KEEPING PACE

A Monthly Newsletter Devoted to the Darkroom Arts

Volume 7~~8~~ Dec. 1993

The Mechanics and Theories of Print Making

Making any kind of color print requires that you first learn the mechanics and then the theories.
The first thing to learn when making any kind of color print are the mechanics. In other words, what do you do physically.

When I first learned the Dye Transfer process, I made the big mistake of reading a book about the subject. In my own mind, I thought that the book was written by experts in the field and what they said was gospel.
Not so, I learned later. The booklet was so full of holes that a truck could drive through them.
The best education I ever received was when I joined the firm of Evans and Peterson, a most prestigious Dye Transfer lab located in in Forest Hills, NY.
Ed Evans and Glenn Peterson taught me the correct way to make a print.
Before I began my "education" with them, I had other chores to do first.
The first thing I did for them was to help build a new color lab.
Me, the most incompetent worker with lumber, electricity and plumbing.
However, I did fine.
I became a good construction worker and helped produce a good looking and good working lab.
After the lab was built I was shown the transfer area.
This is where the last stage of the print was produced. It seemed strange to me that I would begin at the end of the process and not at the beginning of it.
I soon learned the reason for their approach. In making sure that I had good hands for this part of the process I soon learned not to scratch the matrices and learned how to handle them.
Then I ran the prints with chemical controls. The amounts were decided on by either Ed of Glen.
Eventually, I was able to run the prints myself, without any coaxing or help from the hierarchy.

After months of running prints, I was introduced to the enlarging room where the matrices were exposed.
I eventually learned how to expose and process the matrices. The negatives were provided to me by the lab technician who made them. (Silvio Zallio.)
If I ever thought that they were out of balance, I kept my mouth shut until I was convinced that I knew what I was talking about.
This activity went on for almost a year. I was one of the best print runners and matrix production people in the lab. (There were only two beginners.)

After some time I also learned **how** the separation negatives were exposed, processed and examined.
At this time I thought I knew all there was to know about making a color print.
I had made many prints from black and white negatives and I thought that I knew as much as anyone did about what a good negative should look like.

Was I wrong?

And how.
All I had learned so far was the mechanics of the process.
This is a very important thing to remember. The mechanics of any process is critical in producing the best print, but it is only the first half of the process. The second half is the more important half, and demands the complete knowledge of the first half before attempting the production of a fine print.
The Dye Transfer process, that is currently in it's death throes, is only one example of the necessity of knowing how to handle the material, and in what order.
The Ciba process is no different in this respect.

The material

is the first item on the list. As you must know there are different finishes in the Ciba material as well as different degrees of contrast available.
However, regardless of the type of material you use, remember, each of the different degrees of contrast are fixed. There is no simple method of reducing the contrast of the image with guaranteed accuracy
Some very soft images may be printed on the lesser of the contrast materials, but to obtain the kind of contrast you need in your print, it may be impossible to make a specific transparency fit the bill. The mechanics of producing a Ciba print is much simpler than the Dye Transfer process, but still requires expert handling, exposing, and knowing how to repeat the different steps in order to utilize the second half of the process.
For instance: **The tools needed for making a Ciba print.**
The enlarger is very important. Any diffusion system such as the ones found in an Omega, Saunders, Durst and even Beseler will work. Diffusion is not my choice, unless it is a high powered light source. One such system has recently been invented. It is called ZBE.
It contains 1080 watts of light (diffused) and is a color head, and is compatible with most of the 4x5 systems made today.
If you want to work with a condenser system, then a 250 watt bulb will be sufficient for most blowups, unless you can find an old Zenomega pulsed zenon light source.
The lens is critical. A quality Apo-chromatic lens will reproduce most of what you have in your original transparency. Anything less will be just a waste of material.
The timer must be able to handle the electrical load that your light source demands, otherwise you will be forced to use a relay system in order to keep from burning out the timer.
The carrier may only be a glassless carrier. If you want to use contrast masks then a registration carrier is a necessity. The glass employed in such a carrier should be anti Newton ring glass. For small originals, such as 35mm or even 120 films, an "oil" carrier is suggested.
The light source should be controlled by a voltage regulator so that an even flow of electricity will be delivered continually.
The easel is not critical, unless you demand absolute sharpness

The first thing you must do in order to make a good Ciba print is to place the original transparency into the enlargers film carrier. What kind of film carrier? It depends on the degree of sophistication in your system.
Will you be involved in registration? If so, you will need a carrier that is able to be placed back into it's housing repeatedly with the assurance that the position will be the same, each time.

Will you be making contrast masks? If so, then you will need register pins in the carrier, as well as a matching film punch and a platen or contact frame which is also equipped with the same register pin configuration.
The enlarger is the main tool that you will be using to make Cibachrome prints. Get the best that you can afford. However, what is the best? It could be a used Omega D2 or a new version of the Durst. The differences in cost doesn't mean that the more expensive enlarger is better than the old used D2. It really depends on three main ingredients.

1. **The Light source.**
2. **The evenness of the light source on the easel.**
3. **The lens.**

Start with the light source. Is it a diffusion or a condenser type? Either one will work. The diffusion system will help eliminate most of the surface scratches found on all films but will lose the sharp edge effect afforded by the condenser type.
A diffuser system must be even. Most are not. Check out the illumination on the easel with a quality easel meter such as the new Jobo easel meter.
Do you absolutely need a color head? Not necessarily. There is nothing wrong with placing cut CC filters into the light path of the enlarger before it reaches the transparency in the carrier. The beauty of a color head is that it is a adjustable to a fine degree. The drop in filters are not as convenient.
The easel is important. If a simple flat easel is all that is necessary, then a vacuum system may not be necessary. However, if you really care about sharpness at the paper plane, a vacuum easel will assure you of the paper laying flat.
A quality easel magnifier is a necessity. Some use the aerial image and rely on the grain of the material being projected as the focusing point.

What system of processing will you use to process your sheet of material?
There are a few models of the Jobo processor. The CCP2 is a base system that allows accurate temperature control, but the operator is the one that makes sure of the proper timing and dumping of the chemistry. The inconvenience of this phase of the process is overcome by the cost of the machine. It is not automatic, but it costs less than other systems on the market. The temperature control is very accurate. It is a one shot chemical system which means that if you are accurate in your handling of the process, the results will always be the same. You can use any of the different kinds of Ciba chemical systems in this machine. The cost for this base CCP2 is about $1200.
The Ilford ICP 42 processor is a table top system and is also very convenient. It allows for accurate temperature control and is totally automatic, including the drying of the print. However, the major drawback is the fact that the same chemistry is used throughout it's life. Only a specific amount of prints can be produced with the same chemistry before changes occur. Towards the exhaustion of the chemistry's life the color changes will become quite evident. Only the P30 system of chemistry can be used with this machine. The cost for this unit is around $7000.
The Fujimoto table top processor is totally automatic and can use the professional P3 chemistry system as well as others and it has provisions for replenishment and a water hook up so that a long running life of the chemistry is possible. The two other systems do not have this capability. The cost is higher than the Jobo or the Ilford IPC 42. This machine costs around $15,000. The choice is yours.

The mechanics of making a Ciba print.

Place the transparency in the carrier and size the image on the easel.

The making of an exposure and the decision of which filter pack to use can be done by trial and error. Remember, there is more than one type of contrast and surface finishes with the new Ciba (Ilfochrome) material. Choose one. I don't particularly care which one. I personally prefer the pearl surface as opposed to the glossy finish.
Make a strip exposure with variations of 3 seconds each, at a given *f* stop, and with a specific color filter pack. The sheet of Ciba material must now be processed.
This is most critical.
Use an easel meter to record the light level of the light source alone without the transparency in the enlarger. After the processed print has been dried, examine it and choose an exposure from one of the strips that you feel is close to the density you would like to see in the final print.
Then examine the print for it's color balance. Make any adjustments you feel may be necessary. If you are far off, make as many color tests as you feel you may need. In fact, make a "ring around" set of exposures so that one could be chosen as the correct one, or a close one needing more adjustments. Whenever you make a color change in the enlarger head, remove any image from the carrier, place the probe of the easel meter on the easel, and after the color filter changes, without the image in the carrier, adjust the lens *f* stop until it reads the same as it did before. **This is a critical step in the restoration of the light level** each time the lens is adjusted, filters added or if the size of the image is changed.
Keep the light level where it belongs and change the time of the exposure if the density of the image needs adjustment.
Once you have obtained the correct color balance in the print, record the filter pack. The next time you place an image in the carrier, use the same filter pack.
You may find that slight adjustments will be needed because of the subject failure caused by any overwhelming color in the transparency.
The mechanical steps can be listed as follows:

1. Place the transparency in the carrier and size it up on the easel.
2. Adjust the filter pack according to the previous print.
3. If you used an easel meter you may already have an aim point as reference for exposure, such as a white shirt or a flesh tone. Regardless of whether a meter was used or not, make a simple strip print using a fixed exposure time. This is done by moving an opaque board across the paper and exposing each strip for the same time.
4. Process the print.
5. Examine the print and find the optimum exposure and the correctness of the color balance.
6. Remove the image from the carrier and in the dark, and read the light level on the easel.
7. Make any adjustments to the color head, choose the exposure time and again place the probe on center of the easel and adjust the *f* stop to it's original reading. (If necessary.)
8. Make a new exposure and repeat the steps 6 and 7 if necessary.

These are the mechanics of making a Ciba print. I haven't discussed dodging and burning. These are discussed in the next portion of the process.

The Theory of making a Ciba print.
This requires much more thought than just darkroom skills.
The main objective here is to make a color print that you would like to sell to an advertising agency, hang in a gallery or museum and win a blue ribbon for first place in any competition. If you haven't got this kind of burning desire in your plans,

you may just as well send your work to an outside lab that specializes in making prints for a living, with little or no regard for your expectations.

We begin with placing your original transparency on a quality light box and taking a good look at it. Is it really a great image? Are you sure of that? Would it look better if it were warmer or colder? What about the density? Is it too light or too dark?
Is it too contrasty or is it too flat? All of the aforementioned qualities are easily adjustable so that it more readily fits your own interpretation.
So, you make a test print and find that the color is great and the density is fine, but the contrast is too high.
Contrast. This is the major problem with all fixed materials, such as Ciba, Type R, Fujichrome and others.
What is the solution to contrast correction?
There have been many attempts to correct the contrast of the print by chemical means and with photo sensitive glass but these feeble attempts have all fallen by the wayside.
There is only one way to make the image fit the viewers eye and this is by contrast masking.
How is this accomplished?
First, the enlarger is the main place to look in order to find out how much it contributes to the contrast problem.
You must recognize that a diffusion enlarger will produce less contrast than a condenser enlarger.
This is a known fact that is easily proven.
If you place a masked off 21 step grey scale in the enlarger and expose it to a sheet of Ciba material, process it and examine it, you will easily see where the problem lies. Only part of the scale will be visible. You can actually find the two extremes of the scale where detail just begins to show.
Using a densitometer, you can find the same two extreme steps on the original grey scale and determine a density range. What ever this density range is, it is the range needed to make any normally distributed transparency produce a full scale quality color Ciba print.
This may sound strange to some of you who have never used a densitometer. But it is a scientifically proven fact, that if the original transparency has such a density range as exhibited in the grey scale test, then all of the information in the original will appear in the print.
The most used ingredient for making the contrast reducing mask is Kodak's Pan Masking Film. Other films can also be also used but Kodak has produced a product primarily for this purpose.
As a result, if a transparency has a density range of 2.30 and the required density range for producing a quality print cannot exceed 1.85 we must find what percentage of contrast will work.
By subtracting the required range from the original range, we will arrive at a difference of .45.
We must therefore make a negative a mask that has a density range of .45.

When the .45 negative mask is added to the original transparency the overall contrast will have been lowered to the correct range.
A series of similar exposures of a three step grey scale on two sheets of film, processed at two different times will allow one to find the correct percentage (gamma) and the correct exposure time for each extreme developing time. It is then a simple matter to produce a chart that will aid one in finding the correct "gamma" for masks for each transparency in their possession.
(My book on the Ciba Process details this chart making process in detail.)
The bonus of this masking procedure is that you are using a panchromatic sheet of film to make the masks. The film is sensitive to all colors.
It could be exposed with the use of color filters which can make significant color changes in portions of the print without affecting the

overall color balance of the image.
Reds could be made to appear brighter or more dull. So could the greens and blues. In fact all the colors of the image could be adjusted as seen fit by the maker of the print. This is known as artistic license.
It is the imagination of the "artist" in you that can make a very good image, a great image. The creative juices are to found in all forms of art. Color printing is just an extension of the original image.
When contrast masks are used to make the print more able to display all of the nuances of the original, sometimes the highlight areas are affected. The mask, being a negative, will affect the highlight areas first. Any light details can sometimes be lost because of the flattening affect the mask has upon the highlight area of the image. This can be avoided in one of two ways.

1. A pre-highlight mask can be made by using a very contrasty film such as Kodak's Kodalith film Type 3 or any similar film. I prefer panchromatic film so that I can isolate an area and just make the green highlights brighter. Or any other color that I can choose.
   However, any litho film will suffice.
   The image will only include the brightest highlights in the original. It will be a negative, and must be very thin.
   Make this mask first, then add it to the original before making the contrast mask, after which, it is discarded. This is a simple remedy for restoring the highlight areas. It is not the best way, but it does work.
2. A better solution is to make an exposure from the original transparency onto a sheet of reversible litho film, such as Kodak's LPD 4 or any other similar material. This will then produce a positive image. A very short exposure is required so that only the highest highlight areas will appear on the film. It will look like a black sheet of film with little tiny clear areas. This highlight mask is used as an afterthought. After the image has been exposed to Ciba material, it requires that an additional exposure be made using this "highlight mask." This is called a "bump" exposure.

In order to make this system work, you will use one of the following methods.
A. Make the main exposure, cover the sheet of paper with an opaque material, remove the carrier from the enlarger, remove the contrast mask, add the bump mask to the carrier, replace the carrier, and remove the opaque material from the paper and give it an additional exposure. You will have to determine the length of exposure by testing.
This requires that a registration carrier be used, a pin system be installed, and that the enlarger not move one millionth of an inch.

B. Another approach to this system is that a large paper box be taped to the table with a vacuum easel inside the box, also, taped securely. Then the cover of box can be used to cover the exposed image while the activity at the carrier is carried out.

C. A registration easel, with a separate pin system and matching punch can be used to punch and position the paper where it belongs and the paper can then be removed and stored safely while the carrier activity is carried on, and then replaced on the pins when all is ready. Take your choice. For simplicity, I like version **B.**
It is cheaper and does not require any holes in the paper.

Another "color correction" system is the "Isolation" system.
By using color sensitive litho films such as Agfa's P-911, or Fuji's 100 Litho film, you could make exposures that produce isolated negatives

that when added back to the transparency will allow specific areas of the transparency to be "open" and then an additional exposure could be made that could alter the color of any chosen area. It could easily isolate the different colors in the original. By using these different masks a "Bump" exposure could be made which could influence any portion of the image.
For instance.
If a racing car is photographed going by the camera at high speed, and is captured successfully but it is found that the red lettering on one of the many "logo's" is too dull and would look better if brightened, a mask made through the green filter would be blank in the red areas. Add this mask to the "sandwich in the carrier and give it an additional "bump" exposure through a red separation filter. The resulting effect would increase the brightness of the reds only. If at the same time, the brightness if the chrome on the wheels could use some excitement, use a "bump" highlight mask to make the chrome "jump." Do not change the filtration in this re-exposure part of this method. You have the choice of brightening or chasnging the color in question. The theory behind this masking system has been successfully used by myself and many of my students.

It works.
Incidentally, I have always been led to believe that the Type R process was not to be considered a quality process and that it also had a limited life expectancy. However, I may be wrong about this also. According to Henry Wilhelm, the new Fujichrome (the counterpart to Kodak's Type R) has a life expectancy of over 50 years. This apparently will give the Ciba business some problems.
Remember, the mechanics of a process is the first thing you must learn, but the theory of the process is the most exciting part of darkroom work.
In future issues I will take apart the Dye Transfer process and try to explain why the process has had such aclaim in the past and why it seems to be in serious trouble at this present time.

The same separation of mechanics and theory can be explained with any process. The manufacturers are only concerned with the manufacturing of the product so that it will have place in the photographic arsenal. The use of the product can only be dictated by the manufacturer is so far as they know. It is up to the "art" printer to realize the potential of any print medium.
Ansel Adams used to tone his black and white prints with Selenium. Did this deter him from producing great prints?
Dodging and burning of a print is the earliest form of print manipulation. It is used because there is no perfect material.

Did you ever wonder why the Motion Picture studios paid so much attention to lighting? There is no room for dodging and burning on motion picture films. The lighting, and especially the contrast of the lighting, must be completely controlled.

The Production of a Technicolor film was a feat in itself. The contrast of the lighting had to be accurate, and the color balance had to be perfect. Decimired color filters were used to bring any discrepancy in color temperature back to it's correct balance.

Any professional photographic illustrator must also be aware of the same pitfalls that can occur with lighting contrast and color balance.

Shooting a color negative really requires that the same knowledge be available to each photographer, but how many of you ever think about the overall color balance of the overall light you are using to shoot a color negative? The corrective part of the color negative printing system is the

correction of the imbalance of the original lighting.
Color changes in the enlargers color head can correct some, but not all of the deficiencies. If a transparency were shot with the same abandon that usually is applied to the color negative, we would have many more failures in the color transparency.
The demise of the Dye Transfer process is appalling. Kodak has screwed every quality color printing individual who depends on this process for his livelihood.
There are still a few processes that will bail us out. The Carbon Processes, formerly known as the Carbro Process is just one of the possible saviors of the "art" photographer.

This new attempt to make as perfect a print as has ever been made, is here. The new EverColor print is outstanding.
It probably will not be considered for the commercial field, as that part of photography has already been conquered by the scanner and the computer.
Individuals that want to produce museum or gallery quality art photography will have only a few other avenues left to them. One of which is the Cibachrome print process. The others are Type C or Type R, both of which are capable of turning out excellent prints but with a limited life.

Yes, the entire world of commercial photography has been turned around. The days of commercial darkroom enthusiasts will be dwindling away, and in time will only be mentioned in history books.
However, the serious art photographer and printer has the whole world at his call.
The knowledge gained by being involved in the Dye Transfer process will not go to waste.
Think about it. Where else can one gain the information that will enable him or her to do impossible "tricks" with color correction and contrast control? It all began with the Dye Transfer process.
Not even the Carbro process of days long gone can compare with the infinite corrections and manipulations afforded by this almost extinct process.

The same kind of thinking is required by any process. It is not the process that is important, but what we do with it.
Do you remember seeing photographs made by well know photographers who instead of using their highly expensive cameras and lenses, used a pin hole camera or a simple Kodak Brownie camera as their tools. The results of this experiment was printed by Life Magazine many years ago. The results would amaze you. All of the images were well composed and had the proper positioning according to the sun and the results were great.
What I am trying to say is that the brain is the more important tool to use.

I recently received a letter from an inquirer living in Hong Kong. He was concerned with the discontinuing of the Dye Transfer process. Kodak sent him a list of the chemical formulas for the dyes and wanted to know where some of these chemicals could be obtained. I told him to contact
Mory Bard
5500 N.W.69th Ave.
Apt. 481
Lauderhill FL 33319

If anyone can direct a person to the proper company for purchasing the dye ingredients, Mory can.
The letter from Kodak also included the Matrix A and B formulas and the paper conditioner, as well.
What we need most is the formula for the manufacture of the matrix film.
Good luck with whatever process you are currently involved with.
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