# KEEPING PACE

A Monthly newsletter devoted to the art of darkroom photography

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## RECIPROCITY, SUBJECT FAILURE, LATENT IMAGE AND FLARE

**A word about reciprocity.**
Does it affect the matrix film used in producing Dye Transfer prints? Does it affect Cibachrome prints?
**Just what is reciprocity?**
The effect that is has on any single layer film is that is will change the speed of the film as the exposure is lengthened. The film emulsion has been manufactured to a specific speed depending on the color balance of the film. Panchromatic films will be more affected by longer exposures than will orthochromatic films. However, most of the adjustments are not too critical because, even though the emulsions are mixed to be excited by a specific color balance, the fact that they are on one layer makes it necessary only to make a small adjustment.
Actually the affect on matrix film is about the same as any ortho material. For every change in exposure of 100% the amount is less than 5%. Even if you are working from badly exposed negatives, the amount of reciprocity won't be too much of a problem.

**But, if you are working any multi-layer emulsion** such as with Cibachrome paper, then you will have quite a problem. The are three layers of different emulsions on a sheet of Cibachrome paper. Each layer is sensitive to a specific speed and color balance of light. The paper has been manufactured to a specific overall color balance. The important thing to remember is that each layer has a specific speed, so that when exposed at a normal short exposure all works well. but the longer the exposure, the more time it takes for a certain layer to be exposed. The error is increased as it multiplies the error with every increase in exposure time.

The best exposure time for exposing a Cibachrome print is around 20 seconds. Do you have a fast enough light source that will allow you to expose a Cibachrome print for 20 seconds? Most of us do not.
If you expose a print for 30 seconds and decide that the exposure was too short and that you wanted to double the density, and decided to give the new exposure

60 seconds, you would find that the exposure was not long enough and that the color balance shifted towards the blue side.

I have made extensive tests with Cibachrome paper, as I have with almost any other material that my livelihood depended on. I found that at 20 seconds a specific exposure was accurate in both density and color balance. . Then I stopped the lens down one full stop. (using a meter) and doubled the exposure and found the discrepancy. The print was far too light and the shift was about a 5 cyan heavier. Instead of 60 seconds I had to give the new exposure almost 90 seconds and had to add 0.75 red to the filter pack.
I decided to make tests from 10 seconds to 2 minutes and was able to modify my exposures by making a chart showing the amount of error caused by reciprocity. The longer the exposure, the longer the correction and the more red filtration had to be added to the filter pack.

**What is the correct exposing method** to use when making Cibachrome prints?

The first thing to consider is what kind of light source to use. The brighter the light, the easier it would be to make quality prints on Cibachrome. The material is the slowest of all printing papers.
In order to keep the exposures within reason, I decided to install a Pulsed Xenon light source in my Omega D2 enlarger. This unit was once manufactured by Berkey, in N.Y. City. The cost was around $1500 and was to be used with a condenser enlarger. This gave me 1600 watts of brilliant light. The color temperature which was 5000 K was wrong for the material, so I had to add an 85 B color filter to the light beam. This brought the light color balance to 3200 K.
I was now able to make very short exposures and was able to keep the reciprocity factor to a minimum. My exposures could all be kept to around 20 seconds. This meant that I could now make contrast reducing masks that would allow me to make the print fit the range of the paper and the eye.
The first time I was aware of the Ciba process was before it was Ciba's process.
Dr. Bela Gaspar was the "inventor" of the dye destruction process known as Gasparcolor. In 1946 I saw a print in the window of a bank building in New York City. I was amazed by the quality and color saturation of the print. Remember, this was in the days when the only color prints of any consequence were either the Carbro print or Dye Transfer's forerunner, Wash Off Relief. **Imagine, a print in full color without making color separation negatives.** This seemed to be a miracle. Dr. Gaspar's patents ran out and the whole world tried to make something of his process without any luck. Then along came **Ciba.** The worlds largest pharmaceutical company. The wanted to diversify, and bought out Ilford.
When the material was first introduced in the middle "60's, I was asked to be the experimental lab for Ilford on the west coast. I agreed to work with Ilford.
The paper then was only available on Polyester base and was extremely slow. The average exposure from a 35 mm. transparency, when

making a 16x20 print, was in the area of 30 minutes. This was with the normal 211 bulb. (75 watts). Even with the 213 bulb, (250 watts) the exposures were still too long. I burned out many color filters.
This was without any kind of contrast masking. We didn't have any inkling of how much the exposure was affected by reciprocity because the exposures were so long that we couldn't get the data that we needed to come to any conclusion.
Processing the early paper was a nightmare. I built special tanks made with PVC sheet material. There were 7 steps in the process, plus washes. I decided to build 30 x40 tanks so that I could make large prints for display. The tanks were built to include "gas burst" systems.
A large basket was made using PVC pipe and polypropelene screening cloth that could handle 8 large prints at one time.
After two years of trying to get some sort of handle on the exposures and processing problems, I decided to give it up.

Years later, when the newer and faster material was available. I tried it again, and after purchasing a 4x5 Pulsed Xenon unit, I finally made the breakthrough that I needed. The new material was much faster, and had better color and came in two different kinds of paper finishes. Glossy and pearl. Its place in quality printing is assured.
So, getting back to this time in history. The material has been even more improved immeasurably and so has the speed. I still contend that the process works better with a short exposure. I still recommend a Pulsed Xenon light source.
One of my good friends and competitors in the Cibachrome field used a Durst enlarger but removed the light source and replaced it with 4 very bright quartz light bulbs to illuminate a diffusion system. This light source was extremely hot, but very bright and even. A very strong blower kept the film plane cool.
My system for producing quality prints is really quite simple. I keep my exposures at one level. If I have to increase or decrease the exposure for any reason I use my Wallace Fisher meter and change the F stop on the lens and keep the exposure the same. In this manner I keep from getting any kind of reciprocity problems that occur with exposure change.

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**Another problem with film or paper is, whether or not the material is fugitive.**

Fugitive, means that during the time between exposing and processing the material, something is going to happen. All film creates a latent image after exposure. The waiting time before processing is critical with some films or papers.
Matrix film is very fugitive. For instance, if you make a set of mats and decide that you will process them the following morning, you will be in for a shock. The image will lose density. I didn't believe my eyes when it first happened to me. I immediately remade the mats to what I thought was the new exposure, and was off a mile.
I once made a set of mats on Friday afternoon and decided to process them the fol-

lowing Monday. This was a complete disaster. The image was 50% lighter than it should have been. However, not all film is like this. I remember the time when one of my friends and co-workers shot some images of the golden trees of Connecticut one fall, and finished shooting the roll the next fall. The film was processed and it was impossible to tell which was shot when. Cibachrome also has very good lasting qualities. I have made tests for the amount of time the image needed to lose its strength.
It took almost three days for Cibachrome to exhibit any loss of image.
It took 6 hours for matrix film to start to lose detail.
I didn't test any other materials as I was only interested in the material at hand.

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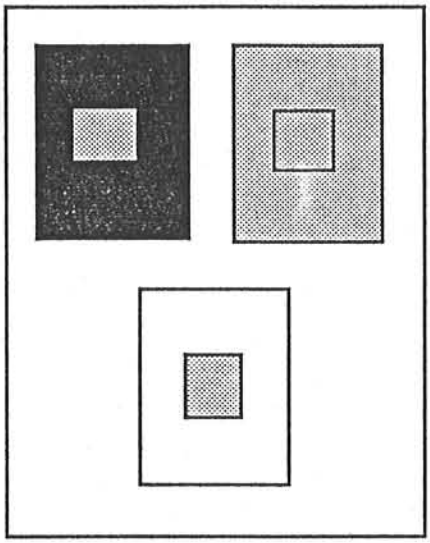
**Another subject that is close to my heart is subject failure .**
If you have never suffered from this fate then it means that you never made a print with an enlarger.
Every positive or negative will produce some sort of subject failure.

**For an example,** if your transparency is of a neutral color balance, such as grey concrete and colorless buildings with a grey sky and very little "color" then any exposure that you make will not be affected too much by subject failure. Making a positive color print, either Ciba or Type R, will require a specific filtration. But take another picture of the same scene, but this time allow a big red bus to drive into the scene and now you have the ingredients to cause a shift in the filtration used in the enlarger.
**Why?**
The fact that you are using an enlarger is the reason. Any time you insert any film in the enlarger, you will have cause for concern. The main cause for the enlarger being the culprit is **Flare.**

**Make this experiment for yourself .**
Buy three small 2 inch neutral density filters of 1.2 each.
Cut and mount these three filters into three sheets of film.
The first sheet should be a sheet of processed film that has a density that is as black as possible.
The density of the second sheet should be as close to the filter as possible.
The third sheet should be a clear sheet. (see diagrams)



Take the first sheet and enlarge it to any size. Make an exposure that produces a nice even grey patch that represents the neutral density filter.
Record the exposure.
Then make identical exposures from the other two sheets and you will find that the results won't be any where near the first exposure. You will be forced to cut the exposures until they match the first one. **The reason is flar e.** The amount of light that gets through the enlarger, will cause the images to be over-exposed when using the

clear film and the average grey film.

**Try this experiment.** With nothing in the enlarger, and in a perfectly dark room with no safelights or any light leaks, turn on the enlarger with the lens at F 11. I can assure you that you will probably be able to read a newspaper two feet from the easel. Then place an average negative in the enlarger and you will find that it will be harder to read that same newspaper.

What does this mean when you are making any kind of color print? If it is a dye transfer print, then the density of the negatives caused by the color balance of the original will have an important affect on the outcome of the print.

A transparency of a red headed girl in a red sequin dress wearing red gloves and shot against a red vinyl background will have a definite look in the separation negatives, The cyan negative will be quite dense. The magenta negative will be fairly open and clear and so will the yellow. If the girl was wearing a white flower in her hair and all three negatives had exact density readings in the flower, you would normally expect the three negatives to have the same exposure. In no way would that be possible unless you were making contact exposures. The amount of flare that would be evident would make it impossible to have all three layers receive the same exposures.

**What about making a Ciba print? Do the same things apply here?** Absolutely. The same thing occurs any time you use the "air" such as an enlarger. The same kind of test is possible here. Using the same neutral density filter as before, but, this time insert it into as sheet of red film, such as Rubylith material. Then, using the enlarger as a light source, make a contact print of the assembly. When you get a great neutral square in the center of this print, record the exposure, the light level and the filter pack.

Now place this assembly into the enlarger carrier. Size the image to any size. Make another exposure using the same exposure time, filtration and light level. I can guarantee you that the results will be different. Why? **Flare.** This is the main ingredient that causes so much trouble when making a print. This is one of the reasons that I use an accurate easel meter when deciding on matrix exposures or when making Ciba prints.

This was the main reason why, when making exposure determinations for the Dye Transfer process, we used to make bromides (black and white prints) of the separation negatives so that the flare factor was built into our calculations.

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One thing that I did during the last 10 years in my professional printing life, was to examine the transparencies closely. If the originals were very dark because of the kind of subject that was being photographed, then I would consider **making separation negative to the actual size of the print.** This meant that if I had to print a man in a dark suit and he was standing against a dark wall, I realized that my negatives would be quite thin. This would mean that a great deal of flare would take

place and I would lose little tiny details in the photo as a result. By enlarging this kind of subject, the flare would not exist in making the enlarged negatives as dark images do not flare. If the negatives were to be made to the size of the final print, all that had to be done was to use a contact frame to expose the negatives to the matrix film, using a sharp point light source.

I have done this many times. The client never knew what I was doing and really couldn't care. As a result, this method of mine was never really known or even talked about, except for the employees that work with me.

I vividly remember making a print of the interior of a piano with the piano wire stings and little felt hammers looking very clear and crisp in the original 8x10 transparency. A 20x24 print was needed. I purchased Kodak's Separation #1 film, 20 x 24 size and using my Durst enlarger sized the image to fit the size print that I needed. I made sure that the image was reversed on the easel, so that when I made the contact matrices, emulsion to emulsion, the image would appear and print right side up.. This particular transparency was about 95% black. If I elected to use the standard procedure, the amount of flare that would have occurred would have been so great that the little thin piano wire and strings would have lost most of their detail.

To me, the print was a resounding success. The client and retoucher never said anything, except, that it was a good job. Which, upon reflection, is all I should have expected. After all, I am the professional. They were depending on me to do an outstanding job. They weren't even aware that a problem would exist. The next time you make a set of contact prints from either color negatives or original transparencies, and are satisfied with the color balance and density, don't be alarmed when the requirements to make the final prints are different from the proofs. The reason is flare.

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**I would like to say something about making Cibachrome prints.**

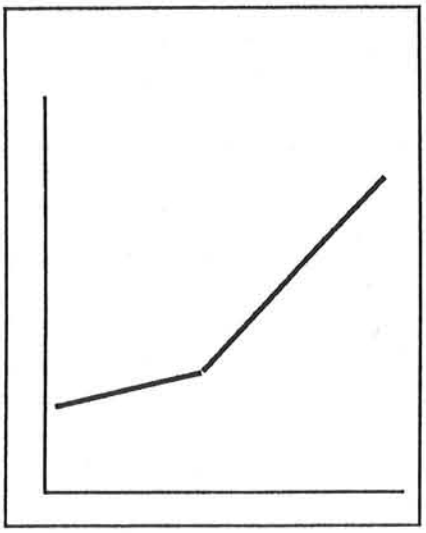
If you are serious about making quality reproduction color prints, you must be aware that contrast masking is an absolute must.

The material is manufactured to a specific contrast range with a gamma of its own and there is no way to change this situation with processing as can, and is, done with Dye Transfer. The only remedy is masking.

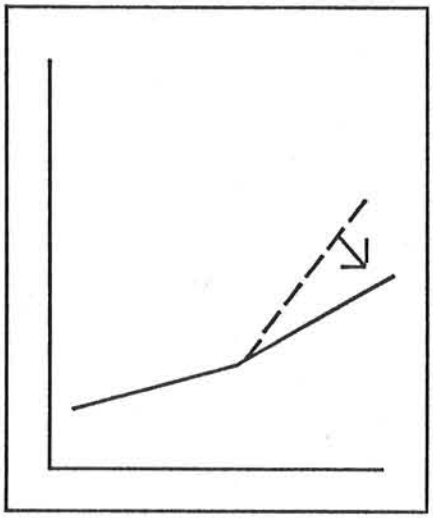
**However, there is one important catch to this whole method of masking for Cibachrome.**

The length of the mask has to be one third the length of a normal mask made for Dye Transfer. The reason is as follows:

The Cibachrome paper is flatter at the bottom end of the curve shape than the rest of the curve, which is almost a straight line.



As a result, if you have already made a masking chart for reducing transparencies to fit the range of the Dye Transfer process, use the same developing times but cut the exposure in half. This will result in a curve shape that has no detail in the first one third of the image, but then masks the rest of the image with the proper Contrast level.



This is important if you don't want flat shadows. Remember, while making these contrast reducing masks to specific percentages, you also have the opportunity to use colored filters to enhance the image even further.
For an example;
If you had to make a print of a large warm orange that was positioned against a green wall, you have an opportunity to make the orange a brighter color or the green a brighter color. Getting both colors to look cleaner or brighter is not impossible but requires much trickier masking.
If you made the contrast mask through a green filter, the green background would look deeper, thereby making the orange appear brighter. If you made the mask through a blue filter, the orange would definitely look brighter as very little of the orange color would affect the mask and therefore it would print much brighter.
In other words, what I am saying is this. Use your masks to do more than just reduce the overall contrast of the transparency. Make it work to brighten colors or to make some colors more saturated.

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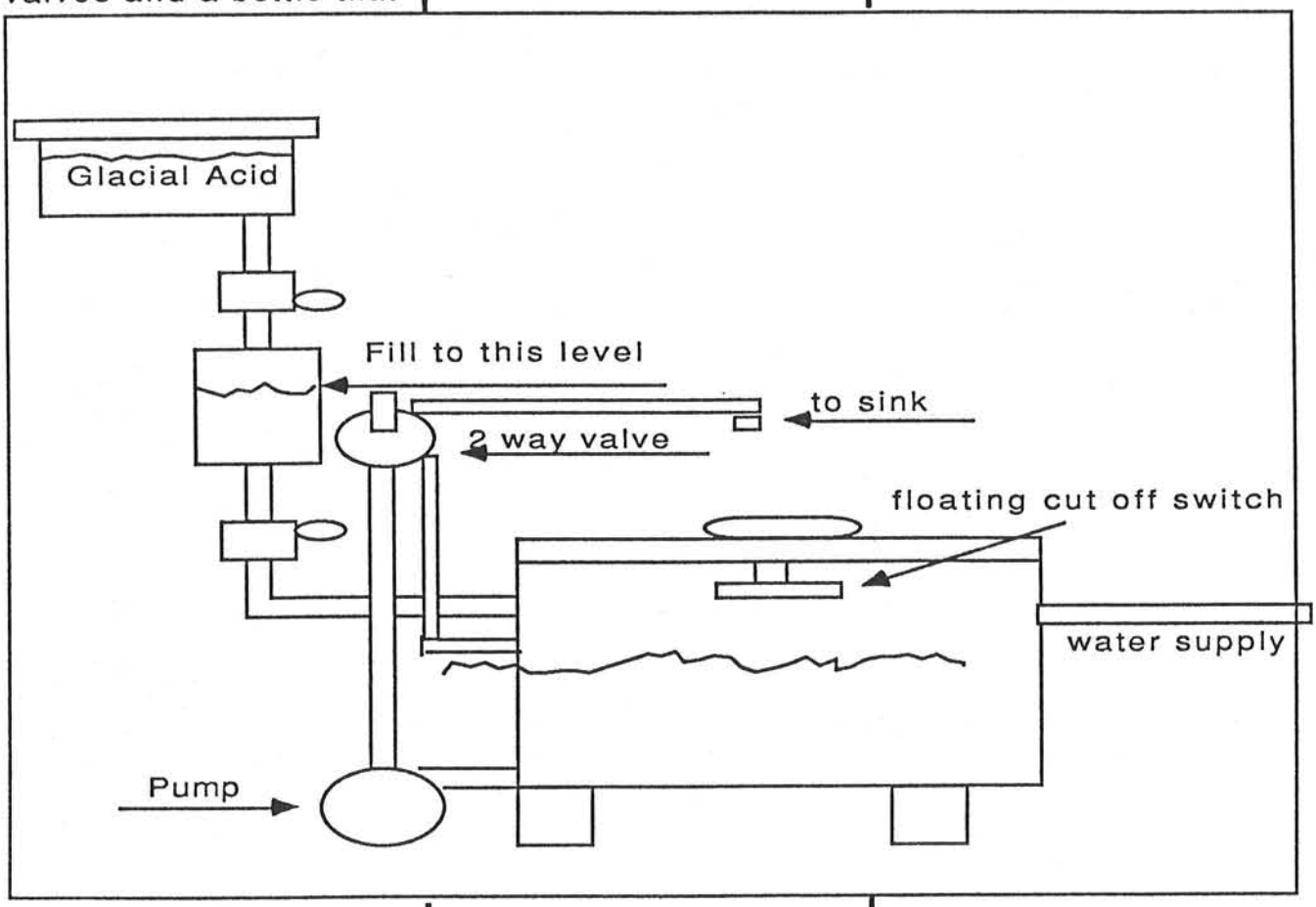
**Making your lab odor free is not difficult.**
The main thing to control is the Glacial Acetic Acid. This pungent chemical can get into your clothing and even into your skin.
I remember visiting a good friend who had a lab in the basement of a large office building. I was not given the room number. However, when I walked into the corridor of the basement. all I had to do was follow my nose.
This wasn't anything unusual. All labs have that distinctive odor that states that this is a dye transfer lab. Mine included.
But, when I retired and built the lab in the rear of my property, I had to make a very important decision. Just what could I do to eliminate the strong telltale odor of the acid.
One of my solutions was to place a large rectangular plastic tank under my sink, so that it was out of the way. This was easy. There are many places to obtain tanks.
The next step was "how to deliver the 1% acid rinse to the sink area?"
This also was easy. Just install a magnetic pump under the tank so that an electrical switch would send the chemistry where ever you wanted it.
The next step was critical. How do you fill it without the possibility of the tank over flowing? This happened to me many, many times in the past.
This was solved by placing the water delivery system into the cover of the tank which

had a cut off valve installed. When the water reached the top, the water would shut off. Adding the strong Glacial Acetic Acid was solved by using a sealed tank and a series of valves and a bottle that I could use to measure with. As a result, many people who visit my lab are amazed that the odor of the acid is hardly noticeable. This is a diagram of what I am writing about. This is a relatively-simple device to make. However, if you like the strong odor of the Glacial Acetic Acid, then forget what I just said.




Just a word about my upcoming video and book on the Dye Transfer process The book is just about ready to go to press. The video has already begun. I trying to keep it under two hours. The book and video will be packaged together and sold as a package. One actually offsets the other. Both units will be needed to really understand just what I will be talking about. Before I am ready, I will notify all those on my mailing list as to the date that these items may be ready for delivery.

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**For those of you who have not yet subscribed yo this newsletter, the cost is $60 per year. Back issues are available for $4.00 ea.**

**Even my book "The Art of Photo Composition" is still available for $50.**

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