KEEPING PACE

A Monthly Newsletter Devoted to the Darkroom Arts

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Pigment Prints. They Are Here to Stay

In order to enjoy the prospect of making great pigment prints, it would be great to be able to make the entire pigment print from beginning to the end. This means that you must have the potential of producing your own separation negatives. I will explain how this is accomplished without going to deeply into the mathematical equations.

The only current pigment system that will allow for such an adventure is the UltraStable process. Otherwise, the only other alternative is the great EverColor process.
This actually divides us into 2 camps. Those that would rather have a great master printer make their prints, or those who would rather take a chance and make their own images.

The UltraStable process is the only current **pigment** process that allows the individual color printers to produce their own prints in their own darkrooms and have complete control of the eventual results.
This doesn't always mean that you will be happy with the results, but unless you give it a try, you will never know your potential.

In order to have complete control it means that any separation negatives used in the process must also be produced by the darkroom aficionado.

The UltraStable process has been associated with the use of 4 color screened separations produced by an outside service company.

The necessity for accurate separations is a must.
The reasons given for using the screened separation method is that the highlight areas can be better maintained with a dot structure and would resist fading of these delicate areas.

However, the process will work with just the three primary additive colors and without the black, provided that they are continuous tone images.
Therefore, it is imperative that the workers who want to make their own prints from scratch, must be able to make their own necessary color separation negatives so that pigment color prints can be exposed to them in the proper order and eventually, fully transferred.

Let us begin with the production of the UltraStable pigments themselves. The colors are long lasting making them truly archival. This is the first time in history that such a statement could be made in reference to a color print. The same can be said

of the EverColor process.

The word "archival" means just that.
Imagine if a color print made in the last part of the 1800's could be made with today's accuracy for the separations and the quality of the pigments, then the works of giants in the field of photography could still be seen. It would be almost like hearing Caruso with today's hi-fi sound systems.
Instead, most color prints lose their vitality and color strength and unfortunately, the colors lose at different rates rendering the prints worthless.

The great Dye Transfer process, which is about to have a rebirth soon, was once considered to have one of the longest lasting color images in history, that is, until the UltraStable system.

However, regardless of the longevity the fact of the matter is this: The quality of the image is of the highest importance.

This is a must.
It would be terrible to have a 500 year print that didn't excite you, or a great print that disappeared in a few years.

The quality of any image, whether it be in black and white or in color begins with the negative.

Let us go back in time and examine what it took to make a pigment known as a "Carbro."

In the early days before color transparencies, the method for producing 3 color separations was a tedious effort. It meant that the subject could not move at all. The camera had to be bolted to a tripod, which in turn was bolted to the floor, and so on.

Finding the proper films that could handle color was almost nil. Panchromatic films were not high on the list of film manufacturers. But when the film was available, many enthusiasts made three exposures, one at a time, through red, green and blue filters. It was at this point that the Carbro system was born.

Later, the invention of the "one shot camera" was used to produce all three images shot at the same time through this great camera.

But how to produce a color print?
This was the age of invention. The Carbro process was born around the turn of the century.

These clumsy, but very critical steps in the evolution of the "color print" was a time consuming process whereby three black and white prints known as "bromides" were made and each one represented a specific opposite color that the separation negative was shot through.

The red filter negative would eventually produce the cyan layer, the green filter negative would eventually produce the magenta layer and the blue filter negative would eventually produce the yellow layer.

These three black and white prints (bromides) were the critical connecting point to the entire process. They had to be produced so that some semblance of density and color balance accuracy could be established.

The white and grey areas of the image had to look alike and if necessary, match. The printer eventually could see a warm grey or a cool grey by just comparing the images and their densities.

This was the most critical part of the process and is where the print was actually made. Any other steps were simply academic.

Choosing the correct level of density and making sure that a color balance existed was paramount.

The production of "bromides" was so important that the use of black and white prints carried over to the production of Dye Transfer prints.

We would use the prints to determine the level of density and the correlation of greys and whites.
When we were satisfied with the bromides, we would then determine the speed difference between the matrix film and the paper, and use the math to come up with a viable set of exposures for the matrix films.
Believe me. It worked then and probably still does.

The term "Carbro" is the mixed letters that spell Carbon and Bromide. "Car" "Bro."

These "bromides" which were produced on an Ilford photographic paper with 4 coats of silver and minus a protective coating, were combined with the appropriate color pigment which was coated on a sheet of paper.

The process worked on a simple principal. The pigment sheets were sensitized just before combining so that any contact with silver would harden that part of the pigment.

The sensitized pigment and the "bromide" were placed in contact by the use of a wringer roller.
After a few minutes, they were peeled apart and the spent "bromide" which was bleached by the chemical reaction, was discarded.
Now, an invisible but hardened image remained on the sheet of colored pigment.

The next step was to soak the pigment sheet in cold water and then place the pigment sheet face down on a sheet of waxed celluloid and squeegeed tightly.

After a few minutes the sandwich of the pigment and the celluloid were placed into a tray of very hot water (about 110°) and after a short while, color could be seen oozing out from the edge of the pigment sheet. With a little lateral movement, the pigment sheet became even more loose. Eventually, the entire paper sheet of pigment would be able to be removed.

What was left was this gooey mess still on the celluloid. Repeated shaking and changing of hot water permitted the unhardened image to melt away and float down the drain.

What remained was the image that was represented by the "bromide" and in full range and with all the parts intact.

This spectacular image was then dried by placing the celluloid in a warm drying box, using a gentle air flow.

This placing of the pigment and it's matching "bromide" procedure was done to all three images.

When this first image was dry it was removed from the dryer and placed face up in cold water.

A sheet of paper known as **"temporary support"** which had an emulsion that would melt at a warm temperature, was also placed into a tray of cold ice water until it was limp. Then carefully placing the paper face down on the sheet of celluloid, the paper was squeegeed into place. All remnants of water were dried off using a towel. Then this whole sheet of celluloid and temporary paper were placed into the same warm air flow drying system.

Have you ever produced glossy prints using a ferrotype plate?
This works the same way.

After a short time in the dryer, the paper image popped off the celluloid just as a ferrotyped image would. The colored cyan image was now attached to the temporary support paper and it's celluloid was clean.

The order of placing the pigments was important because the yellow was an almost solid color and was not as transparent as the other 2 colors.

However, when all three images were placed, they have to be turned over and the yellow would now be at

the bottom, where it belongs.
The first image to be placed on the temporary support paper was the Cyan.
The next part is where it became tricky.

Remember, the magenta and yellow images were also placed onto their own sheets of waxed celluloid and dried.

Now the magenta was next. This time the magenta celluloid sheet was placed into cold water and the temporary support sheet with the cyan image was placed into it's own tray of ice cold water.
The paper was placed over the cyan image and **hand registered** by looking through the back of the celluloid until all the parts fit.

Good eyesight was a must. Considering that the paper had a warp and a weave to its manufacture, the images would never fit accurately.

Constant pushing and pulling various parts of the image until they lined up was a struggle.

The water also had to be removed from the print. Small squeegees and towels were used for this purpose. When this image was in place, and enough water was removed, then it too was dried.
Now we had 2 colors on the temporary paper sheet.

The same procedure was used for the yellow sheet.

When all three images were now in place on the temporary support paper, and they were dry, the next step was to soak this temporary sheet and a sheet of double weight photographic paper known as the "final support" in cold water, they were combined and squeegeed face to face and placed under heavy weights for 45 minutes to one hour.

Then the final step, remove the weight from the "sandwich" and place the whole thing in a tray of hot water. The temporary support paper's emulsion would quickly dissolve and leave the color image attached to the final support. That's it.

A good 3 or 4 hours of work **after the separations were made and the "bromides" were produced** and we finally get the chance to see if our work was right.

This was a grueling full day or two. Any mistakes meant starting over from scratch.

But time has marched on and in the 1930's Kodachrome transparencies were born.
And in the 1940's Ektachrome transparencies joined the fray.
Now we have many different manufacturers producing these fabulous films that we all take for granted.
This meant that any camera could now be the instrument for capturing the elusive images that we all sought.

No longer did we have to shoot separations with this large and clumsy "one shot camera" with it's speed of ASA 5. But, if we still wanted to make Carbro prints, we needed separation negatives.

The rush was on. No one knew how to make contact separations from transparencies. Least of all was the Kodak company. They tried but came up short. It was left to the labs to "invent" systems that they (and they alone) would use.

At the very beginning of the struggle to make separations, along came another process known as Kodak's Wash Off Relief. It was a simple process patterned after the famous Technicolor process.
The production of separation negatives began in earnest. Every lab had it's own system.
The leader of the pack was a lab known as Evans and Peterson. They figured out why highlight masks were necessary and invented a system where not one, but three highlights were made, representing all of the primary colors.
They understood the reason for contrast masking. They

knew much about balances as they were probably the best Carbro lab in the country.

Making the separations became a daily effort. Using a simple and repetitive method. They turned out great prints.
Then Kodak shocked the world with their Dye Transfer process.
The improvement in the dyes and in the processing of the matrix films made life a bit easier.
The register system was also discovered and companies such as Condit Mfg... were born.

The Carbro process died a slow but natural death.
The colors of the pigments did not match the colors of the dyes used in the production of the transparencies, but the inability to understand the reason for masking was the main reason for it's demise.

From 1947 until 1993, Kodak produced the necessary materials to produce these great Dye Transfer prints.

The digitizing revolution began and Kodak immediately made a decision.

Stop production on any and all processes that did not make a substantial profit.

Good-bye Dye Transfer.

But in the wings of the photographic effort Charles Berger, a young and energetic photographer and a person with a zest for bringing back a better than ever Pigment process came up with a new system that defied aging and produced an extremely sharp and colorful print. . **UltraStable**.

The name says it all.
Charles worked with various Litho companies that could produce the necessary 4 color separation negatives.
The process worked.
It was divulged to me that the process could also work with continuous tone separation negatives.

This is my area of expertise. Making separation negatives became an obsession for me. I investigated everything that was ever written about the production of separation negatives. Most of what I read was written by people that never made a professional print in their lives. I worked primarily for advertising agencies. They needed good work. As I improved my own abilities, I became a member of the "necessary evil " group. It was here that I had to examine and "invent" methods that worked

After almost 50 years in the business of controlling contrast I believe that I have found the answers to most of the contrast problems of many different processes.

In order to make any kind of print we must first think backwards.

Finding the degree of contrast that any process requires is a simple study in mathematics.

The following pages will explain why I go through specific steps to find the "magic" density range that will produce a great print.

My main concern is that there must be a systematic approach to the production of separation negatives. I believe that if we know what kind of contrast these new pigment materials demand, then it is our job to fill this need.

If you are using an enlarger, you know the differences between diffusion systems compared to a condenser systems. This is only the tip of the iceberg.
The color of the lamp, the color of the carrier glass, the kind of lens, the degree of electrical current and it's stability, the kind of water used in your chemistry and many other possible environmental problems will all contribute to the final outcome of your work.

For instance, after a simple test is performed, you will be able to determine the kind of contrast range the pigment

sheets require.
Even though the exposures are made by contact, and not influenced by diffusion or condensers, the actual color of the exposing lamp and the quality of the glass used in the contact frame will play a role in determining contrast requirements as well as the speed of each colored pigment. They may not be all alike.
This is a very important part of the process.

But, what about the kind of film to use for large separation negatives?

There are not too many films available.
Kodak has suspended manufacture of most of their films in large sizes. The only large size (16x20) film available is Separation # 2.
Ilford's largest sized Delta films are up to 12x20.
Fuji produces a film called GP 100 and it is available in sizes up to 20x24.
If you call Fuji at 800-877-0555 extension 6205, they can tell you where the nearest dealer is in your area.

In order to make the separations you will need an enlarger. I presume that you already own one.
If you are shooting 8x10, then by all means use your 8x10 enlarger to make the enlarged separation negatives.
On the other hand, if you can use 35mm or 4x5 system will also work. Your equipment list will grow as you need it. If you shoot a specific size, you probably already have an enlarger that can handle your needs.
The enlarger must be equipped with a registration carrier capable of being locked into place. It should also be able to be locked in place so that it will not move in any direction.
The carrier must have a set of register pins built into the carrier. The easel should also be a register easel with a vacuum system.
A diagonal film punch that fits the carrier and a large film punch for the vacuum easel on the table top under the enlarger.
The easel can be a magnetic easel by gluing magnets to it's bottom and using a sheet of metal as the table top.
The enlarger should have a filter drawer and not have to place filters under the lens.
The filters can be purchased through a kodak dealer to almost any size you wish.
The best colors are the Red 29, the Green 61 and the Blue 47B . These have been the accepted separation filters for years.
You should have some means whereby you can expose and process contrast masks. This is an important part of the process. A sufficient sized sink to handle 3 trays the size of the print and plenty of hot water.

The process works as follows.
Once you are ready, you can take 21 step grey scale and using a light source (ultra Violet) such as those found in table top plate makers, make a series of different exposures onto a cyan sheet of pigment (supplied by Ultrastable.)
The material is sensitive to this kind of light source. The rest of the room safelights can be the ordinary "bug" bulbs found in any grocery store.
After you make a few exposures, take the pigment sheet and soak it in cold water, then squeegee it onto a sheet of final support polyester material also supplied by UltraStable.
After a few minutes, place this "sandwich into a tray of hot water/ Eventually, color will ooze out and with careful agitation the entire pigment sheet can be removed, leaving only a blob of color on the polyester sheet.
After some agitation, the unwanted color will dissolve and find the drain. What is left is this sharp clean cyan image of a grey scale.
Examine it through a Red 29 filter and try to find where detail starts to show at each end of the scale.

Once these two areas have been found, read the same exact steps on the original grey scale and record the numbers.

If you subtract the low reading from the high reading you will obtain a density range.
It is this magical density range that will open the doors for you.
The final negatives of any kind must contain this density range.
However getting to this point requires some work.

If you choose a film for the separations and use the recommended developer and it's normal developing time, you can safely assume that the gamma of development is around .75.
I this is fairly accurate, then you must take into account the fact that you must first know what the combined contrast mask and transparency should be before you embark on a negative production.

For instance:

If you know the required density range of the separation negative (1.2) and the approximate gamma of development of the negative (.75) then divide the .75 into the 1.20 and the answer is the necessary combined transparency and contrast mask density range. (The answer is 1.6) Let us call this combined group by a simple term (CMT)

As long as we know that the required range for the CMT then all we need to do is this.
Original transp 2.6
Required CMT 1.6

Subtract the low from the high reading and the difference is 1.0

Follow me closely here.
If you divide the difference of 1.0 by the original density range of 2.6 the answer is 38.

This means that you must make a mask at 38% gamma. When this mask is applied back to the original transparency you will have achieved the required CMT. Now simply expose the final negatives and process them normally.

The actual process is much more complicated than that. But if you are serious about this procedure of making enlarged negatives this is the way to do it.

The contrast masks are made by contact. They are combined with the original in the enlarger and sized to the actual print size.
The method I have used to make the exposures is rather simple.
I don't ever change the relationship of the three exposures between the negatives, but I do vary the exposures using the *f* stop. Here is how. I first make an strip test exposure of the red filter negative. I make enough exposures so that I can find the one with a shadow reading of .35.
Then I use an easel meter such as a ZBE or a Pixtronics to read the lightest area in the image. I record this reading.

From then on, i simply place the combined CMT into the enlarger size it up, read the lightest area and adjust the *f* stop until it reads as it did in my test.

If I already know the exposures and developing times for the three separation negatives, it becomes a simple matter to make the three exposures and then develop to my standard times.

This system works in a couple of ways. By having a sandwich of mask and transparency in the enlarger I eliminate the most disturbing element of ruination, **Flare.**
It also eliminates the necessity of having masks made to the size of the print.
I haven't gone into the actual procedure of making masks and the necessary charts because it would take much more space than this newsletter requires to print.
All I can say is this. The procedure works. I have used it in the Dye Transfer print process. The reason I did it for the Dye Transfer

Process, is because I wanted to eliminate flare.
I know I wrote about this before.
The job I had to work on was complicated by the fact that it was the inside of a black piano, including the very sharp and detailed piano strings.
Over 90% of the image was black. If I made the separations by contact, I would have had to contend with the empty areas of the negative that represented the black piano.
This flare would have reduced the piano strings to a grey and would have lost the critical sharpness hat the original 8x10 contained.

If you doubt this occurrence, shoot a detailed image of a safety pin against a black velvet background. Do this in black and white. Then Make a contact print of the negative.
Now make a blow up of the image to 16x20.
Just expose the 8x10 area of the pin, to save the expense of a large sheet.
Compare the results.
If I am wrong I will eat my hat.

I am so concerned about the need for a detailed explanation about making enlarged separations for the UltraStable process that I have decided to write a book on the subject.

It is in the works. If any of you are interested, let me know and I will place you on my mailing list.

As you must know. I have been toying with the digitized systems, so that I won't look like a fool when I am challenged about the differences between "hand's on" and the computer.
I have discovered that both systems have their place.
The commercial field is totally involved with the computer. The speed and convenience that it affords is unapproachable. They can do more on one hour than I could have done in a few days.
However, I have also seen some very fine work done on a high end system that compares to any fine print I have seen lately.
The dividing line is money.
Apparently, for a price, one can make great images using a scanner, a computer and a very high end printer
A case in point is Graham Nash and his company Nash Editions.
I knew Graham when he was with "Crosby ,Stills and Nash." I knew him as a collector of fine photography. He sold his collection and purchased a high end flat bed scanner and a top of the line computer and an Iris printer (30x40) He has been exhibiting his prints all around the country. They are fabulous.

However, at this time they are not as long lasting as UltraStable or EverColor but who knows how science works, Any day now, they could announce a new dye that wont fade. .
So, from where I sit, I can see the incursions from outside sources that promise to invade the sanctity of fine art. It has begun.

I still feel that the best argument against any computer driven "art" is the honesty and artistry of the "hands's on" photographer.

If any of you own a computer and have tried to reach the support group for a specific program, and when the phone rings you get a recorded message that asks you to punch a number when you have reached the desired area. Then you are asked to hit # 1 if you want this, or #2 if you want something else. By the time you hit all of the necessary numbers and listen to awful music for 20 minutes you feel lost, slam down the phone and curse the day you ever got involved with the computer.
Has this ever happened to you?

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