

Ziatype

A Bostick & Sullivan Research Project

HISTORY

The Ziatype was developed in the Labs of Bostick & Sullivan. I was looking for a better way to control color and contrast in a palladium or palladium-platinum printing system. About 20 years ago I tried Guiseppe Pizzighelli's printing out process developed in the late 1800's without much success. In the mid 1980's Dr. Michael Ware developed a variation of Pizzighelli's POP process which has enjoyed a loyal but small following.

This process is also a variation of Pizzighelli's process. It uses lithium palladium chloride as the primary metal and ammonium ferric oxalate for the iron compound. In the Pizzighelli and Ware's processes, color and contrast are interlocked and controlled largely by humidity. In the Ziatype the color and contrast are controlled chemically, making for a much more controllable and flexible printing system.

The Ziatype has undergone some changes in the past year and will more than likely see more in the future. We here at B+S are striving to constantly improve our products and the Ziatype is one of our priority products.

The Advantages of the Ziatype:

A printing out system. Images can be evaluated as they print. In most cases the first print will be successful. Far fewer underexposed or overexposed prints.

Greater contrast control without graining. Normal silver negatives made for printing on No. 2 grade paper can be printed.

Greater paper acceptance. It tends not to be finicky and prints well on most papers.

Greater color control. You can "dial in" various shades of brown and red brown, purple and grays.

Greater printing speed. As much as 3 stops in some cases.

No developer needed.

Cold neutral black color with pure palladium. The elegance of a Frederick Evans print with palladium.

Good Dmax without the use of costly platinum.

Your kit will contain:

Ziatype Kit	25ml	100ml
Ferric ammonium oxalate sol. 1	25ml	100ml
Lithium palladium chloride sol. 3	25ml	100ml
Ammonium dichromate sol. 2	25ml	100ml
Sodium tungstate 40% sol. 4	25ml	100ml
Tween 20 10% sol.	25ml	100ml
Citric acid clearing agent	250gm	1000gm

MATERIALS you will need to provide:

UV light source -- the sun works nicely though a little unreliable at times

Coating rod or brush

Contact printing frame

Protective mask or respirator
5 eyedroppers, one for each solution.

Optional:

1 mil to 3-mil Mylar sheets

STEP-BY-STEP PROCEDURES

LIGHTING

All processing should be done under yellow bug light or very low illumination. The Ziatype appears to be a little more sensitive to ambient light in the printing room than the conventional platinum and palladium process. Though there may not be any visible fogging in the print, incipient fog might compress the midtone values.

EMULSION

For an 8x10 print start with 15 drops (about 1 ml) of ferric ammonium oxalate sol.2

If you want a warm brown tone, add 1 or more drops of sodium tungstate sol. No. 4. Three drops will make a very warm sepia print. When you add the tungstate solution to the ferric ammonium oxalate a slight precipitate will form. Swish the solution around for a moment and it will dissolve. (If it is added after the lithium palladium solution is added it will be harder to dissolve the precipitate.)

Now add an amount of lithium palladium Sol. No. 3 equal to the amount of ferric ammonium oxalate No. 1.

If a neutral gray color is desired, use only the lithium palladium sol. No. 3 and ferric ammonium oxalate No.1 together in equal amounts.

Adjust contrast by adding small quantities of ammonium dicromate sol.2 (1 drop per 8x10 is quite a bit so you may wish to dilute the dicromate solution with water for finer control.)

1 drop or more of 10% Tween 20™ may be used to adjust the absorption qualities of the paper. This will vary according to paper and conditions. It is an emulsifier and surfactant. It aids in spreading the emulsion and helps it penetrate the sizing of the paper. If the paper forms darkish areas during coating where the sensitizer has penetrated unevenly, use less Tween 20. Be sure to mix the Tween 20 into the emulsion thoroughly or it may leave a spot where the over-concentrated Tween 20 penetrated the paper. You can dilute the Tween with water.

COATING

Coating can be done with either a glass rod or a brush. The amount of sensitizer may vary with the paper being used but it should be in the 1.5 to 2 ml range for an 8x10 print if you are brush coating. If you are rod coating, you usually need about 15% less.

The key to success is to get enough but not too much emulsion on to the paper surface. The use of Tween 20, will also aid in getting the right coating depth.

Using a coating rod

The example we will use here is for an 8x10 print on a 11 x 14 sheet of paper. It is also assumed that you are right handed. Southpaws, as usual, will have to interpolate.

Prepare a coating area. Obtain a 16 x 16 inch piece (or larger) of 1/4 inch plate glass. Have the glass shop sand the edges.

Using a level, level the glass. A handy trick is to use a couple of pieces of modeling clay in each corner. It should be leveled so quite a bit of pressure can be applied and not squish any clay out of level.

Tape the paper to be coated with a couple of 1-inch strips of masking tape on the two top corners. The paper will be placed on the glass in "landscape" orientation. Even portrait orientation prints are coated in the landscape mode.

Lightly mark the 8x10 area to be coated with pencil marks in the corners.

Measure out your emulsion. It should be approximately 2 ml total. I like to use 1 oz plastic taco sauce cups from restaurant supply houses, but any small glass or plastic receptacle will do.

Take a clean glass coating rod and place it about 1 inch to the right hand edge of the area to be coated. The rod should be pointing from top to bottom of the print.

Hold the rod in your right hand and with your left hand quickly pour the emulsion from the cup up and down the length of the rod. It should flow against the rod as your pour.

Now gently but quickly move the rod up and down about a half-inch to flow the emulsion evenly up and down the rod.

Starting on the right hand side, pull the rod to just over the left margin of the print. The emulsion will run up and down the rod due to capillary action.

Now start moving the rod to your left across the paper covering an area a little larger than than 8x10 with maybe an inch or so extra on each end. When you get to the left edge lift the rod slightly off the paper and back down to readjust the emulsion and then move the rod to the right hand edge.

You will not need much pressure on the rod. You will continue the back and forth action. In the beginning you will move at a modest pace. If you were counting you might go: One .. two .. three .. four.. lift.. down.. reverse direction ..one .. two .. three.. four and so on. Each count taking about one second in the beginning

While going back and forth observe the emulsion line through the clear glass rod. At first it is a running seam of emulsion but as you progress, it will get thinner. When it becomes a very thin line, it is time to stop. As the line gets thinner you will need to go slower and perhaps you will need to add more pressure. You do not want to break the line. The last pass across the paper could take 15 seconds or more.

If you have never done this, it may sound exceedingly complicated, but it is not that difficult. The problem is trying to describe it in writing. The whole operation is quite intuitive once you understand two things. Gradually slow down and don't break the line of emulsion. You might want to practice at first with some dark coffee (add a little Tween 20 to judge its effects.)

Drying and Humidification

The Ziatype process depends on humidity in the paper to allow the development to occur during the exposure. The process is quite flexible, so working practices among printers may vary. Beginning Ziatype printers should follow this outline at first, and then vary their practice later to suit their particular printing needs.

One Step Drying

This is the best method to obtain true black. First coat the print with brush or glass rod. Let the print sit for two or three minutes. Using a hair drier with a cold air setting, blow dry till the surface of the paper is just dry. The paper should not crackle when snapped or bent back and forth gently but quickly. It should sound a little dead. In no case should the paper be wet enough to transfer any wetness to a negative. The paper is now ready to print.

Carl Weese has perfected a method that is almost foolproof.

The basic trick is to run your darkroom at 50-65% relative humidity. You will need a functioning humidity gage. I need to run a fairly large humidifier due to the exceptionally dry atmosphere here in Santa Fe. We are also at 7000 feet altitude, which doesn't help much either. When I am in a hurry and the humidity is low, I run hot water in my 16-foot darkroom sink and when Bostick isn't around to complain, I spray some water on the floor as well. Carl is in Connecticut and only needs a small electrostatic drugstore humidifier to get his up to the recommended level. I suspect those in Key West, Florida may need a de-humidifier to get to the 50-65% level.

Once your darkroom is set to the right relative humidity range, the process is simple.

Coat your paper.

Let it sit for 2 minutes to soak in. .

Dry for 1 minute under a cool air stream, A small clip on fan will do nicely. Time will vary depending on fan and print size. Make your first experiments with a negative that your life doesn't depend on.

What is important is consistency. Once you get a routine that produces prints you like, just repeat the humidity and drying times. Everything else like color control and contrast control will then be chemically dependent.

Two Step Drying and Humidification

This method will produce black to black-brown prints with lithium palladium.

First coat with a brush or glass rod and let sit for a few minutes as in the One Step method. Dry the paper thoroughly on both sides. To humidify, take the print and move it emulsion side down about 6 inches over the spout of a humidifier. (A standard ultrasound "sick room" humidifier works best while the less expensive hot steamers have a tendency to spit water, which is annoying and could ruin a negative.) Occasionally turn it over and humidify the back. Try to get an even coating of the paper with the steam. An 8x10 piece will take only a minute or two to properly humidify. A good rule of thumb is to listen to the crackle of the paper. Snap the paper a little and listen. When starting out it will sound very alive, as humidity builds up it will sound a little deader. With this method, it will not sound as dead as with the One Step.

Chamber Humidification

One can build a very simple chamber with a cardboard box, or more elaborate ones with full humidity controls. The choice is determined by the individual's talents

and resources. Several printers have built a chamber with a large clear plastic clothes storage bag with the bottom having been cut out for the spout of the humidifier.

Some experimentation will reveal the proper "soak" time for the print. At 60% humidity, 2 to 3 minutes soaking in the chamber should be about right. Chamber humidification can quickly over humidify the paper if left too long. The paper should still have some snap to it and not be like a limp rag.

PREPARING FOR EXPOSURE

A good "split back" printing frame will be necessary in order to check by inspection the exposing print. Bostick & Sullivan has their own brand for sale.

Take two pieces of 1 mil Mylar (2 and 3 mil can be used) that are at least one inch larger than the paper and sandwich the paper between the two. A paintbrush of the appropriate size can be used to smooth down the Mylar and to effect cohesion at the edges to seal it. This will both trap the humidity in the paper and keep it from drying out during exposure and protect your negative from any wet spots that may have accidentally developed on the paper during humidification.

The Mylar is a safety precaution and probably can be dispensed with. Carl Weese and I have printed hundreds if not thousands of prints and we have not ruined one negative...well, not yet!

Assemble the components in the print frame in this order: glass, negative, Mylar, paper, Mylar, frame back.

NEGATIVES

Negatives should have a long density range and can even be longer than that used for traditional platinum and palladium printing. A good negative would be one with a Base + fog of 0.2 to a Dmax of 2.0 or more. Because it can tolerate a higher percentage contrasting agent in the Solution No. 2, the Ziatype process can print traditional silver negatives with a range as low as base + fog of 0.2 to a Dmax of 1.2 or less.

Carl and I have found that the Rollo Pyro developer produces exquisite negatives for the Ziatype process. A negative that prints in Ziatype also will print beautifully on Ilford Multigrade II with no filter! The Rollo Pyro developer was designed for use in Jobo™ processors but works fine as a tray developer as well. Starting times for Rollo Pyro for Tri-X is 8 minutes in a Jobo™ processor. This should be a good starting point for tray development as well.

Some mythology has developed about the dangers of pyro. It is true that it is poisonous and should be handled with care but my reading of the research data is that it is no more dangerous than Metol™, which is used in most developers.

EXPOSURE

Use either a standard non-silver UV light bank or sunlight.

The Ziatype is about 2 to 3 stops faster than traditional developing out palladium printing. Exposure should continue until the print looks right. It will appear yellow in the highlights but overall the exposure will be correct.

WET PROCESSING

After exposure, immerse in water and wash in a slow stream for about 2 minutes.

Prepare the citric acid clearing bath, one tablespoon to a quart of warm water.

Soak in clearing agent for 5 minutes with occasional agitation.

Wash in clear water for 10 minutes.

Blot with archival photographic blotters and dry on screens or by hanging on clips.

COLOR AND CONTRAST CONTROL

The Ziatype will tolerate without graining considerable ammonium dichromate "Contrast Boost" Solution No. 2. However, be aware that printing times can increase considerably.

The Ziatype system was designed so that color and contrast are chemically controlled. Changes in the paper humidity can affect both color and contrast. The Ziatype worker needs only to devise a working method that is fairly consistent and produces coated paper with close to the same humidity level. Once that is achieved, color and contrast can be easily controlled.

Color additives

One of the advantages of the Ziatype system is the ability to get a wide range of colors by simply adding various compounds to the emulsion.

The Ziatype is a work in progress and has a multitude of variables. Workers are encouraged to experiment.

A lithium palladium print that has been exposed and allowed to sit without washing and clearing will progressively turn brown.

A print made with 50% lithium palladium drops, 25% gold chloride (5%) drops, and 25% sodium tungstate (16%) drops may produce blue/black split tones.

Grays, blues, and purple tones can be obtained by replacing any portion of the lithium palladium solution in the emulsion mix with a 5% gold chloride solution. Colors vary with paper, humidity level and amount replaced. As more is replaced, the contrast increases.

Variations in color can be obtained by mixing brown additives with the gold chloride. The possibilities are endless and have not all been tested. Individual printers can develop unique combinations to suit their own needs and desires.

Notes:

Origins of the Ziatype Name

The Ziatype was named for the ancient New Mexico Anasazi pueblo people's symbol for the sun. The Zia is the familiar circular image with 4 sets of 4 rays seen on the flag of New Mexico. It seemed appropriate as our business is located in New Mexico and I had been using its sun to make the prints.

Bostick & Sullivan Web Site

Check out the Bostick & Sullivan web site for updated information on the Ziatype and many other technical tips on handcoated photography.

At: <http://www.bostick-sullivan.com>