



# *Introduction*

Printmaking is undergoing significant changes. Printmakers are growing more aware of safety and environmental issues. It is no longer satisfactory to use hazardous materials to make prints, no matter how splendid the results. This has led to a search for safer, better methods and materials. Polyester plate lithography weds old and new technologies, and is one of the safer and more environmentally friendly printmaking techniques.

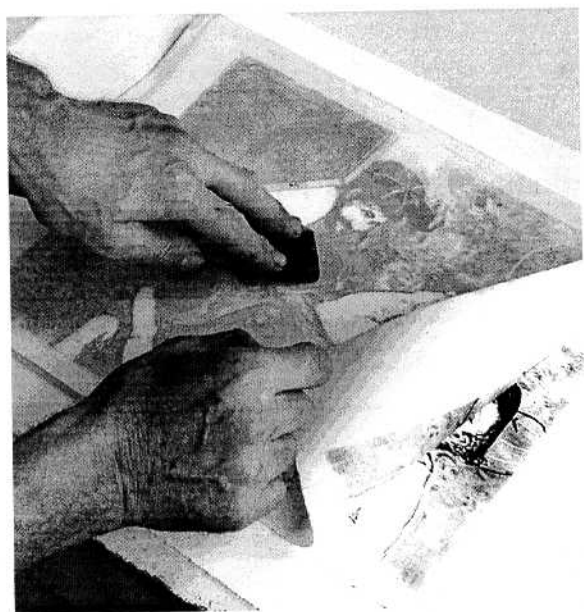
The author discovered polyester plates in 1997 while engaged in an Idaho State Board of Education Grant. He learned from the distributors that polyester plates were developed in India as inexpensive offset lithographs. They were designed for a copier which creates images by depositing and fusing toner to its surface. The plates are nearly paper thin with a textured surface much like a metal lithographic plate. They are nonporous and water-loving, printing any imaging material that is waterproof and will fill the pores of the plate. The plates are composed entirely of polyester with no other coating, making their shelf life almost

infinite. As offset lithographs, they can print from a thousand to two thousand prints. This is more than adequate for fine art runs.



Random Toy Chaos by George Roberts,  
courtesy of the artist.

Polyester lithographic plates are easy to use and yield excellent, sophisticated prints. Making a polyester plate lithograph involves only a few simple steps. The artist first draws on a polyester plate using a black ball point pen or any of the



Hand printing a plate.

many methods outlined in this text. Once the drawing is finished, the plate is ready to print. With a sponge and water, dampen the plate and, using lithographic ink and a brayer, ink the plate. When the plate has been sufficiently inked, place it on top of a piece of paper. Using a wooden spoon, rub the back thoroughly. The pressure of the spoon will cause the ink to be printed on to the paper. A lithographic or intaglio press can also be used to print the plate. That is how simple and direct the process is. No etch, no chemicals, no rub up, no rosin or talc; just straight forward printing directly

from the imaged plate. Modifying the print is also easy. The artist can dry the wet plate and draw additional marks using the ball point pen or erase portions using a pencil eraser. When modifications are finished, wet and ink the plate to start printing again. No counter etch is necessary. The modifications will print as well as the original drawing. The uncomplicated sophistication of polyester plate lithography is one of the reasons the author is so enthusiastic about the process.

The author believes that polyester plate lithography has five characteristics that make it an excellent choice for artists. First, polyester plates are safe to use. They require no elaborate or expensive safety features in the studio or classroom. The only equipment artists need to protect themselves are Nitrile gloves, an apron, and occasionally a dust mask and an exhaust fan when using an air brush. The materials are also not harmful to the environment. No harsh chemicals are necessary for etching or clean up. Vegetable oil, diluted ammonia in water, liquid detergent and rubbing alcohol are all that is necessary.

Second, polyester plates are more convenient to use and require less technical knowledge than the old lithographic methods. A beginner can make and print a polyester plate lithograph in 20 to 30 minutes and have a clear understanding of the process. The new materials free artists from the technical complication of the old methods. This allows them to

concentrate on content, creativity and aesthetics.

Third, most everything used in association with a polyester lithograph are common materials that are readily accessible, yet technically excellent. Most of the materials can be purchased in a grocery, hardware or art supply store. They yield prints of the highest quality with minute detail and great artistic control.

Fourth, polyester plate lithography is more direct. The plate is imaged as simply as one would a drawing and then printed. The old methods required imaging, etching, rubbing up, washing out, rolling up, counter etching, reworking, etching again and so forth. Each step had to be done just right or the print could fail. Polyester plates can be imaged, proofed, reworked and printed with no steps in between.

Fifth, the plates can be printed by hand. This means ownership or accessibility to a press is not necessary. It also means that polyester plates can be printed on surfaces that cannot be run through a press, even three dimensional surfaces.

Equally important to printmaking in general is the fact that the new, safer methods and materials will allow printmaking to be taught in the secondary schools. Children begin to learn music in their earliest years. Many become accomplished musicians by the time they reach college. Most students do not have the opportunity to study printmaking prior to college, because its time-consuming, complicated nature and toxicity make it

difficult to teach at the secondary level. With the advent of the newer, safer methods and materials, it can become a part of the curriculum. All of the new techniques can be taught within the 30 to 40 minute time-frame of a secondary school class period, and the students can achieve excellent results. If printmaking can be taught in junior and senior high schools, our future printmakers will be much more advanced when they reach college and there will be more of them.

We are in the midst of a printmaking renaissance. The research into ImagOn and the safer intaglio materials and techniques, polyester plate lithography, water-based screen printing and water-based inks in general are among the significant and enlightened fine art media developments in the late twentieth century. Within the next few years they will become the norm in printmaking studios and classrooms. We will look back on this time of change in printmaking as an era dedicated to improving the methods and materials while making them safer and more environment friendly.

# Photolithography

Polyester plates have directly linked printmaking to the computer. Now any image generated on a computer, photographic or otherwise, can be printed directly onto polyester plates. The equip-



Last Chance by Sue Wilson, Courtesy of the artist.

ment required to make a photolithograph are a computer, appropriate software, (Adobe Photoshop is recommended), a scanner, a laser jet printer, and an ink jet printer or a copier. Making a photolithograph is quite simple. Scan a photograph, manipulate it in Adobe PhotoShop similar to the way one would in a dark room, and then print it directly to a polyester plate using a laser jet printer. The polyester plate with the photo imaged on it is now ready to print with no further steps required. The following are more detailed instructions for producing a photolithograph.

It should be noted that this text is not meant to be an instructional guide for using a computer. Therefore, there will not be detailed instructions as to how to use computers. There are plenty of classes one can take and texts to read to become computer literate. These instructions are being provided for those who already possess basic computing skills and who want to use the computer to create images for their prints.

## ***Making a Photolithograph***

The following instructions are for an Apple Macintosh computer, Umax scanner and Hewlett Packard 5000 Laser Jet Printer. The steps are listed to make them easy to find. The reference to "click" is an indication to use the mouse button.

### ***Scanning***

1. Start the computer and open the hard drive.
2. Open Adobe Photoshop.
3. Turn on the scanner. Sometimes a scanner needs to be turned on before the computer.
4. Place the photograph in the scanner.
5. Click the mouse button and hold on "file" and scroll down to "import." Highlight "UMAX Majicscan" and release the mouse button to open the scanner software.
6. Using the "scanner controls," follow the steps below.
  - A. Set the scanner to "flatbed (reflective)."
  - B. Set to "gray."
  - C. Set to "300 or 400 dpi or dots per inch."
  - D. Set at "100%."
7. Click the "preview" button on the control panel.
8. When the image appears in the window, move the marquee to fit the edges of the image. Use the mouse to click and hold on a corner and drag the marquee to the edge of the image.
9. Once the marquee is where it belongs, click the "scan" button on the control

panel.

10. The image will open as an Adobe Photoshop file and appear on the screen.

### ***Making Adjustments to the Image Using Photoshop***

1. To change the size of the image, go to "image" and highlight "image size."
2. In the new window under "print size" highlight the width number and change it to the new size. Do the same with the height and then click "OK." Make sure the size chosen is a size compatible with the printer.
3. Most scanned images need to be lightened to print well on the polyester plates. To adjust the value of the image, click and hold on "Image" and highlight "adjust." While still holding the mouse, move the cursor over to "curves" and let go.
4. In the small curves window, move the diagonal line using the mouse and watch the values of the image change. When the image is satisfactory, click "OK."
5. Another method of lightening the image is to make it less opaque. This is accomplished in "layers."
6. To change the texture of the image, highlight and hold on "filter." Scroll down to the option desired, highlight it, and let go of the mouse. For instance, choose "texture" and then highlight "grain" and let go. In the new window move the slider on the "intensity" and "contrast" scale until the

desired effect is achieved. Click on "OK."

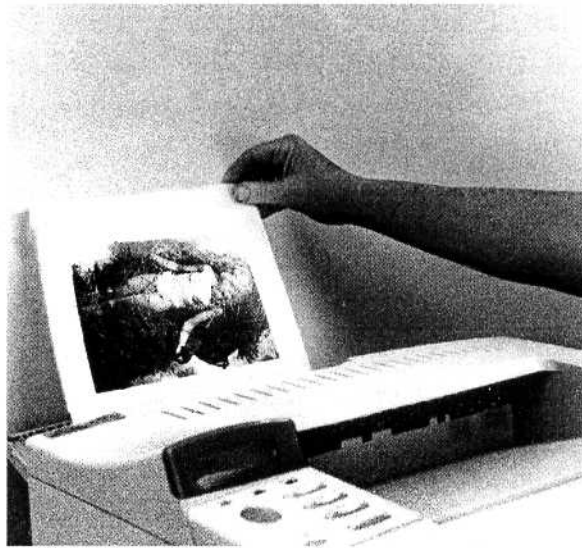
7. When the image is satisfactory, save it.

12. Click "print" and be patient.

13. The plate is imaged and ready to print as a lithograph.

### ***Printing on the Hewlett Parkard 5000 Laser Jet Printer***

1. Most laser jet printers can be used to image a polyester plate. The HP 5000 is superior to the rest because of its ease of use, its high resolution and the size of plate it can print. The HP 5000 will print a plate 11" x 17". Smaller HP printers also work well but do not print plates larger than 8 1/2" x 11."
2. Click and hold on "file" and highlight "Page Setup."
3. Choose the options wanted and click "OK."
4. Click and hold on "file" and highlight "print."
5. The printer screen will appear. Click and hold on "general" and highlight "image options."
6. In "image options," check "highest quality" and "enhanced."
7. Click and hold on "Image options" and highlight "resolution options."
8. Set the resolution option to 1200.
9. Next click and hold "Resolution Options" and highlight "Printer specification options."
10. Click on "media type" and highlight "transparency" or "rough" to print on the polyester plates.
11. Cut the polyester plate to a size that will fit in the printer and put it in place.



A polyester plate imaged using a laser jet printer.

### ***Laser Jet Printer***

The HP 5000 laser jet printer prints at twelve hundred dots per inch and the toner density is adjustable so there is more control over the final image. The heat for fusing the toner is also adjustable. At this time 11" x 17" is the largest size that can be printed on a laser jet printer. No additional heating is necessary to fuse the toner. The printer takes care of that task.

One very interesting possibility the polyester plates present is the use of images created on the laser jet printer combined with drawn images. One can start with the drawing or the laser jet printed image and layer any number of combinations. Use any or all of the tech-

niques described in this text in combination with one another.

## ***Ink Jet Printer***

Ink jet printers will image a polyester plate if they use waterproof pigment-based ink. All other inks will not image a polyester plate because they will wash off when the plate is wet during printing. The Epson 1520, 1200 and 3000 are excellent printers to use. They will print a plate as large as 18" x 24." The resolution is 1440 dots per inch and they print a random dot pattern. A plate imaged using an ink jet printer must be allowed to dry for as long as a week before the plate can be printed. The author has tried heating the plate to dry the ink without any satisfactory results. The detail and quality of the prints, however, makes this inconvenience a small one. In addition, a plate imaged with an ink jet printer requires a longer lithographic ink. Add a number three lithographic varnish to the ink to make it longer. When the plate is inking well, go back to a shorter ink to insure that the prints will hold up while editioning. At this time the use of an ink jet printer as an imaging device for polyester plates has not been perfected. But the author has printed from plates imaged with an ink jet printer.

If a computer , scanner, laser jet printer or ink jet printer is not available, use a copier. There are many copiers that can produce good quality prints. Put the photograph or other image in the copier

and load the polyester plate where the print paper usually goes. Make a copy to the plate. Some copiers do not fuse the toner well, so check the toner before printing. The best precaution would be to fuse the plate in an oven in order to make sure the toner will not come off the plate. See "Fusing the Toner" in the chapter on toner. Commercial copy centers, blue print and printing shops all have good quality copiers that can even make 18" x 24" copies.

## ***Making Color Photolithographs***

A color photograph can also be printed using polyester plates. For each color a separate plate must be made. A photo-



A print pulled from a plate imaged on an ink jet printer by Jim Ballantyne, courtesy of the artist.

graph is made up of four colors: cyan, yellow, magenta and black. To break the photograph down into its constituent colors, use the computer. Scan the color photograph and import it into Photoshop. The "channels" window will appear and have the photo broken down into its constituent colors, cymk (c = cyan or blue, k = black, y = yellow and m = magenta). If the photo has been scanned in rgb color (r = red, g = green and b = blue) change it to cymk by highlighting "image" then "mode." Under "mode," highlight "cymk" and let go of the mouse button. Notice that the amount of memory required for cymk color will be greater than rgb. If the channels window does not appear on the screen, highlight "windows," scroll to "show channels" and let go of the mouse button. The channels window will appear on the monitor. Each of the colors in the photograph will be represented on a separate line in the channels window. Highlight one of the colors at a time and it will appear on the monitor. Make adjustments to the individual channels if you like. If you do make changes in any of the individual channels, be sure to view them all together to see the effect of the changes. Do this by highlighting the top channel or the one labeled "cymk." Once you are satisfied with the photograph, highlight each channel individually and print it on a polyester plate. When each of the four colors (cyan, yellow, magenta and black) are printed on four different plates, the task is to choose the color each plate will be printed as a lithograph. One can either use lithographic inks called

process colors, which are designed to match the colors that produce a color photograph, or choose colors more creatively. When the colors are chosen, begin by printing the lightest valued color first and work up towards the darker colors, printing them one on top of the other. Each plate must be printed on top of the next in perfect alignment. Aligning the color from each plate is called registration.

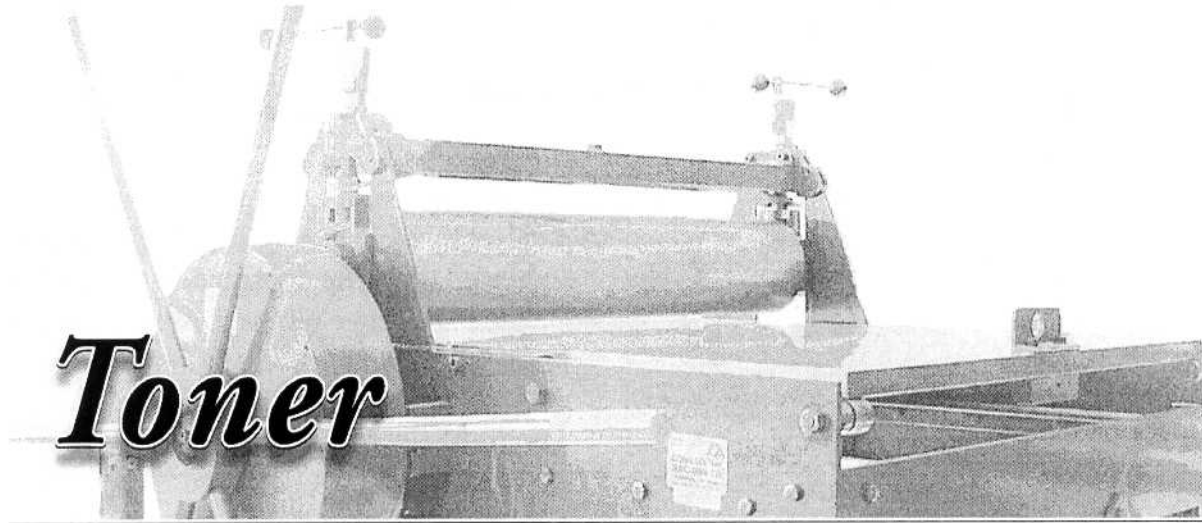


For registration information, see the chapter on color. Once all four plates are printed overlaying each other, the color lithograph is complete.



Color separations from a photograph, black, magenta, yellow and cyan.

# Toner



Toner has been used by lithographers for many years. It is historically applied to the stone or plate as a wash or dry. Once on the stone or aluminum plate it



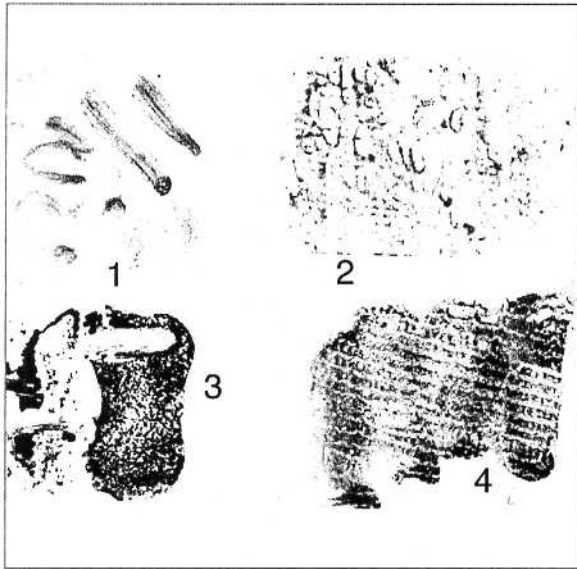
Toner wash.

is historically fused using white gas or acetone. Norm Levy at [Mediastreet.com](http://Mediastreet.com) developed a method of fusing toner using heat which is safer than using chemicals. Once again the offset lithography industry is leading the way to safer, better products.

Toner is the powdered plastic beads used in copiers and laser jet printers. It can be obtained in refill bottles from office supply stores or one can get a couple of tablespoons from a used toner cartridge. Many businesses empty the excess toner from used toner cartridges into a waste container. Ask around to see if you can get a lifetime supply from these waste containers.

## *Toner Wash*

One of the initial problems faced after discovering how polyester plates could be used for fine art printmaking was the problem of finding a way to use toner other than printing it on the plate with a laser jet printer. The author had first used toner mixed with water and alcohol to make a wash, and heard about toner powder being used as a drawing material. After experimenting with some variations, the author recommends the following formula: two parts rubbing alcohol, two parts water, one-half part toner, and one-eighth part Hunt Speedball Drawing Fluid or pancake syrup.



Toner wash texture. 1. Bush strokes. 2. Toner stamped on the plate using a sponge. 3. Toner with alcohol dropped on it. 4. Toner blotted using textured cloth.

Christine Nelson suggested the use of syrup for those that don't have Hunt Speedball Drawing Fluid in their studios. The function of the drawing fluid or syrup is to give the toner wash enough stability to stay where it is brushed on the plate. Other materials can be substituted. Soap and photoflo work, but they bubble leaving a different toner pattern on the plate. The formula can be adjusted to accommodate the artist's goals. Experiment with it. If a less controlled mark is desired, the drawing fluid can be omitted from the mix. If too much drawing fluid is used, it will prevent the toner from fully fusing to the plate. If a blue cast appears on the plate, too much drawing fluid was used. The plate will need to be washed off with water to start over. Toner prints best when it is gray. When the toner looks black on the plate, it is

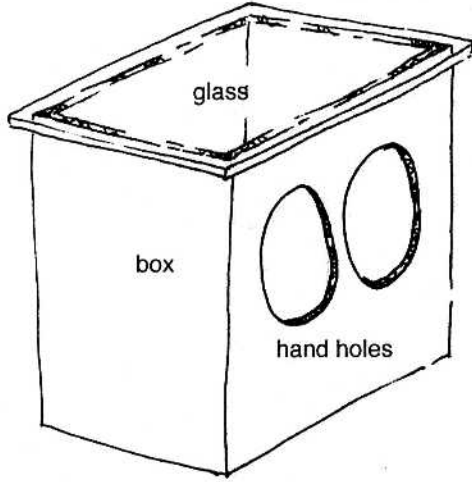
usually too thick. Thick hills of toner tend to chip off during printing or do not fuse well. Toner can be manipulated to gain a huge range of grays. When areas of black are desired, draw them with one of the other wash materials like Future Acrylic Floor Polish. Paint them on after the toner is fused. When mixing the powdered toner, it is wise to take some precautions. Wear gloves and a dust mask. Make a large enough batch so it isn't necessary to mix it often. Don Messec suggested using a cardboard box with hand holes and a glass top when



An example of chipping toner.

mixing the toner. With the toner mixing procedure occurring inside the box the dust will be confined making working with it safer.

Brush the toner wash on the plate in thin layers. While drawing, keep in mind that the toner prints a bit darker than the drawing looks on the plate. When the drawing is finished, let the plate dry. As it



Safe mixing box for toner powder.

dries, the alcohol, water and drawing fluid will evaporate leaving only the toner. When the toner wash is dry, it can be manipulated further. Use a cotton swab or paper towel to push the toner around or pull it off the plate.

A great variety of surface texture is possible using toner wash. The texture can be either negative or positive. Light negative texture is achieved by pressing material into the toner wash. Positive textures are created when toner tusche is applied to a textured material and then pressed to the plate. Many surface variations are attainable using a combination of these two methods. Toner wash can be pushed around with a cotton swab or other material. It is easy to manipulate. If one is not

satisfied with the original image, the toner can be washed off the plate to begin anew.

## *Fusing the Toner*

The old method for fusing toner was to use white gas or acetone, which are toxic chemicals. Norm Levy at [Mediastreet.com](http://Mediastreet.com) told me about the fusing ovens they sell specifically for Pronto Plates. With a little experimentation, other heat sources were also found. In any case, the toner will come off the plate if it is not fused to the surface. Fuse the toner to the plate by heating it in an oven at 250 degrees fahrenheit for about four minutes. Preheat the oven and place a cookie sheet inside. Put the polyester plate on the cookie sheet and watch the time carefully. Too much heat will warp and burn the plate. All ovens do not heat the same. Test the heating temperature and time in the oven you use. The toner is fully fused to the plate when it will not wash off with water. Test it by putting a little water on your finger and running it across a small portion of the plate. If the toner does not wash off, it is fused.

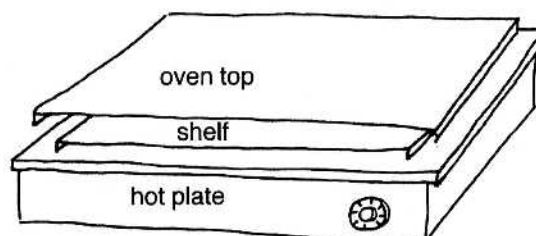
One of the fusing methods the author first used was to heat the plate with a quartz heater. The author passed the plate back and forth in front of the heater until the toner melted and turned shiny. If this method is used, keep the plate moving so the heat does not warp or melt the polyester plate. A melted section

of the plate will cause creases in the plate during printing. Also, avoid putting fingerprints on the plate because they will attract unwanted ink. Toner can be removed from the plate after it has been fused using wintergreen oil and a cloth or cotton swab.

## ***Hot Plate Oven***

Most printmaking studios do not have ovens but do have hot plates. A hot plate can be converted easily to an oven. To make one, have a piece of sheet metal cut an inch wider and longer than the size of the hot plate top. Three of the four edges of the sheet metal should be bent at a ninety degree angle so that the bent edges are one half inch tall. The bent sheet metal will constitute the top of the oven and should be placed on the top of the hot plate. If the hot plate is large, it may be necessary to reinforce the sheet metal top so it does not sag. To make a shelf for the oven, use a piece of sheet metal a little smaller than the top. If one quarter inch of all its edges are bent at a ninety degree angle, it can be slipped under the oven top so it sits a quarter inch off the top of the hot plate and forms a shelf. If the shelf sags, reinforce it on the bottom side. Keith Howard suggests attaching an oven thermometer in a hole in the top of the oven so one can always gauge the temperature inside. Once the hot plate oven is built, it must be tested to see what setting creates the proper temperature. The temperature should be between 200 and 220 degrees fahrenheit. Purchase a small, flat oven thermometer and place it on the

oven shelf or read the thermometer built into the top of the oven. Pick a setting and wait fifteen minutes to see what the temperature is in the oven. Adjust the setting until the proper temperature is achieved. When the hot plate oven is up



Plans for a hot plate oven.

to temperature, test a plate in it to see how long it takes to fuse the toner. In the author's hot plate oven it takes five to six minutes to fuse the toner at 220 degrees fahrenheit. The author has also had some success fusing the toner by placing the plate on a hot plate and watching it carefully. The plate will warp and burn quickly, so keep a wary eye on it.

## ***Multiple Layers of Toner***

Toner washes can be applied to the plate and fused any number of times. After fusing one layer of toner, a new layer can be drawn on top and fused as well. Keep each layer thin. Do not allow the toner to build up in hills on the surface of the plate or it will interfere with the printing and/or chip off the plate. Multiple fusing allows a great deal of freedom and complex detail in the creation of images. In addition, one can use a razor blade or dry point needle to scratch

white lines into the toner before or after it has been fused to the surface.

## ***Transfer Method Using Toner***

Acetone has been used to transfer toner from a photocopy for many years. It is applied to the back of a photo copy and allowed to soak in for a few seconds. It is then placed face down on a plate. Using a wooden spoon, burnish the back of the photo copy to transfer the toner from the copy to the plate. One should be very sure the texture or image is just right before transferring it onto the plate. One may want to distort an image through the transfer method or one may simply like the look of a transferred toner image. The author's students have produced drawings and lithographs using photocopies and acetone. Acetone is not an ideal substance due to its toxicity, and for this reason it is a good solvent to avoid. Since there are a number of reasons why one might want to transfer toner instead of working directly on the plate, the following method is suggested.

First, create the image, texture or whatever you desire on a piece of paper. Create the image using any of the toner drawing methods, a laser jet printer or copy machine. Once the toner image is satisfactory and fused to the paper, the image can be transferred to the plate. Place the plate face up on a table. Place the toner image face down on top of it. If there is a possibility that the paper will

move during the transfer, tape the two together. Use an iron to heat the back of the paper. Once the paper is warm, use the tip of the iron to burnish the back of the paper. The heat and burnishing will cause the toner to transfer to the plate. Inspect the plate from time to time to see that the image is transferring by lifting a corner of the paper. If the whole image is to be transferred, take great care to burnish every square inch of the paper. If one wants only portions or random sections of the toner to transfer, then one would only burnish those areas one wants to transfer. Once transferred, the toner is fused to the plate and ready to print. If one is unsure that the toner is fused, one can test it by washing water across an edge of the image using a finger to see if the toner will come off. If one wants to be absolutely sure the toner is fused, heat it in the oven as described earlier. An image transferred in this way will not have all the detail of the original.

Toner can also be transferred using wintergreen oil. A small amount should be applied to the back of the paper with a cotton swab or cotton ball. Allow the paper to sit for about a minute while the wintergreen oil soaks in and loosens the toner. Place the paper face down on a polyester plate and carefully burnish it using a wooden spoon or dresser drawer nob. The plate can also be run through a press to transfer the toner. Burnishing and the pressure of the press causes the toner to release from the paper and

adhere to the plate. Too much wintergreen oil will melt the toner causing it bleed. Neither transfer methods will transfer as much detail as in the original. The wintergreen oil produces a lot of odor, so use it in a well ventilated area or outside.

### *Toner Crayon*

A toner crayon can easily be made or purchased. Litho Coal is the commercial name of the toner crayon. Both the hand-made and commercial product are an excellent means of imaging a polyester plate. The formula and method for making one by hand is as follows.

Take a two inch by two inch piece of newsprint and roll it into a tube one quarter inch in diameter. Fold over the bottom and tape it. That will function as the mold and container for the toner crayon material. Mix a couple of teaspoons of toner with alcohol until the mixture is the consistency of frosting. Thoroughly mix in three or four drops of gum arabic. The gum arabic acts as a binder. Next, spoon or squeeze the toner mixture into the cylindrical newsprint mold. When the cylinder is full, set it aside to dry. If one is making a fairly large batch, put it in a squeeze bottle so it can be more easily squeezed into the newsprint mold.

When the toner crayon is dry, tear back only an eighth of an inch of the newsprint to expose the crayon. If more is torn off, the toner crayon will break or crumble. Draw with the toner crayon as if

drawing with a piece of charcoal. The results will appear very similar to a vine charcoal drawing. When the drawing is finished, fuse it in the oven and print it.



Toner crayon drawing.

A toner drawing can be further manipulated using a cotton swab. The toner can be pushed around or pulled off the plate. Textures can be pressed into the toner to pull off a negative texture or toner can be applied to a textured material and stamped to the plate for a positive texture.

Wear gloves when handling toner. Any toner that comes into contact with the skin

should be washed off with cold water. Do not use hot water, as it will fuse the toner to the skin. Also it is possible that some toner may get suspended in the air. If the toner is being used vigorously wear a dust mask for protection. Wash off toner dust from any surface using a wet paper towel.



# *Drawing Techniques*

## *Drawing Material*

Any drawing material used to image a polyester plate must fulfill two important requirements of polyester plate lithography. First, the drawing material must be insoluble in water. It must be insoluble in water because water is used in the printing process to resist the ink. If the drawing material is water-soluble, it will be washed off the plate the first time it is wet with the sponge. Second, it must fill the pores of the plate. The drawing material must fill the pores of the plate to displace the water and attract the ink. Any material that fulfills those two requirements will image a polyester plate and print.

Keep in mind while drawing on the polyester plates that oil in the skin will transfer to the plate and print. Do not rest your hands or fingers on the plate while drawing. Use a piece of paper or a drawing bridge between your hands and the plate. Also, be sure to leave at least a one inch margin around the image. It will aid in printing by providing a place to clip the plate to the table. Another rea-

son for the margin is to keep the ink brayer from rolling over the edge of the plate and depositing ink on the edge, which would print as an unwanted black line. Ink would also be deposited on the glass around the print which would need to be cleaned up after each inking. One can avoid these problems by leaving sufficient borders.

One of the convenient characteristics of polyester plates is that they are semi-transparent. An artist can lay a preliminary drawing under the plate and use it as a guide to the marks being made on the plate.

## *China Marker*

Images made with a China Marker are similar to those produced with a lithographic crayon on aluminum plates. The process is direct: draw with the china marker on the plate. While the china marker does not yield a huge range of values, it does provide a good black and several other tones. There is no fusing required for the china marker, nor is it



necessary to etch it. However, for some variation in the technique, the china marker can be melted on the surface of the plate. Stick the plate with the china marker drawing into a heated oven for several minutes or use a hair dryer to melt the china marker. One can also achieve greater variation in value by placing a piece of sand paper under the plate while drawing. The sand paper will break up the marks into a kind of dot pattern.

Press fairly hard when drawing to insure that the China Marker fills the pores of the plate. If it does not fill the pores, it will not print. It is possible to modify the drawing by scratching and scraping into it or by using sand paper. Scrape and scratch only the china marker. Deeper scratches into the surface of the plate will print as dark marks. Also be careful not to build up the china marker on the plate so that it is higher than the surface. If the marks are drawn so they are

### ***Drawing material:***

1. Stones Crayon.
2. Drawing pen and acrylic floor polish.
3. China marker.
4. Permanent marker.
5. Ballpoint pen.

above the surface, the marks will come off during printing. Use a razor blade to scrape off any hills of china marker.

### ***Permanent Marker***

Permanent markers have long been used by offset lithographers to correct small errors on plates. When the author first talked to Norm Levy at Mediastreet.com he told him how permanent markers and ball point pens were used. If they could be used to correct errors then they could also be used to image the plates. It was a good beginning.

Not all permanent markers will image a polyester plate. The author has yet to discover what makes the difference, but Sharpie and Micron pens work well. Draw directly on the plate using the variety of points available, from chisel to fine tip. Modifications to the drawing can be made using a pencil eraser or a razor blade. Scratching away white lines with a razor blade like a scratch board drawing works well. The eraser does lighten the marker, but when printed the variation is only slight. It can, however, erase to a white. Both water soluble markers and soft lithographic pencils can be used as a resist under the permanent marker. Apply either or both to the plate and draw over them with the permanent marker. Wash the surface with water and the water soluble marker and lithographic pencil will wash away, leaving white marks in the areas where they were used.

### ***Ballpoint Pen***

A ballpoint pen produces very successful line drawings on the polyester plates. Draw with the pen the same as on paper. Be sure to make dark marks by pushing fairly hard against the plate. Light marks will deposit ink on only the top of the plate texture and therefore will not print. The ballpoint pen ink must fill the pores of the plate in order for it to print. Modification can be made to the drawing using an eraser or a razor blade. Remember the precautions mentioned earlier about scraping.

### ***Stones Crayons***

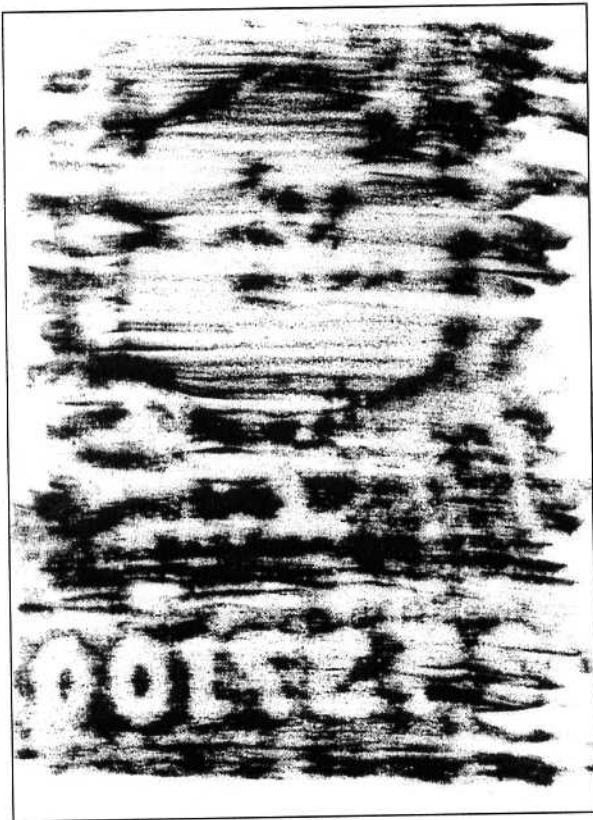
Another drawing material that works well on polyester plates is Stones Crayons. Greg Page first demonstrated the use of Stones Crayons as a polyester plate technique. Since then it has been found that the hardest of the crayons, a number five, is the best to use because it will not wash off the plate. Draw with it as you would on paper. Once again, be sure the crayon is filling the pores of the plate. Drawing too lightly will only apply crayon on the surface and therefore, it will not displace the water in the printing process. If the water is not displaced, the mark will not print. It will take some experimentation to find out which light marks will print. As a general rule, draw black to medium gray marks.

### ***Graphite***

An ordinary graphite pencil can be used to image polyester plates. Use an H or harder pencil and press hard while drawing to insure the graphite gets into the pores of the plate. The graphite marks will print black if black ink is used. A graphite look can be attained by using graphite or gray-colored ink. The graphite can be modified with an eraser. It should be noted that marks made with a graphite pencil print much like a ballpoint pen. Since the pen prints more reliably, the author recommends using it instead of graphite.

## *Rubbing*

Because polyester plates are almost as thin as paper, they can be used to make rubbings from textured surfaces. Use a china marker or a Stones Crayon. Lay the plate face up over a textured surface. Draw across the plate and watch the image or texture appear. Draw fairly hard so the drawing material fills the pores of the plate.

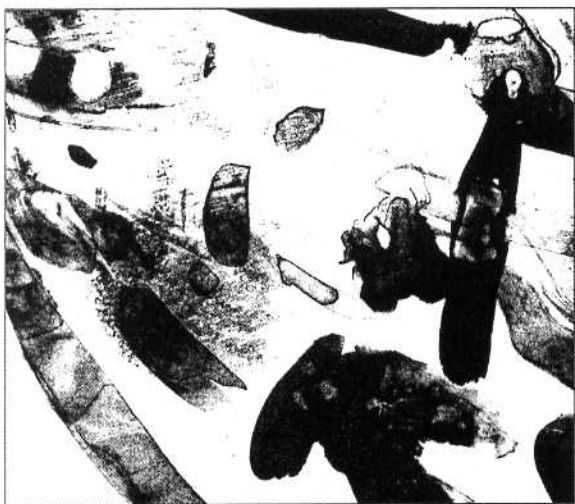


China marker rubbing.

# Wash Drawing Techniques

## *First Principles*

As with the drawing material, there are important guiding principles for



Wash drawing brush strokes.

using any aqueous media on polyester plates. First, any wash material must be insoluble in water when dry. Second, unlike other drawing material, washes will fill all the pores of the plate wherever they are applied. When all the pores of the plate are filled in any given area, it will print black. Even when a wash drawing material is thinly applied and

variation in value is visible on the plate, the whole area will still print black. A gray requires that some plate pores be filled with an imaging material and some in the same vicinity remain empty. The more pores filled in any given area, the darker the area will print. The more pores in an area that are not filled with an imaging material, the lighter the area will print. Any aqueous material will fill all the pores wherever it is applied, even when it is applied very thinly because a liquid will flow into the lowest portions of the plate. Other strategies must be used to get grays using wash drawing material. You will find strategies for varying the value in each media description.

## *Hunt Speedball Screen Filler*

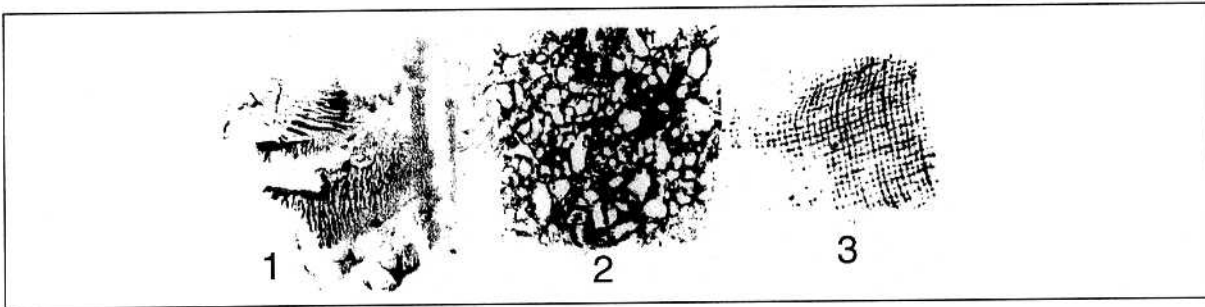
Hunt Speedball Screen Filler functions well as a wash drawing material. Thin it with water as much as three parts water to one part Screen Filler. Brush it on the plate or use a drawing nib to create lines. In either case, the marks will print black. Even if variation in value can be seen in the light areas they will print

just as black as the heaviest application. While the first print pulled from the plate may show the variation in value originally seen on the plate, the light areas will soon fill in with ink as the print stabilizes. Variation in value can be achieved with Screen Filler by using the following method.

changing the method used to apply it. Screen Filler can be applied with an air brush, as a texture transfer or spattered on to the plate. All of these methods of application will create value variation.

### *Texture Transfer*

A sponge or other textured material



Texture transfers: 1. Applied using Mylar. 2. Applied with a sponge. 3. Applied with cheesecloth.

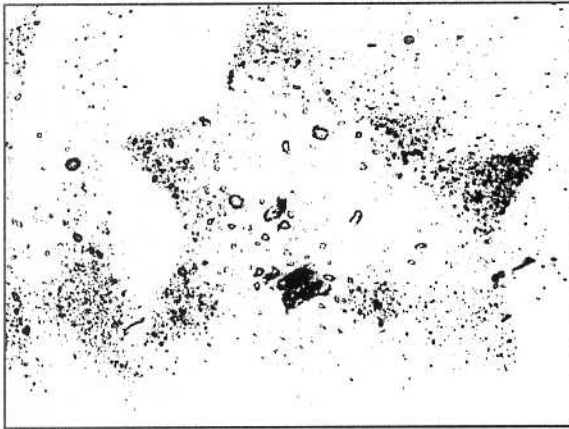
After applying the Screen Filler in varying amounts to achieve visible value variation, ink the plate. Be careful to ink the plate so all the variation remains. Use a stiffer ink and take care not to over ink the plate. When the plate is inked, pour a little fountain solution on the plate and rub it lightly across the wash using a sponge. The fountain solution will remove the Screen Filler where it is not covered with ink. When the thin Screen Filler is gone, water can occupy the areas and resist the ink during printing. This assures that the value variation will persist throughout the entire edition. Do not scrub too hard with the sponge or all of the Screen Filler will come off. If there is any sign the inked Screen Filler is coming off, wash the plate with water. Other means of creating value variation entails

dipped in or painted on with diluted Screen Filler can be dabbed onto the plate. The texture will transfer via the Screen Filler to the plate. To determine how the texture will look, it is helpful to test the texture on a piece of newsprint first. If the sponge is overloaded with Screen Filler, a blob rather than a texture will be stamped on the plate. To avoid blobs, dab the texture several times on the newsprint until the texture is showing clearly, then apply it to the plate. If too little screen filler is on the sponge, little or no texture will show on the plate. Don't over work the texture. That is, don't repeatedly stamp an area or it will fill in and print a solid black. When stamping the texture on the plate, place a section of newspaper over the texture and rub across it to insure even pressure. To

confine the texture to a specific shape, cut a stencil and place it on the plate before applying the texture.

### ***Spatter***

Spattering Screen Filler is simple and effective. Use a tooth brush or other stiff bristled brush. Cut a stencil to confine the spattering and place it on the plate. Dip a tooth brush in Screen Filler and

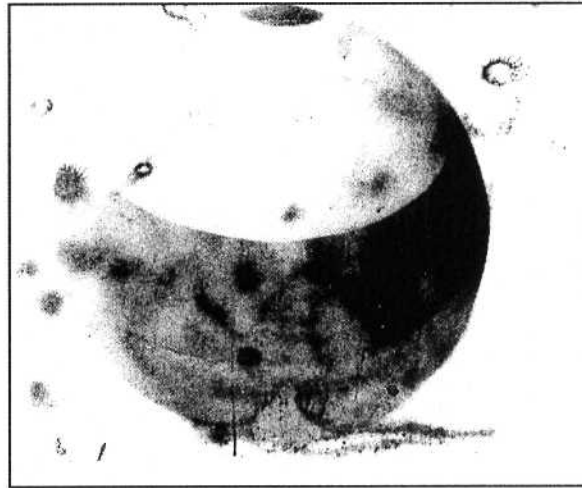


Spattering with a wash.

hold it so the brush is facing the plate. Stroke a palette knife or other similar instrument across the tooth brush bristles. Another method of spattering is to rub the tooth brush across a wire mesh. Either way the results are the same. The Screen Filler will flip off the brush and land on the plate in varying sized dots. The more the surface of the plate is spattered, the greater the density of the dots and the darker the surface will print. If the brush is overloaded with Screen Filler, large blobs will fall to the plate. To avoid this, test the spatter on a piece of newsprint before applying it to the plate.

### ***Air Brush***

To use Hunt Speedball Screen Filler in an air brush it must first be thinned. Thin it by adding two parts water to one part Screen Filler. If the Screen Filler is not diluted, it will clog the air brush. Add India ink to darken the Screen Filler so it can be seen. Test the air brush on a piece of white paper before applying it to the



Air brush drawing.

plate. If the Screen Filler is air brushed on the plate to the point where it is a dark gray, then the screen filler has been applied too thick and will print black. It must look light gray to print gray. Be careful not to over-spray the plate. Start with a very thin spray and build up the values layer by layer. Sophisticated images can be drawn with the air brush. The range of values that can be achieved are infinite. Use a stencil if small areas are to be air brushed or if specific shapes are desired. There are many books published about using an air brush as a fine art tool. Consult them to find out how to use the air brush more effectively.

## Scraping Whites

Screen Filler can also be scratched or scraped with a needle or razor blade to produce white lines much like a scratch board drawing. Use the edge of the razor to produce broader white areas with some textural and tonal variation. As always,



Razor blade scratches.

take care to scratch only the Screen Filler off the plate. If the scratches are deep, they will print rather than be white. When the clear polyester under the textured surface can be seen, the scratches are too deep.

## Shellac

Orange shellac is an inexpensive, readily-available wash material that is easy to use. Bill Hosterman first demonstrated to the author that shellac might be used to image a polyester plate. Bulls Eye orange shellac works well. Orange shellac is preferable to clear shellac because it is easier to see on the plate. To use it as a wash drawing material, first thin it with rubbing alcohol using one part shellac and four or five parts alcohol. The shellac can be applied with a brush or a drawing nib. The shellac creates beautiful surfaces and

can be removed in places to create light values using a cotton swab and alcohol. Be warned that sometimes the alcohol will make an area darker rather than lighter. If the alcohol is left in a puddle on the plate, it will tend to attract the surrounding shellac and make a black patch. To lighten the value, be sure to remove the shellac and the alcohol from the surface. Another method of creating variation is to blot the shellac with a textured material or a paper towel while it is still wet. The textured material will remove the shellac and create light areas of texture. Gum arabic can also be used as a resist under the shellac. Thin the gum arabic with water to create some variation. When the gum is dry, cover it completely or partially with thin shellac. When the shellac is dry, use a sponge and water to remove the gum arabic. The best uses of shellac are for blacks and as texture transfers. To manage a texture transfer, apply shellac to a textured cloth or other material and dab it onto the plate. It is wise to first test the texture on a piece of newsprint to be sure the right amount of shellac is on the cloth. If too much is on the material it will blob up on the plate.

## Future Acrylic Floor Polish

Future is an inexpensive, and easily obtainable wash material. Because Future was designed as a floor polish, it is clear. However, as a printing media it is easier to use if it has some color to it. Toner can be added to the Future so it can be seen when it is brushed on the plate. The best

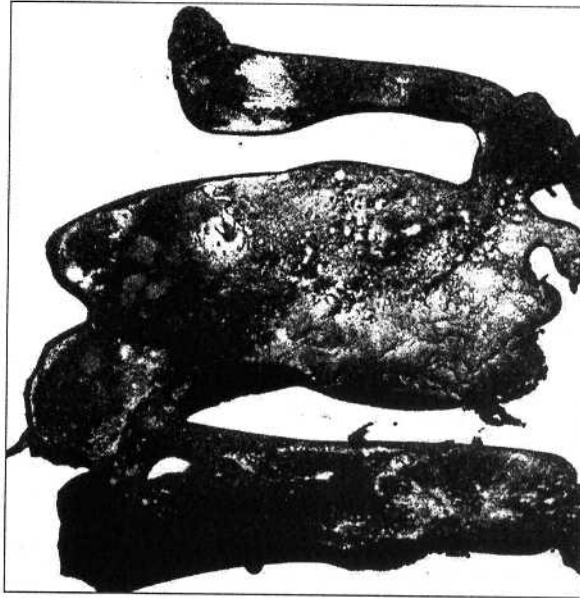
formula for Future is two parts rubbing alcohol, one part water, one part Future and one part toner. The alcohol and water thins the Future so it does not over fill the pores of the plate. When the pores of the plate are over filled, the Future can be lifted off the plate during printing. India ink can also be used to color the Future so it can be seen. Add enough India ink so it is sufficiently darkened.

Future can be brushed on the plate or drawn on using a nib just like Screen Filler. It can also be stamped on the plate using a textured material, spattered on the plate or used over a resist. Any of the methods described for other wash materials can be achieved using Future.

### ***Grays and Some Means to Achieving them With Wash Material***

Some success in creating printable gray values using Future has been achieved by developing the plate in soda ash and water. A quarter teaspoon of soda ash in a liter of water works fairly well. The soda ash seems to dilute the thin areas of Future creating pin holes of empty plate pores. The amount of pin holes will determine how gray the Future prints. Keith Howard suggested this method to the author. To begin, apply the Future to the plate so visible variation can be seen. Allow the Future to dry. Ink the plate as if one intends to print it, paying attention to maintain the variations in value. That is, one should see the value variation on the plate after the ink has been applied.

Immerse the inked plate in the soda ash and water and leave it for about six minutes. Do not agitate or brush the plate while it is in the soda ash solution. If you do, all the Future will be removed. At the end of six minutes, remove the plate and rinse it with cold water. The variation will appear though it will be unpredictable, but variation will exist. Proof the plate to see the results.



Gray wash reinforced using fountain solution.

### ***Some Variations***

A random image can be created by putting alcohol and water on the plate and dripping or dabbing Future into it. The water and alcohol disperses the Future in odd and unpredictable patterns. When the alcohol and water have evaporated, only the Future is left on the plate. The best way to know exactly what images have been created on the plate is to proof it. To confine such an unpredictable pattern, use gum arabic as a stencil. Paint the gum arabic around the area

where the pattern is wanted prior to applying the alcohol, water and Future.

Gum arabic works well under the Future as a resist. Apply the gum arabic to the plate in any fashion. As always, some creativity can be used when applying the gum. Use it to stamp a texture, spatter it or apply it with a brush or drawing nib. Once the gum is dry, use a sponge and water to wash the gum out from under the Future.

### ***Acrylic Paint***

Another good wash drawing material is acrylic paint. Use Bone Black because the pigment particles are larger and will help create value variation. Thin the acrylic to the consistency of a wash and begin painting. The acrylic paint creates mostly a nice black, but some variation can occur when the paint is left wet on the surface so that it gathers in some areas and is thin in others. Some experimenting is required to get the thinness of the paint correct for variations in values, but the results are worth the effort. The acrylic paint can also be blotted with various textures while it is still wet. The areas blotted will be lighter in the configuration of the material used to blot it.

### ***India Ink***

Recently one of the author's students, Jayme McAfee, painted india ink on a plate. He created lots of variation in value and surface texture. The india ink was permanent, waterproof and carbon-

based. When the plate was printed, all of the variation printed beautifully. Several more prints were pulled from the plate and the variation continued to print. It was a wonderful discovery. In subsequent tests, another brand of india ink of the same type produced equally good results. The value variation does, however, have a limitation, it begins to fill in at about the fifteen to twenty print mark. The filling can be delayed by the careful application of diluted fountain solution at the first sign of filling. For short runs, it is a beautiful technique. All of the methods of imaging a plate suggested in the descriptions of other wash materials can be used with india ink. Brush it on. Use a drawing nib. Spatter it. Print textures on the plate and even air brush it. It appears to be a very versatile wash drawing material. It should be noted that when printing India ink with value variations, it is best to use an ink that is fairly stiff. To insure that the grays remain, use the following method. Paint or apply the India ink so that there is value variation. Let the India ink dry and apply printing ink to the plate as one would when printing. Ink the plate once or twice so all the value variation remains visible. Apply some fountain solution to a sponge and lightly rub the solution over the plate. Wash the plate with water immediately after applying the fountain solution. There is a danger of removing all of the India ink if the fountain solution is left on the plate too long. One or two applications with rinsing in between should be sufficient. The fountain solution removes all of the India ink that is not protected by the printing ink



India ink wash: 1. Gray brush strokes. 2. Black brush strokes. 3. Dry brush strokes. 4. Lines made using a drawing nib.

insuring that those areas will remain white. Let the plate dry thoroughly before printing it.

### *Mezzotint Effect*

A mezzotint effect can be achieved with any of the wash materials using a reduction technique. Cover the whole plate with a wash that, if printed, would create a solid black. Paint fountain solution on the wash in the areas one wants light. Allow a couple of seconds to go by before dabbing the area with a paper towel or damp sponge. One can work in both directions, removing ink and adding it until a satisfactory image is achieved.

Proofing the plate is the only way to be certain what has been done. If the plate does not reflect everything expected, print it two more times on newsprint to remove the excess ink and continue working with the fountain solution and cotton swab until the plate prints all the variation intended. Remember, one can add dark areas as well as remove light areas.

Another interesting variation one can achieve using india ink is to apply it to the plate, allow thirty seconds to a minute to elapse, and wash the plate under running water. Not all the ink will be washed. What remains are interesting patterns and textures. To confine the texture, use gum arabic to mask out an area of the plate.

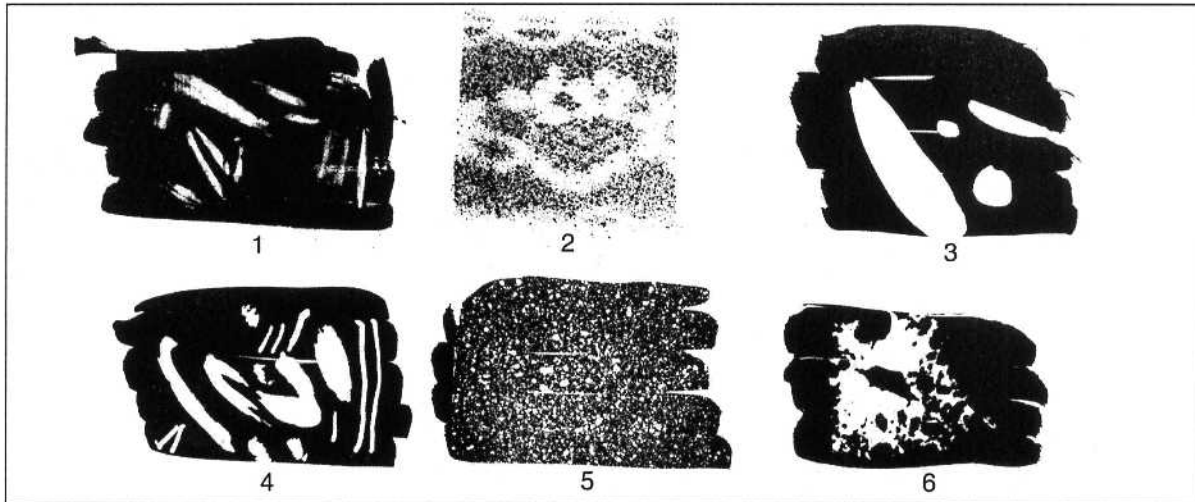


Mezzotint effect.

# Resists

A resist or mask is applied to the plate to hinder imaging materials from adhering to it. By doing so, the resist preserves the clean, white plate wherever it is used. Resists are used when artists know ahead of time where they want active negative white areas. Resists are preapplied to the plate in order to block an imaging material from adhering to the plate when it is applied to it. When the resist is removed, it takes the drawing

material with it. Whatever the configuration, the resist created will translate as a negative or white area in the midst of the drawn image. For example, apply a resist to the plate in the form of a star and draw over and around it with a ball point pen. When the resist is removed, a white or negative star will appear within the pen marks. There are many possibilities for using resists. Experiment and see the tremendous variety that can be achieved.



Resist materials: 1. Water-soluble crayon resist. 2. India ink spatter through a textured cloth.  
3. Rubber cement resist. 4. Gum arabic resist. 5. Spattered gum arabic resist.  
6. Gum arabic applied using textured material.

### ***Gum Arabic Resist***

Gum arabic and china white water color paint are two good resist materials. Paint, draw, spatter or apply either one on the plate as a texture. When it is dry, paint or draw over it with any drawing material that does not require fusing. Allow the drawing to dry and wash the plate gently with a sponge and water. The gum arabic or china white will wash off, taking the drawing material with it and leaving white areas. The rest of the drawing material will remain in place and print black. The gum arabic can also be applied to any surface or texture and be stamped on to the plate.

### ***Water Soluble Crayon Resist***

For a softer-edged resist, water soluble crayons and lithographic pencils function well. The characteristics of the surface will look different, but the results will be the same. Draw with either material wherever white areas are desired and cover the crayon or lithographic pencil with an imaging material such as a permanent marker. When the marker is dry, wash the plate with water and a sponge to remove the resist. When using water-soluble crayons or lithographic crayons, draw them on the plate so they are thick and fill the pores of the plate. They must displace any imaging material drawn on top of them to work. If the resist is drawn too thin, it will not wash off and produce whites. If the resist is not completely washed out, use a slightly wet pencil eraser to remove the rest.

### ***Water Soluble Marker Resist***

Water-based markers can also be used as a resist. They work well resisting permanent markers. Again, draw with the water-soluble marker and let it dry. Cover the marks with a permanent marker. When it dries, wash the plate with water to remove the resist. The white areas will be immediately apparent.

### ***Rubber Cement Resist***

Rubber cement can also be a useful resist. Paint it on thinly. Draw, paint or create textures over it. When it is dry, gently rub off the rubber cement.

### ***Other Resists***

Open-textured material can be used as a resist. A doily, for example, can be placed on a plate prior to spattering a wash drawing material over it. The solid areas of the doily will prevent the spatter from striking the plate. The open areas of the doily pattern will allow the spatters to reach the plate yielding a negative image of the doily pattern. The solid areas of the doily will print white in a gray spattered field.



# Printing

There are many successful ways that polyester plates can be imaged, making them very useful to any artist's vision. They are equally versatile to print. They can be printed by hand or on either an intaglio or lithographic press. Printing a lithograph revolves around the principle that water and oil do not mix. An oil-based ink applied with a roller on a wet plate will not stick. The water resists the ink, preventing it from adhering to the

plate. If any area on the plate is oily or dry it will attract and hold the ink. Polyester plates will print an image when an area of the plate's texture is filled with a water-proof material. This prevents the water from entering that area. The water-proof imaging material, which remains dry, will attract the ink. That area will print black. The wet areas around it resist the ink and will not print. An image can be created by drawing on a polyester plate



The printing table.  
Note the spring  
clamp holding the  
plate in the lower  
right hand corner .

with a water proof material like a ball point pen. The plate is then wet lightly with a damp sponge creating the resist, which prevents the ink from sticking to the plate. An ink-laden brayer rolled across the plate will deposit ink in only the dry areas of the ball point pen drawing. When the plate is printed to paper, the ink comes off the plate and is deposited on the paper. That is the general principle that makes polyester plate lithography work.

Prior to printing, there are a number of items that must be prepared. Each item necessary for printing will be considered one at a time before going on to the actual printing instructions. This constitutes a list and description of all that is needed to print.

### ***Plate Preparation***

It is not necessary to prepare the plate in any particular way. Polyester plates have no chemical coating, nor do they require one. It is, however, necessary to take some precautions. Keep your fingers and anything else off the surface. The oil in your skin will print, as will any scuffing or foreign material that gets on the plate. It is also necessary to handle the plates carefully because the printing surface of the plate can be rubbed off. The one preparation the author recommends is that the borders be painted with gum arabic. Leaving a one inch border will make printing easier since it is necessary to hold the plate at the edge with a spring clip while inking. The border will provide the

space for the spring clip without interfering with the ink roller. However if toner is used, do not paint the border with gum arabic. The gum will cause the edges of the plate to curl horribly when the toner is fused to the plate in the oven. The curled edges will make printing difficult. Instead of using gum to protect the borders when using toner mark the borders lightly with a graphite pencil. The pencil marks should not print. If some of the toner crosses onto the border, simply wipe it off with a paper towel before fusing.

### ***Paper***

Quality printing paper is plentiful and available in great variety. One important characteristic makes a good printing paper: softness. Softer paper is more easily pressed into the plate, picking up the ink more readily. The paper should not be soft like paper towels, but merely paper that feels soft and smooth on its printing surface. Feel printing papers and it will become clear which surfaces are soft and which are hard. A soft paper is one that has less sizing in it, making it absorb water more readily. The greater amount of sizing in the paper, the less water it will absorb. Another factor that makes a paper soft or hard is the length of its fibers. A shorter-fibered paper is harder and a longer-fibered paper is softer. The softer the paper, the more easily the ink is transferred to it, thus picking up every minute detail of the print. It should be noted that the paper can be too soft. When it is too soft, fibers will be pulled

off and left in the ink on the plate. Harder, less smooth paper can be made to print well if it is soaked in water. When the paper is soaked, the fibers of the paper are loosened or spread so it can more easily be pressed into the ink on the plate. As a general rule, it is best to print with dry paper, especially when making a color print. Wet paper will shrink or warp when it dries. Lighter weight papers will also print well dry because they are more malleable and therefore, more easily pressed into the ink. To be safe stick with paper designed for printmaking.

### *Soaking Paper*

The process of soaking the paper in preparation for printing is simple. Gather the paper near a water source like a sink. Wet the paper one by one by either running them under the faucet, by dipping them in a tub of water or by wetting them with a sponge. Lay each piece one on top of the other as they are dampened. When all the pieces are wet and on the stack, put them in a plastic bag and seal the bag with tape. Place a board and a little weight on the bag to press the paper together and not allow any air into the bag. Let the paper ruminate for 6 to 12 hours to soften it sufficiently. To begin printing, remove and blot one piece of paper at a time. To blot the paper, place it on a clean bath towel and fold the top of the towel down over the paper. Rub the towel to press it into the paper or use a rolling pin. The towel will absorb any surface water from the paper, leaving it lightly damp and soft. Hold the paper up to the light

after blotting to see if there is any surface water. If there are shiny slick areas, the paper needs to be blotted again. Use a soft paper brush to remove any lint or foreign particles from the paper.

The best side of the paper on which to print is the felt side. When the paper is made, one side of the paper is against the screen and has the water mark on it. The other side is against the felt. It is fairly easy to tell which side is the screen side by looking closely at it. The faint impression of the screen will be evident. There also may be a watermark on that side. The other, smoother side is the good printing side.

Several papers print well dry. Among them are Rives Heavyweight, Rives BFK, Rives, Lightweight, and Hahnemuhle Biblio. Many other papers can be made to print well by soaking them. Among them are Hahnemuhle Copperplate, Arches Cover Stock, Stonehenge, and German Etching.

### *Dampening Water*

The water that dampens the plate is very important. Without it, polyester plates will print a solid black. Use a quart container to hold the water. Ideally the water should have a pH of 4.5 to 5.5 and be cool. Test the water with a piece of litmus paper. Add fountain solution in small increments until the appropriate pH is achieved. If the tap water is too alkaline or acidic, use distilled water. The water will dampen the plate where no

waterproof image material exists. The imaging material displaces the water and remains dry. When the ink roller is passed over the plate, the water resists the ink, not allowing it to adhere to the damp areas of the plate. Where the imaging material fills the pores of the plate, the ink adheres to it without being impaired. It is essential that a minimal amount of water is used so that no water is present on top of the image areas. On the other hand, if an insufficient amount of water is used to dampen the plate, it will accept ink where there is no image, or the plate will turn black all over. Watch the plate closely while printing. The areas at the edge of the images tend to dry the quickest. It will be apparent when they are drying out because a halo of ink will appear around them. Two rules of thumb are necessary to remember when using fountain solution. First, if the plate will not ink, decrease the amount of fountain solution in the water. It is likely to interfere with the ink adhering to the plate. Second, if the plate scums or ink adheres to the plate where it is not wanted, add fountain solution to the water a little at a time until the scumming stops. The function of fountain solution is to balance the water's pH, and increase the water's resistance to the ink.

### *Sponge*

Both the sponge and water should be kept clean. If the water becomes dirty, change it immediately; the same should be done with the sponge. The sponge

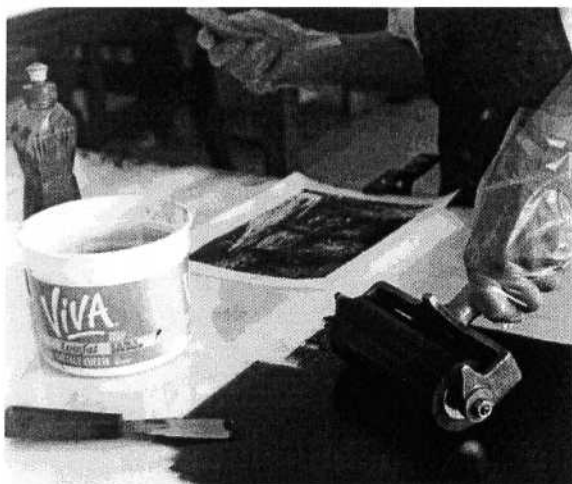


Dampening the plate.

should be a cellulose or natural sponge. An inexpensive cellulose sponge that comes in packages of four or six works fine and can be found in the grocery store. The important characteristics of the sponge are that it must not flake off (or it will cause scumming) and it must not hold too much water (as foam sponges do). Too much water will interfere with printing by getting water where it is not wanted or by putting too much on the plate. Two containers of water and two sponges are recommended. One to dampen the plate and the other to clean up scumming or dirty margins. If one water container and sponge is used they will become dirty quickly and affect the quality of the print.

### *Inking Station*

An inking station has two very important requirements and several lesser ones. First, the inking table should be of a comfortable height. A sore back will result



Inking station.

from a low inking table. The table should be a little higher than waist high. If a table is too high, one will tire from lifting the roller and rolling it across the ink slab at an uncomfortable height. Second, the table should be covered with a one quarter inch glass large enough to accommodate both an area for rolling out the ink and for the plate lying next to the ink. There should be additional room on the table top for the ink roller, water container and sponge. It is also helpful if the glass overlaps the table so the plate can be clipped to it with spring clamps while printing. White paper under the glass helps one to see the color accurately when color printing. Finally, the table should be in close proximity to the press.

## ***Ink***

There are many excellent lithographic inks. Graphic Chemical and Daniel Smith both make good inks. Using a one-inch-wide putty knife,

remove some ink from the can and put it on the glass ink slab. A glob the length of the putty knife and one-half-inch deep will be plenty. Use the putty knife to spread out the ink, and then scrape it up and spread it out again. This should be done for a couple of minutes to warm up the ink. The ink will be stiff before it is warmed up and become longer and less stiff afterwards. Pick up the pile of ink on the slab with the putty knife and push it into the glass and pull up. The ink should stretch out and slowly run back onto the ink pile. The distance it can be pulled determines how "long" the ink is. An ink that is short is less sticky and will not ink the plate sufficiently. The stickiness of the ink is referred to as the "tack." Ink needs to be sticky in order to move off the ink roller and stick to the plate. Ink that is too long is often too tacky and will over ink the plate. Long, tacky ink will turn gray values into blacks and fill small white areas. An ink that is not tacky enough will not ink the plate or ink it poorly. If the ink is too long and tacky, add magnesium carbonate to shorten it. If the ink is not tacky enough, add number three lithographic varnish to it. Generally, ink that is good for large black areas will stretch out between the ink slab and the putty knife about five or six inches and run slowly back to the slab. The ink that runs back will create ribbons of ink on the ink pile. Those ribbons of ink should settle out in about ten seconds, but not sooner than three seconds. At that point the ink is ready to use. Delicate grays and minute detail require a shorter ink. It should be noted that temperature and humidity will

affect the ink. Heat increases an ink's length and tack.

Spread out some of the ink the width of the roller or brayer. Do not spread out all the ink. Too little ink is better than too much. It is easier to start with a little ink and add more if necessary, rather than having to scrape off excess ink. Roll the brayer into the ink. Roll back and forth through the ink to make it even both on the brayer and the ink slab. Roll the ink out fairly thin. The ink should make a low "shhh" sound and have a velvety look. If there is too much ink rolled out, it will make lots of "shhh" noises and look more heavily textured. The ink should be rolled out the width of the roller and as long as its circumference. Do not waste the ink or roll it out too thin by rolling it out over a very large area of the slab. Roll vigorously through the ink while spreading it. Roll in four or five different directions to get an even, thin layer of ink on the brayer and slab. Swap ends of the roller to help roll it out evenly. If too much ink has been rolled out, stop and scrape some off using the putty knife. It may take several scrapings and rollings before the excess ink has been removed. When the ink is rolled out evenly and thinly, it is ready for printing.

### ***The Roller or Brayer***

The roller or brayer should be slightly wider than the image but not wider than the plate. If the roller or brayer is wider than the plate, ink will be deposited on the glass around the plate. A good quality rubber roller of thirty durameters

works well. Even an inexpensive brayer will work if it is round and has no low spots on it. Polyester plates are very forgiving of poor rollers. When a roller or brayer is not in use, put it on its feet or in a cradle. If a roller is left for a period of time sitting on a table, a flat spot will develop and affect how well it inks the plate. The smaller the brayer, the more times the plate will need to be inked between printing. A smaller brayer carries less ink because it has less surface area. While printing, ink will be consumed and additional ink will need to be rolled out. Roll out the ink that was spread using the putty knife. Once the ink is pulled down to the inking surface, roll it out evenly before beginning to use it on the plate. Depending on the size of the print, the ink should be replenished every five or six prints. The larger the area of the image, the more ink used.

### ***Keeping the Print Clean***

Both the plate and the paper must be kept clean to insure an accurate print. To accomplish this, leave borders on the plate and keep them clean of ink while printing. Avoid getting finger prints on the plate or its margins. Keep one's gloved hands clean of ink. It is important to clean one's gloved hands after the ink has been worked up and is ready to roll out. This will help ink from being deposited on the roller handle or on the plate. It is also helpful to make some paper handlers. That is, cut pieces of paper about one and one half

by three inches and fold them in half. Use these to handle the paper during printing. Pick the paper up at the corners



Backing paper on the press bed.

using the paper handlers so there is little chance of getting ink or anything else on the paper.

## ***Backing***

When the inking is complete, the press must be prepared. One task is to place backing paper on the press bed or plate backer. Many different kinds of paper can be used as backing. Three pieces of newsprint, or a smooth velum proof paper are commonly used. In any case, the number of sheets of backing paper either under the plate or on top of the print paper changes the look of the print. The softer the backing or the greater number of pieces of newsprint,

the softer the edges of the image. The harder or less backing, the crisper the image. The backing provides a cushion while printing, making the pressure more even across the plate. Change the backing often. If one piece of the backing paper becomes wrinkled, it will carry over to the print as a dark line. Also be careful to line up the backing so no paper edge is overlapping any part of the image area.

## ***Tympan***

When printing on the lithographic press, a tympan is necessary. When printing on an intaglio press or by hand, it is not. The tympan is a cover sheet that is placed over the print paper with grease smeared on the top side. It functions to help the scraper bar pass easily over the print. It can be made of plastic sheet, Mylar, fiber glass, Red Pressboard or a thin sheet of metal. Do not put too much grease on the tympan or it will get on everything, possibly ruining the print. To avoid spreading the grease, use a piece of folded paper to handle the tympan.

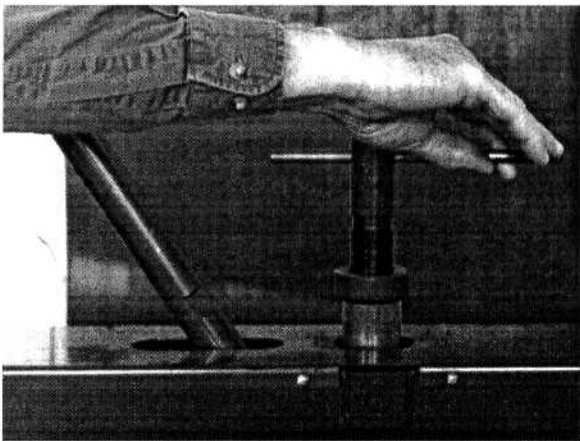
## ***Scraper Bar***

A scraper bar is only found on a lithographic press. It is made from maple wood and is beveled on the side that scrapes across the print. It is covered with a strip of leather with grease added to make it slide easily across the tympan. The bevel on the scraper bar should not be too sharp or it will break easily. The bottom of the scraper bar should have at least a quarter of an inch of flat surface. The beveled edge covered with leather

should not have nicks or dings. Such things will transfer to the print as a light line running the length of the print. The scraper bar should be narrower than the plate backer. The reason for this is that any part of the scraper bar that extends past the plate backer will cause an indentation in the scraper at the point where it overlaps.

### ***Adjusting the Press Lithographic Press***

A polyester plate can be printed on either an intaglio or lithographic press. The lithographic press is easily adjusted for polyester plates. Use a plate backer on the press bed. A plate backer is necessary because polyester plates are so thin. The plate backer can be made of plywood



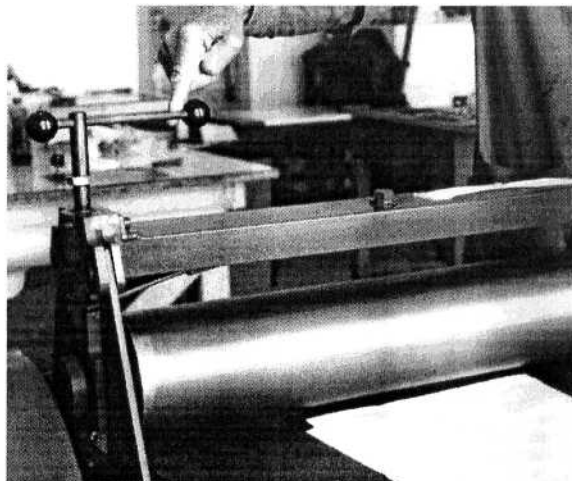
Adjusting the lithographic press.

with a formica top or aluminum. The pressure adjustments are best made while proofing. Place the backing paper, inked plate, newsprint and tympan on the plate backer. Move the press bed so the edge of the print paper is directly under the scraper bar. Pull the pressure handle all

the way down and adjust the pressure screw on top of the press, stopping when the scraper bar comes into contact with the tympan. Turn the screw clockwise to tighten the pressure. Lift the pressure handle, turn the pressure screw about three quarters of a turn tighter, and pull the pressure handle down once again. It should take some effort to pull it down this time since it is exerting pressure. Pull one print to test the pressure. If the print is too light there is too little pressure. Tighten the pressure screw a quarter turn further.

### ***Intaglio Press***

The intaglio press is easy to adjust for polyester plates. Simply remove the felts and turn the two adjustment screws on top of the press until the upper roller is resting on the press bed. Do not over-tighten the roller against the press bed. Adjust it to the point where the upper roller is just touching the bed. Further pressure adjustments can be made by



Adjusting the itaglio press.

adding backing paper under the plate. Too much pressure on either press is not good. It will cause the ink to be pushed into white areas of the plate resulting in loss of detail. If there is too much pressure, turn the pressure screw a quarter turn counter clockwise. Print again and adjust until the press is yielding a good quality print. One can print using an intaglio press with the felts left on it. This may be desirable when the press is being used simultaneously to print ImagOn intaglios. If that is the case, make no adjustment; Just set the polyester plate on a new beveled copper plate during printing.

### ***Proofing or Proving the Plate***

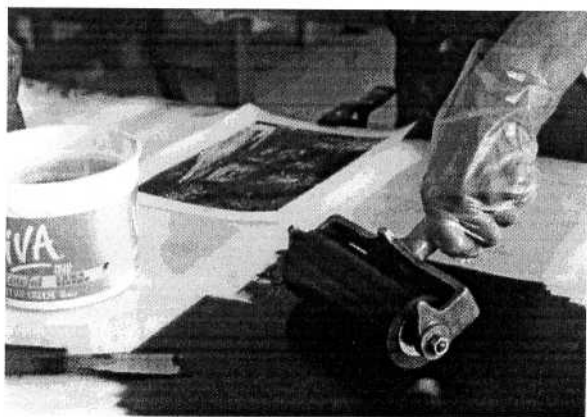
The first prints pulled from a plate are called "proofs." The artist uses them to test the plate or to "prove" the plate will print as it was intended. If it does not print as intended, adjustments can be made so the plate prints satisfactorily. Proofing is also helpful for learning to print the plate better. The first prints can be made on newsprint. Three to five proofs should be pulled to work up the plate. The plate will and should print lightly the first couple of prints. If it prints darkly, too much ink is on the roller. If the plate prints as desired in the first or second print, it has been over inked and will lose detail in later prints. Bring the print up slowly until just the right amount of ink is on the plate to print as it was intended to print. As prints



Pulling a print

are pulled, adjustment can be made to the amount of ink on the roller and the number of times the plate is rolled with ink. Proofing also helps to stabilize the plate. It takes pulling several prints from the plate to stabilize it so it will print consistently for a long run or edition. When the plate begins to print consistently, it has stabilized and is ready to edition on good paper. The proof that satisfies the artist is called the "bon a tierer." All subsequent prints are pulled to match its quality.

To proof, clip the plate to the edge of the glass using a spring clip and wet the glass under the plate. Dampen the plate with a sponge as directed in the section entitled "dampening the plate." When the plate is lightly but evenly wet, roll the plate with ink. Do not use any pressure when rolling ink on the plate. Roll lightly and quickly. Roller pressure can cause the ink to fill small white areas on the plate. Slow rolling can also cause overinking. Roll the brayer back and forth across the plate about five or six times, then wet the plate and roll six more times. At this



Inking station.

point, go back to the ink slab and roll the brayer through the ink vigorously, recharging the roller with ink. By doing so, you will also be keeping the ink warm and long. Notice that it takes several vigorous rolls before the ink starts making the low “shhh” sound and looks velvety once again. Three to five repetitions of the process of recharging the roller and inking of the plate will be a sufficient number before the first proof is pulled.

### ***Making Adjustments to the Plate While Proofing***

A wonderful aspect of polyester lithographic plates is that they require no etch and therefore no counter etch to make changes after proofing. The plate can be redrawn or elements of the image can be deleted with little effort. When proofing, the artist often wants to change something about the print. With a polyester plate, all that is necessary is to rinse any fountain solution off the plate using water and let the plate dry. When the plate is dry, any of the materials used to image the plate can be used to add information. Portions of

the plate can be removed either by scraping or erasing them from the plate. Once the changes have been made, begin proofing again. Changes can be made any number of times until a satisfactory image is achieved. The plate can also be proofed as it is in the process of being imaged. Stop in the middle of working on the image and proof to see what has been accomplished and then go back to imaging the plate. To clean the plate of ink, print it on newsprint several times without inking the plate. That will remove most of the ink.

### ***Editioning the Plate***

When the plate is printing the image as intended, it is time to edition, that is, pull the limited number of prints that will constitute the edition. Organization will make printing go smoothly. Place the pile of printing/paper cut to size in a convenient location where it will be both accessible and safe from anything that might ruin it. Place the newsprint backing and proofing paper cut to size where it is convenient. Make sure to have lots of newsprint handy. The padding will need to be changed often. The ink slab should be next to the plate so no excess movement is necessary when inking. Put the water and sponge near the plate along with a small squeeze bottle filled with fountain solution. Also keep lintfree wipes like Kim Wipes or lintfree paper towels handy. You'll need an extra sponge and water for cleaning up the margins or scumming. The tympan should be clean on the nongreasy side to insure no grease gets on you or the printing paper. It should be placed where it will be out of

the way but easy to reach. If a lithographic press is being used, the scraper bar should be the same size or nearly the same as the plate. Check it for nicks and dings. Change it if it is at all defective. The more one prints, the more organized one becomes.

If finger prints or ink get on the borders of the plate, they can be cleaned off using a lint-free wipe and diluted fountain solution. Since fountain solution can remove drawing materials, it should not be used in its pure state to clean unwanted ink in the drawing areas of the plate. Dilute the fountain solution by adding approximately one table spoon per liter of clean water. Dip a sponge in the diluted solution and wipe off the unwanted ink. Use a cotton swab instead of a sponge if small delicate areas need to be cleaned. Unwanted ink in the image area can be cleaned off using a sponge and fountain solution or by pushing the roller quickly across the surface of the plate. Rolling quickly is called snap rolling. Snap rolling is even recommend for normal inking as it prevents the roller from lingering on the plate and depositing ink where it is not wanted. It also prevents the roller from being pushed hard against the surface of the plate. Pushing hard forces ink into the white areas on the plate.

## ***Printing By Hand***

Polyester plates can be printed without using a press. The equipment necessary to print by hand are a burnishing tool, like a wooden spoon, cupboard nob

or intaglio burnisher, a sponge, water tub and brayer. Ink the plate as described earlier. Place the printing paper on a smooth, flat surface. Any texture on the printing surface will become part of the print. Place the inked plate on top of the paper and hold it firmly in place. Use masking tape to hold the plate and paper together if the plate is too large to hold by hand. Burnish the back of the plate with the burnishing tool. Burnish in several directions to insure that all the ink is pressed into the paper. Use moderately firm burnishing pressure. Periodically pick up a corner of the plate to see how well the plate is printing. It helps burnishing to sponge the back of the plate with a little water. The water will help the wooden spoon slide easily across the back of the plate.



Hand printing the plate.

There are several advantages to printing by hand. The greatest is avoiding the cost of purchasing a press. In addition, plates can be printed on surfaces that could not be run through a press because they are too thick or too large. For example, plates have been printed on metal, vegetables, wood, walls, glass, cardboard, and many other surfaces that require hand printing.



# *Color Printing*

Color lithographic inks are readily available. Both Daniel Smith and Graphic Chemical make a good quality ink in a variety of colors. Color inks are prepared for printing in the same way as black ink. Each color has its own characteristics, however. Some are more opaque or transparent, while others are longer or shorter. Colored lithographic inks can be mixed to make additional colors. Keep in mind that the color on the slab will look different when printed onto the paper. The difference is in the thinness of the ink and the whiteness of the paper. Each affects the way the color looks when printed. The best way to test a color ink before printing is to spread a little onto a scrap of the printing paper using a finger or a putty knife. Scrap it on thin so it will resemble the printed ink as closely as possible.

## *Planning a Three Color Print*

Making a color print is much different than making other kinds of art using color. Each color is printed from a separate plate. Therefore, if three colors are needed, three

plates must be created. Finding a way for each plate to contribute to the finished print such that they create a coherent whole is not easy. One way to address that difficulty is to use the guidelines that follow. It should be noted that these guidelines are not hard and fast rules for making a color print. They are merely one method of helping the artist to understand the relationship of the plates to the final color print. These instructions will address the use of three plates and three colors. But the procedure can be applied to any number of plates and colors.

## *The First Color*

1. The first plate should establish the whites that are the result of the paper showing between the patches of color. If the whites are not established now, they will be lost to the print forever.
2. The first color should be the lightest in value. It is not essential that the first color be light, but the author wants to make the point that the value of the colors is always a factor to be considered. Also a light color will contribute

as a ground or secondary color and tend not to dominate.

3. The first plate should contribute some detail and some texture so the paper will show through and help integrate the color with the paper.
4. The first color should have a variety of compositional elements so that it is not too simple or visually boring.
5. The first color should also be considered for its intensity. Make the first color less intense. Lower the intensity by adding the opposite color or black and white inks. Variety in the intensity of the colors is an important component to consider.
6. The first color should cover more area of the picture plane than any of the other colors. The amount of area each color covers is an important element to consider. An equal amount of area of each color, if not well thought out, is visually uninteresting.

### ***The Second Color***

1. The second color should be a different color and darker in value.
2. It should cover less of the picture plane than the first color.
3. It should establish additional detail and create some texture to help integrate the second color with the first and the paper.
4. It should maintain key whites established by the first color. It should maintain some of the first color; it should not simply cover all of the first color.
5. It should vary in intensity and value compared to the first color and create

variety in the compositional elements that make up its shapes and forms.

### ***The Third Color***

1. The third color should cover the least area of the picture, and establish itself as the dominate color.
2. It should be different in color and be darker in value than the first two colors. It should be different in intensity also.
3. It should establish more of the detail and establish areas of emphasis. The darkest and most intense color will create emphasis whether it is planned or not.
4. It should maintain some whites, and some of the first and second colors.
5. It should have a textural element to help to integrate the previous colors.
6. It should have a variety of compositional elements in its shapes and forms that contribute to those established by the first two colors.
7. It should unify the print and finish the images or concepts.

Each plate should have an independent visual interest but contribute only a part of the whole. Do not do too much on any one plate.

### ***Papers for Color Printing***

Most of the printing papers are excellent for color printing. Some important considerations when selecting a paper are its whiteness, its weight and its suitability to printing dry. The whiter the paper, the

brighter the colors will look. If muted color is desired, choose an off-white paper. Heavier weight papers will be more durable. Printing color after color can be rough on paper. Finally, it is easiest to get the registration right if the paper is printed dry. Dampened paper will expand when wet and shrink when it dries. The change in the size of the paper does make registration difficult. To print well, dry paper should be soft. The softer it feels, the richer the ink and the more detail it will pull from the plate. Rives BFK is an excellent paper to print dry. It is soft, heavy-weight and can take the abuse of multiple printing.

### ***Color Registration***

When producing a color print, one must keep in mind that each color is generally printed from a separate plate. Each plate is printed at a separate time, one on top of the other. If one wants a three color print, three plates must be used one for each color. A problem one encounters when executing a color print is in lining up each color so that it will work with or register exactly with the other colors from the other plates. There are a number of methods of registering the colors. The author will explore a few of those.

### ***Registering Using The Transparency of the Plates***

Polyester plates are semi-transparent. This makes color registration easy. When planning the various colors, the plates can be taped together so one can draw on one

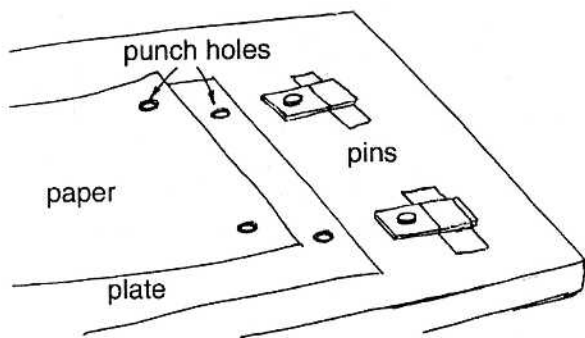
plate while looking at the images on the other plates. This makes exact registration simple. Each plate in turn is brought to the top to be drawn on while the plates underneath serve as a guide. It helps to work on a light table, especially if you have more than a couple of plates. It is also possible to put a drawing underneath the plate as a guide. To work more spontaneously, create the first plate and print it. Create the second plate by laying it over the first plate while making the desired new marks for the next color.

Registering the plates when printing is also simple. Print the first color as one would a black and white print. Allow the print to dry before the next color is added. If the ink is still wet, it will come off the paper and on to the plate. When that happens, the plate must be cleaned before it can be inked again. When the first color is printed and the whole edition is dry, the second color can be printed on top of the first. Ink the second plate with a new color. Place several sheets of newsprint on the press bed for backing. This time put the printing paper with the first color printed on it on the newsprint instead of the plate. Place the plate with the second color face down on the paper. It will be clear where the plate should be placed to align the two colors because both colors will be clearly visible. The third plate is registered the same way. Place the paper with two dry colors onto the press. Place the inked plate for the next color face down over the paper. All colors will be clearly visible so aligning them is just a matter of lining them up

visually. Registering the colors is done by eye. With practice, registration will be quick and effortless.

### ***Pin Registration***

Another method of registering the plates is to use a pin system. Two or three offset lithographic pins can be used. They consist of a small metal plate with a short stud or pin on one end. Holes must be punched in the plates the diameter of the pin. The plates are pushed down onto the pins which hold them together. The pins are used not only to hold the plates together while the artist is working on the drawings, but also during printing. While printing, the pins are taped to one end of the press bed. Each plate, as it is printed,

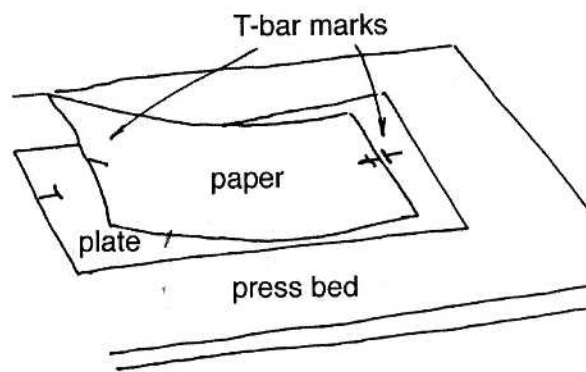


Pin registration.

is held by the pins. The printing paper is also punched with holes so it fits on the pins too. That way the paper and the plate are always in the same relationship no matter which plate is being printed. The pins are not run through the press. The scraper bar or rollers are run up to them and back. For this reason both the paper and the plates must be longer than the image on them.

### ***T-Bar Registration***

Another method of registration is the 'T' mark. Again the plate must be larger than the image to accommodate the 'T' marks. On each end of the plate a 'T' is drawn. On top of the plate the 'T' is drawn upside down. On the bottom, it is drawn right side up. The paper is cut so that it fits on the plate ending at the 'T'-marks. On the back of each piece of paper a corresponding mark is drawn that will be used to match up with the 'T' on the plate. Each piece of paper is marked prior to printing. The top mark should be dif-



T-bar registration.

ferent from the bottom mark, so there is no mistake as to which way the paper is placed on the plate. The marks are used during printing to line up the paper with the plate and thus the images on each plate.

### ***Multiple Colors on One Plate***

It is possible to increase the number of colors used in a print without making additional plates. Several colors can be

inked on a single plate. To accomplish this, it is necessary that several configurations on the plate be separated by empty areas. Each color will have to be rolled onto the plate without being rolled into the areas intended for other colors. The area separating them will assist the artist in rolling ink on one specific configuration. Considering how these separate colors can be integrated in the finished print is important.

### *Chine Collé*

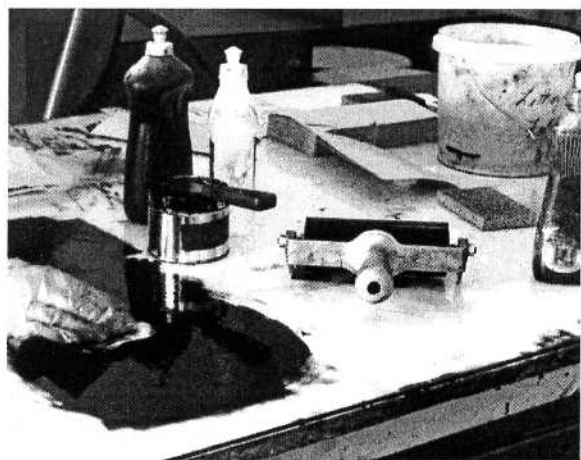
Another successful means of printing color is to use chine collé. Chine collé is the process of coloring pieces of paper, cutting them to the desired shape, and adhering them to the print paper during printing. When the print paper is placed on the plate, it will receive the ink and have the colored paper stuck permanently to it. The process goes like this: Color one side of a piece of rice paper using washes of acrylic paint. Acrylic paint should be used because once dry it is insoluble in water. Cut the dry colored rice paper to whatever shape the print requires. Ink the plate and place it on the press bed. Apply a thin layer of wheat paste to the back side of the colored rice paper and place it in its proper place glue-side-up on the inked plate. Lay the dampened print paper on top of everything and run it through the press. The paste will affix the colored rice paper to the printing paper and the plate will print on top of both.



# *Clean Up*

## *Clean Up*

Most cleaning will be done after proofing or printing. Some cleaning will be needed to erase imaging material from the plate. The materials necessary for cleaning are vegetable oil, rubbing alcohol, wintergreen oil, liquid detergent, fountain solution and diluted ammonia.



Clean up.

## *Cleaning up After Printing*

The ink on the slab and the roller are first removed using vegetable oil. Wear gloves while cleaning. Scrape the excess

ink off the glass using the putty knife. With a paper towel or a rag, wipe the slab with vegetable oil. Scrub the ink until it has been loosened by the vegetable oil. Using a clean paper towel, wipe up the ink. A film of ink and vegetable oil will remain. Pour a little alcohol on the slab and wipe it down with a clean paper towel. The ink slab should now be clean. Use the dirty paper towel to clean the ink off the putty knife. Finish cleaning the knife with a little more alcohol. Clean the roller by pouring a small amount of vegetable oil on it and wiping it down with a paper towel or rag. After wiping it down one time, add more oil and wipe it down a second time. The majority of the ink should now be off the roller. Pour some liquid detergent on the roller and rub it around with a wet, gloved hand. Scrub thoroughly to remove the oil and ink. Rinse the roller with water and repeat the cleaning with liquid detergent until all the ink is off the roller. Now dry the roller and put it away. If the gloves have any ink left on them, use a little vegetable oil to loosen it and wipe it off with a paper towel. It is best to wear the gloves while cleaning

them. Finally, wash the gloves with soap and water and they should come clean.

### ***Cleaning the Plate***

The plate can be cleaned of ink so that it can be stored for use at a future date. First run the plate through the press three times, printing on newsprint. This should eliminate most of the ink. Second, scrub the plate lightly with a diluted fountain solution and a sponge. Remember, pure fountain solution will remove drawing material from the plate. Let the plate dry and put it away for future use. This method allows for lots of proofing and reworking.

### ***Cleaning the Tympan and Press***

Any grease on the plate backer or press can be cleaned off using rubbing alcohol and a paper towel. Clean the non-grease side of the tympan with alcohol as well. It is a good habit to clean the press and tympan before and after printing.

### ***Ammonia and Water***

Use ammonia diluted in water to clean unwanted drawing material off the plate. Mix a solution of ten percent ammonia with ninety percent water in a squeeze bottle. Pour a little ammonia solution on the unwanted area and scrub it lightly. Use a cotton swab or tooth brush to aid in the cleaning. When the unwanted material is off, wash the plate with water to remove all ammonia residue.

### ***Fountain Solution***

Fountain solution can be used to clean ink off anything. However, it is expensive to use as a cleaning agent. To remove small areas of unwanted ink, use a cotton swab soaked in fountain solution. It can also be used to modify a drawing during printing. Apply it carefully to the area one wishes to remove and scrub until the plate is clean and the mark is gone. A stain of the mark may be left on the plate, but it should not print.

### ***Wintergreen Oil***

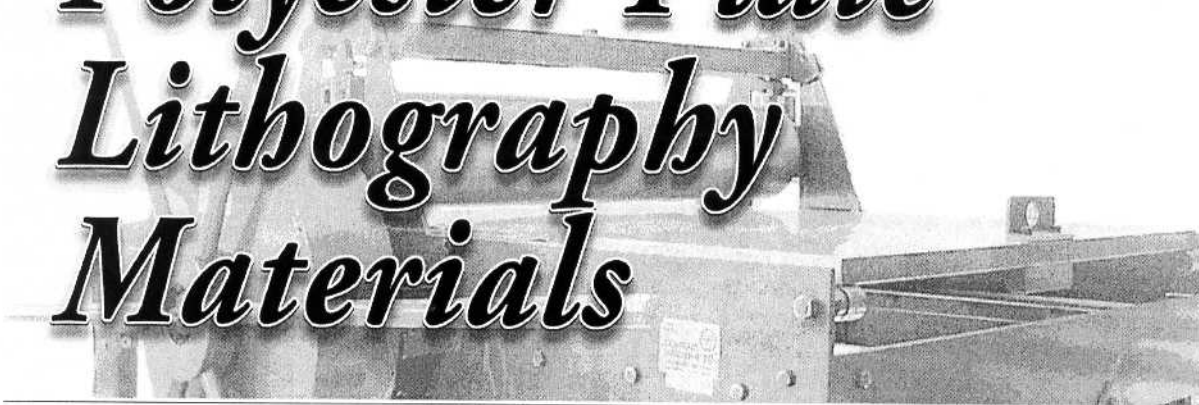
Wintergreen oil can be used to remove fused toner from the plate. Use it in a well ventilated area because it smells strong and breathing it is not safe. Soak a cotton swab with wintergreen oil and use it to scrub off unwanted toner. Use gloves while working with wintergreen oil.

To clean a plate after proofing or editioning, print two or three times on newsprint without inking the plate. That will be all that is necessary for a plate imaged with drawing materials. For plates imaged with toner, use fountain solution and a lint free wipe to further clean the plate.

### *Final Thoughts*

New printmaking media, like polyester plate lithography, clearly offer an excellent alternative with many advantages over the older media. It is easy to learn and use and therefore can be a part of the curriculum at almost any level. It can produce excellent prints with or without using a press. It is versatile, offering a broad array of imaging techniques. It is safer. It can produce as sophisticated an image as the artist is capable. It is much less complicated since no etch is required. It is easily incorporated into other media: painting, drawing, sculpture, ceramics etc. Printing on surfaces other than paper is not difficult, no matter how wild the imagination. These are the attributes of polyester plate lithography. There is no time like the present to make some responsible changes that will safeguard the health of artists, contribute to a clean, healthy environment and produce excellent quality prints.

# ***Polyester Plate Lithography Materials***



## ***Polyester Plates***

Polyester plates can be purchased in a variety of sizes, but the 18 inch by 24 inch size is the most versatile because it can be cut to any smaller size. The plates are designed to have a surface much like a metal plate lithograph. They are water-loving and can be imaged with almost anything that is water proof. They were designed to be imaged using a copy machine or a laser jet printer. The toner from either constitutes the waterproof imaging material. The laser jet printer directly links lithography to the computer and all the images that are possible using a computer. Pronto Plates are excellent polyester plates.

## ***Fountain Solution***

Fountain solution is added to the water that dampens the plate during printing. It has two functions: (1), to balance the pH of the water (it is slightly acidic) and (2), to aid the water in resisting the ink (it contains a wetting agent). It can also be used to clean scum from the plate.

## ***Lint-Free Wipes***

Lint-free wipes are important in cleaning unwanted ink from the plate. Kim Wipes and some paper towels are excellent choices. Lint-free wipes are necessary because lint can cause ink to be deposited in unwanted areas on the plate.

## ***Toner***

Toner can be used to image the plate, even in the absence of a printer or copier. Toner wash and toner crayons can easily be made. All that is required is some toner, alcohol and syrup. Bottles of toner can be purchased from office supply stores or toner can be removed in small amounts from a used toner cartridge. Toner crayons called Litho Coal can be purchased at art supply stores.

## ***Hunt Speedball Screen Filler***

Screen Filler is normally used as a block-out in screen printing. However, it functions well to image a polyester plate because it is water-proof when dry. It can be purchased wherever screen printing

supplies are sold. It must be thinned with water to be used successfully as an imaging material. It works well transferring texture, as a wash, and in an air brush.

### ***China Marker***

A china marker is designed to draw on most any surface. It has the drawing characteristics of a lithographic crayon. Not all china markers are water-proof, so test them before buying one.

### ***Ballpoint Pen***

Not all ball point pens will image a polyester plate. Black, inexpensive pens work best. Bic and Universal pens are two examples of pens that work.

### ***Permanent Marker***

Not all permanent markers will image a polyester plate. Sharpie and Micron pens work well and come in a variety of tip sizes. Black permanent markers are the most reliable.

### ***Water-Soluble Marking Pens***

Water-soluble marking pens are used as a resist under permanent markers. They keep the permanent marker from adhering to the plate, thus preserving a white or markless area.

### ***Laser Jet Printer***

While most laser jet printers will image a polyester plate, Hewlett Packard

printers work very well. The larger models will image a plate as large as 12 inches by 18 inches. They also have the added advantage of being able to adjust the toner density and the heat needed to fuse the toner to the plate. The HP 5000 is highly recommended.

### ***Ink Jet Printer***

With the advent of pigment-based water-proof inks, ink jet printers can image polyester plates. The high resolution of Epson printers makes them an excellent choice. Relatively inexpensive Epson printers will print plates as large as eighteen inches by twenty four inches. Imaging a plate using an ink jet printer is still in the experimental stage.

### ***Hot Plate Oven***

A household oven works well to fuse toner tusche or toner crayon to the plate. However, most studios are not equipped with ovens. A hot plate can be converted easily to an oven. See the directions in the body of the text.

### ***Cellulose Sponge***

The sponge is used to dampen the plate during printing. The common cellulose sponge works well. It will not flake off and cause scumming. It also does not hold too much water, which would interfere with ink transferring from the brayer to the plate. Avoid foam sponges.

## ***Water Container***

The water container does not have to be anything special. Its only requirement is to hold the plate dampening water and not leak.

## ***Lithographic Ink***

All lithographic inks are not the same. Some are more tacky or stickier than others. The ink that works best for polyester plates is one that is a bit tacky. Daniel Smith and Graphic Chemical lithographic inks are good and generally do not need modification for most printing situations.

## ***Linseed Oil Lithographic Varnish***

Lithographic varnishes are used to modify inks. The varnishes come in a variety of viscosities. They are made by boiling linseed oil. The longer it is boiled, the more viscous the varnish. If an ink is too stiff, add some number three varnish in small increments until the plate begins to accept the ink.

## ***Magnesium Carbonate***

Magnesium carbonate is a white powder used to modify the ink. Its function is to stiffen ink that is too sticky and over inking the plate. Add the magnesium carbonate in small increments until the ink is printing well.

## ***Rollers and Brayers***

Rollers are used to ink the plate.

Rollers are large in size. Brayers are small rollers. Rubber rollers are durable and work well. They come in a variety of sizes. Polyurathane is also a good material for rollers and brayers.

## ***Plate Backer***

Since the plates are thin, they must be put on a plate backer when printed on a lithographic press. Metal plate backers are manufactured for this purpose but are very expensive. A good quality sheet of plywood or masonite three quarters of an inch thick with a smooth laminate on the surface works well. An intaglio press does not require a plate backer.

## ***Tympan***

A tympan is used on a lithographic press. It is placed on top of the plate and paper when printing. It is greased on one side to help ease the passage of the print through the press. A tympan can be made of mylar, fiber glass, press board, metal or plastic.

## ***Newsprint***

Newsprint paper is used both as a proofing paper and as padding or backing material. Purchase it in pads or check the local newspaper for end rolls. Normally the end rolls are free for the taking.

## ***Ink Slab***

An ink slab is where the ink is rolled

out in preparation for printing. It can be an old lithographic stone or a heavy piece of glass. Be sure the size will accommodate the largest roller that will be used for printing.

### ***Putty Knife***

A putty knife is used to work the ink prior to rolling it out and to mix an additive in the ink. A one inch or one and one quarter inch blade is good. A couple of palette knives are also handy when mixing colored inks.

### ***N-Dex Nitrel Gloves***

Nitrel gloves are used to protect the hands from the ink and toner. They are also used during clean up. Latex gloves will work as well.

### ***Lithographic Pencil***

The lithographic pencil is used as a resist. It is drawn on the plate then covered with a water-proof drawing material. The plate is washed with water which removes the lithographic pencil and the drawing material on top of it, leaving white marks in a dark field.

### ***Plastic Containers***

Plastic containers like clean used yogurt or butter containers are good for mixing many of the ingredients used in the process. Having plenty of them available would be helpful.

### ***Oven Thermometer***

A flat thermometer will allow the temperature to be taken in the hot plate oven. It needs to be flat to fit into the small space on the oven shelf.

### ***Pinch or Spring Clamps***

Spring clamps are commonly found in hardware stores. They are used to hold the plate while it is being inked.

### ***Stones Crayons #5***

Stones Crayons are a water-proof material used to image polyester plates.

### ***Future Acrylic Floor Polish***

Future is used as a wash drawing material. It is also good for creating rich blacks, mezzotint effects and as a pen line.

### ***Cotton Swabs***

Cotton swabs are used to clean small areas of unwanted ink off the plate. They are dipped in fountain solution to scrub off the ink. Use them also as a drawing tool with toner.

### ***Gum Arabic***

Gum arabic is used as a resist and to preserve a clean border on the plates.

### ***Orange Shellac***

Shellac is used as a wash drawing material. It works well for transferring texture, and as a kind of mezzotint. Mixed

with gum arabic and alcohol it makes odd, unpredictable marks.

### ***Hunt Speedball Drawing Fluid***

Drawing Fluid is used as a resist in screen printing. When mixed with toner, it stabilizes the wash so it stays where it is placed. Ordinary pancake syrup functions in the same way.

### ***Vegetable Oil***

Vegetable oil is used to clean ink off equipment after printing.

### ***Rubbing Alcohol***

Alcohol is used to remove the vegetable oil residue left after cleaning up ink. It is also used as part of the formula for toner wash and toner crayons.

### ***Liquid Detergent***

Liquid detergent is used to clean up any vegetable oil residue.

### ***Litmus Paper***

Litmus paper is used to test the pH of the water. Once the pH is known, fountain solution is used to gain an ideal pH of 4.5 to 5.5.

### ***Measuring Spoons***

Measuring spoons are used to measure the fountain solution accurately in

balancing the pH of the water.

### ***Ammonia***

Diluted ammonia is used to remove drawing material from the plate. It should be diluted with water using one part ammonia to 30 to 50 parts water.



# Trouble Shooting

## ***Photolithography Problems***

**Problem:** White spots appear on the plate.

**Solution:** White spots are normally the result of foreign particles on the plate that will not allow the toner to fuse to it. Clean the plate with fountain solution and water. Remove all dust from the plate prior to running it through the laser jet printer.

**Problem:** White lines appear across the image.

**Solution:** The lines are usually caused by a bead of toner scraping across the plate in the laser jet printer. Clean the printer by dusting it properly and running a cleaning print as the printer manual advises.

**Problem:** An unintended regular pattern appears throughout the entire image.

**Solution:**

1. The source of the problem might be that the toner cartridge is running out of toner. Remove the toner cartridge

and shake it from side to side before putting it back in the printer. If that does not help, replace it with a new cartridge.

2. It might be that the image was scanned at too low a resolution. Scan the image at 300 or 400 dots per inch.
3. The scanned image could be a printed image of poor resolution. There is no solution except to find a new image.

**Problem:** The toner comes off the plate while printing.

**Solution:**

1. The problem could be that the toner was not fused well. Fuse the toner in an oven at the proper temperature and time settings.
2. It might be that the ink is too stiff and is pulling the toner off the plate. Add a little number three varnish to the ink.
3. It could be that the dampening sponge is being rubbed too hard against the plate. Sponge the plate lightly.
4. Possibly the heat setting on the printer is too low. Change the printer media selection to "rough," which will set the

fusing temperature to the highest setting.

5. The problem might be a dirty plate. Clean the plate before printing on it.

### ***Drawing Material Problems***

**Problem:** Ball point pen lines will not print.

**Solution:** This usually results when the pen is drawn too lightly on the plate and the ink is not filling the pores. Redraw the lines pressing harder to force the ink into the pores of the plate, but not so hard that the plate is indented.

**Problem:** The China Marker will not print.

**Solution:** This is the exact same problem as the ball point pen not printing. Press harder when drawing with the china marker to fill the pores of the plate.

**Problem:** The china marker comes off when printing.

**Solution:**

1. The problem could be that the china marker is built up above the surface of the plate. Scrape off the excess marker using a razor blade.
2. Possibly the ink is too stiff and is pulling the china marker off the plate. Add a little number three varnish to the ink.

### ***Resist Problems***

**Problem:** The resist does not produce a white.

**Solution:**

1. It could be that the resist was applied too thinly. Apply the resist in a thicker layer but not so thick that it will chip off.
2. The drawing material applied over the resist might have been reworked so much that it pulled the resist off the plate. Do not overwork the drawing material, especially if it is a wash. The wash can dissolve the resist. Cover the resist with the drawing material with as few strokes as possible and avoid reworking it.

### ***Printing Problems***

**Problem:** The plate will not accept the ink.

**Solution:**

1. It could be that the fountain solution is resisting the ink. Use pure water to dampen the plate.
2. The problem might be that the drawing material does not fill the pores of the plate. Redraw the image.
3. Possibly the ink is too stiff. Add a little number three varnish to it. It is also helpful to print the plate once when it is not inking well. For some reason printing the plate will make inking thereafter easier.
4. The problem could be that there is too much water on the plate. Dampen the plate just enough to resist the ink. Beads of water on the image areas indicate too much water.

**Problem:** The plate scums or accepts ink

where it is not wanted.

**Solutions:**

1. It might be that there is not enough fountain solution in the water. Add fountain solution a table spoon at a time until the scumming stops.
2. It could be that the sponge is dirty. A dirty sponge will deposit ink on the white areas of the plate. Keep the sponge clean. If it gets ink on it, get a new one.
3. It could be that the water is dirty. Dirty water causes tinting or spots of ink to show up in the white areas. Use clean water and keep it clean.
4. The brayer could have foreign material on it. Clean the brayer.
5. It could be that there is too much ink on the brayer. Roll the brayer on the glass until the ink is of the appropriate consistency.
6. It could be that the sponge is being pressed too vigorously against the plate, pushing ink where it is not wanted. Use light pressure when dampening the plate.
7. It could be that the plate may have dried causing ink to be deposited in the dry areas. Keep the plate damp to avoid this problem.
8. It might be that the dampening water is too hot, making the ink long and sticky. Use only cool or cold water while printing.
9. It might be that the ink is too long and sticky. Add magnesium carbonate to the ink.
10. It could be that the inking roller is being passed too slowly across the

plate or it is being pressed too hard against the plate. Pass the roller across the plate swiftly and lightly.

**Problem:** The image is coming off during printing.

**Solutions:**

1. The fountain solution may be removing the drawing material. Use little or no fountain solution in the dampening water. Use diluted fountain solution when cleaning scum from the plate.
2. It might be that the drawing material or toner was applied too thickly. Thick toner will chip and be easily pulled off the plate. The solution is to apply just enough drawing material to fill the pores of the plate and no more.
3. It could be that the sponge is being rubbed too hard across the plate, removing drawing material. Rub lightly while dampening the plate.
4. It might be that the toner was not fused well. The solution is to stop printing and fuse the toner to the plate in an oven.
5. The ink might be too stiff and tacky. Add number three varnish to the ink.

**Problem:** The gray washes are turning black.

**Solution:** Most washes, no matter what their value, will print black because any liquid will fill all the pores of the plate where it is drawn.

1. To achieve a gray, half the pores of the plate must remain empty of drawing material. See the wash chapter for methods of creating gray washes. The

best way to avoid this problem is to create grays using a toner wash.

2. It could be that the gray washes are filling in during printing because the ink used to print is too long. Add magnesium carbonate to the ink to shorten and stiffen it.
3. It might be that the dampening water is hot, making the ink longer and stickier, and causing the grays to fill in. Use cool or cold water to dampen the plate.
4. It could be that the inking roller is being passed too slowly across the plate or is being pressed too hard against the plate. Pass the roller across the plate quickly and lightly.

**Problem:** The print is getting lighter with each print pulled.

**Solution:**

1. Water might be getting in the ink, making it stiff and hard to roll out onto the plate. This usually happens when there is too much water in the sponge. Squeeze out the sponge so that it is wet but not holding excess water. Roll out the ink vigorously on the slab until an appropriate "shhh" sound occurs. If that does not work, scrape up the spoiled ink and mix a new batch.
2. It could be that the ink on the roller is not being replenished. To resolve this problem, add ink to the slab or roll the brayer vigorously in the ink until it makes the proper "shhh" sound.
3. The problem could be that fewer pieces of backing paper are being used during printing. This is simple to

solve, use a consistent number of backing sheets.

4. It could be that different papers are being used to print. When the paper is changed, the print will turn out differently. Do not change paper. If a heavier paper is being used and it prints light, dampen it before printing.

**Problem:** The plate prints inconsistently.

**Solution:**

1. The problem might be that the ink is being rolled out unevenly. Roll out the ink evenly by rolling the brayer through the ink in three or four different directions.
2. It could be that the brayer is too small. Change to an appropriate size brayer.
3. The problem could be the backing. If the number of backing sheets changes from print to print it will affect the amount of ink that comes off the plate and onto the paper. Use a consistent number of backing sheets.
4. It might be that the backing sheets are stacked with some of the edges of the paper inside the edges of the plate producing pressure differences across the plate. Stack the backing paper so no edges are inside the area where the plate lies.

**Problem:** Unwanted light lines are appearing in the print.

**Solution:** These are usually caused by nicks in the scraper bar or scratches in the tympan. Use a good scraper bar and tympan. Check them prior to printing.

**Problem:** Unwanted dark lines appear in

the print.

**Solution:** These are usually caused by wrinkled backing paper. Check the backing paper for wrinkles or creases prior to printing. Replace those that are wrinkled.

**Problem:** The toner comes off during printing.

**Solution:**

1. The problem could be that the plate is dirty. Clean the plate before imaging it with toner.
2. Possibly the fusing temperature is too low. Make sure the oven temperature and fusing time are sufficient by testing both.
3. The problem might be that there is too much drawing fluid or syrup in the toner wash. Put very little Hunt Speedball Drawing Fluid or pancake syrup in the toner wash. Two or three drops is all that is needed.
4. It could be that the toner is being applied too thickly. Apply the toner in thin layers to avoid a build up of toner that will chip off.
5. It could be that stiff, tacky ink is the problem. Add a little number three varnish to the ink.
6. Hard sponging might be the problem. Lighten up.

**Problem:** The prints are getting darker from one to the next.

**Solution:**

1. The problem might be that the inking roller has too much ink on it. Roll out the ink over a wider area to thin it on the roller.

2. It could be that the inking roller is being passed too slowly across the plate. Roll quickly and lightly.
3. It might be that the plate is being inked a different number of times each print. Be consistent with the number of times the plate is rolled with ink.
4. The pressure of the press might be too great. Adjust the press pressure so the blacks are rich and the grays are many and varied.
5. The problem might be that the ink is too long. Add magnesium carbonate to shorten and stiffen it.
6. It might be that there is too much ink on the slab. Scrape some off and begin inking once again.
7. It could be that the inking roller is being pressed too hard against the plate. Always use light inking roller pressure.

**Problem:** Roller marks appear on the print.

**Solution:**

1. The problem might be that the brayer is warped. Use a good, round brayer. If the roller has more ink on one side than the other, it will result in an unevenly inked print.
2. The problem might be that the plate is being inked unevenly. Take care to ink the plate consistently and evenly. Roll out the ink in three or four different directions to evenly distribute the ink.

**Problem:** The detail is not printing.

**Solution:**

1. The detail might be filling in because

the plate is being over inked. Ink the plate fewer times than before. If the plate is inked five times, try inking it only three times.

2. The problem might be that the paper is too hard and thick. Soak heavy, harder papers to soften them.
3. It could be that there is insufficient backing under the plate. Make sure there are at least three sheets of backing paper under the plate.
4. It might be that the ink is too short and stiff. Add some varnish if it is too stiff.

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