KEEPING PACE

A Monthly Newsletter Devoted to the Darkroom Arts

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How to Determine Correct Exposures

Making the correct exposures on all of the separate film and paper items requires accuracy and concentration.
The main question is this. "How" is the question of correct exposure calculated? Most of us have worked by the "seat of our pants" approach. There is nothing wrong with that so long as the results can be immediately seen. Making a black and white print is probably the simplest of all the steps, because the results are produced right before your eyes. Compared to the making of the matrices for the Dye Transfer process it is child's play.

Let us begin with the simple production of making a contrast mask.

The contrast mask is easy to produce, but unless you know what you are doing, it can cause much concern.

For instance, Making a mask for reducing the con trast of any transparency used in making a Cibachrome print seems to be a simple matter.
For a while, a photo sensitive piece of glass manufactured by Dow Corning, was used and was called a "minut mask." There was no accuracy involved. The transparency and glass were taped together and exposed through the transparency with flashes of a strobe light.

Eventually, a negative image appeared on the glass and this helped reduce the contrast of the original.

Was this system successful? No.
The reason for it's failure was the fact that it was an uncontrollable method. It also was an amateur attempt and lacked the necessary color control that a professional system must have. A simple change in contrast is not enough.

How does one determine the correct exposure in making a simple reduction mask?
You would be amazed at the many variations in mask production that I have witnessed.
One major color printer in the Los Angeles area actually makes the mask in this fashion:
The exposure time varies but the development time remains constant In this way he makes a thin mask or a heavy mask by exposure only. That is it. If the print doesn't fulfill his desires, a new mask is made and only the exposure is adjusted.
How is the exposure determined for a new transparency? Who knows.
I presume that after enough masks have been made that he can judge the exposure

by "feel."
Making an exposure in a camera, without the aid of auto exposure, means that you must have some guide for a good exposure.

For quite a while, all film manufacturers packed a little data sheet of paper in the film box that told what shutter speed and *f* stop to use in different conditions of daylight, such as sunny, sunny but in the shade, in the shade, cloudy days, rainy days, etc. This was an attempt to help those of us that couldn't afford an exposure meter.
Once the exposure meter was invented, and the price was lowered, the days of guessing were over. Now we could actually make decisions based on actual conditions.

Even the simple act of making a good exposure on black and white paper could be measured by some sort of easel meter. However, I still use the strip test to determine the correct density and my eyes to make adjustments in any filter pack if I am using variable contrast paper.
The eyes are great meters.

In making contrast masks for any process requires that tests be made, and times for processing and exposure be made so that the proper "gamma" of development be achieved on the masking film and therefore make for a better final print.
Once these times of exposure and development are determined, then strict adherence to time and temperature, and to agitation be maintained. With this great "tool" for producing accuracate and predictable results you can be on your way to making truly fine prints.
It would be wonderful if we didn't need densitometers, but I can't see going back to that era in time.

Remember, the production of a great black and white print is primarily in the eyes of the print maker. The person making the print must realize that quality demands that certain aspects be adhered to.

For instance, **never,** I repeat, **never,** pull a sheet out of the developer before it's proper time so that you can "save" a print. The entire idea of obtaining the greatest depths in a print can only be achieved by proper development. Change the exposure if you must, but never the developing time.

So far all we have done is use our eyes to make judgments. Now let us examine the problems with Cibachrome.
I have a special theory about masking. I have used this approach for a long time and I know that it works.

Every enlarger will produce a specific degree of contrast with everything else being constant.

All enlargers are slightly different and some are drastically different.
The difference between a condenser enlarger and a diffusion enlarger is only the tip of the iceberg. Other "things" that affect the quality of any print is the color of the lens, the color of the light source and mainly, the eye of the beholder.

It is possible to determine the exact degree of contrast that your specific enlarger can produce?

How?
This is a simple test that I have used for years. Place a 21 step grey scale in your enlarger and expose it by projection onto the sheet of material you want to evaluate.
Start with Cibachrome.
Make a series of different exposures so that one "good" one can be used for this procedure.
After processing, examine the processed grey scales and choose one that has an equal exposure that places the steps in the center of the sheet.
Look carefully at the chosen grey scale and find the area on each end of the scale that just starts to exhibit some form of tone (detail.)
Mark these 2 steps.

Then remove the grey scale from the carrier, and using your densitometer, read the steps and then subtract the lower reading from the higher reading and you will obtain the density range that your enlarger requires in order to produce a good print with details at both ends of the image.

From now on, if any transparency does not meet this "requirement" then you will be aware that some sort of mask must be made in order to change the overall contrast of your original so that a simple exposure can be made that will allow you to make a print that is not bald in the highlight areas or blocked up in the shadow areas. A mask made to the proper percentage (or gamma) is the answer.

This then, is the premise that I have been writing about for these past few years in my newsletters and in my books. I detail the procedures that will allow you to make a mask at the correct gamma for your image and most importantly, your enlarger. Every enlarger is unique and has a contrast quality of it's own. Once this mask is made and placed in register with the original transparency the image must be exposed.

In this event, you have a few choices. A simple easel meter can be used and after testing for accuracy, the probe can be placed on a particular area of the flesh tones, or a grey, or a white, and the meter will aid you in getting close to a good print on the next time you try to make a print exposure.

Simply place the probe of the meter on the area you want to match and adjust the *f* stop until it matches the test print reading.

However, after the first test print, the rest is up to you. At this point, you and you alone are in control of the quality of the print.

But, what about procedures for processes that do not give you a final print to look at for quite some time.

The Carbro process is one of the processes that require many moves before you even get a hint of what to expect in color. The Dye Transfer process is another.

In fact, any lithographic process is in the same kind of "blind" process.
It is only after all of the contrast masks have been made, and after all the highlight masks have been made, can you even get to the point of exposing separation negatives. And you still won't have any idea where you are until the unveiling of the print.

Each of the above steps had to be exposed.

How was the correct exposure determined?

Not by guess or conjecture but by making accurate and repeatable tests that resulted in the production of working charts. One chart for each procedure. One for the overall contrast, one for the highlight restoring, and one for the correct exposure and developing times for the separations. **Does this mean that you must do this in order to make great prints?**
Absolutely.
The days of praying for a good result are over, In fact, they have been over for quite a while.

In order to make a great print on the fantastic **Dye Transfer process who's rebirth is almost ready to be announced,** you must be aware of the fact that repeatable exposures must be easily determined and predictable.

The first thing you did when evaluating the requirements for the Dye Transfer process was to expose a 21 step grey scale onto the material of last resort, (the matrix film)

Then you had to find the top and bottom of the scale where detail was just about to appear and mark them.

Then you found the exact points on the original grey scale and read them and subtracted the low reading from the high reading and the results were the required density range needed on the separation negatives in order to make a good print.

Then you had to find the density range of combined mask and transparency (CMT) of the "sandwich" in order to process the final separation negatives at gamma .70. Now you were ready to tackle the world of color with much more assurance of accuracy. Remember, the matrix film has the same ratio of exposure for each sheet. The three sheets have the same speeds and are all exposed through the same light source.

There is more than one method for finding the correct exposure for the matrix film. The simplest is to make a strip test of the image from red filter negative (prints Cyan) on an 8x10 sheet of matrix film, process it and then dye it Cyan, transfer it and look at it through a red filter as if it were a black and white print, and examine it compared to the transparency also through the same red filter. When you feel that the images look compatible in density, you have a few choices for determining the rest of the exposures. Using your easel meter, place the probe over a neutral area and record the density. Then, without moving the easel meter, change the negative in the carrier to the next image (green filter neg, prints magenta) and record the same neutral area. Do the same with the last remaining negative (the blue negative, prints yellow) and record it's density. If the three reading are the same, give them all the same exposure as the first good test. If not, then use the log scale on any scientific calculator to determine the other exposures. Remember , you still have not seen an image in full color.
However, you may not have a neutral area in your photo.
The best thing to do after your first strip test is to read the middle step of the three step grey scale (you did include it in your work?) **Read this middle step in each of the three negatives** and determine the correct exposures from this set of information.
A simple remedy for those who like to "see" what they are about to get is to just make a set of black and white prints of the three negatives, and by using your greatest meter, your eyes, make a set of prints that hopefully have a neutral area that can be compared by folding the prints and laying them over the first sheet.

Make as many corrections as you feel are necessary. This is the fastest, if not the best way to train your eyes to be able to see the differences in a simple thing like a grey wall. Is the wall cold grey or warm? Your eyes can determine this easily after you make a few hundred black and white test prints.
There has been a growth in the pigment processes. They have a particular problem all of their own. The three pigments have their own individual speeds. The light source must be "hot" enough to make an impression on the hardening qualities of the prepared pigment sheets. However, the speed of each color is independent.

This procedure works with the UltraStable process, or the EverColor system or any other pigment process available. The first thing that should must been done is to make a series of exposures of the same 21 step gray scale onto a sheet of Cyan pigment.
After the hot water bath, transfer the sheet to a final support paper.

Now, as we did before with the cyan matrix film, examine the image (through a red 29 filter) of the most normal grey scale and locate the top and bottom ends of the scale where detail just

begins to show.
This will tell you what the **density range requirements** are for the pigment material. Once you know what that is, and further go through the process of the CMT so that negatives can be made at Gamma .70, the next problem is as follows.

Remember, the speed of the matrix is the same for all three eventual colors. Not so with the pigment process.
First, If you make the test on the Cyan material, examine the results through a red filter? Once you find the correct density requirement you are ready for the next step.
Use the opposing grey scales for this next procedure
Make a series of exposures through the opposing grey scale.
On which color should you do this?
On all three colors.
You will find that the three colors, have their own speed. If you did the tests properly, , you will have found the the three colors have speeds of their own.

So the next step is as follows. Suppose you find the optimum exposure for the **cyan is 30 seconds, and 50 for the magenta and 75 for the yellow,** what do you do?
Simple.
Find the differences in the separation negatives. and use these differences as factors. This will enable you to make accurate exposures for each layer. It should look like this: Cyan 100%, Magenta 1.66%, and the yellow ,250 %.

Multiply each of the optimum pigment factors by these negative differences and the results should look pretty good.

Another important thing to realize.
When a set of separation negatives are made, make sure of the details in the shadows first. If they are too light in the shadows, the results will be disastrous. Examine the grey scale patches. If they read the same then the set is in balance. In most instances, the colors in nature are not that neutral. The differences will show in the negatives. **The grey scales are the only hope to getting the correct balance and contrast level.**

Use the grey scales as a comparison tool only.
For the production of an UltraStable pigment print, you will need an ultra violet light source. The place to find such equipment is in the warehouses of used equipment in Litho supply companies. A good system, such as a flip top model, allows for exposures without you getting "sun burned." The vacuum system should be strong and reach 25 lbs. of vacuum pressure before any exposures are made.
Register pins should be used, other wise the advantage of easy registration is lost. Make sure that the register pins are placed so that the glass has little holes drilled into it so that the pins have somewhere to go once the top is closed.
A reasonably sized sink that can hold 2 or 3 trays of the correct size, and a transfer area. Purchase a slab of marble or stone from a stone supply. Make sure that it is flat. Drill holes into the stone for the placement of pins. Make the holes loose enough so that the pins can move. Miix and place 2 part epoxy cement into the holes, place the pins into the holes and using a sheet of pre-punched plastic final support paper, place it over the pins. This will automatically move the pins into the proper place. Let it set in this position.
Then cut the film out, and using a scraper, remove any glue that may still be near or around the pins.
A good roller is all that is needed.
A series of yellow "bug" bulbs can be used as safe lights in this darkroom and afford one much illumination. Make sure that you have good lighting at the end of the procedure so that an honest evaluation of the print can be made.

The advantages of enlarged separations or contact separations.

Let us say that you like the idea of making prints from negatives via the contact method. This means that if you can afford it you can have an image scanned and separated to the size you wish for a relatively small amount of money. Then, you can use a contact frame and a simple hanging light bulb and a timer, expose a set of matrices (Including the black) and make a very colorful print without the additional expense of obtaining an enlarger, which in itself would limit you to the size negative that you could use, and also mean that you must make your own separation negatives.

Consider this,
you could buy your negatives on the outside, as I have indicated, or with your small enlarger make larger separation negatives from which you could then also make contact prints via the Dye Transfer process. The choice is a simple one to conclude.

If you already know how to make contact separation negatives, you could use these negatives to make any kind of contact print. Not only the great Dye Transfer print, but the UltraStable pigment print also.

One of my subscribers has made a colorful print using the UltraStable pigments without a screen and it looked great. A bit more accuracy in his approach to exposing the pigments and his print would have looked even better.

Let us assume that you want to make prints larger than 11x14. You have 2 options open to you at this time. Either purchase a set of scanned and screened separations or make your own enlarged separation negatives.
If you would rather make your own enlarged separations from which you can make contact prints in any process, and already know how to make contact separations, the process is simple.

When making contact separations you are constantly adjusting exposure times because of the differences in density in the transparency. However, if you are using a system similar to mine, here is the method I would use.

The masking charts would not have to be changed , since they are produced by contact. The built in highlights would fall into the same procedure. Make all of the preliminary masks by contact.
Then you must establish a new set of exposure and developing times for the enlarged version. Once you have these new times locked in, simply use your easel meter and read a light area of the image being projected on the easel. A white would be ideal, but anywhere on the image as long as it represents the top of the scale.
Now you already know the exposure and developing times and all you need to know now is the density reading obtained by the easel meter. Place a new masked image in the enlarger and size it to what ever you need, **then after it is positioned and focused, read the light level of the highest point of the image and adjust the meter until it reads the same as the test and simply use your fixed set of exposures and developing times.**
Remember, any contrast changes have already been made because of the requirements if your system. You don't need any further changes. But if you do, they will be small and easily met by making minute changes to the A and B portions of the matrix developer or with addition of acid to the dyes.

The Disadvantages

The only disadvantage is the fact that **flare** could influence the final outcome of the printed image. Flare is the one thing above all others that can destroy the sharpness, color accuracy,

total definition and contrast of the final image.

The advantages of making your separations via the contact method.

The fact that a pin point light source could be used when making a contact exposure will ensure a very sharp image, so sharp, in fact, that the grain of the original color film could be a factor in definition. This is the only reason for making negatives by contact.

The disadvantages are :
Any surface scratches or marks will also blow up in size when the final image is made.

If you make a 10 times blowup of the image, the grain is also enlarged with the scratches and marks. Guess what? You are going to see the grain. Don't compare the visibility of the grain with sharpness.

Most important, the grain of the actual film used in the production of a separation negative is very evident if it is made by contact. Therefore the separation negative's grain will also be enlarged along with the image and all of it's faults. The only time I would recommend making separations by contact is when the original piece of film is 4x5 or larger.

I would always enlarge small originals 35mm or 2 1/4) because of this factor.

The only time I would veer from this procedure is this:
The amount of white or black in a transparency.

An example:
A 2 1/4 piece of film is received for producing a print. The client wants a Dye Transfer print. This means that the exposing element will have to be a negative.

If I make a set of negatives via contact, then the flare factor is almost negated. This will help produce a crisper print.

If I decided to make a set of enlarged negatives, then the flare factor would be great. This would help to produce a less crisp print.

On the other hand, if the client send you a transparency of a coal miner at work in a mine and the transparency is almost a 90% dark image, then what would you do?

I would make enlarged separations so that the flare would not be a problem. But then we would have a problem, the negative has to be printed. The flare factor has returned.
However there is one redeeming factor.

If the negatives are enlarged to the size of the final print, then a contact of these negatives could produce an almost flare free image. Think about this for a second.

We are really torn between which way to go. It is a tough choice. Therefore, I feel that it is absolutely necessary to be able to make separations in either system, contact or enlarged. I have written about a method I have used many times to be able to "see" into the dark areas of an image without the fear of flare becoming a problem. I would make separation negatives to the actual size of the print and then make contact exposures onto the matrix film to be able to produce flare free images of dark section with ease. The clarity was so overwhelming, that a few times I was asked if this was the same transparency. This was the greatest award I could receive from a client.

This problem is completely erased when making a scanned set of negatives. The scan system delivers a negative free from flare and most important, free from curve shape distortion. This is called "straight line reproduction."
This is the main reason why most magazine images look so sharp.

The simple fact that the magazine images look different to all of us is the fact that pure color is not being observed. A screen image is being printed, along with a black image so that the final image has some semblance of form.

A set of negatives from the same image could be produced by any local litho house with a scanner. Will your prints look better than the printed page? I don't think so.
There are exceptions to this fact. EverColor and UltraStable have proved this. The size of the screen is the reason.
But the original Carbro print, and the current "Carbro" prints being produced by Rene Pauli, of San Francisco, have been produced without the aid of any screened negatives but simply from separations that he had produced himself..

If you are an artist, you have two choices. Either you produce the entire print project yourself, or you farm it out. If you feel that you are unable to make a great print, then, by all means, resort to some master printer to produce your image. This is why I was relied upon for many years. My client list consisted of over 90 individuals that were recognized as world class artists.

Don't forget. I was in the commercial field. My images were printed as billboards or magazine ads, but the photographers that produced the transparencies were first class artists. I didn't expect Art Kane, or Irving Penn to step back from the camera and worry about the contrast levels or the color balance of an image, They really had more important thjings to do. They were being creative with the camera. However, don't think that they overlooked any print made for them. Super critical is the only word I could use to describe the persona's of many of the top photographers.

Phillipe Halsman was no exception. I sometimes made as many as 14 Dye Transfer prints of the same image before he would say, "Make one more between number 11 and number 12."

Home datkrooms.

Many of you have darkrooms that work fine. The major problem with home darkrooms is that they are (for the most part) better than most professional labs. I know from experience that very few labs had the kinds of controls that are really necessary for fine repeatable work.
My labs all had temperature accuracy in the processing of separation negatives, masks of all kinds, and the best of all "One shot chemistry."
I did not ever re-use any chemistry (with the exception of fixer)
All of the chemistry for masking, and for separation production were done with unerring accuracy.
A water tank with a circulating stream of tempered water always kept my developing temperatures at 68° day and night. This included the diluted chemistry for making masks, The Kodalith chemistry for highlight masks and isolation masks, the actual mix for the production of separation negatives and as well for the Matrix A&B chemistry, the acid stop bath, and the fixer. **Everything.**
I don't know of more than 2 or 3 labs that were this deliberate and consistent with this part of the process. Most labs that I have tried to help lately, have no control of the developer or any other part of the liquid process. The machines that process the color film may be an exception, but nowhere else have I see the dedication it deserves.
Thanks for reading this far.

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