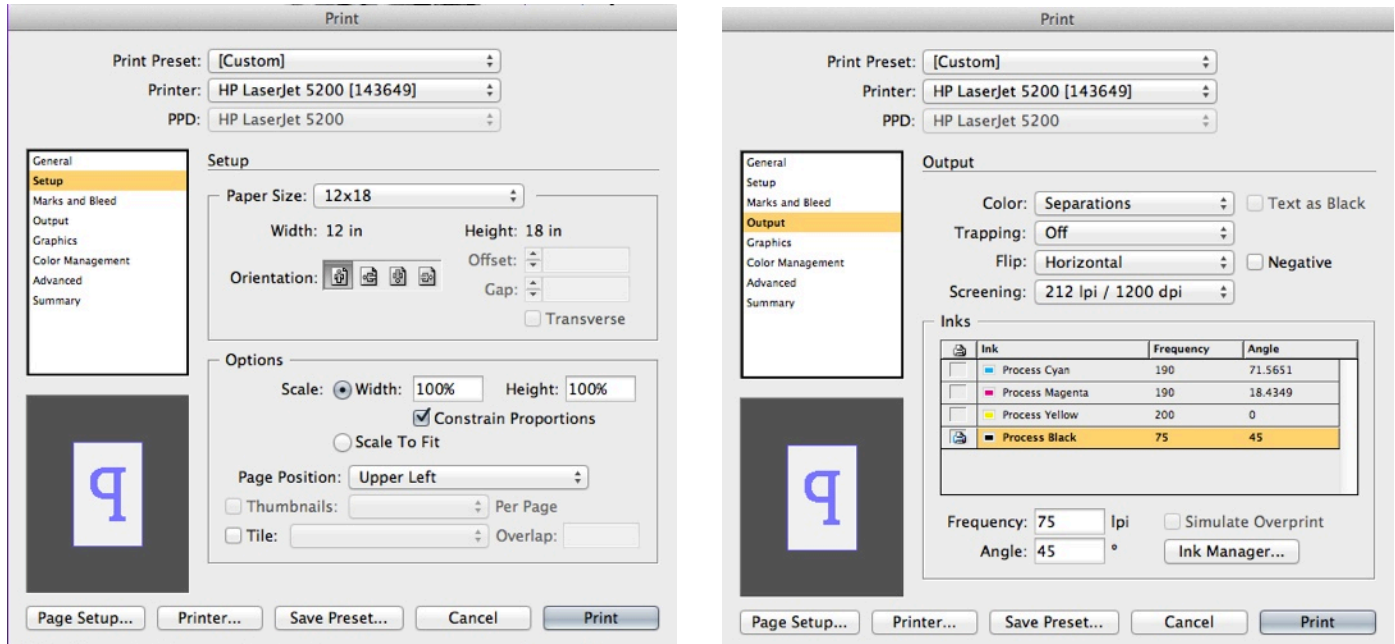
### Working with Laser Printers

---

Although limited in size, laser printers are excellent for creating films and separations to be used with a variety of printmaking processes. Laser printers create the illusion of a continuous tone image with varying sized halftone dots, measured in Lines Per Inch (lpi). By default most black & white laser printers will print images at a much higher lpi than can be used for hand printing. If the lpi is lowered it will be easier to maintain a balance between the amount of ink that is needed to print the photo litho plate, and the space around the dots that is needed to hold water and repel the ink. To adjust the lpi of an image you are printing to a laser printer, you will need to place the Photoshop file in InDesign, which can control the halftone screening features of a laser printer. InDesign will also allow you to print larger images by 'tiling' them to the printer, so they can be pieced back together and exposed to a photo litho plate.

#### Using InDesign

Printing a film on a laser printer requires the use of both Adobe Photoshop CS5 and InDesign. Your Photoshop file must be converted to Greyscale Mode (If you are printing color separations you will need a CMYK file, or a greyscale file with either Duotone settings applied, or one or more spot channels).



Settings adjusted in InDesign for printing halftones on laserprinters.

1. In

InDesign, create a new document that is the same size as the paper you will send through the laser printer.

2. Go to MB > File > Place... to select and place your image file in InDesign.

3. Once your image is positioned go to MB > File > Print.

Under Setup, select the Printer and Paper Size to match your paper and printer.

4. Under 'Output', switch 'Color:' to Separations. 'Flip' your image Horizontally so it will print reversed. Turn off the printer icon next to Cyan, Magenta, and Yellow, so only the Black (Greyscale) plate will print. Set the Frequency for the black plate to 75 lpi and the angle to 45°.

5. Click Print.

If you are printing a Duotone, spot channels or a CMYK color separation, the angles for each film are: Black/Darkest Color: 45°, Cyan/Next Lighter: 15°, Magenta/Next Lighter: 75°, Yellow/Lightest: 90°.

75 lpi works well since it is easy to control when printing by hand, and still holds a great deal of detail and tonal information. Printing higher lpi images usually requires more skill and control. Usually, you wouldn't want to go above 95lpi unless you are working with very smooth and thin papers. 85 lpi works well with care and the texture of most printmaking papers.

It is also important that you keep your image files and InDesign files saved in the same folder, since InDesign only creates a link to the image that it accesses when printing.

## Making Transparencies from Laser Prints & Photocopies on Paper

If you saturate your laser prints or photocopies with baby oil or mineral oil (unscented baby oil) they will be transparent enough to expose your plates. Soak a very small rag with the oil and work it into the back of the paper until it is evenly translucent. Wipe up all of the excess oil from the paper with a clean rag. The excess oil can be blotted up by placing the oiled print between newsprint for a few hours.

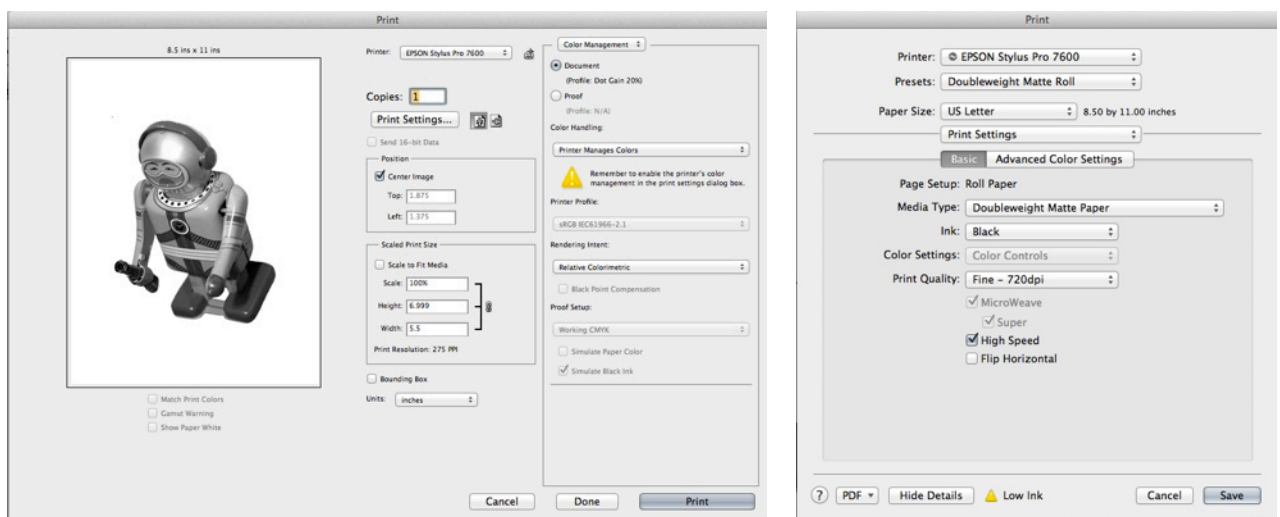
## Enhancing Toner Opacity

The black areas of most laser prints and photocopies will often not be quite dense enough to block out all UV light from the exposure unit and can create mottled areas rather than solids in your final prints. This can be fixed by spraying a coat of Krylon Matte Finish Spray onto your laser print or photocopy. It will cause the toner to swell, making a substantially denser image. *Do this only with adequate ventilation.*

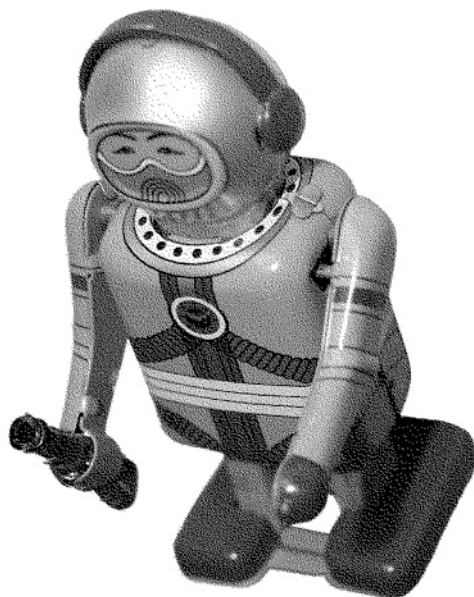
## Working with Inkjet Printers

Inkjet printers create very fine photographic quality images, which can be challenging to print by hand, especially for less experienced printmakers. Inkjet printers do not produce images with halftone dots like laser printers, but instead use a random pattern or 'dither' of ink dots. Tonality is created through the frequency or density of the dots rather than the amplitude or size of the dot as with halftones.

Halftone films can be printed from an inkjet printer if RIP (raster image processor) software is purchased that can control the printer to produce this



Common settings for printing transparency film on an Epson inkjet printer.



### Bitmap Image

When printing on inkjet transparency film such as Pictorico OHP, you can convert your file to a bitmap to create larger and more distinct dots. The larger dot size will make inking, sponging and printing the plate by hand easier. In Photoshop, set the bitmap resolution output to 240ppi and the method to diffusion dither. When you output the film to an Epson printer, set the print quality to 1440dpi and the media as Premium Glossy Photo Paper. The bitmap can create moires on the Epson printer so test first if you are working with a different bitmap output resolution. I selected 240ppi because it divides equally into the printer's resolution:  $1440\text{dpi}/6=240$ .

type of dot pattern and color separations. Two different RIPs currently available are AccuRIP, and ImagePrint by Colorbyte Software.

Inkjet printers will also print grayscale images in color, unless you set them to do otherwise. If you set the printer to use only the black ink, the film will have dots that are more distinct. With Epson Printers and Photoshop, you can turn off color printing by allowing the 'Printer to Manage Color' in the Photoshop print dialogue box under 'Color Management' and then switching to 'Ink: Black' in Print Settings by first switching to 'Epson Color Controls' under 'Color Matching'. Printers that use pigmented inks for glossy photo papers produce the most opaque dots for film. The printer should be set to print at least 720dpi/Fine. Pictorico OHP Film ([www.pictorico.com](http://www.pictorico.com)) is the best to use and a little more expensive than others, but there are many types of film available.

If you convert your image to a 240ppi bitmap (Image Mode > Bitmap > 240ppi Diffusion Dither) you will be able to produce a film with distinct dots that will be much easier to print. Bitmaps with a resolution higher than 240ppi will often produce a moire on Epson printers, so print a test to check your results. A bitmap file should automatically print with just black ink.

## Exposure Times

---

In theory, you want the shortest exposure possible, while still exposing the plate long enough that the non-image areas of the plate develop away cleanly or only leave a very faint haze. When testing translucent materials, it is easy to determine the correct exposure by making several test plates in small increments, and finding when the fog or haze left on the plate by the translucent film fully disappears during developing.

### Approximate Exposure Times for the Amergraph 150

.003 Drafting Film (Single Sided): 16lu

Artex Textured Film: 22lu

Pictorico OHP Inkjet Transparencies: 28 lu

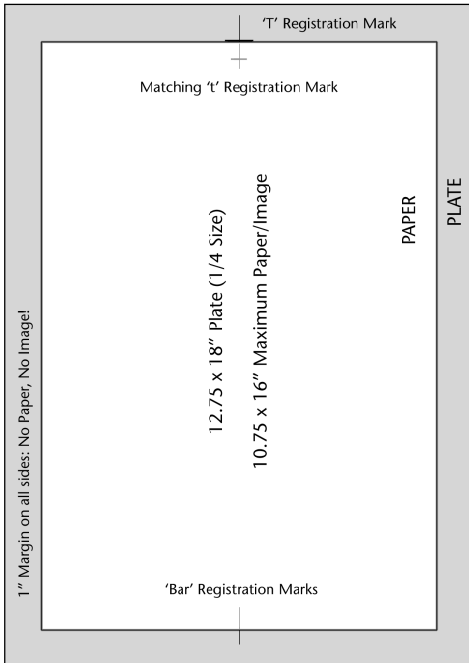
Oiled Laser Prints/Photocopies/Inkjet Prints: 68 light units

*All times are approximate! You may need to test your images individually. Remember to expose 'emulsion to emulsion'.*

## Exposing & Developing Your Plates

---

1. Position your film *face down* in the center of the plate and adhere it with small pieces of Scotch Tape.
2. Turn on the exposure unit and set the desired exposure time.



- Place your plate *face down* on the glass in the center of the exposure unit.
- Close the top and start the exposure.
- When the exposure is complete, take out your plate and put it in a developing tray. Pour a generous amount of developer onto your plate and quickly begin working the developer across the plate. Make sure you develop the edges of the plate completely. Development should take about 1 – 2 minutes.
- Take the plate to the washout booth and rinse both sides of plate well with water. Squeegee off the excess water and allow your plate to dry.
- At the press, with the vent turned on, clean up any spots on the margins of the plate with acetone and a Q-Tip or cotton pad.
- Sponge a thin layer of water on the plate and shake up the Finisher/Cleaner/Preserver. Apply a thin layer of the FCP to the plate with a sponge at the press with the vent turned on. Smooth down with the sponge and allow to dry.

You are now ready to mix your ink, prepare your paper and begin printing!

## Printing

### Prepare Paper and Newsprint

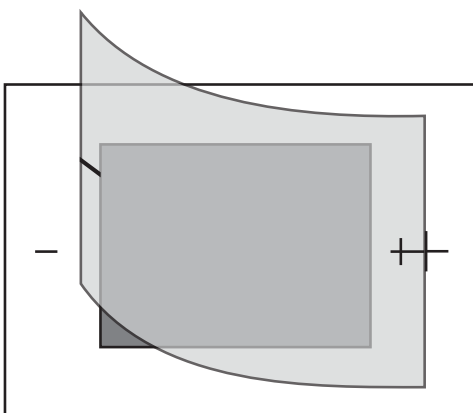
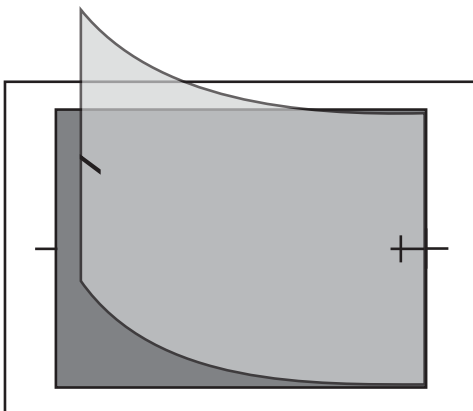
Tear down your paper to fit your image (Note: The paper should *not* be larger than the plate.) Use a 3-H pencil to make 'T & Bar' marks on the back of your paper. Prepare as many sheets of newsprint as sheets of paper you will be printing plus at least 4 extras. The newsprint should be larger than your printing paper.

### Setup the Press for Printing

Center your plate on the press bed with (slide the plate around with a little water underneath to get it to stick) and install a scraper bar that is narrower than your plate but wider or equal to the width of your paper.

Grease your tympan, set pressure and traverse marks. Be certain that the scraper bar will not start before the edge of the plate or run off the end of the plate.

Get two bowls, one with about 1 liter cold water + 1/2oz Glycerin and 1/2oz Gum Arabic. The other bowl should be empty and is used to discard dirty water. Lay your paper and newsprint in two separate piles on the table next to the press.



### Registration

T and Bar registration is a very accurate method for aligning multiple plates. The illustrations show some common measurements for margins and setting up registration for a bleed-format print, and a window-format print.

## **Mixing Ink**

If you are just printing black, a 50/50 mixture of Litho Black 1796 and Crayon Black Litho Ink will work well. If you are mixing a color ink, be sure to modify it with mag and/or body gum as needed so the ink holds its shape rather than relaxing into a puddle. Lay out a small bead of ink and roll-out your ink. Start with very little ink, or what is referred to as a 'lean slab', and add ink as needed while proofing. The surface of the ink on the slab should be satin in appearance and make a soft sizzle noise.

## **Printing**

Rinse the plate well with water. Immediately begin inking your image by alternating inking, charging your roller, and sponging. Pull a proof after 2 or 3 passes. Pull at least two proofs before switching to proofing paper or good printing paper to allow the image to take ink fully.

The two most important things to control are the amount of water on the plate and how much ink you apply. Keep a very thin, streak free film of water on the plate when inking. Carefully count the number of passes of ink you make. Do not over-ink your plate. Water control is critical with photo plates and if not kept even can cause inconsistencies between prints. Photo plates also require quick rolling, and you may only be able to roll back and forth across the plate 2 or 3 times, before it begins to become too dry.

Before printing on good paper for the first time, add ink. You can control print quality through consistent inking and using only as much as needed. Pressure should be fixed, but if you have added ink several times and the image remains 'salty' or light, increase the pressure. You should always have enough ink on your roller and slab to print the image in about 3-4 passes. Add ink as needed according to this rule. If your image is printing very dark, and filling-in in dark tonal areas, or the ink on the paper looks very heavy and glistens, you most likely have too much ink on your slab. You should Scrape 1/2 the ink off the slab, roll out the roller and print one newsprint without inking your image to strip the excess ink from the plate before continuing.

Color inks will need to be modified by adding magnesium carbonate and body gum. Body gum, although similar in appearance to an oil varnish, does not contain any grease, which can cause problems for photo plates. The color inks that we use, manufactured by Hanco, contain little or no grease. Your ink should not instantly relax into a puddle when it is properly modified and it should provide some resistance when mixing and hold its shape longer when resting on the slab. Inks that consist primarily of transparent base can create problems such as roller marks and sponging streaks. Working with a mixture of white and transparent base rather than the transparent base alone, will help alleviate this problem. Fine pore sponges

with rounded corners, and adding glycerin and gum to the sponging water can also help with these types of problems.

If your ink is tinting-out, where the ink bleeds across the plate and contaminates your sponges, or appears to bloom after inking, your ink requires mag and a heavy varnish such as #8 or Body Gum.

## **Clean Up**

---

### **Saving Your Plate**

Once you are finished printing you may save the plate to work with later by cleaning it down with the Finisher/Cleaner/Preserver. If you don't want to save your plate, fold it in half and put it with the other plates to be recycled.

1. Put on gloves and turn on the vent.
2. Apply a small dollop of Finisher/Cleaner and work over the plate with a rag.
3. Rinse the plate off with water and a rag.
4. Apply a thin layer of gum that has been diluted with a little water. Sponge down and dry.

### **Cleaning up the Ink Slab and Roller**

1. Put on your gloves!
2. Scrape up the ink on the slab with a razor scraper and discard it on a phone book page.
3. Roll the excess ink off the roller onto the slab and scrape it up. Repeat.
4. Pour vegetable oil on the roller while it is resting on the slab. Spin it around and work the oil over the slab.
5. Wipe up the excess vegetable oil and ink from the roller and slab. Use the oily rag to clean down ink knives and razor scrapers.
6. Clean the glass slab and ink knives with Simple Green until they sparkle!
7. Turn on the Vent!
8. WIPE THE ROLLER DOWN WITH MINERAL SPIRITS AND A CLEAN RAG! ALL INK MUST BE GONE!  
PUT THE RAGS IN THE RED SAFETY CANS!

### **Cleaning the Press Bed**

Simple green will usually clean most everything off the press bed. If not, use an old sponge, water, and powdered cleanser.

**Thank you for leaving the studio clean and tidy for the next person!**