Fireworks: Raku and Sawdust Fired Photography

Jerome Nevins

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FIREWORKS

Raku and Sawdust Fired Photography


Thesis Submitted: May, 1976 Bevier Gallery, R.I.T.

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Joel M. Swartz
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A Monologue

Scene: Fifth Avenue, between Thirtieth and Thirty-first Streets
Enter. Hamlet. Stei chen, wearing a Japanese obi as a necktie.

To paint or photograph -- that is the question:
Whether 'tis more to my advantage to color
Photographic accidents and call them painting,
Or squeeze the bulb against a sea of critics
And by exposure kill them? To paint--to "snap":
No more; and, by a snap, to say we end
The heartache, and the thousand natural shocks.
That art is heir to-- 'tis a consummation
Devoutly to be wish'd. To paint, to snap;
Perchance to tell the truth: -- Aye! there's the rub.
How may a fact be lost in fuzziness
When we have cast aside the painter's brush
must give us pause: There's the respect
That makes picture-painting of so long life;
For who would bear the whips and scorns of time,
The dealer's wrong, the patron's proud contumely.
The pangs of despised art, the cash's delay,
The "nerve" of the profession, and the spurns
That patient merit of the unworthy takes,
When he himself might triumph over all
With a base camera? Who would brushes clean?
To grunt and sweat in schools or studios,
But that photograms were not dependent
On some manual fake: Photography turned painting;
Paintographs or Photopaints; a sad plight,
Which makes me rather bear (at times) the painter's ills
That turn entirely secessionist.
Thus producence makes chameleons of us all;
And thus my native store of "faky" talents
Is sicklied o'er with scarcity of tricks;
And enterprises of great moments to A.S.,
With this regard, their currents turn away
And lose their name: artistic. Soft you now!
The Kâšebier, austere, comes down the street. Nymph of Newport;
In thy brownish tint be all my sins remembered! 

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INTRODUCTION

The subject of this thesis is a product, I believe, of all the subtle proddings of methods and purposes of my study of photography at the M.F.A. level at Rochester Institute of Technology between 1974 - 76. My goals as a student were to explore as deeply as possible, ideas and ideologies relative to image making via photography as well as its materials and processes. The development of a consistent and recognizable and perhaps "saleable" style during my two years at RIT did not interest me. Thus, this thesis has concerned itself with process, reason and idea, not with product.

At the beginning of my second year of study, I became quite dissatisfied with the "regular" methods and procedures of photography:--Commercially manufactured film snapped through a commercially available camera, printed on factory-made, ultra controlled, printing paper in, of all places, a smelly dark-room!! I began to feel as if I were a spectator to the creative process--on the sidelines conceptualizing the photograph at best and never really getting viscerally involved. What is more, those commercial photo materials began to seem "unreal" that is, without substance--an imitation--a window looking
into a certain visual experience— but it could not be as exciting as the colors, textures and forms as the earth itself. I came to view the dye colors in Kodak "C" paper as being cheap, deceptive and totally unsatisfying.

I carried a two-year minor in Ceramics. Perhaps it was this experience more than any other that was awakening this sense of excitement of material and processes and their relationship to the finished object created. Clay working is perhaps the Art that used the ancient primal materials— earth, air, fire and water most completely. An object of clay is made, dried, and then subjected to roaring, flaming madness, becoming as stone— the literal colors of the earth.

The other aspect of this thesis is the search for a method of incorporating the accidental, the spontaneous as an aesthetic goal; perhaps it was in rebellion against the usual scientific accuracy associated with photography. I wanted my photo images to incorporate an element of the unplanned for— the unknown happenings of these chosen materials, clay and fire, to be an important part of its visual aesthetic.

I therefore chose to use raku and sawdust firing as my main image producing processes.

Raku and sawdust firing more than any other technique produce the most marvelous and spontaneous interplay of
light and shadow. Its colors are infinite in range and subtlety. The finished object seems to have grown out of the earth. Indeed, many of my photographs did come to look like remnants from an archeological dig.

The core of my thesis then became a search for a way of intelligently incorporating photo imagery into fired ceramic objects. The finished presentation represented only a very small portion of the many pieces attempted and processes tried. The final result represented my best efforts to resolve this problem. In some ways I feel I have succeeded; in other ways, it was just the beginning.
PROCESSES AND PROCEDURES

Early on in the project, I decided that I did not want to merely coat the ceramic object with photo emulsion (Rockland, etc.) and expose and print the object in the dark room using normal paper chemicals and procedures. The result would have been no different than that which I was trying to get away from. I wanted ceramic glaze and pigment to undergo a firing. I then decided to fully investigate the silk screen technique.

A review of the available literature showed that the most widely used technique was the screen process one, where low fire glaze is screened onto decal paper; then a coating of clear burning ceramic varnish is screened over the image to provide a flexible film for transferring the image onto the ware. When soaked in water, the paper releases the image and varnish so that the decal may be positioned on the ware. The ceramic ware must have been previously fired, though, for a good bond to take place between the decal and the piece. I had spent at least two months exploring this technique. I am presenting this process here for the benefit of one who may wish to use this technique. A word of warning—this is an involved and lengthy process. It is expensive, and to do it
properly, one must have access to a dark room and a good ultraviolet light source and preferably a vacuum frame. After I had worked my way through this technique, I rejected it, partly because of the time and energy element and because this technique gave me a product that was too controlled looking. Also, the decal approach wouldn't work well with the Raku technique.

**The Screen**

The type and quality of the screen used is very important; a 220-245 mesh is excellent for decal work. Avoid the screens usually available in an art supply store. The standard screen that is sold is numbered 12XX having a mesh size of 124--far too coarse for the holding of detail in the halftone. The XX refers to a multifilament fiber--also something to be avoided. I used a monofilament polyester, Swiss made, yellow dyed silk, having a 232 mesh size. This screen is durable and extremely tough. The monofilament weave holds the halftone dot better than a multifilament weave and the structure is more dimensionally stable.

**The Film Positive**

For photo-silkscreen reproduction, it is necessary to have a positive halftone or high contrast Kodalith. The
screen process is either "go or no-go" in terms of passing ink. At this time I was producing my positives using the Fine-line method. This method was discovered accidentally and was found to produce a reticulated Kodalith of high contrast having a random dot pattern. This method was more aesthetically acceptable to me than the usual halftone with its mechanical look. Kodalith Ortho film, Type 3, number 2556 may be developed in the fine line developer for 1 1/2 minutes to produce this effect. It is very important to agitate for the first 15 seconds then allow the film to be absolutely still for the remainder of the development time for maximum reticulation. Refer to the work of Syl Labrot, especially his large screen landscapes to see the beauty and potential of this technique.

The Stencil

Screen printing is a sophisticated stenciling technique. There are two major ways of making a photo stencil, by direct emulsion and indirect. In the direct method, the screen is coated by a light sensitive emulsion, allowed to dry, then exposed through the film positive in direct contact. The emulsion hardens in the areas struck by light and remains soft in the unexposed portions. The screen is then rinsed out with warm water (90 degrees F). The hardened areas remaining in the screen
make up the stencil. I used screen Star Emulsion available from the Atlas Silkscreen Co. It is purchased in conjunction with a Bi-Chromate sensitiser solution.

I was more successful with the indirect method using a pre-sensitised photo film composed of a gelantinous material backed with a plastic carrier. After being exposed in contact with the film positive glossy side up to a UV Source, it is developed in a two percent (2%) solution of hydrogen peroxide for ninety seconds, then washed out with a fine spray of warm water. The stencil, still tacky, is placed gelatine side down onto the screen, being careful not allow air bubbles to form and is allowed to dry. The plastic carrier film may then be easily peeled off leaving behind the negative stencil on the fabric. This stencil material is manufactured by the Ulano Company under the trademarks of Hi Fi green, Blue Poly and RX-200, a red film. The film comes either in rolls or sheets and may be developed in Ulano's A&B developer. This developer is light yellow when working and turns brown when exhausted.

**Printing Medium**

I used cone 018-017 China paint. The pigment is available from Standard Ceramic Supply or L. R. Reuche. The pigment must be mixed with an oil based vehicle; a
medium consisting of equal parts of Damar Varnish, boiled linseed oil and turpentine may be used, but I found it easier to use a commercial prepared vehicle available from Atlas Silkscreen Company. Simplex Decale paper is usually available from a local art supplier.

A good ceramic decal varnish must be used to coat the printed image. No. 25-810 Cermaic clear coat, manufactured by Wornow process is also available through Atlast Silkscreen Company.

After allowing the china paint to set up overnight the varnish may be printed using a screen with no stencil. It is best to use a separate screen for the varnish coat and a screen with a larger mesh, i.e., 12 XX would lay down a thicker coat of varnish giving a stronger decal. This too must be allowed to dry overnight. The decal is applied by soaking it in warm water until it starts to uncurl and the starch coating seems to loosen. Carefully, it is then slipped onto the glazed ware that has been thoroughly cleaned with acetone. Air bubbles there must be worked out from the center to the edges. This is allowed to stand overnight before firing. One must always fire the kiln with the lid vented so the fumes from the burning varnish and china paint can escape. It is best to fire them slowly to Cone 017 in about seven or eight hours, allowing slow combustion of the organic matter
and good fusion of the china paint.

The most success I had with the screen printed decal technique was when I applied my images to dime-store white ware plates (the open stock variety). I always had little trouble transferring and adhering the decal properly and the fusion between the china paint and the low fired glaze on the plate. Imagery-wise, it was a failure; I was very dissatisfied. Even when applied to glazed stoneware, there was little visual interest in terms of the interaction of the photo glaze and the pot or between it and the firing. At this point I jumped into three weeks of photo-etching cone 10 stoneware clay and glaze, another technique which I had discarded. I tried to etch my images into the glazes of my cone 10 tests feeling that perhaps the three-dimensionality of the photo would give me what I was looking for. I was remotely successful in etching the glaze using a mixture of beeswax and parafin applied with a Tjanting tool; however, the hydroflouric acid left behind an insoluble precipitate. Having been advised that this precipitate was most likely a calcium, I formulated a glaze having no calcium, yet the precipitate formed anyway. Furthermore, when I used the Kodak photo-resist solution in conjunction with the hydroflouric acid, the resist dissolved away before the acid was able to work on the glaze.
"Dime-store" white ware self portrait

Black china paint in screen process base, silk screened onto simplex decal paper, transferred to the white plate having been prepped with acetone then fired to cone 017.
Slab was first fired to cone 10 then "quick method was used. Xerox self portrait in conjunction with the Gestetner Thermal Stencil. China paint in screen process base was squeegeed through the flexible stencil without silkscreen frame or decal paper.
The Gestetner Process

By accident I stumbled upon a marvelous adaptation of an office printing stencil--the Gestetner thermal stencil. I learned that an elementary art teacher in the town of Greece, New York, was taking his students' pencil line drawings and was making instant "silk-screens" using the Gestetner thermal stencil. I immediately bought a box at an office supplies store in Rochester and on the same day was producing my own "screens" also.

The Gestetner thermal stencil is a heat sensitive stencil. When it is passed through an office thermofax machine with copy sandwiched between the second and third layers, it makes a stencil which will pass ink in the same way the Ulano Blue Poly will, with an additional benefit--the stencil is supported by its own built-in fine mesh paper screen so that after being sent through the thermofax machine, it is the silk screen and stencil, all in one step. Although it may be taped to the underside of a conventional silk screen and used to print on to paper in the normal way, it will work just as well without the regular screen, although it will tend to wear out sooner without the projection of the conventional screen material. The Gestetner stencil is also highly flexible, allowing the image to be printed right on the curved surface of a pot, thereby eliminating the decal step altogether.
The bisque fired slab with the screened photo is placed into the kiln while the kiln is red hot (1800 F. or -). When the slab also reaches temperature and the glaze fluxes, the slab is removed then reduced with combustible material in a suitable container.
The stencil is sensitive to pencil and xerox images. It seems to work well with any image that has free carbon in it; black India ink and type from a typewriter work well--ball point pen and most magazine print will not work very well. The procedure for making the stencil is as follows: Take the original xerox photograph and sandwich it between the back sheet and the green sheet. Set the Thermofax machine to a medium to slow speed. Usually, there is a marking on the Thermofax machine indicating the proper speed marked "Thermal Stencil." Carefully peel the green sheet from the face of the xerox print. It should be evident now if the proper exposure was given. If the speed of the machine was too fast, too little heat would have been reflected from the free carbon in the xerox and the green sheet on the stencil will not have become perforated. If the Thermofax machine was set at too slow a speed, then a loss of detail will be noticed in the green sheet which will now be too "open." Once the correct setting on the Thermofax machine is found, it will be a fairly good constant for any further stencil making.

The Xerox Process

I had access to a Xerox model 4 camera and processing unit. This system was developed for the light printing
industry. It allows paper plates for offset lithography to be made "instantly" as it completely by-passes the usual darkroom and litho plate preparation procedures. The copy is photographed with the Xerox camera and the image of it is then directly transferred to the paper plate after it has been charged with Xerox toner.

Professor Charles Arnold, at R.I.T. has used this system for the last ten years as a way of photographic seeing and print presentation.

A Selenium plate is the heart of the Xerox system. No silver based film and wet processing is involved. The Selenium plate is subjected to a high-voltage electrostatic charge. This renders it light sensitive with an average A.S.A. speed of between 1 and 3. The plate is exposed in the usual way. For development, the plate is clipped to a rocker box where Xerox toner is cascaded over the face of the plate. The toner is carried by minute balls composed of a plastic compound and is available in different colors in addition to black. Where light has struck the selenium plate, the electrostatic charge it was holding is dissipated in that localized area, thereby not allowing the toner to adhere to that spot on the plate. Those areas not receiving exposure are left charged and the toner there adheres lightly to the plate, in the same way a sweater will stick to one's body.
when a static charge is generated upon removal of the sweater during the winter—especially during times of low humidity. The toner on the plate may now be transferred to the paper by laying the paper lightly over the image on the plate, then sending it through the charging unit with a reverse charge. The toner on the paper may now be made permanent with either heat or a saturated atmosphere of carbon tetrachloride that the paper is immersed in for a short while.

The Xerox process is one much akin to the Raku process in ceramics. One is always working with a benign or malicious spirit over one's shoulder. Chance is a large factor in the results. Too many unknown factors are at work ranging from the amount of relative humidity present, the amount of charge the plate received, the quality of paper used to transfer the image, the precise amount of exposure, the relative amount of broad areas of light and dark in the image being photographed, and a hundred other magical and unknown factors including the relative positions of the heavenly bodies at the time of exposure. The Xerox process may truly be called Raku Photography for Raku in ceramics does not necessarily refer to a specific technique or process but rather to a philosophy of working and its results. The overall effect of a beautiful Raku clay object is one of spontaneity characterized by a feeling of an intimate, transitory,
unsubstantial play of shadows. More than any other photographic process, the xerox print speaks on inner language of serendipity as one element of the photographic image relates to another not only in terms of the intended imagery of the photographer but also in terms of the physical re-ordering of the toner as it is laid down upon the selenium plate. It is this inner physical play of electrostatic charge, quite beyond the control of the photographer, which is all important. Xerography is coarse and un-refined, as is Raku pottery. Xerography uses and enjoys the chance happening of physical elements as a major source of its imagery as does Raku. Whereas the standard photo practices of the day are highly planned and controlled, Xerography and Raku place emphasis upon the beauty of the accidental and spontaneous and an appreciation of the physical world and forces of nature, undominated or controlled by man.

This goes to the heart of why I chose to do a photography thesis in clay. I had fallen completely in love with this method, this spirit of chance image making. The strong elemental forces of nature in the form of earth, air, fire and water were best coalesced and allowed to speak doing Raku. Having discovered that Xerox images would produce "instant" stencils which I could "silk-screen" on to my clay ware using the Gestetner Thermal stencil, my way became much more clear.
History of Raku

The term raku was derived from the Chinese character meaning enjoyment, pleasure, contentment, ease, and was the seal used by a dynasty of potters whose work over fourteen generations formed the central tradition of Raku. The first of these potters, Chojiro was under the patronage of Sen-no-rikyu, a great tea master of the late 16th century, who found in the tea utensil created for him by Chojiro the epitome of refined simplicity which lies at the heart of every element of the Zen Buddhist tea ceremony. With the death of Chojiro in 1592, his son, Jokei, continued the raku tradition. It was this son who received from the warlord Hideyoshi the raku seal. The most renowned Raku potters have been: Donyu (1574-1656), third generation of the Raku family; Hon Ami Koyetsu (1556-1637) one of Japan's greatest artist-craftsmen; and Ogatu Kensam (1663-1743). ²

Paul Soldner explains in an article entitled, "Raku as I know it": "In the Spirit of Raku there is a necessity to embrace the element of surprise. There can be no fear of losing what was once planned and there must be an urge to grow along with the discovery of the unknown. In the Spirit of Raku--make no demands. Expect nothing. Follow no absolute plan. Be secure in change. Learn to accept another solution. Prefer to gamble on your intuition." ³
Form vs. Image

In dealing with clay and glazes as the medium of image making the problem of three dimensional form inevitably comes up. During this period of experimentation with the visual implications of the various techniques that I was trying on, I also had to deal with the problem of successfully integrating the three dimensionality of the clay object with its two dimensional imagery.

First, I decided that the object should be non-functional in nature. I did not want to complicate an already confusing situation. Bowls, pitchers and dinner ware already had much to say apart from the fact that they were ceramic. (What would it mean to eat one's dinner from the face of a best friend?)

Spherical and cylindrical shapes are best viewed by walking completely around them. I felt that aspect of their being also complicated the issue. How was I to relate the photograph to the act of walking around 360 degrees to do it? Therefore, the slab was my best choice. It doesn't present all of the conceptual problems that a sphere would. It could in fact become as two dimensional as a sheet of photographic paper.

At this point then, I have settled upon the Xerox camera and print as my source of images on the camera end, transferred to the Raku Slab on the ceramic end and the Gestetner
After removing the slab from the kiln, it is quickly immersed in a barrel containing combustible material. More of the combustible is thrown in to cover the slab then the barrel is sealed to deprive the slab from oxygen and to develop smoke patterns.
Thermal stencil as the means of directly and quickly transferring the former to the latter.

**Clay Body Formula**

The following is a list of the formulas for clay body and glazes.

**Raku Clay Body**

<table>
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<tr>
<th>Ingredient</th>
<th>Percentage</th>
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<tr>
<td>Fireday</td>
<td>30</td>
</tr>
<tr>
<td>Goldart</td>
<td>30</td>
</tr>
<tr>
<td>Talc</td>
<td>15</td>
</tr>
<tr>
<td>Grog</td>
<td>20</td>
</tr>
<tr>
<td>Ball Clay</td>
<td>5</td>
</tr>
</tbody>
</table>

**Glaze Formula**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colemanite</td>
<td>50</td>
</tr>
<tr>
<td>Gerstly Borate</td>
<td>50</td>
</tr>
<tr>
<td>Copper Carbonate</td>
<td>5</td>
</tr>
</tbody>
</table>

Still at this point, all of my technical problems were not worked out. After transferring the image on to the bisque fired and glazed raku slab, the image became somewhat fugitive with the glaze I was using. As the image and the glaze fluxed during the firing, the photo moved with the glaze as it melted thus destroying most of the photo in the process. I then went to a glaze that was more stable during its melting stage and did not move at all due to the addition of kaolin and flint.
Its formula is as follows:

Flint 1 Parts by volume
Kaolin 2
Gerstly Borate 3

With the addition of Copper Carbonate, I was getting nice copper reds with good post-fired reduction.

At first, I followed the usual procedure of reducing the slabs in a barrel filled with straw, then closing the lid to induce heavy smoking and hence reduction. Later, I experimented with doing a more controlled reduction. I would put the red-hot slab on a bed of gravel, just as I removed it from the kiln, then would place bits of straw, banana peels, coffee grounds and anything else that was combustible that I could find. The coffee made a salt and pepper effect of light and dark. Dried banana peels produced a faint swirl effect.

I also was successful at producing an irridescence over the surface of the glaze. After the slab was removed from the kiln, I would start the local reduction and let the slab cool just a bit in the process. I then sprayed on a thin suspension of tin chloride with water and an air brush until I could see the irridescent surface appear.

A slab is more fragile than a spherical form. I did lose more than fifty percent of my pieces due to breakage alone. My procedure for making the slabs was
Portrait of Karen

Finished slab with copper reduction glaze and Xerox-Gestetner screened portrait.
as follows: I would wedge a seven or eight pound ball of raku clay; then roughly pound it into a four inch thick pancake. Then I would slap it down on to the floor in different directions and on both sides. The slab is soon drawn out to approximately one half inch thick and about eighteen inches in diameter.

A block of wood 5 x 7 inches was impressed into the clay in the center, then removed. I then draped it over two or three balls of crumpled newspaper to form a hump where the image was to be. The slabs were then dried approximately one week then bisque fired to cone 08.

My last change in procedure was to stop putting the "matted print" look into my slabs with the impressed block of wood and to drop glazing altogether. I accomplished nothing by setting off the intended image area from the rest of the slab.

The glaze was just another step that kept me from my real intentions of working with the natural forces and materials of the ceramic process. I was most satisfied to print the image directly on the Raku slab. The black and white Xerox image worked best when set in counterpoint against the black and white images of smoke and Raku body. The more I simplified, the more tuned up and direct the result was.
The Xerox portrait has been screened onto white slip with black low fire pigment. The bisqued slab is shown before undergoing the sawdust firing.
The Sawdust Firing

This method of firing is based upon the primitive method of open pit firing. It is still practiced today by the American Indian potters of the Southwest. In open pit firing, the ware is piled up upon a bed of straw or dried dung and then covered by more straw, dung, sticks, etc. It is lit from the top, thus heating the ware relatively gradually as the fire progresses toward the center of the setting. Glazes are not used, but rather decoration is done using raw earth oxides and clays and much of the decoration is produced by the carbonizing effect of the smoke.

Perhaps as an extension of the technique of post-fired reduction technique of Raku, some potters have experimented with this same primitive process to get directly to the smoking of the ware, thus by-passing the costly and time-consuming firing of the ware to 1800 F. in the Raku Kiln. My experiments with this process were as follows.

The Sawdust Kiln

I constructed a sawdust kiln from hard brick by merely stacking them in a box shape with an interior dimension of approximately 27" x 27" x 27". Ordinary construction grade brick may be used. The base of the kiln may be
The sawdust kiln was constructed by laying up hard firebricks without mortar with an opening of eighteen inches square. After the setting was loaded, two 12 x 24" kiln shelves were laid on top to control the rate of combustion.
earthen, brick or concrete. (See illustration).

To begin a firing, dry sawdust is poured into the floor to a depth of about five inches. The largest piece was then loaded in, followed by another three inches of sawdust. Some of the slabs were placed vertically with the combustible sandwiched between them; five inches of sawdust finishes the setting, then a wood fire is built on top. After the sawdust is well lit, I placed a sheet metal roof over the kiln to allow the sawdust to smoulder at a slow rate. The smoldering continues slowly downward for 12-18 hours. The first pieces from the kiln were a revelation. The most marvelous smoke patterns were produced in the simplest, most direct way. The photo image was fired on in the process and I got the most interaction of image, smoke and clay yet.

It was at this point that I made my thesis presentation: dissatisfaction with my previous efforts with decalomania kept me looking for some kind of solution to this problem. The first confusion was solved when I realized that what I was searching for was image, not form; not product, but process. I had to try many approaches only to see that a certain method was not to produce what I was looking for. In the end, the simplest process produced the most meaningful solution for me.
The fire was welcome to express itself using smoke as its image maker. The result was sooty blacks, earth tones and rich and somber umbers -- the colors of the elements themselves. My xerox portraits wove themselves into this undulating pattern becoming more than a mere record of the person portrayed.

The ancients believed that were four elements: earth, air, fire and water. Smoke was the antithesis of mud or clay. Mud combines the elements of earth and water and smoke combines air and fire. Smoke symbolized the relationship between heaven and earth. It pointed out the path through fire to salvation and was a symbol of the soul leaving the body.

I became involved in an attempt to unify diverse and conflicting elements into a single statement.
Fired image with copper glaze, Gestetner stencil 22a
Suppliers:

Photographic and Silk Screen Supplies:

Eastman Kodak Co.
343 State Street
Rochester, New York 14650

Atlas Silk Screen
1733 Milwaukee Avenue
Chicago, Illinois 60647

Advance Process Supply
400 N. Noble Street
Chicago, Illinois 60622

Ulano
210 E. 86th Street
New York, New York 10028

Pigments and Ink:

L. R. Reusche
2 Lister Avenue
Newark, New Jersey 07105
Suppliers (Cont'd)

Standard Ceramic Supply Co.
P. O. Box 4435
Pittsburg, Pennsylvania 15205

Mason Color and Chemical Co.
East Liverpool, Ohio 43920

Ceramic Color and Chemical Mfg. Co.
Box 297
New Brighton, Pennsylvania 15066

Decal Paper

Brittans (USA) Ltd.
26 Strawberry Hill Avenue
Stamford, Conn. 06902

or

from local art and graphic supply stores.
ENDNOTES

1.) Sadakichi Hartmann, "A Monologue", Camera Work, Alfred Steiglitz, Editor., April 1904, p. 24

2.) Paul Soldner, "Raku as I Know It", National Council of Education on the Ceramic Arts, October, 1968, p.1

3) Paul Soldner, IBID, p.3
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