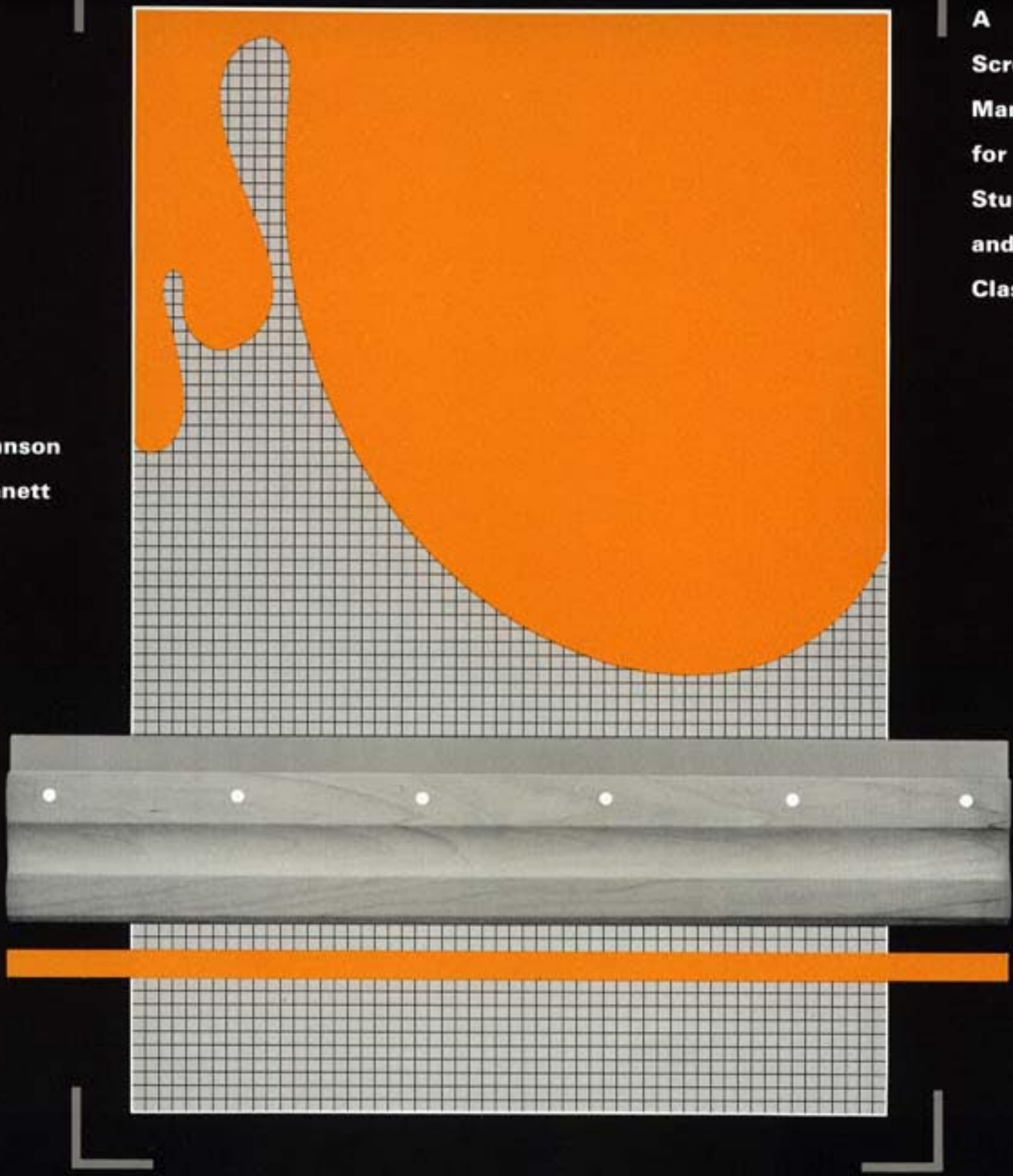
Water-based Inks:

A Screenprinting Manual for Studio and Classroom



Lois M. Johnson
Hester Stinnett

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Preface

Over the past fifteen years, the Philadelphia Colleges of the Arts Printmaking Department has been requested to test many screenprinting materials. Not until 1979, when oil-based products were escalating in price and health hazards were becoming more medically visible, was the experimentation with water-based inks seriously undertaken. The department, like others teaching the fine arts application of this versatile medium, relied on the traditional oil-based products for permanency of color and surface applicability in mark-making. To quote Dean Meeker, Professor of Printmaking at the University of Wisconsin-Madison, "You can print with this process on anything that is standing still!"

In 1979, Catherine B. LeCleire, a graduate student at PCA, joined me in investigating the properties and handling of the water-based screen inks. Through the research, comparisons were made from technical and aesthetic vantage points on the currently used oil-based products and the newly-improved Hunt/Speedball Water Soluble products. The experimentation required finding new or adapted methods for the implementation of the water-based products, since many of the stencil image-making materials were also water soluble. Additionally to be overcome were the pervading attitudinal biases that water-based inks were best for fabric printing and hobbyists.

After a year of intensive tests of stencil processes, qualities of opacity of the inks and varied paper stocks, Cathy and I incorporated the water-based inks into the screenprinting curriculum of the College with follow-up questionnaires on student reactions. She also created comparison prints of the same idea in both oil- and water-based inks to test the handling in her own imagery. Cathy was reinforced by the adaptability of the water-based inks, and decided to elicit professional external reaction to her work. In 1980, the Director of the Print Club, Ofelia Garcia, and the Curator of Prints at The Philadelphia Museum of Art, Kneeland McNulty, were shown her comparison prints of the traditional oil- and water-based methods. Their positive reactions to the water-based screenprints were an indication that the department was on the right track—water soluble materials proved as versatile as oil in creating printed images on paper.

Permanency of surface has been a virtue of oil-based printing and was in question in the water-based ink usage. This issue was not a problem for Garcia and McNulty who noted that considerations of care and handling in museums were similar for prints made with water-based inks as for water color paintings. Cathy and I were further encouraged by the enthusiastic responses to the water-based products by the students surveyed.

In 1980, Catherine B. LeCleire submitted "Waterbased Inks: An Alternative in Screenprinting for the Studio and the Classroom" as fulfillment of the thesis requirement for the Master of Arts in Education at PCA. Since that time, the Printmaking Department has been committed to the implementation of water-based inks for instructional purposes. I incorporated the products into my own professional printmaking and edition printing after fifteen years of oil-based production.

Since LeCleire's initial master's research was conducted, several new lines of water-based inks and products have been introduced. Tests of individual ink lines were conducted by faculty member Hester Stinnett as the department pursued its collection of information supplementing the thesis results. PCA Printmaking has continued to investigate the inks, clean-up materials and studio techniques by utilizing the products in the screenprinting studio. The advantages of solvent-free screenprinting were becoming visible also to the area printmaking community, and we were ready to share our enthusiasm.

Lois M. Johnson
Chair, Printmaking Department
PCA Workshop Faculty Coordinator
The University of the Arts
Philadelphia, Pennsylvania

The positive response to the first publication of the Manual has been very gratifying, and we are pleased to present this updated version in reprint with the support of The University of the Arts.

L.M.J. H.S. 1990

As knowledge of PCA's experimentation and use of water-based inks spread, area schools contacted the department with questions. These queries demonstrated the need for information about water-based materials and processes. The development of the PCA Water-based Screenprinting Workshop was a response to these needs. Conceived as an annual symposium/ workshop, the PCA Workshop set three goals: to provide information and experience to artists, college, and secondary school instructors who attended the workshop; to invite artists and printers of national reputation to work together to create a limited edition screenprint using water-base inks; to collect information and build upon LeCleire's thesis and publish a step by step manual thereby reaching a wider audience of arts and educators. The artist's handling and their printed editions would further test the professional standard and quality of the inks used.

The first Water-based Screenprinting Workshop was held in January, 1985, at the College's Printmaking Department. The Workshop was made possible by a generous grant from the Hunt Manufacturing Co. Artist Pat Steir worked with printer Franz Spohn and colorist Shanna Linn on the production of a diptych entitled, *Self Portrait after Rembrandt.*

Both Spohn and Linn had used the Water Soluble line of inks and were familiar with the characteristics of the ink. Prior to the Workshop, Steir had completed the drawing separations on Mylar and selected colors. Following Steir's instructions, Spohn and Linn began proofing. By Steir's arrival, several versions of the image had been proofed and together they discussed ink opacity, transparency, and printing sequence. Numerous changes in transparency were requested by the artist and accomplished in a very short proofing time. While at the Workshop a final set of proofs were printed from which Steir selected the *bon á tirer.*

Concurrent with the proofing of Steir's image, Workshop participants attended lecture demonstrations in the adjacent studios. Lois and I presented all aspects of the water-based screenprinting process during the two day event. Participants experimented with different lines of inks and various stencil materials: each gained experience by working on individual projects utilizing the demonstrated techniques. The structure of the Workshop allowed each participant to investigate those techniques of most interest. Participants interrupted their projects to check on the progress of Steir's image.

Spohn and Linn continued to print the edition after the Workshop's conclusion. Printed on Stonehenge Heavyweight paper, the eight-color screenprint was delivered to the artist for approval and signing. Steir expressed her satisfaction with the project and with the results the inks were able to yield.

The second Water-based Screenprinting Workshop was held in January, 1986, and had an expanded format. The Workshop was made possible by a second grant from the Hunt Manufacturing Co. and a National Endowment for the Arts grant. Artist Robert Stackhouse and printers Bob Blanton and Bill Wygonik of Brand X Editions, New York City, were invited to the Workshop. Shanna Linn returned as the colorist. Wygonik and Blanton had printed for a number of artists including David Hockney, Willem De Kooning and Frank Stella. They had not, however, previously printed with water-based inks. This was also Robert Stackhouse's first screenprinting project. Linn contributed her extensive knowledge of the inks to the project and once again acted as liaison between artist and printer.

A second group of college and secondary school teachers as Workshop participants attended lecture demonstrations by Lois and me: the Workshop was extended to three days to provide additional studio time. A portfolio edition of prints was created during this period and was exchanged by the participants.

While participants worked on their projects, Stackhouse set about drawing separations and the printers began color proofing. Frequent press-side conferences were held as the complex, sixteen-color print developed. Linn worked closely with Stackhouse to mix each ink color to his instruction and to respond to the color relationships on the print. She commented upon the Permanent Acrylic Ink that was used, "With the palette we had, we were able to match every nuance of the watercolor we were using as a guide. The viscosity of the ink was excellent; we never needed to adjust it. The range of hue was

Lois Johnson demonstrating stencil technique at the 1985 PCA Screenprinting Workshop.

excellent. The colors kept their strength even in the lightest wash areas."

After printing the edition, Bill Wygonik echoed Linn's observations, adding that they had no problems printing and were pleasantly surprised with the inks. He would consider using water-based inks in future projects.

Stackhouse found that the speed of the screenprinting process and the fast drying time of the inks allowed him to see proofs of the image right away. He could then base his next drawing separation upon the proof. Many color alterations were made, yet the entire proofing process which began two days before the participants arrived, was accomplished in five days. Wygonik and Blanton completed the edition of fifty at their New York studio.

Both Workshop sessions proved conclusively that water-based inks meet the high standards of professional artists and printers, as well as the demands of a school studio. After experimenting and printing with water-based inks, you will soon realize that hesitation and assumptions that the inks are of inferior quality or will not yield the desired results are unfounded.

Hester Stinnett

Director, PCA Water-based Screenprinting Workshop 1985, 1986

Acknowledgements

In a project as vast as the Water-based Screenprinting Workshop has been, there are many people and institutions to thank. First, William Parshall and the Hunt Manufacturing Co. whose careful consideration and continued support of the project allowed it to develop and grow; second the artists Pat Steir and Robert Stackhouse for their involvement and willingness to come to the Workshop to create important screenprints. Also appreciation to the printers, Franz Spohn, Bill Wygonik and Bob Blanton and colorist Shanna Linn for sharing their expertise and expending hours of hard work. The National Endowment of the Arts provided funding that allowed the expansion of the Workshop during the second year and the publication of this manual.

Many members of the PCA community and students gave of their time and services including Cindy Schrager, Laurel Schwass-Drew, Chris Myers and Andrea Marks. PCA, now The University of the Arts, also provided facilities support during the Workshops, and awarded a Venture Fund Grant and additional funding towards the publication of this manual.

During the Workshop several companies generously provided supplies for the participants to use. In 1985: Advance Process Supply Co., Majestech Corporation, Photo Process Screen Manufacturing Co., Rising Paper Co., SmithKline Beckman, Stretch Devices Inc., and Utrecht Art Supply Co. In 1986: Advance Process Supply Co., Majestech Corporation, Photo Process Screen Manufacturing Co., Rising Paper Co., SmithKline Beckman, and TW Graphics Co. supplied materials and services to the Workshop.

We would also like to thank Catherine Le Cleire for her energetic research. Special thanks to those students who participated in the experimentation with processes which are now accepted as routine studio practice. Shanna Linn, Barbara Rowe, Allegra Ockler and Nancy Mc Gee contributed their technical knowledge and experience for inclusion in this manual. Finally, appreciation to Marie Naples for her advice and editing of the manuscript.

Shanna Linn, Franz Spohn, and Hester Stinnett conclude color proofing of Pat Steir screenprint.

Water-based Inks

Over the past ten years there have been a number of factors that have influenced the screenprinting industry to develop water-based inks. As awareness of the health and safety risks associated with solvent-based products mounted, industries, educators, and artists throughout the nation sought alternatives. Consumer requests coupled with the government's enforcement of pollution laws and enactment of the *Right to Know Law* prodded the screenprinting industry to seriously reconsider water-based ink technology. As a result there are currently a number of quality water-based products available. Ink manufacturers continue to research, refine and introduce new products to meet the growing needs of industry, educators, and artists.

Through individual use and experimentation with the inks, attitudes have changed. Screenprinters who previously only used solvent-based products, now acknowledge the qualities of water-based products. Through the PCA Water-based Screenprinting Workshop program we have demonstrated that professional quality prints can be achieved using these inks. There is virtually no difference between the appearance of the water-based inks printed on absorbent paper and solvent-based inks printed on the same stock. Educators and artists have found that they are able to create a variety of visual effects with water-based inks. Speed of the ink's drying time and ease of clean up make it ideal for the classroom where work time is often limited and ventilation inadequate for oil-based inks and solvent usage. Water-based inks cut costs in solvents and improve the health and safety environment of the screenprinting studio.

All water-based inks, emulsions, and reclaiming solutions are not completely non-hazardous. As an instructor, or artist, it is important to know the characteristics of the products you and/or your students use. Read product labels and follow the recommendations for safe use. Recent legislation has led to the improvement of labeling on some products and improvement of information about product content.

Material Safety Data Sheets for chemical products are required to be made available from manufacturers and distributors. The requirement for Material Safety Data Sheets is established by the OSHA Hazard Communication Standard 29CRF 1910.1200. This is a federal standard which requires the divulgence of acute and chronic hazards.

Upon request most Material Safety Data Sheets are made available for the inks, emulsions, and screen reclaimer products tested. Any cautionary information has been included in the descriptions of various products and procedures in this text, based on information gathered in 1986.

Certain manufacturers are submitting their products and formulations to toxicologists for toxicity determinations as per the American Society for Testing and Materials (ASTM) D 4236, Standard Practice for Labeling Art Materials for Chronic Health Hazards. This practice is intended to have the adaptability to keep labels current with existing regulations and the latest medical and scientific knowledge for acute and chronic hazards. Compliance may be certified by a certifying organization. Manufacturers are using the Art and Craft Materials Institute, Inc. as the certifying organization. The Institute has established three identifying label seals: AP, Approved Product- non-toxic; CP, Certified Product-non-toxic and exceeding established product standards for quality; and HL, Health Label (Cautions required) toxic with approved labeling. Non-toxic is defined as, "no materials used in the product shall be present in sufficient quantities to be toxic or injurious to the human body as a result of any forseeable handling or use including ingestion of a large single dose or multiple small doses comprising the equivalent of one gram daily indefinitely".

In addition to the cautionary information, we have indicated the products that have been submitted to the voluntary testing and labeling program and their ratings. Thus far only the Hunt/Speedball products have been tested. Both the Hunt/Speedball Permanent Acrylic Ink and the Hunt/Speedball Water Soluble Ink were rated AP, Approved Product, non-toxic.

For further information about the testing and labeling programs and a listing of the tested products contact the Art and Craft Materials Institute Inc., 715 Boylston Street, Boston, MA 02116. For further information on art hazards contact the Center for Occupational Hazards, 5 Beekman Street, New York, NY 10038. The Center is a national clearinghouse for research and education on hazards in the arts. The Center publishes the *Art Hazards Newsletter*, an excellent source for up-to-date information on new or pending regulations and current precautionary information and procedures.

Labels certifying product testing, used by the Art and Craft Materials Institute, Inc.

Screenprinting Set-up

For short term use by students, the wooden hand-stretched and stapled screen may be the most inexpensive and appropriate. Screen frames, 30"×40" or smaller, should be constructed of 2"×2" #1 pine. Redwood, less likely to warp, is a preferable material for building larger screens. Due to excessive water in clean-up, the frame must be polyurethaned or painted with alkyd gloss enamel to protect the wood and prevent warping.

A well-stretched screen can withstand repeated printing and cleaning, assist in registration, and will contribute to the longevity of the mesh. The screen fabric must be taut and remain in tension after continued reuse. The recommended material is monofilament polyester. Mesh count most suitable for students printing with water-based inks is between #190 and #210; the higher counts will clog more quickly. As experience in printing is gained, and finer detail is desired, mesh #280 and #300 can be utilized with the water-based products. The yellow mesh color is preferable to white if photo stencils are used, as the non-reflective yellow absorbs light during screen exposure. To keep the screen taut, soak the mesh before stretching it onto the frame, taking care not to crease the fabric. After the screen is stretched and dry, a good quality tape is applied to the frame, extending about ¾" in to the mesh area to protect the staples and along the frame edge. Recommended tapes are Advance Process Supply white solvent tape or a high-quality silver duct tape: the paper tapes and shellac do not hold up with the extensive water washes.

The staple-stretch method works for smaller screens with cotton cloth tape placed between staples and mesh to help prevent rust. Very large screens should be stretched by a commercial shop for longer-lasting tension. The rope method (mesh stretched by rope countersunk around the screen perimeter) is a possibility for use with water-based inks. The rope loosens, however, under the strain of continued water pressure, especially if a power washer is used.

Metal frames as an alternative to wood frames have been developed and tested with a higher percentage of success, particularly with commercial printers. The Newman Roller Frame, an aluminum frame constructed with a rachet action to maintain screen tension evenly, is able to be adjusted without restretching the entire screen. The equipment is more costly than wood frames, but over several years is worth the investment for the artist/printmaker.

Rick Appleton demonstrates assembly of Newman Roller Frame.

Wooden squeegees must be coated with paint or polyurethane to prevent warping or swelling of the handle. Metal squeegee handles are recommended. Blade material of grey rubber or translucent polyurethane afford best results for printing on paper.

A level printing surface of white formica laminated to a plywood base (a minimum of ½" thick) provides a stable base to attach printing C-clamp hinges for screen registration stability. A 6" prop stick with an L-screw allows for elevation of the screen for paper registration between squeegee pulls.

History

Two of the major goals of an artist making prints are the image-making flexibility of the medium and control of his/her mark-making. The directness of drawing on screen or transparency has the advantage of being right-reading, with no reversals of the printed image as in etching and lithography. The stencil process historically has had the ability to create a broad scope of drawing, tonal range, and clarity of shape beginning with the first stencil of banana leaves punched with designs and berry pigments squeegeed through to fabric. The stencil transformed over centuries from hand-held shapes of skin to paper held securely by human hair and filaments of silk attached to sticks. In the last half of the nineteenth century, the stencil was applied to natural silk mesh attached to wooden frames—silk screen. The pigment pushed through the stencil was generally similar to oil paint when printing on paper. Around the turn of the twentieth century, a rubber blade with a wooden handle was utilized for the process which was most active in the production of wallpaper, fabric printing and utilitarian products on paper.

During the Works Progress Administration of 1935–1943, artists were employed in commercial silkscreen shops. As the artists were involved in printing posters and war-related products, the possibility of the medium for their own expressive use was also explored. "When in 1935 the Government, through its WPA/FAP, formed Poster Divisions to employ jobless commercial artists, the Government unwittingly launched a movement to improve the commercial poster and raise it to its true art form."* Previously guarded industrial secrets of particular effects in tone and line now were exchanged among the artistic community, and silk screen became the next of the printmaking processes to find its artistic personality separate from its commercial application.

The Philadelphia Museum of Art Curator Carl Zigrosser coined the word *serigraphy* c. 1942 to latinize and separate the new "silk writing" by artists from that of the commercial shops. As photo image-making in the 1950's and 1960's began to predominate, the natural silk stretched on the frames was replaced by polyester and nylon products, since they are more durable, easily cleaned and can be reclaimed from the photo emulsion. Screenprinting is now the contemporary term for this stencil printing process. The stencils used for water-based printing are related to and developed from those of oil-based materials.

* O'Connor, Francis V.
Art for the Millions.
New York Graphic Society,
Greenwich, CT 1973.
p. 177.

Hand-cut Stencils

To print flat areas of color with a sharp or an uneven torn edge, a hand cut paper is used for quick disposable stencils. Freezer wrap, a white paper coated on one side with plastic, can be used. The plastic coating renders the paper moisture-proof, and will withstand the friction of printing. After printing is completed, the stencil is thrown away, and the ink washed out of the screen. Stencil cuts should be made on the coated, shiny side of the paper. The translucent freezer wrap can be placed over a drawing, then cut out, removing the paper where the printed image is desired. Other hand cut stencil materials are clear contact paper, Mylar or Denril. The Mylar and Denril (.005 mil. plastic sheeting) are unaffected by the humidity of the inks, will not stretch during printing, and can be washed off and reused. Acetate, however, is not recommended as it will stretch when it comes in contact with the ink, causing printing problems. Clear plastic contact paper is capable of more detailed cut images due to its adhesive backing. With good adhesion of the contact paper to the screen mesh, the stencil will withstand printing friction and ink washout remaining ready for reuse.

General steps to follow when preparing any of the materials are: cut with sharp mat knives, stencil cutters or single-edged razor blades on a stable surface. Use of a

Application of cut freezer-wrap paper stencil to the screen frame.

light table or window is helpful for working from a drawing or proof. No image reversal is needed when using freezer wrap paper, Mylar or Denril. Do not overcut corners; cut exactly to the corners and stop. Extension of the cut beyond the corners will cause the ink to leak out while printing. For block-out of all non-printing areas, cut the block-out material at least 1" larger in length and width than the opening of the mesh surface, and attach it to the underside of the screen.

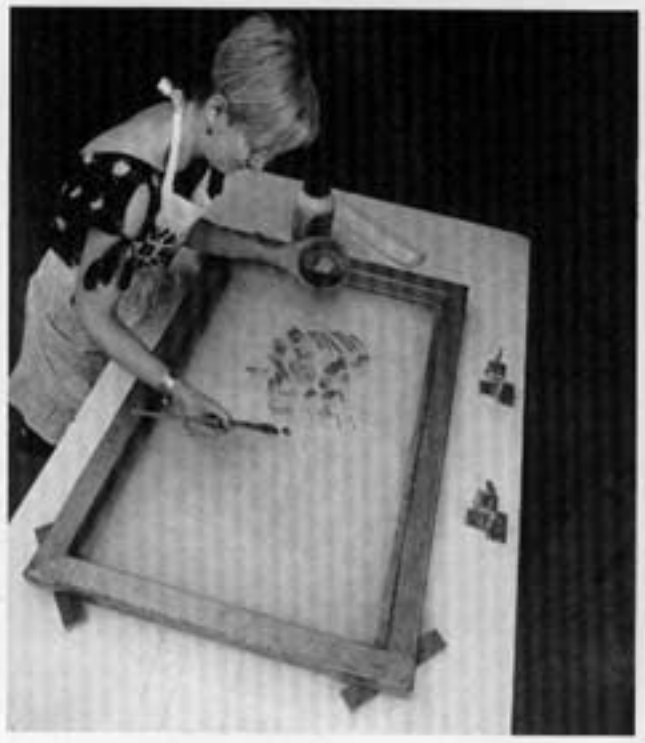
When cutting the contact paper, keep in mind that the adhesive side must attach to the underside of the screen—therefore, either reverse the contact paper and cut through the backing and adhesive simultaneously or reverse the drawing to the contact paper before cutting the stencil. Burnish the contact paper firmly on to the screen mesh, pressing out the air bubbles. Paper or plastic stencils are attached to the screen frame, not the mesh, with good quality masking tape which prevents the moisture in the inks from releasing the tape. Surface tension of the stencil must be even, with no pulling or stretching for clean prints. When printing the paper or plastic stencil, begin with one very firm stroke of squeegee and ink will adhere the stencil to the screen. The ink also acts as an adhesive for small floating stencil shapes added during the printing process.

Lacquer-cut Film Stencils

Lacquer film should only be used in a very well-ventilated studio by professionals wearing solvent-resistant gloves. This stencil method is not recommended for elementary or secondary school students. When using this process, adhering and removal of the cut film are accomplished by lacquer thinner or acetone on a dry screen.

Direct Drawn Stencils: Screen Block-out

Hunt/Speedball Screen Filler liquid can be applied directly on the screen mesh: when dry and printed the filler will block out the ink creating a negative mark by allowing the passage of ink around it. With the screen elevated at least two inches above



It is necessary to elevate the screen from the table surface when applying screen filler block-out to the mesh.

the printing surface, apply a thin layer of screen filler: brush on, spray, blot with a sponge or cloth to create various textures with the filler. The areas where the brownish filler is applied will not print. Keep the container tightly covered to prevent thickening. If necessary, thin with up to 50% water to return the filler to a flowing consistency.

To create a tonal, lithographic wash effect, brush water on the screen mesh first, then brush on a thinned solution of filler onto the area. For this technique, the filler can be diluted to a solution of 25% filler and 75% water. Dry the screen thoroughly, at least eight hours or overnight before printing.

After the filler application has set, the screen may then be elevated to fan for speed drying. (For the wash technique, setting will take longer.) To print the screen filler image, prepare a hand-cut paper or plastic stencil to define the printing area unless filler block-out is over the entire screen. The image will fill in slightly for the first few proofs before stabilizing. This is particularly noticeable with the wash technique. Proof until filling in has stopped and the stencil stabilized; then proceed to the paper selected for editioning. The screen prepared with a block-out can be printed, the ink removed with water, and printed repeatedly. Once printing is completed, the

filler is removed with Wisk or a similar household detergent. See Screen Reclaiming chapter for cleaning procedures.

To create a reversal effect of the screen filler stencil, first create and print stencil as described above and wash ink from the screen with water, leaving the filler stencil intact and dry thoroughly. Scoop-coat or squeegee the back of the screen with a thin, even layer of photo emulsion. Allow emulsion to dry in the sunlight or fluorescent light for at least one hour. After that length of time, remove the screen filler with Wisk, 409 Cleaner, or any good quality grease remover. The photo emulsion will remain in the screen creating a positive image—the reversal of the printed screen filler image. The emulsion can also serve as a block-out; however, more vigorous washout is required with the appropriate chemicals. See Reclaiming section.

Direct Drawn Stencils:
Crayon Block-out

Wax crayons, such as Crayola or oil Craypas can be drawn on the screen which will block passage of the inks, leaving crayon-like marks and lines. Leaves or fabric when placed under the screen will create rubbings as the crayon is passed over the mesh identifying the textures of the material below. Apply a thick layer of crayon so the block-out will hold up under the friction of printing. Prepare a cut paper or plastic stencil to define the printing area. After printing, wash ink from screen with cool water: crayon marks will remain intact and can be reprinted. To remove the oil crayon, dry the screen, and with good ventilation, apply paint thinner with a soft cloth and rub.

Direct Drawn Stencils:
Drawing Fluid Resist

Hunt/Speedball Drawing Fluid applied to the screen mesh creates a positive mark: the areas where the fluid is drawn will print. With the screen elevated in a horizontal position, apply the blue drawing fluid with a brush, sponge, cloth or spray. The fluid can also be thinned with up to 50% water to increase its flow for use in a pen: use a bamboo or round nib point that will not puncture the screen. Once the fluid application has set, the screen can be raised to vertical position for fan drying.

When thoroughly dry, use a scoop-coater or stiff cardboard squeegee and coat the entire mesh with a thin even layer of the screen filler. For best results, the filler should be applied to the same side of the screen as was the drawing fluid. When using small cardboards to coat, begin in a corner of the screen and move with steady pressure over the fluid. Do not back-track except on a small overlay of edges: one pass with the filler is sufficient. Continue this action until the drawing fluid area and open screen mesh are evenly covered. Separation of the fluid and the filler surfaces will be evident. (Do not squeegee on the underside of the screen: the fluid will be sandwiched, causing washout problems and unclear stencils.) After the filler is dry, the drawing fluid is washed gently from the screen with a cold water spray, creating the openings in the filler stencil where the fluid had blocked the screen mesh. Check the

A flat surface is recommended for applying wax crayon to screen mesh.

After drawing fluid image has dried, a thin layer of screen filler is scoop coated onto mesh.

stencil against the light for pinholes. Alterations in the stencil or pinholes are corrected by reapplying the filler to the needed areas. Dry the screen which is now ready to print.

Direct Drawn Stencils: Lithographic Crayon Resist

Lithographic crayons dissolve in water and lend themselves to another technique similar to that of the drawing fluid: however, this method yields a more textural crayon-like image. Draw or rub soft (#0–#1) litho crayons on the screen with the mesh in contact with printing surface. Elevate the screen and coat the entire mesh with one pass only of Hunt/Speedball Screen Filler. Use a scoop-coater or cardboard squeegee following directions as described in the Drawing Fluid section. Let screen filler dry and wash crayon marks out with cold water. The screen filler will remain in the mesh and the areas that were drawn, print. Caran D'Ache water color crayons can be substituted for the lithographic crayons.

Direct Drawn Stencils: Monoprinting

The Caran D'Ache water color crayons provide another even more autographic stencil method. With a cut paper or plastic stencil to identify printing position, use the color of crayon desired to be printed and draw directly on the mesh with the frame in contact with the table surface. Two or three different colors may be worked in this manner. To release the crayon pigment to the paper below the screen, squeegee the transparent base (or a light tint of color and transparent base) over the crayon. The crayon will print for about five impressions in a monoprint manner: reapplication of the crayons and continued printing will complete the series. Hot water spray cleans the crayons from the mesh after printing.

Photographic Stencils

The photographic stencil, used by the commercial printing industry for a variety of uses including fabric, label, and poster printing, is the most versatile process for all

Monoprinting with transparent base and water color crayon.

manners of markmaking and capable of producing very fine detail. Of the methods of photographic stencils, the approach most appropriate for the water-based inks is the photo emulsion coated directly onto the screen mesh. Photosensitized films, such as Poly-Blue which was designed for use with oil-based inks, do not hold up for more than a few squeegee pulls as the water-based inks dissolve the film stencil.

The photographic direct emulsion translates a drawn or photographic transparency of an image to be printed into a stencil by exposure to a light source and development by water spray. When the photosensitive emulsion coated on the screen is exposed to the UV portion of the light spectra through the transparency, the emulsion hardens, leaving that emulsion underneath the opaque areas in the transparency water soluble and therefore able to be dissolved when washed by a tepid to warm (100 F.) water spray.

Preparation of Drawn Photo Transparency for Photo Stencils

Supports for drawing that yield controllable results are frosted Mylar, tracing paper/vellum, acetate, prepared acetate, Copylex. Drawing materials that create opaque, yet visually variable tones are India ink, black acrylic paint, etching hard ground or asphaltum, lithographic tusche, opaque

markers, permanent Magic Markers in red or black, Stabilo 8008 pencils, lithographic crayons #1–#5, grease pencils, black spray paint, air brush with photo opaque, and pressure sensitive letterforms and texture patterns (Chart-Pak, Letraset, etc.) . . . When working with opaque materials, what is drawn is what prints! The selected transparent support should be placed over the drawing or proof, on a light table or other stable surface. The advantage of working on the light table allows for checks of opacity for stencil reading that will correspond to the exposure time of the photo stencil.

Observe the drawing periodically through light to determine which areas may appear opaque to the eye when drawn, but will in fact bleach out upon exposure to light—very lightly marked areas will not block the exposure light source. Drawing with twice as heavy a touch will assist in depositing sufficient pigment on to the drawing surface—the frosted materials and tracing paper will be the most responsive to pencil/crayon marks. The plastic supports of Mylar and prepared acetate have the best surface to draw with inks, paints, crayons and pencils, and have the added advantage of durability for reworking, cleaning with solvents and reuse. For hard-edge or detailed forms, translucent plastic films such as Ulano Rubylith or Amberlith, which block the transmission of UV light, are excellent. Cut carefully on the dull emulsion side with sharp tools, leaving the color film where the printed image is desired, and peel the film away from the acetate backing. Both the drawn and cut film transparencies should be created right-reading: there is no reversal from the composition as it is to be printed.

Preparation of Photographically Generated Transparency

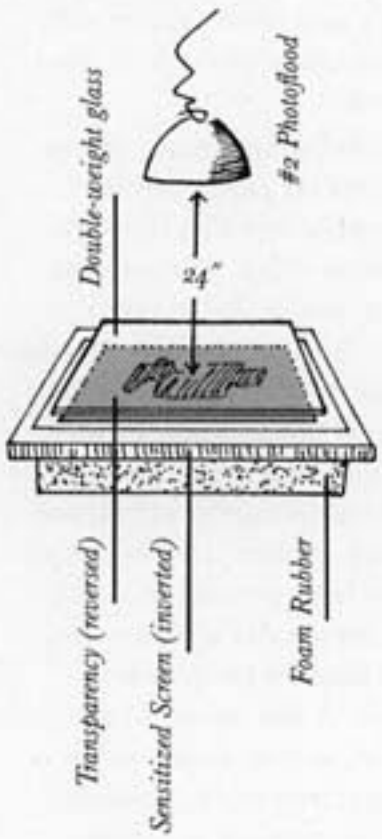
Images from printed matter such as newspapers, magazines, and photographs can be implemented in several methods. Many photo-copying machines are capable of printing toner or ink onto acetate for copies of printed matter or photographs, and the scale can also be increased or reduced. Photographic negatives enlarged on graphic arts film and processed with A and B developers yield a positive image. Color slides or negatives may also be used in the enlarger exposed onto graphic arts film, but the forms and tonal ranges will not be as clear and sharp as those of black and white negatives.

Magazine or newspaper copy, photographs and drawings on paper can be translated into graphic arts film through use of a copy camera which photographs the paper image in actual, enlarged or reduced size, onto the graphic arts film also known as orthofilm or Kodalith, thus yielding another range of possibilities. Printed newspaper or magazine photographs will carry the dot pattern format to hold tonal ranges. This system is often used by artists as well and can be incorporated in to the transparency by using a dot screen when utilizing the copy camera for drawn or photographic work. A dot screen of 100 lines per lineal inch to trap tonal ranges is sufficient for most screen work; however, variations are as interpretive as artists' ideas. Good sources of information for guides in experimentation are *Creative Darkroom Techniques* published by Kodak and *Options for Color Separation—An Artist's Handbook—A Compilation of Methods for Use in the Graphic Arts,* edited by Philip Zimmerman and published by The Visual Studies Workshop Press in Rochester, New York.

Coating the Direct Emulsion Screen

The emulsion mixed and sensitized according to directions is coated on a clean, dry screen stretched with polyester monofilament mesh. The coating may be done with stiff cardboard, plastic squeegee, or scoop coater designed for this purpose to render a layer of emulsion that is thin and even or stencil quality will be affected. The screen is coated with photosensitive emulsion in subdued light in a darkroom. To protect the light-sensitive emulsion, a yellow bug light reduces the UV rays sufficiently from pre-exposure. The sensitized screen must fan dry for a minimum of one hour in the light-safe room before exposure. As the screen dries, it becomes light sensitive. For short runs of printing—75 prints or less, one coat of emulsion is sufficient; for greater durability, a second coat on the bottom side of the screen is

Exposure Set-Up for Photographic Stencil



recommended to increase stencil longevity and image sharpness by reducing sawtoothing. Check the manufacturers' instructions for coating and exposure recommendations.

It should be mentioned here that the two types of direct screen emulsion—one sensitized with ammonium bichromate and the other sensitized with a diazo salt—should both be handled with extreme caution. Both chemicals are most potent in powder form: wear gloves and a dust mask when measuring and mixing the solution, and wear gloves when coating the screen. Sensitize the screen in a darkroom that has adequate ventilation. Of the two emulsions, diazo is less hazardous to handle and renders a more sensitive stencil to detail. See Reclaiming section for comparison of removal from screen of the two emulsions.

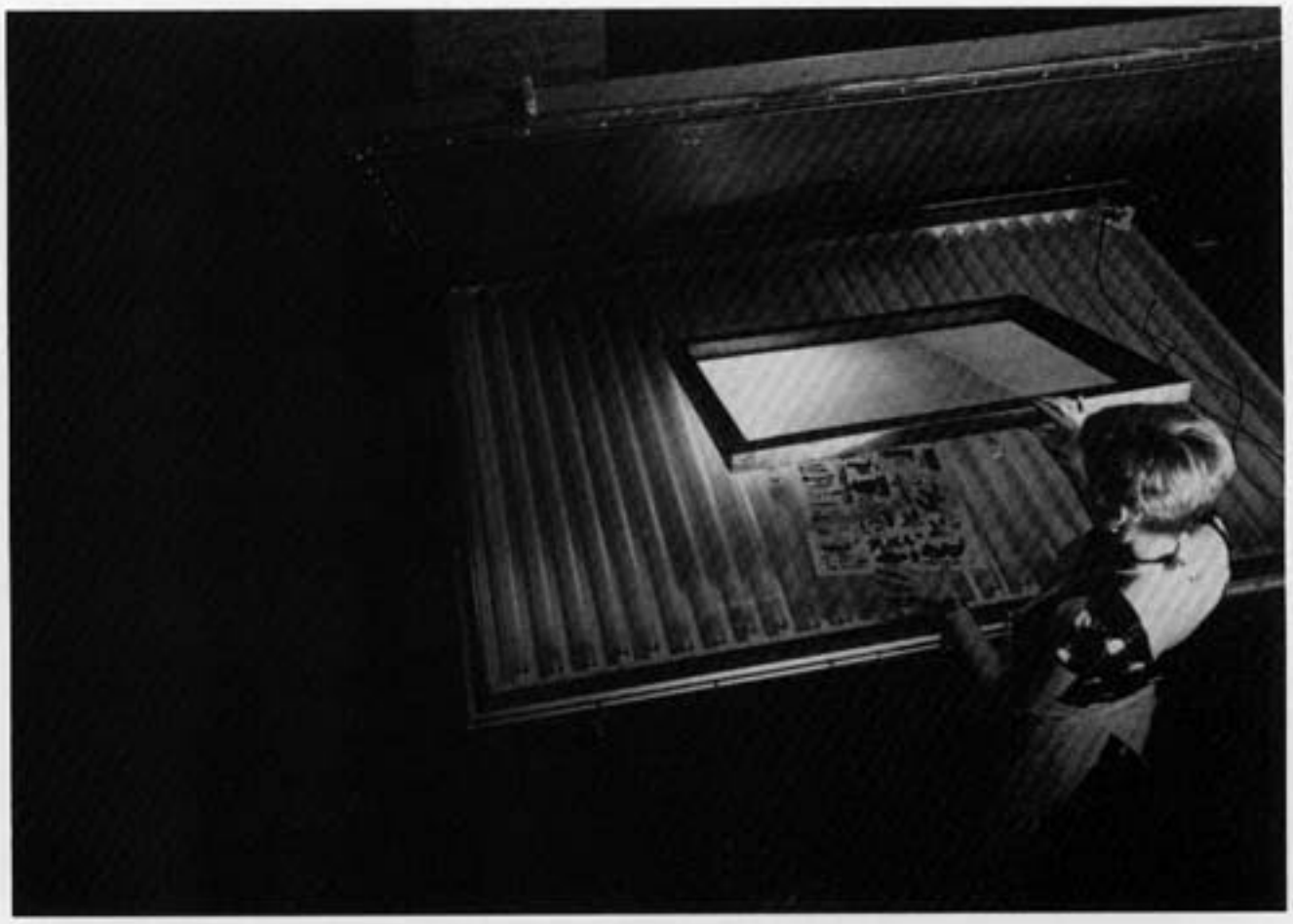
Using a scoop coater, firm pressure is required to ensure a thin even coating of photo emulsion.

Exposure and Development of Photo Screens

The exposure of the photographic stencil requires a steady light source. Typical setup for exposure is a #2 photoflood anchored about two feet above a stable surface large enough to hold the coated screen. To insure tight contact between the transparency and the sensitized screen, place a foam rubber pad under the screen which should be placed with the coated side towards the light source. Because the screen is inverted, reverse the transparency from the orientation for printing, and place in position on top of the coated screen, no closer to the edge than two inches for easy printing. To complete the contact with screen and transparency, place a sheet of double-weight glass—slightly smaller than the screen frame—on top of the transparency *sandwiching* the film and screen mesh with the pressure of glass and foam. The heavy glass is necessary because single-weight will eventually crack due to heat of the photoflood during exposure. The length of time the prepared screen is exposed to the light should be adjusted as per the density of the transparency, particular mixture of emulsion, type of light source, and distance of the screen from the bulb. Test screens are advised. The average exposure for a screen with one coat of direct emulsion with the exposure set-up described is 15 minutes. For screens larger than 22"×30", a second photoflood may be required for the area to be evenly exposed. Keep track of exposure times and types of transparencies. Screens sensitized with diazo will also require testing to determine the exposure time. Heat as well as light rays can activate the photo emulsions, particularly those sensitized with bichromate. Keep screenprinting darkroom and exposure unit light source ventilated with fans to prevent heat build-up. Follow manufacturer's recommendations for storage of mixed and unsensitized chemicals.

Another system of exposure that is frequently used by schools and commercial shops for reliable exposures and contact is the Poly-Lite Unit. The machine affords very intense even light and a vacuum blanket for contact. Equipped with a built-in timer, the Poly-Lite reduces the time of exposure because of the strength of the UV light. The unit is available in a range of sizes, has relatively low maintenance, and is easy for students to operate.

Following exposure of the screen, place the screen in a vertical sink, moving quickly as the screen is still light-sensitive. With a gentle spray of lukewarm temperature water (approximately 100 F.), wet both sides of the screen quickly and evenly. Continue to develop the image from the coated screen side with increasing water spray pressure and temperature as necessary as the areas that were covered by the opaque



Positioning sensitized screen on top of drawn transparency in Poly-Lite exposure unit.

sections of the transparency begin to open up. These areas were not hardened by the light and therefore wash out, leaving the mesh clear to print the image. Carefully wash the entire screen even in non-image areas, since the sensitizer and emulsion must be washed away thoroughly or scum can be left in the stencil. Check the stencil against light. Stencil is complete when the transparency image is visible as clear, open mesh in the screen. Give one more quick, cool wash over both sides of the screen and fan dry immediately. Air drying without the fan can result in the emulsion seeping in the open stencil, blurring the image.

Problems in washing out the photo stencil can result from a variety of factors. If the emulsion washes out of the screen too quickly, destroying the image, the following may be possible causes:

- the screen is coated too thickly with emulsion
- screen is not thoroughly dried
- exposure time is too short
- water spray is too hot
- water spray is too forceful

If the screen image doesn't wash clear after five minutes of spray, these are possible causes:

- screen was subjected to light prior to controlled exposure
- exposure time was too lengthy
- the transparency was not placed between the light source and the coated screen during exposure
- water spray is too cool
- water spray is not sufficiently forceful

Through the process of elimination, find the source of the problem. If necessary, reclaim the screen, dry and recoat the screen with emulsion and re-shoot the image into the screen.

General Recommendations for Printing with Water-based Inks

Paper

Use rag content paper stock for edition printing: lighter weight, wood-pulp papers will buckle, resulting in uneven printing surface. Refer to section on Printing Papers for brands and characteristics. Cut all paper exactly the same size. Registration is improved by using the machine-cut edge of the stock rather than the deckle or hand-cut edge.

Registration

With screen and selected stencil tightened in the hinges, register the printing paper under the screen, lining up the stencil image to the paper. Place register marks on the table surface for three points of contact; the side and bottom of the lower left corner of the sheet and the bottom right edge. Materials used for registration can vary from three to four layers of masking tape cut in 1½" strips to commercially available adhesive or metal tabs. Stencil placement on the hinged screen and registration of paper should be accomplished before the ink is applied to the screen since visibility for registration is difficult after printing has begun.

Supplies

Materials to have assembled for printing are 8 oz. washable bowls or containers with lids (larger depending on screen size) for mixing and storing inks, spatula or spoon, paper towels, 3"×5" matboards, foamcore pieces or small plastic squeegees for cleanup, and water bottle with a fine spray attachment. Keep inks, mixing, and paper in separate locations. Install lines with drilled clothespins or metal clips, or racks for screenprint drying within easy reach of the printing table. A sharp squeegee, at least 1" wider than the stencil image to be printed is essential for quality printing. Care must also be taken that the squeegee does not ride upon the taped edges of the screen.

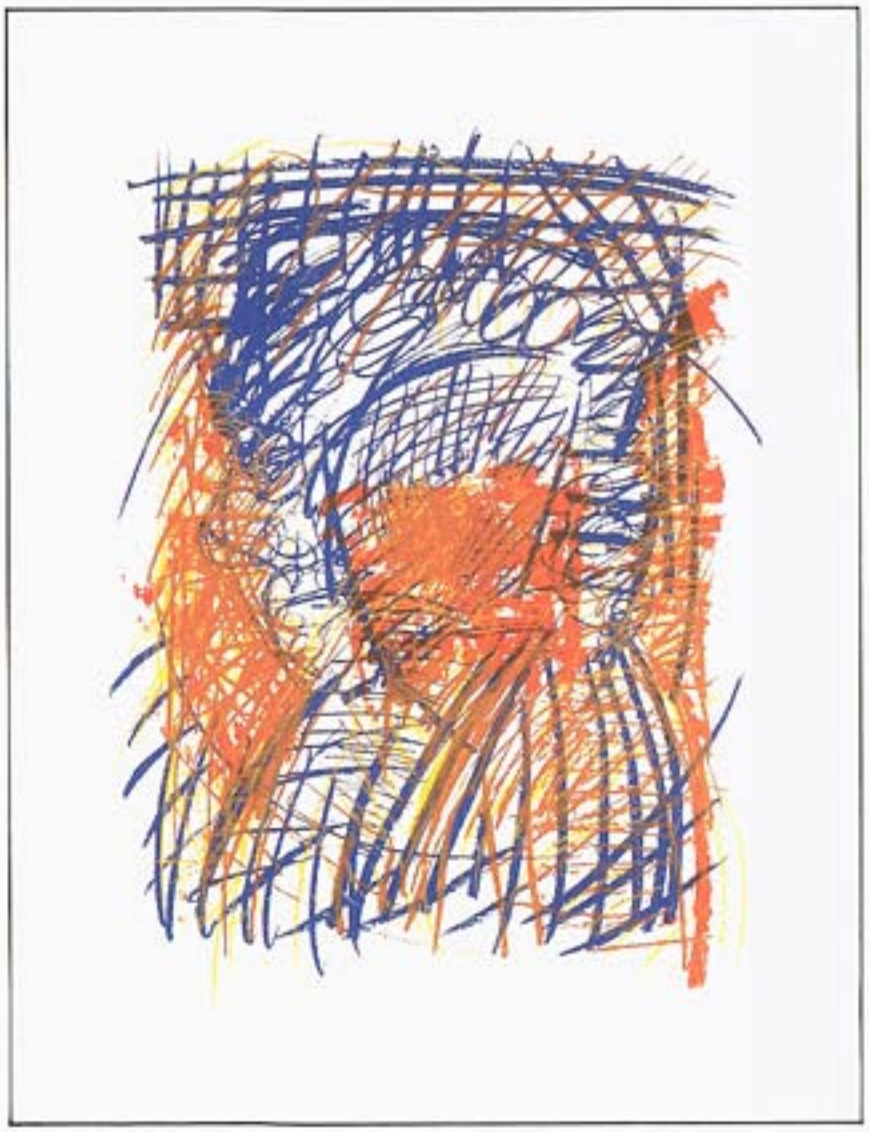
Printing

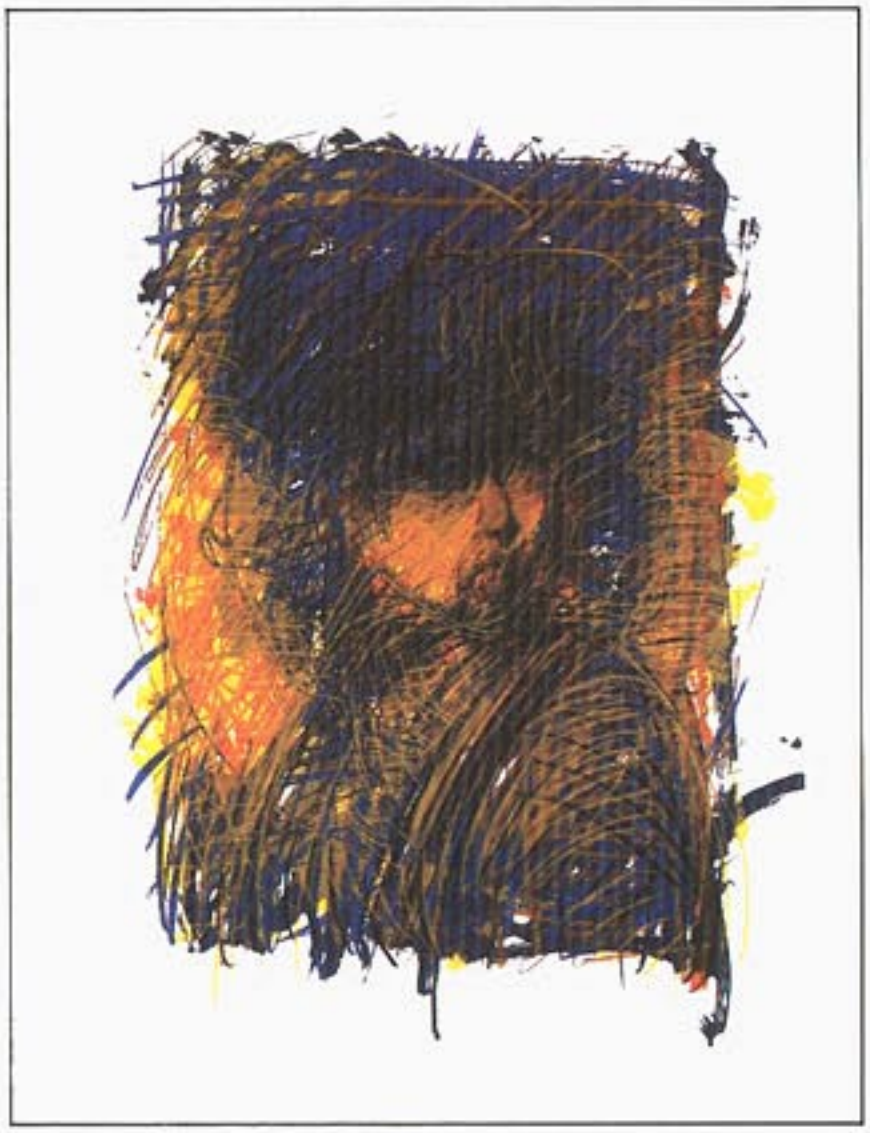
The quantity of ink prepared should correlate to the area of the image to be printed, number of proofs, and edition. For example, about 8 oz. of ink will print 15 square inches of flat color in a series of 25 prints. More linear or tonal stencils will require less ink for the same edition number. A half-tone or wash texture screen can be printed with ink that is one-half by volume transparent base to opaque pigment, and the tone will still read opaque because of the pattern of dots. Plan ahead: in the sequence of printing an edition, it is very inconvenient, time-consuming, and usually inaccurate to stop, mix and match more ink to finish the same run. Inks should have a honey-like consistency or viscosity for ease of printing.

To print, pour a ¼" wide line of ink the length of the squeegee in the well of the frame nearest the hinges. Grasp the squeegee with both hands toward the ends of the handle, spreading fingers for equal distribution of weight. Push from the shoulders, making a quick side to side movement of the blade in the ink with pressure to make contact with the screen and begin the pull down the length of the mesh. Hold a 45 degree angle with the squeegee, keeping pressure even in each arm, taking care not to ride up on the taped edges of the screen. When the squeegee is completely past the stencil image, release pressure and use the blade to scoop up the travelling ink, and return it to the ink well at the hinges. Lift, prop up the screen, and check the color and registration of the proof. If no corrections are to be made in the stencil, placement, or color, hang the print to dry. Flat drying surface is preferable, as moisture in the inks can cause paper curvature in some stocks when dry. To continue making the edition, add ink to the well after every four printings; check the registration, consistency and color, until the series is complete.

Once the edition has been printed, remove remaining ink from the screen and squeegee and store in a lidded container. Peel off any cut paper stencil and tape from the screen, and proceed to spray with lukewarm water to wash the ink from the screen and squeegee. (Refer to Ink Mixing and Color Selection or Screen Reclaiming sections for further information as necessary.)

Take a deep breath—no solvents!





Pat Steir
Self Portrait, After Rembrandt
Diptich, 1985

PCA Water-based Screenprinting Workshop edition.
8 ink and crayon drawings on mylar.
Printed with Hunt/Speedball Water Soluble Inks
on Stonehenge Heavyweight paper.
h:93.98 cm×w:142.24 cm
Edition: 30.

Troubleshooting

Minor stencil changes can be made while the screen is hinged. Filler may be applied to either the photo stencil or the filler blockout stencils for quick repairs. Clear and clean the area of ink with water and dry. Apply filler, allow to dry, and continue printing. When resuming printing, mist the screen with water and print several proof sheets until the image prints clearly. Cut paper stencil changes can be accomplished by removing or adding desired elements.

While printing, clogged photostencils can be cleared in small areas by using reclaiming solution with a brush to open the screen, but must be followed by a paper towel water wash. Note: this method can be hard to control. If clogging is widespread, clean ink from the screen and save. Try to redevelop with warmer water and more pressure from the spray. If there are no results, use rubber gloves, and apply a dilute solution of the reclaiming solution with a paper towel or a soft rag. Leave on the screen 2–8 seconds, then respray. The screen which may have been pre-exposed or over-exposed can open, clearing the stencil. Dry immediately with a fan. This method can also result in loss of the stencil if care is not taken. If still unsatisfactory, remove the stencil entirely; dry, resensitize and reshoot the screen with less exposure time or redraw the transparency for increased contrast.

A clogged filler stencil can be cleared while printing through a similar procedure: apply 409 Cleaner or Wisk carefully—allow to soak, rub until clog opens, rinse and dry.

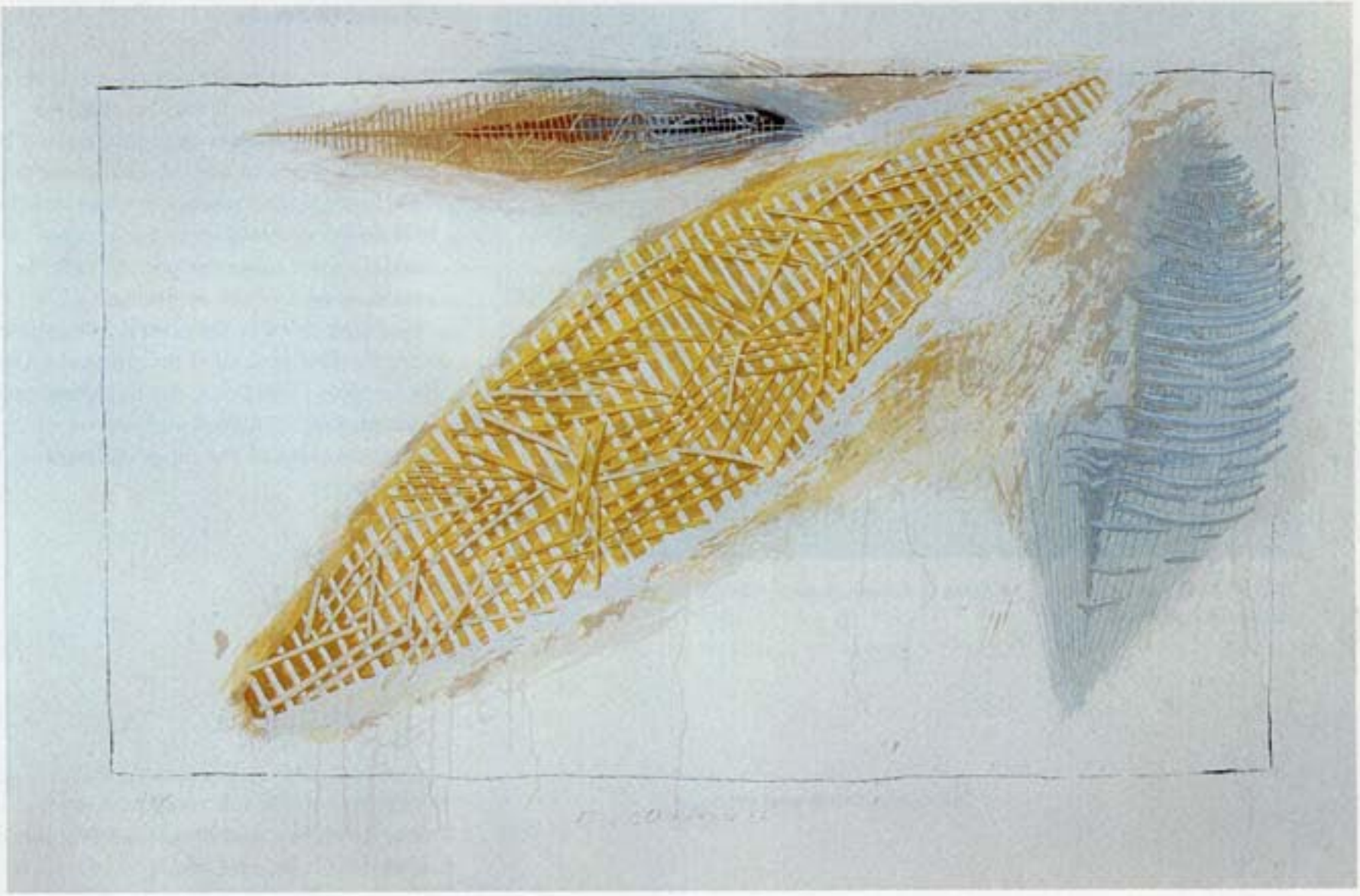
Printing Variations

Off-contact printing is the elevation of the screen from the printing table by placing ¼" cardboards, plywood, or foamcore pieces under the screen frame. If the screen hinges are resting on the table surface—not countersunk to the table level—place the cards only under the corners of the screen frame opposite the hinges. This will equalize the level of the screen above the table. For hinges that are countersunk to the table level, place the cards under the frame in the hinges as well. This elevation permits the screen mesh to snap back as the pull of the squeegee blade passes. In this method, the screen, ink and paper are not in continuous contact while printing.

The flood-stroke technique allows more time in the printing process. Extra ink flooded onto the screen keeps the mesh moist while paper is being placed in registration. After the first squeegee pass is completed, raise the screen about two inches. With even pressure, pull a thin film of ink across the slightly raised frame to the ink well, depositing fresh ink in the stencil, but not on the paper below. Prop screen and remove print and place onto the rack. Register another sheet of paper and print: a double deposit of the ink functions to keep the stencil from drying in. Continue the rhythm of pull, flood, remove print, register, pull, flood, etc. adding ink to the well when needed. Detail retention is aided by using the flood method with the screen frame off-contact. This method of flood printing is used with care for printing a cut-paper stencil as movement in the stencil from direction change can cause blurred images.

Another variation on printing stencils is Pochoir. This method, developed in France, and appreciated for the subtleties of tonal range in paint application, is achieved by using a dauber very quickly to apply ink through a stencil. Ink can also be sprayed through a stencil in diluted form for an airbrush quality.

After completion of the edition of water-based screenprints, the series or individual prints can be sealed (for subjection to other processes or to render the prints insoluble to water) by overprinting with a clear coating. Liquitex Acrylic Gloss or Liquitex Acrylic Matte Medium can be printed on top of most of the inks tested. These materials are insoluble to water when dry. The screen cleans easily with Wisk and a hot water spray immediately after printing. Naz-Dar Overprint Varnish will provide a semi-gloss surface, while Naz-Dar Synthetic Enamel Gloss renders a higher sheen to the surface. Both these products require solvents for clean-up.



Robert Stackhouse
Untitled
1986

PCA Water-based Screenprinting Workshop edition.
16 ink and pencil drawings on Mylar.
Printed with Hunt/Speedball Water Permanent Acrylic Inks
on Arches Cover, 300 gram paper
h: 79.37 cm × w: 120 cm
Edition: 50.

Bill Wygonik and Bob Blanton of Brand X Editions proofing Stackhouse print on Filbar screenprinting press.

Printing Problems

In the hand-cut paper stencil, paint squeezing under the stencil and beyond the printed image area is generally caused by too much water in the ink or the cut paper stencil was pulled unevenly when attached to the screen. Another possible cause is too much ink per squeegee pull. Check the materials and adjust as necessary.

If ink dries in the screen immediately after the first pull, or if the printed image is incomplete in sections, the following problems may be identified and solved while the screen remains in the hinges, retaining its registration:

Ink is too thick and viscous	Depending on the ink used, add water and/or glycerine, and/or a small amount of transparent base, and remix
The printed image is too light or uneven	Increase the squeegee pressure
Ink is dry in the screen	Mist screen with water; print image on to newsprint repeatedly, clearing out the dry ink
Entire image did not print—details lost	Depending on the ink used, add water and/or a drop of glycerine and/or a small amount of transparent base and remix Try printing from a flood
Bubbles or heavy build-up of ink forms around printed edges	Decrease the amount of water in the ink by adding opaque color or base, remix Another possibility is to increase squeegee pressure
Streaks or blotches in flat printed areas	Make sure flood coating is even Apply firm, even pressure when printing Be certain that ink is thoroughly mixed
Print sticks to screen mesh, or print releases from the mesh slowly, creating halos in the large flat areas of color	Speed up squeegee stroke Try printing off-contact If problem continues, check ink viscosity: add thinners as indicated If problem continues, check that the screen is not warped; the screen mesh tension may need to be tightened by restretching

Registration and printing benefit from using a vacuum table as a printing base. Paper is held in position by vacuum suction while the squeegee is pulled and the screen lifted. This table is standard equipment in commercial shops. College studios may have a manufactured, home-made, or a portable version. The vacuum table top is easily constructed with ¾" plywood drilled with 1/32" holes at one-inch intervals on a grid. An air space of 1½" is needed; sealed air tight with caulk. The suction is provided by a household vacuum cleaner (in flow reverse) and attached by a hose to a hole cut in the middle of the base bottom.

For high volume, large-format printing, a Cincinnati "one-arm bandit" with vacuum table is recommended; the squeegee counterbalanced by a weight is operated by the printer. For even further automation in printing and control, the Filbar screenprinting press is the most applicable to volume production as the machine features an automated squeegee.

From the limited edition of 20 prints to commercial production, the water-based inks demonstrate consistent, quality printing!

State proofs of printing sequence and color variations of Steir image.

Ink Mixing and Color Selection

Mix small amounts of ink to test for color, then print a swatch of the color. The value of the ink as it appears in the mixing container will often be deeper than when it is printed on the paper. Mixing small amounts of ink and test printing will eliminate wasteful mixing of quantities of ink that look color correct in the container but not when printed. Colorist Shanna Linn, when mixing color for the Steir and Stackhouse editions, drew the ink into plastic syringes. Precise units of ink were then extruded and mixed together while Linn kept careful record of the proportions of the mixed inks. Swatches were printed and shown to the artist for approval. After a color was selected, Linn would refer to her original receipe, multiply the units and determine an exact recipe for a larger quantity of that color. A professional color system may not be appropriate for the individual screenprinter or for the classroom situation. Measuring ink with units of teaspoons and cups will aid students in color mixing. Establish general ratios of color, such as, one-part color to ten-parts base as a guideline for mixing.

After selecting a color, mix enough ink to print the entire edition. Consider the amount of ink coverage on the page. A large flat area will require more ink than a linear or textured area. For example, about 8 ounces of ink will print 15 square inches of flat color in a series of 25 prints. Check the ink's consistency. To achieve a honey-like consistency use the designated additive (water, glycerine or other) for the ink system. Do not add more than the recommended amount or the ink will run and blur when printed.

To mix a transparent color, start with a larger amount of base and gradually add the opaque pigment. Test the tint mixture frequently to determine its strength: this approach will help eliminate wasting ink. Students often start with a cup of opaque ink and end up adding five cups of transparent base to establish a tint. Six cups of ink are more than most printing situations require. Ink brands will vary in their mixing characteristics. The type of image printed will also affect the reading of the transparency. For example, a half tone or wash-textured screen can be printed with ink that is one half by volume, transparent base to opaque pigment, and the tone will still read opaque because of the dot pattern.

Most manufacturers offer a wide selection of colors to consider. Selection of one of each of the following colors will provide a color system from which other colors can be mixed: opaque white, black, brown, a warm yellow, a cool yellow, a warm red, a cool red, a warm blue, a cool blue, and transparent base. As one gains familiarity with a specific manufacturer's color line, in particular the ink's pigment saturation, a broad spectrum of colors can be easily mixed. Some hues are achieved through the combination of two or more pigments, so that in mixing they may react differently than expected. For example, in a spectrum, red mixed with blue yields purple. In mixing a screenprinting ink, a warm red combined with a cool blue often yields a brown. Since the ink contains more than one pigment and a variety of chemicals, you can not anticipate screenprinting colors to interact like spectral light.

Color Chart

color	warm	cool
red	cadmium, fire	cerise, alizarin, magenta
blue	turquoise, peacock, cyan	ultramarine, royal
yellow	medium	primrose, lemon, process yellow

Colorist Shanna Linn demonstrating controlled color mixing.

Ink Brands

We have focused on and tested the water-based inks that have been on the market for a number of years. The inks have been tested in classroom situations as well as in professional studios. Our findings and comments are based upon both of these conditions. To present as accurate a comparison as possible, each of the inks is described and evaluated to the best of our knowledge in the following categories: consistency, color range, transparency, opacity, additives, removal of ink from the screen, and general comments.

Throughout this handbook, brand names of frequently-used products are mentioned. These references are not commercially sponsored endorsements. Rather, they identify products which, through trial and error, have proven to be the most effective. The brand names are included as a means of facilitating your success in establishing your water-based screenprinting studio.

Advance Aqua Set

Textile Ink, WIT Series

Consistency

Ink consistency will vary from color to color. The opaque white for example is very thick, does not flow, and requires the addition of water to achieve printing consistency. Brown WIT 602 RM has a good printing consistency straight from the container. Other colors, such as golden yellow or fuschia have a pudding-like consistency, as if transparent base had been added. Water or glycerine can be added to adjust ink viscosity. Bodying Agent WIT 866 is a milky white liquid (with a strong odor), that can be added to thicken the ink. Use sparingly, for a few drops of WIT 866 will react immediately when mixed with the ink. The ink is very stable after mixing and storing.

Color Range

Excellent, full range of colors. Fluorescent and process colors are also available.

Transparency

Developed for textile use, these inks are often transparent when used straight from the container. They yield a dye effect when printed. 100% golden yellow when printed on top of 100% brown, is absorbed into and blends with the brown. The inks seem to have transparent base already added to them in the manufacturing process: when 100% fuschia is printed on top of 100% brown the colors mingle and blend. These inks also did not carry their tinting strength as far as some of the other tested inks due to their initial transparency. Good tinting strength was demonstrated in mixtures of one cup of transparent to 2, 1, or ½ teaspoons of color. Beyond that ratio, the color vanished into the page. The process colors, red, blue, and yellow, have greater intensity and greater tinting strength. Aqua Set Transparent Base tends to yellow when mixed with light colors. Artist and screenprinter, Nancy Mc Gee of Milwaukee, has extensively tested both the Aqua Set Inks and the Hunt/Speedball Permanent Acrylic Ink. She supplements the Permanent Acrylic's color range by adding Aqua Set process colors, which have good transparency, tinting strength and luminosity. Mc Gee mixes Aqua Set process colors with Hunt/Speedball Permanent Acrylic Transparent Base to avoid the yellowing problem caused by the Advance Aqua Set Transparent Base. The manufacturer recommends that you do not intermix ink brands.

Opacity

Developed as a textile ink, Aqua Set inks are not meant to be opaque or completely block out other colors. The opaque white, however, when printed at 100% on top of the brown did completely cover the brown. Black is also opaque. As mentioned in the section on transparency, most colors straight from the container blend with overprinted. To make a color such as golden yellow or fuschia opaque, add white. The white pigment lightens color value.

Additives

Water or glycerine added to ink adjusts viscosity and prevents drying. As a guide, mix one ounce of glycerine to one gallon of ink. Bodying Agent can be added to decrease the flow of the ink. Add the agent a drop at a time. Retarder and an extender base are available.

Removal of Ink from the Screen

Scoop up excess ink from the screen and save in lidded containers. Hose ink from screen using warm water. Liquid detergent can be applied to ensure thorough ink wash-out. Sponge softly to remove ink from stencil edges. If ink has dried in the screen it can be quite difficult to remove from the mesh. First scrub with detergent, Advance recommends the use of a power washer to hose ink out of the mesh. When screen is dry, apply Advance T 902 Fast Wash Up solvent to the clogged area. Use soft cloths to apply the solvent and scrub clog from both sides of the screen until the mesh is clear. Wear solvent-resistant gloves and work in a well-ventilated area when using the T 902 Fast Wash Up solvent. Degrease the screen after using solvent with mesh prep or mesh paste.

Comments

The Aqua Set inks dry to a matte finish. Ink soaked into the paper, little ridging or build up occurred when overprinted or absorbent paper. Color lightfastness ratings were not available from the manufacturer. Being a textile ink, the ink had been tested for wash-fastness, which relies on heat setting. The manufacturer states that lightfastness will be better when using the ink at full strength. Inks are less lightfast when mixed with white or when transparent base is added. Air Cure Catalyst WBC-892 does not affect lightfastness. It was not included in our study.

When proofing is halted during the printing process, water can be misted onto the screen to prevent the ink from drying in the mesh. When proofing resumes, print several trial proofs without ink to "print-out" the water from the mesh. More ink can then be added and printing resumed. For our tests, screens with #196 polyester monofilament mesh were used with no clogging problems. Most inks had no odor, with the exception of the opaque white, which had a strong ammonia-like smell. Ammonia is sometimes used to achieve "bodying" or viscosity when used in conjunction with a polyacrylate. The bodying agent also had a strong odor; the container should not be left open while working. Use in a well-ventilated area. Dark colors did stain the mesh but there was little staining of rubber mixing spatulas. Prevent the inks from freezing. The inks will mold after opening and exposing to warm temperatures; simply skim off mold and continue using the ink. The inks and extender base WIT 800, are not flammable and contain less than 1% mineral spirits. If ink splashes into eyes, wash with water for 15 minutes; if swallowed, induce vomiting and call a physician. Wash ink off skin with soap and water. The Aqua Set inks have not been submitted to the Art and Craft Materials Institute for testing and rating.

Since our research, Advance has changed their policy and will no longer sell this product to individuals, artists or schools; it is available only to industrial clients. We include it because some artists may still have access to this product.

Hunt/Speedball
Permanent Acrylic Ink

Consistency

The consistency of these inks is excellent. Hunt/Speedball Permanent Acrylic Inks are ready to use straight from the container for printing a saturated or darkest version of a hue. Water or a few drops of glycerine can be added to adjust viscosity and help prevent ink from drying in the mesh. During the printing of the Stackhouse image no water or glycerine was added to the ink. No adjustment was necessary even with the white ink, which tends to be thick due to its high solids content: very stable after color mixing and storing. Inks mixed, stored in tightly sealed containers and opened one week later needed no adjustment. Hunt/Speedball Permanent Acrylic Ink demonstrates good shelf life after mixing and storing. After exposure to warm temperatures, the mixed ink develops mold. Simply skim off mold and continue using the ink.

Color Range

The color range of these inks is excellent. A full selection of colors are available from which any color can be mixed. Colors are bright with pure hues, not muted or too neutral. Artist quality acrylic paints, including metallic or pearlescent, can be added to the transparent base or inks to extend the palette. Process colors are available in this ink line.

Transparency

Hunt/Speedball Permanent Acrylic Inks have excellent tinting strength. Color remains brilliant and luminous as transparent base is added. The label on the transparent base container instructs not to add more than 50% base to the ink: when testing we found greater quantities could be added with no resultant printing problems. One tint mixed from the Stackhouse print was ½ teaspoon of color to one quart of base, a ration of 1 part color to 400 parts base. Hunt/Speedball has recently (fall 1986) reformulated the transparent base to cut down on ink bubbling and "swirl" marks that occur when printing a large flat area. The No-Heat Transparent Textile Base has been discontinued.

Opacity

Overall these inks demonstrate a very good opacity. To completely cover other colors, straight white ink has to be overprinted twice. Opacity for dark colors is very good. Lighter colors vary in opacity.

Additives

Water or glycerine can be used to adjust the viscosity or prevent drying in the screen. As a guide, add one drop glycerine for every four ounces (½ cup) of ink. Retarder Base contains glycerine and will slow drying time of the ink to several hours. It is recommended to add no more than 25% retarder base by volume to the ink. An extender base is available that can be added to the ink. It will reduce bubbling of the ink and maintain print quality when printing with very transparent ink mixtures.

Removal of Ink from the Screen

Scoop up excess ink from the screen and save. Hose ink from screen using warm water. Ink tends to cling to the mesh; apply a solution of diluted liquid detergent, such as Wisk and softly scrub with a sponge to thoroughly remove ink. This will prevent color build up from the stencil edges. To remove dried ink from small areas of the mesh, apply denatured alcohol to the dry screen mesh with soft cloths. Rub the clogged area vigorously from both sides of the mesh until the clogged area clears. If alcohol will not remove the clog, use the same method and apply lacquer thinner. Use these solvents in a well-ventilated area and wear solvent-resistant gloves. Degrease mesh after applying any solvent to remove solvent residue.

Comments

These inks dry to a permanent matte finish. Ink soaks into the paper: little ridging or build up occurs when ink is overprinted. The manufacturer's ratings of color lightfastness range from "good" to "excellent". Lemon yellow, orange, and dark red received the "good" ratings, all others were rated "excellent".

During press-side conferences when proofing was halted, water was misted onto the screen to prevent ink drying. When proofing resumed the first few proofs were printed without ink to "print-out" the water from the screen. More ink was then added and printing continued with excellent results. The finest mesh used was #280 with no clogging problems. The inks have little or no smell; the transparent base does have a slight odor. Ink easily rinsed away from utensils with no noticeable staining. Even dark colors did not stain the screen mesh. Prevent inks from freezing. It is recommended that inks are stored at room temperature in tightly sealed containers. Hunt/Speedball Permanent Acrylic Inks have been certified as AP, Approved Product, non-toxic, by the Art and Craft Materials Institute.

Hunt/Speedball

Water Soluble Ink

Consistency

The consistency of the Hunt/Speedball Water Soluble Ink has been rated fair. Upon first opening ink container, the ink is thick, lumpy, and has a separate layer of liquid on the top. After stirring thoroughly, the ink becomes more fluid. All colors have a high content of solids and require the addition of water and transparent base before printing. During the printing of the Steir image, 50% transparent base with 20% water to total volume of ink was added to achieve printing consistency for "opaque" colors. The ink was never used straight from the container. If the ink is used straight from the container, it is difficult to press through the mesh, tends to dry in the screen, and dries to a thick layer on the paper. Inks mixed, stored in tightly sealed containers, and opened one week later, needed adjusting before printing. More water and base are needed to return ink to printing consistency. This second adjustment lightens the color; subsequently more ink and base must be added to return ink to its original color strength. When stored in metal containers, ink will rust the container. Some colors, especially magenta, are fugitive and will fade over a short period of time. After printing and drying the ink may separate and bleed outside of the printed edge or thru an overprinted color. The ink will dry out even when properly stored giving it a shorter shelf life after it is opened. The ink will mold after opening and exposure to warm temperatures.

Color Range

The color range is good; however, it is limited in the blues and greens. A bright turquoise, for example, can not be mixed from the available inks. Watercolor or gouache can be added to the transparent base to extent the palette. If the inks are added to the tint mixture, they will overpower the watercolor or gouache.

Transparency

Due to the opacity and the high content of solids these inks will retain brilliance when mixed to a medium range of transparency. Brilliance is lost when mixed to a very transparent tint. All colors seem to have white solids content so that when mixed with transparent base, the tint seems cloudy. For light tints, watercolor or gouache added to the transparent base is more effective.

Opacity

Hunt/Speedball Water Soluble Ink colors are very opaque. Dark colors, black, brown and blue when mixed 50% transparent base with 20% water to total volume of ink for printing consistency, were completely opaque. White or yellow mixed to the same proportion were not completely opaque. Overprinting was necessary to completely block out a darker color printed beneath the yellow or white.

Additives

Add water and transparent base to adjust the printing consistency. Both will inhibit the drying of the ink in the screen.

Removal of Ink from the Screen

Scoop up and save excess ink. Hose ink from the screen with warm water. Ink does tend to cling to the screen surface: soft scrubbing with a sponge will aid in wash out. To remove ink from screen, hose with hot water and scrub, until ink residue is dissolved.

Comments

Hunt/Speedball Water Soluble Inks dry to a matte finish. After printing and drying on the page, the ink is still water-soluble. If printed in too heavy an application, inks will dry to a shiny finish and will eventually crack off from the surface. Thinned inks will soak into absorbent paper with little ridging or build up. Ratings of color fastness range from "poor" to "excellent" Magenta was rated "poor" to "fair". Violet and orange were rated "fair". Yellow and red were rated as "good". All others were rated "excellent" by the manufacturer. Do not mix Hunt/Speedball Water Soluble Inks or base with Hunt/Speedball Permanent Acrylic line of ink. When mixed, this combination will coagulate and be unprintable.

During press-side conferences when proofing was halted, water was misted onto the screen to keep the ink from drying. When printing resumed, the first few proofs were printed without ink to "print-out" the water from the screen, and then more ink was added. The finest mesh used was #200; finer meshes tended to clog. There is a slight smell to the ink. Dark colors will stain the mesh and rubber mixing utensils. Prevent inks from freezing.

Due to the high solids content in the ink; it can be difficult to press through the mesh. As a result, ink collects around the stencil edge and dries, causing uneven printing. Firm squeegee pressure can alleviate this problem. Young children, senior adults or anyone who has difficulty excerting pressure continuously while printing may experience this problem. Team printing, or having two people push down on the squeegee is one solution. Lowering the height of the printing table is another.

In overprinting or attempting to trap colors in successive printings of a multi-color print, paper stencils can become stained with previous colors and occasionally offset that color during the subsequent color run. The dampness of the ink affects the previously printed colors. This problem is unqiue in the use of hand cut stencils, and has not occurred while printing with photo stencils.

One tester did note skin drying and irritation after prolonged contact with the ink. We recommend use of rubber gloves to those who have sensitive skin or allergies. Hunt/Speedball Water Soluble Inks have been certified as AP, Approved Product, non-toxic by the Art and Craft Materials Institute.

Consistency

The consistency is excellent: TW Graphics WB 1000 are ready to use straight from the container. The flowing consistency of the ink does not vary from color to color. The white ink and the extra-pigmented white also have good-flow consistency. Addition of clear base is recommended to adjust viscosity, when necessary and prevent the ink from drying in the screen. Water in small amounts can also be added to adjust the ink. Without clear base or water added, some testers noted that the ink became sticky or gummy during printing. The ink did not, however, dry out completely, and there was no problem washing the sticky ink out of the screen. The amount of clear base or water added depends entirely upon the printing situation. The total volume of ink can be altered to include 1%—12% clear base or water. For example, we added 2 teaspoons of water to 1 cup of ink. The ink is very stable after color mixing storing. Inks mixed, stored in tightly sealed containers, and opened one week later did not need adjustment. These inks have an excellent shelf life.

Color Range

TW Graphics WB 1000 inks have an excellent color range. The reds tend to be dark: the cerise is darker and more neutral than most clear, cool process magentas in other ink lines. Most colors are made from a single pigment source or mixture of single pigments. The colors, when mixed together, did not shift or neutralize as did some of the other brands we tested. Colors blend in a manner similar to oil paints.

Transparency

The inks have excellent tinting strength: color remained brilliant and luminous as transparent base was added. Chrome yellow medium held its tinting strength at ⅛ teaspoon chrome yellow to ½ cup clear base: a ratio of 1 to 200. There was no bubbling of the ink when mixed with high ratios of clear base.

Opacity

With the TW Graphics WB 1000 Water-base Inks, lighter colors are successfully printed on top of darker colors, exhibiting very good coverage. 100% chrome yellow allowed little show-through of the 100% iron oxide brown on which it was overprinted. 100% turquoise blue when printed on top of 100% iron oxide brown completely blocked out the brown. Also available in the WB 1000 line are two white inks: WB 1010 white for mixing and WB 1012 extra pigmented white for opaque coverage. Colors cut by 50% with clear base, such as chrome yellow, still demonstrated very good opaquing power.

Additives

Clear base or water is added to adjust ink viscosity and prevent drying in the screen, it is important when adding water to mix the water thoroughly into the ink. In hot weather the manufacturer recommends adding up to 2% by volume of TW 1816 to keep the screen open: added in that amount drying time is not affected. WB 1001 reducer base is the extender for the line. WB activator is available to increase the ink's resistance to water when dry and is used when printing wall coverings or markings on vehicles. The activator is not necessary when printing on paper and it was not included in our testing.

Removal of Ink from the Screen

Scoop up excess ink from the screen and save in lidded containers. Spray screen with 409 or Fantastic cleaners. Let cleaner react for a few minutes then hose away ink with water. Softly sponge to loosen ink that may cling to the mesh. Solutions that are alkaline will react with the ink and effectively clean ink away. A mixture of one cup of ammonia to one gallon of water can be used in place of prepared cleaners. TW Graphics also manufactures screen cleaners S-03 and S-032 that are used in the same method as those listed above. To remove dried ink from the mesh, apply the above-mentioned cleaners directly onto the clogged area and scrub. The clog will lift away.

Comments

WB 1000 is a matte finish ink permanent upon drying. The WB 2000 is very similar to the WB 1000 except it dries to a gloss finish. There are several other lines of TW Graphics inks that are suitable for printing on metal and plastic. Even though the inks are water-based, are diluted with water and clean up with water, they contain small amounts of solvents. The inks do have an odor. Good ventilation is recommended and is necessary especially in a classroom or studio situation. The Material Safety Data Sheet advises that high concentrations of the ink may cause headaches, dizziness and nausea. These colors: the chrome yellows, deep red, burgundy red, and chrome greens contain lead chromate. The inks must be handled with care. It is not recommended to mix any other manufacturers products into these inks. These inks may clog septic tanks. Consult with the manufacturer for recommendations if you have a septic tank into which the inks would be washed.

The inks soaked into the paper with little ridging or build up. The manufacturer's ratings of color lightfastness range from "good" to "excellent"; individual color ratings were not available. Water can be sprayed onto the screen to prevent ink from drying when delays in proofing occur. When proofing is resumed, add more ink and continue printing. Screens with #280 mesh count were used with not clogging problems. There is no staining of mesh or rubber mixing utensils. Freezing during shipment does not affect the ink: once thawed, the ink can be used. The WB 1000 line has not been submitted to the Art and Craft Materials Institute for testing.

Ink Products Chart

Brand Name	Recommended for School use			May contain lead	Contains solvents	Contains water only
	Elementary	Secondary	College			
Hunt/Speedball Permanent Acrylic Inks	■	■	■			■
Hunt/Speedball Water Soluble Inks	■	■	■			■
TW Graphics WB 1000			■ *	■ **	■ ***	
Advance Aqua-Set Inks	Not available to individuals or schools, industrial clients only					

* Experienced students perhaps graduate level, using proper protective equipment. See cautions below.

** Some colors contain lead pigments.

*** Caution is advised when using products that contain glycol ethers. Glycol ethers can be absorbed through the skin, as well as inhaled and have been associated with liver and kidney damage, and anemia.

There are a variety of printing papers available that are suitable for use with water-based inks. Heavier, smooth papers will absorb ink without buckling and retain clear crisp detail. Thinner papers are not stable and will warp or buckle causing print registration problems. Roughly-textured papers will cause uneven ink coverage when printed. As a guide, paper gram weights between 235 grams to 320 grams are stable and appropriate for water-based printing. Lighter-weight papers, such as Japanese papers (30 grams to 180 grams) can be experimented with. Warping is to be expected with thinner papers. Also recommended are sized papers which have a glue-like material added, controlling ink absorbtion and increasing stability. Due to the sizing, inks tend to sit on the surface rather than soak into the paper. A light-weight Japanese paper which is sized will be more stable than an unsized Japanese paper.

An equally important factor in paper selection is longevity. Acid free, 100% rag, or neutral pH papers will not discolor or deteriorate as do sulphite papers. Aesthetic considerations, such as, color, surface texture, and appropriateness to the image are factors in paper selection. When printing multiple layers of transparent inks, for example, it is important to consider that the colors will appear more luminous on a bright white paper than on a cream or buff paper.

Finally, experiment with various papers. Take into consideration the amount of ink coverage on the page and the number of layers of ink that will be printed. One layer of a flat background color may cause more buckling than several printings of linear or textured area scattered across the page. In some situations a lighter-weight paper may be suitable.

Listed alphabetically, the following papers have been tested and recommended for use with water-based inks. All are available nationally through mail-order suppliers. Other papers with similar charactistics may be available regionally, test for stability and absorbency.

Aquaprint Silk Screen:
100% rag, 235 gms or 290 gms
Aquaprint by Dolphin Papers is a smooth-surfaced paper, internally and externally sized to retain stability. After many over-printings the 290 gms weight paper did not buckle. Comparatively inexpensive, Aquaprint is recommended for classroom or studio use.

Arches Cover:
100% rag, 250 gms, 270 gms, 300 gms
One of the most popular printmaking papers, Arches Cover is also suitable for water-based printing. The 300 gram weight was used for the Robert Stackhouse edition. In printing the Stackhouse image, the paper readily absorbed the ink. Some buckling did occur when a flat background color was printed, but not enough to cause registration problems. After drying and stacking under weight the prints flattened out.

Arches 88 Silk Screen:
100% rag, 300 gms, 350 gms
Bright white in color, Arches 88 is a water-leaf paper and contains no sizing. The heavyweight of the paper prevents warping when printed. The surface is very smooth and hard. If water is spattered on the surface the paper will bubble up and will not flatten out when dried.

Dansk:
100% rag, 320 gms
Dansk has a vellum finish designed for direct lithography printing. The hard, smooth finish makes it very appropriate for water-base printing.

Domestic Etching:
50% rag, 175 gms
Due to the light weight of Domestic Etching it is susceptible to buckling. It is inexpensive and recommended for proofing.

Gallery 100:
100% rag, 245 gms
Available in vellum or smooth finishes, Gallery 100 is sized with calcium carbonate. The sizing gives the paper a hard surface similar to a hot press paper and a very good printing stability.

Giovanni:
(formerly Italia) 50% rag, 310 gms
Giovanni is a white, slightly textured paper which absorbs ink readily. The heavy weight of the paper prevents buckling.

Inomachi Nacre:
100% kozo, 180 gms
A handmade paper of 100% kozo, Inomachi Nacre is very smooth to the touch. The long fibers which the paper is made of give the surface a swirly pearlized appearance. The paper readily absorbs ink without buckling. In areas where flat colors are printed, the long fibers absorb a greater amount of ink and create a texture.

Lana Gravure:
100% rag, 250 gms
Lana Gravure is an off white, slightly textured, and very absorbent paper. Some slight buckling was noticed after five overprintings of flat color areas, but registration was not affected.

Mirage:
100% rag, 310 gms
Mirage from Rising Paper is available in vellum or plate finish. The plate finish is very smooth; both finishes allowed for crisp definition of printed edges.

Newsprint:
Smooth newsprint paper is recommended only for proofing.

Rives BFK:
Rives BFK Heavyweight, Rives Heavyweight—250 gms, 280 gms, 175 gms, all 100% rag
Lightly sized, Rives BFK is a standard paper for many printmaking processes, including water-based screenprinting. Available in a variety of colors. Rives Heavyweight (175 gms) is susceptible to buckling when flat areas of colors are overprinted.

Stonehenge:
Stonehenge Heavyweight—245 gms, 320 gms, both 100% rag
Stonehenge Heavyweight was used for the editioned screenprint of artist Pat Steir with excellent results. A smooth-surfaced paper, sized with calcium carbonate, the Heavyweight did not buckle after many overprintings. Stonehenge, 245 gms is also smooth surfaced and sized for printing stability. Both are available in a variety of neutral colors.

Tiepolo:
(formerly Fabriano CMF Etching)—290 gms, 100% rag
Tiepolo has a slightly textured surface. Heavy sizing in the paper gives it good printing stability.

Utrecht Printmaking Paper:
100%, rag, 250 gms
Inexpensive relatively smooth surface paper which does not buckle with overprinting: available in white and buff.

Screen Reclaiming

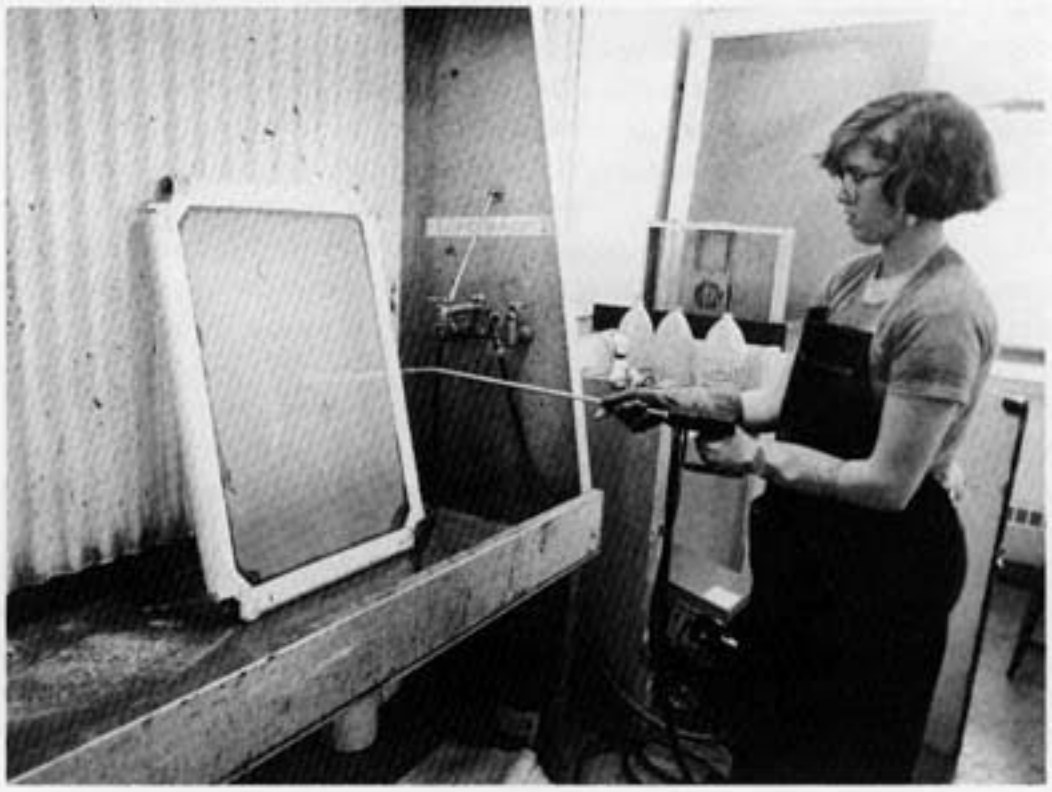
Some of the strongest chemicals in the screenprinting process are used in the reclaiming procedures. Screen reclaiming is the removal of hardened photo emulsion, screen filler, or drawing fluid from the screen fabric so that the screen can be reused. Thorough removal of the printed stencil from the mesh is critical to the success of subsequent stencils. The removal of stencil material is accomplished through a chemical reaction. The appropriate chemical for the fabric and stencil is applied to the hardened stencil causing it to soften, break down and wash away. The Hunt/Speedball Screen Filler, for example dissolves and scrubs out when soaked in Wisk, Mr. Clean or 409 Cleaner. Direct photo stencils, however are designed to meet industrial printing standards which means withstanding the friction of thousands of printings without breaking down. The application of strong caustic chemicals is required to remove such durable stencils. It is very important to follow the manufacturer's procedures and recommendations. The Material Safety Data Sheet for the product should be read and precautions taken before using. Rubber gloves should be worn when applying reclaimer and scrubbing out screens. If reclaimer is sprayed onto the mesh, a mask should be worn to prevent inhaling the chemical. Eye or skin contact should be avoided. Using a paste screen reclaimer may eliminate the possibility of splashing reclaimer in one's eyes.

Reclaiming Products and Process

Reclaim screens as soon after printing as possible. The longer stencil material or hardened emulsion stays on the mesh, the more difficult it is to remove. Cleaning screens with monofilament mesh is somewhat easier than other meshes. The smooth, non-fiberous structure of the thread allows the reclaimer to lift away the stencil material. Using a pressure washer ensures thorough reclaiming. A worthy addition to the print studio, the unit is hooked up to the washout sink. Combining air pressure with water, the washer directs a strong jet of water onto the soften stencil. Wear rubber gloves, glasses or goggles, and an apron when using the pressure washer. Also spray the screen first without pressure to wash away most of the reclaiming solution. Then turn on the pressure to thoroughly wash away emulsion from the mesh. Due to the pressure, most washer units cause the water to splash back in a fine mist, the mist may contain reclaiming solution as well as water. Avoid contact with this mist. Screens must be stretched well to withstand the continued use of a pressure washer. A pressure washer may push through a screen stretched by the rope and groove method. Consult the reclaiming chart for treatment of specific stencils. The general procedures for screen reclaiming are:

1. Clean printing ink thoroughly from the screen by hosing it with water.
2. Follow manufacturer's recommendations and apply reclaimer liquid or paste onto the stencil. One method is to place the screen flat on a bed of newspapers, in a large tray. The reclaimer is then poured or brushed onto the stencil. Make sure the entire stencil area is covered. Clean any reclaimer spills immediately.
3. Let soak so that the reclaimer will react with and soften the stencil. Do not let the reclaimer dry to the fabric: reapply reclaimer to prevent drying.
4. Scrub with brush to loosen stencil, especially areas where the stencil was thickly applied.
5. Wash out thoroughly by hosing with water. Check to make sure all of the stencil has been removed.
6. Brush on mesh prep, mesh paste or screen degreaser liquid. Scrub to remove emulsion or reclaimer residue. Hose out with water.
7. Let dry, screen is ready for next stencil.

Problems with screen reclaiming usually occur when stencil material is thickly coated, overexposed, or when hardened photo emulsion or ink has been left in the fabric for long periods of time. All of these instances require vigorous scrubbing. A thin coating of emulsion, screen filler, or drawing fluid is recommended. Even thin coats of emulsion can be difficult to remove when left in the fabric for long periods of time. Our screen reclaimer tester found that six month old diazo photo stencils could not be removed by scrubbing for twenty minutes, while using a regular hose. The stencil was removed, however, after scrubbing and using the power washer. Some emulsions that had only been in the fabric for three weeks resisted reclaiming. Repeated reclaiming with a power washer finally removed the stencil.



Cleaning and reclaiming screen using power washer.

After reclaiming a screen, occasionally a streak or a thin ring of dried emulsion around the stencil border is noticed. This can be caused by dried ink that was not completely washed out before reclaiming. Repeat the reclaiming steps concentrating on the affected areas. Sometimes dried emulsion is in unusual configurations, blotches, or patterns unrelated to the image that was printed. This can be caused when the soft emulsion is not completely washed out in the reclaiming process. The softened emulsion must be sprayed out of the mesh completely or it will dry and reharden in the mesh. Softened emulsion that has rehardened in the mesh results in a stronger, tougher clog. A second application of a stronger mix of screen reclaimer may or may not be effective. Another solution is to dry the screen and use denatured alcohol: pour a small amount of denatured alcohol onto two cloths and rub the affected area vigorously from both sides of the screen. If the alcohol does not remove the clog, consider using a haze remover. Use alcohol only in a well-ventilated area, wearing rubber gloves. After applying alcohol to the mesh, degrease the mesh with mesh prep or mesh paste to remove any residual solvent. Solvent residue will cause the next layer to clog in the same area. The best prevention of rehardening or rebinding is careful, thorough reclaiming.

Haze Removers

After repeated use, screen fabrics develop ink stains or "ghosts" of previous images. Some inks and colors, such as brown, black, and magenta will stain more than others. These stains will not wash out: they can be distracting when coating the screen, drawing stencils, and printing. Most importantly, they interfere with exposure of photo transparencies. Developed for industrial use, haze removers clean away these stains as well as dried-in ink and emulsion. The products are effective but contain caustic chemicals and are very corrosive. They must be properly handled. It is not recommended that haze remover be left out in a community or school studio where it could be inadvertently misused. Consult the Material Safety Data Sheet and follow the manufacturer's instructions. Haze removers must be used in a well-ventilated area: breathing these vapors can cause irritation of the nose and throat, nausea and vomiting. Rubber gloves and goggles must be worn. These products cause chemical burns on contact. Vapors should be fan blown away from the person using the haze remover and from other people in the vicinity. Treatment of screens with haze remover is not part of the regular reclaiming procedure. Before using a haze remover consider the gravity of the clog and the environment the product will be used in. Rather than using a haze remover in an unventilated area, restretching a screen with new mesh is advised.

Stencil Reclaiming Chart

Stencil	Reclaimer	Method
Wax crayon (resist stencil)	Mineral spirits/or Paint thinner	Rub clogged areas with solvent on soft cloths. Wear gloves. Continue rubbing until crayon is removed. Degrease mesh after using solvent.
Caran d' Ache (water soluble crayon)	Hot water	Soak screen, scrub with brush until crayon dissolves. Rinse clean with hot water.
Hunt/Speedball Screen Filler	Mr. Clean/or Wisk or 409 Cleaner	Apply cleaner to both sides of screen. Let soak 15 mins. Scrub with nylon brush. Spray with hot water to rinse filler from mesh.
Hunt/Speedball Drawing Fluid	Cold water	Soak screen with cold water, let sit. Drawing Fluid will dissolve. Scrub with nylon brush if necessary. Rinse clean.
Ammonium Bichromate Photo Emulsion	Household bleach diluted: one part bleach to four parts water/or use screen reclaimer (see Reclaimer Chart)	Apply bleach or reclaimer to both sides of the screen. Scrub with nylon brush until photo emulsion dissolves. Wear gloves. Do not let reclaimer dry in screen. Spray with hot water to thoroughly clean screen. Degrease mesh. *Note: Read manufacturer's caution and Material Safety Data Sheet before using any reclaimer. Use pressure washer if available.
Diazo Photo Emulsion	Screen reclaimer (see Reclaimer Chart)	Apply reclaimer to both sides of the screen. Scrub with nylon brush until photo emulsion dissolves. Wear gloves. Do not let reclaimer dry in screen. Spray with hot water to thoroughly rinse reclaimer from mesh. Degrease mesh. *Note: Read manufacturer's caution and Material Safety Data Sheet before using any reclaimer. Use pressure washer if available.

Screen Reclaiming Products Chart

Screen Reclaimers	Emulsions				Comments
	Ammonium Bichromate	Magicol-T (diazo)	Nazdasol (diazo)	Ulano-TZ (diazo)	
Diluted Household Bleach	■			■	Do not use bleach on silk mesh. Use only in ventilated area.
ICC 767	■	■	■	■	Industrial strength, premixed solution. Very effective. Only available in 5 gallon 30 gallon sizes.
MBC Screen Reclaiming Crystals	■	■	■	■	Comes in crystal form that is mixed into liquid solution. Strength can be increased when necessary, by doubling the recipe. Very effective industrial strength.
Ulano #4 Stencil Remover Liquid	■	■		■	Premixed liquid, effective, Available in quart, gallon, or 5 gallon sizes.
Ulano #5 Stencil Remover Paste	■	■		■	Thick consistency keeps the reclaimer on the mesh and cuts down on waste. Same active ingredient as Ulano #4. Effective, available in quart, 1 and 2 gallon sizes. Thickness also prevents splashing of reclaimer into eyes.

Ink Suppliers

Listed below are ink manufacturers. Contact the manufacturers for regional suppliers.

Aqua Set Textile Ink WIT Series:
Advance Process Supply Company
440 N. Noble Street
Chicago, IL 60622
(other Advance offices are located throughout the nation)

Hunt/Speedball Water Soluble Ink and Hunt/Speedball Permanent Acrylic Inc:
Hunt Manufacturing Co.
230 South Broad Street
Philadelphia, PA 19102

WB 1000 Water Base Ink:
TW Graphics Group
7220 East Slauson Avenue
City of Commerce, CA 90040

Screen Reclaimer Suppliers

Advance Process Supply Company
400 N. Noble
Chicago, IL 60622

Intercontinental Chemical Corp.
4660 Spring Grove Avenue
Cincinnati, OH 45232

Majestech Corp.
PO Box 440, Route 100
Somers, NY 10589

Photo Process Screen Manufacturing Company
179 W. Berks Street
Philadelphia, PA 19122

Ulano Corp.
255 Butler Street
Brooklyn, NY 11217

Paper Suppliers

ANW-Crestwood
(Formerly Andrews/Nelson/Whitehead)
315 Hudson
New York City, NY 10013

David Davis Fine Art Materials Company
539 La Guardia Place
New York, NY 10012

Dolphin Paper
624 E. Walnut Street
Indianapolis, IN 46204

Graphic Chemical & Ink Company
728 North Yale
Box 27
Villa Park, IL 60181

Stephen Kinsella Inc.
PO Box 6863
Brentwood, MO 63144

Guy T. Kuhn Papers
31 S. Potomac Street
Hagerstown, MD 21740

New York Central Supply Company
62 Third Avenue
New York, NY 10003

Rising Paper Company
Park Street
Housatonic, MA 01236

Daniel Smith Inc.
4130 1st Avenue S.
Seattle, WA 98134

Utrecht Manufacturing Corp.
33 Thirty Fifth Street
Brooklyn, NY 11232

Stencil Materials

Chaselle
9645 Gerwig Lane
Columbia, MD 21046

Hunt Manufacturing Co.
230 South Broad Street
Philadelphia, PA 19102

Utrecht Manufacturing Corp.
33 Thirty-Fifth Street
Brooklyn, NY 11232

Equipment

Cincinnati One-Arm Squeegee, Power Washer

Majestech Corp.
PO Box 440, Route 100
Somers, NY 10589

The Naz-Dar Company
1087 N. North Branch Street
Chicago, IL 60622

Photo Process Screen Manufacturing
Company
179 W. Berks Street
Philadelphia, PA 19122

Filbar Screen Printer,
Poly-Lite Exposure Unit,
Scoop coaters

Advance Process Supply Company
440 N. Noble Street
Chicago, IL 60622

Solvent gloves, respirators

Advance Products Co.
1021 Spring Garden Street
Philadelphia, PA 19123

Lab Safety
P.O. Box 1368
Janesville, WI 53547

VWR Graphics
7930 National Highway
Box CN-92001c
Pennsauken, NJ 08110

Photography: David Denick, Lois M. Johnson and Hester Stinnett

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