

KEEPING PACE

A Monthly newsletter devoted to the art of Darkroom photography

Volume # 12 June 1988

Necessary equipment for making quality prints

For the past year I have been writing about the various techniques that could be applied to any of the professional print processes. The list of equipment is also a must. I will list my suggestions and recommendations for achieving the best possible quality when working in a darkroom. The easiest way for me to list a set of complicated items is to begin with the first step in the darkroom. The equipment will be separated into two parts. The exposing tools and the processing components.

If you walked into my darkroom, the first thing that you would see is the large light table. This table has two purposes. The first, is for a place to work, examine originals, and secondly, a surface which allows me to cut things together and to assemble the necessary

items needed to prepare for my kind of work, namely, separation negatives. I installed 5000K fluorescent tubes from MacBeth. **However, remember one thing. Whether you are making separation negatives, or just simple contrast masking, the equipment is basically the same.**

This light table will need a couple of lucite triangles, for cutting against when inserting a transparency or any other film into a larger sheet of film. (The main reason for inserting a smaller piece of film into a larger piece of film is so that the punch holes will not break off, and that the transparency will be more difficult to scratch.) You will need plenty of Scotch's "Magic tape",

regular masking tape, black tape#160 and "silver" polyester tape. The latter is waterproof.

You will need single edged razor blades, and an Ex-Acto knife. Brushes for opaquing, and a pair of magnifying goggles to wear when attempting to work on a sheet of film.

Magnifiers are a must. A five power glass sold by Kodak is fine. Cost is around \$50. Edmund Scientific Co. in Barrington, NJ, sells various kinds and magnifications. These are definitely worth the money. I prefer a 12 power glass when examining a 35mm transparency.

The next thing to consider is what sizes you will be working from. If you plan to work from

35mm transparencies and expose them directly onto a final material, then you will need a **pin registered carrier** and a quality enlarger. The enlarger list is quite long:

The Omega. There are many models. The old workhorse, D2, is still found in storage rooms and the new D5 is excellent. In any case, a 4x5 size with variable condensers will allow one to work from 35mm to 4x5 originals. Or a smaller enlarger with a diffusion color head and a changeable light collector box to enable one to capture as much of the light source as possible. You will still need a pin registered carrier. The prices for the Omega can range from \$150 for the old D2 to \$1295 for the D5500 dichroic system.

The Durst 4x5 L 1200 model can be outfitted to be a condenser enlarger or a diffusion enlarger. Durst makes a pin registered carrier and also supplies a film punch that matches the carrier. The prices for the Durst range from \$1350 just for the chassis, and by the time you add the items you want, the price could get as high as \$7000. Is this enlarger worth it?

It is without question one of the finest pieces of equipment made anywhere. If you are intent on producing quality work, you won't go wrong with this enlarger.

The Beseler enlarger is another old workhorse. The basic 45 MXT chassis is rugged and reliable. You can add any kind of light source. The registration carrier is available from Condit Mfg. Sandy Hook, Conn. The cost for the film punch and the pin carrier is somewhere around \$550. This same system was designed for the old Omega D2. The basic chassis cost for the Beseler is \$629. The price adds up as you add more items to the unit.

Saunders has a 4x5 enlarger that is sturdy and will work in your professional darkroom. The starting price for a dichroic enlarger is around \$1200.

Condit is producing an enlarger with all of the registration equipment necessary for producing special effects and has registration capabilities.

The main thing to consider is this; If this is the enlarger that will be used to expose your final material, make

sure that it is sturdy and can be modified so that it can be locked in position.

A word about lenses.

The finest lenses are being produced by Nikkor, Fuji, Rodenstock, and Schneider. If you have any of their top line lenses then your work will reflect this quality. I would suggest that the Apo lenses be used whenever it is financially practical. The Apo EI Nikkor 105mm cost around \$2000. It is extremely sharp and is used by most of the top quality Dye Transfer and Cibachrome labs in the country. I have used the Apo Rodenstock 90mm and found it also to be extremely sharp. However, if you use any of the top line lenses, I would find it difficult to distinguish which lens was used to make a specific print.

If you plan to make enlarged separation negatives, then the choices get a bit narrower. I prefer the old workhorse, the Omega D2. It can be modified with a variable condenser head, and a point source. Omega manufactures a point source for their microfilm unit. This

same head has been modified and sold by Condit Mfg. for the past 30 years. The unit consists of a light head with a method for placing the light source at the correct distance from the focal plane, so that any size original from 35mm to 4x5 can be enlarged with a point light source.

Any of the enlargers that I have already listed will suffice for making enlarged separations.

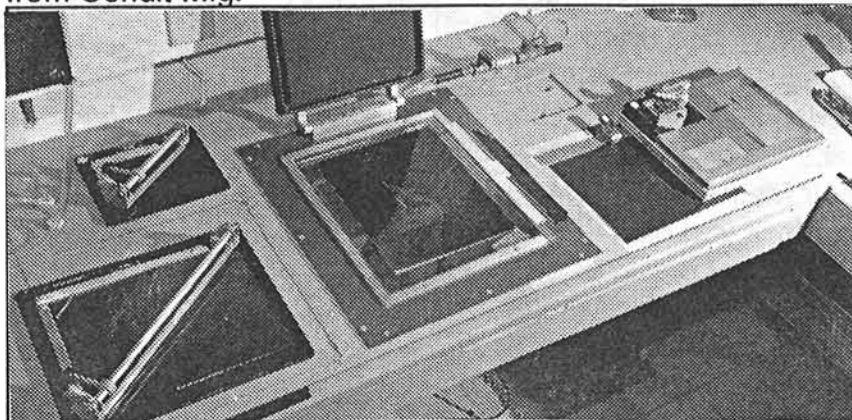
If you plan to work with large transparencies, your choices of enlargers is as follows:

The Durst 8x10, L 1840, is a heavy duty enlarger that would fit the qualifications for a quality enlarger. So would the **Fotar, the Devere, and the Carston**. The costs are from \$7,000 to \$30,000. It depends on your pocket-book. I have used old **Elwood enlargers** for 45 years. Throw away the head and purchase a **Peterson head from Fotar, in N.Y. City**. These old enlargers are still around. They can be purchased for under \$800. Condit can modify this enlarger with ease.

The only other necessity is the use of an **"oil" immersion carrier**.

This carrier should be used whenever a point source is used, because the needle sharp edge effect will pick everything, such as dust,

light scratches and abrasions. The carriers for specific enlargers can be obtained from the manufacturers or from Condit Mfg.



These carriers must be leak proof. Condit sells a carrier that takes inserts so that one can actually have hundreds of transparencies set up in these inserts and only use one carrier for all of the handling.

I personally have one carrier with the pin system installed in the glass of the leak proof carrier. This was originally used for producing Cibachrome prints but is also used for making separations. This carrier enables me to place a mask in the same carrier with the transparency. The system that uses inserts doesn't allow for this extra convenience.

I have already explained why the "oil" system works. But to refresh your memory: The silicon "oil" eliminates dust specks, light scratches, keeps the image flat, and eliminates the refraction caused by the light rays

bending out of shape as they travel through the glass.

The next area of my dark-room will include the

contact system for making contact masks and contact separation negatives.

If you are in the business of making Cibachrome prints, you must be aware of the fact that contrast masking is an absolute necessity if you are really concerned about quality.

The system I use was purchased from Condit Mfg. It consists of a vacuum platen, various pin glasses, a vacuum pump, and different sized film punches to fit the different pin glasses. I use a 2 1/4 punch, a 4x5 punch and an 8x10 punch. All are diagonal and they will fit the various pin glasses. This allows me to insert a 35mm transparency into a 2 1/4 sheet of film, and a 2 1/4 transparency into a 4x5 sheet of film, or a 5 x 7 transparency inserted into an 8x10 sheet of film, or to work from an original 8x10 transparency, and to allow

me to expose by contact, any of the masks or negatives that I require.

Depending on your needs, you may only require one punch and one pin glass. You may also only need a pressure contact frame. Kodak sells one that contains the pin system that fits their Matrix Punch. In other words, if you plan to make any kind of mask, or frisket, or any special kind of maneuver, you should be equipped with the proper registration equipment.

The contact light source is the next area to discuss.

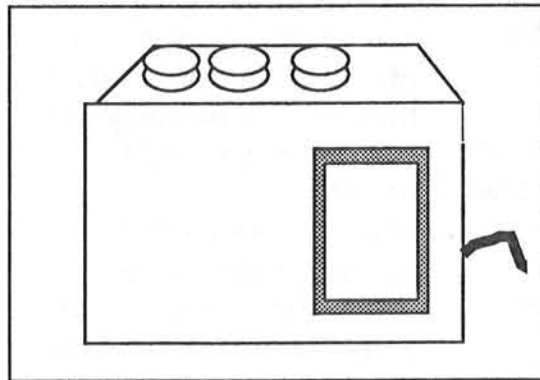
This can be a home made contraption that works by placing a light bulb (incandescent) in a box with a hole in it, so that just the light bulb is visible. Over this hole place the filters that you plan to use. These filters can be placed on a wheel that can be spun and can position each filter in its place. Or the filters could be placed in a slide glass, so that each color could be positioned over the hole in the box. This box could be under the table or overhead. It all depends on what your working habits are.

You can purchase a point source unit from any graphic art supply CO. A unit made by K&M is totally controlled with buttons. The light level can be controlled with a variable voltage transformer-

and the filter wheel can be positioned by pressing a button, so that a specific filter can be called into use.

The light source used for viewing the transparency.

I have had more problems with this one aspect of photography, than anything else. In the beginning, there were many kinds of light boxes. Most of them were off by a mile, when compared to today's standards. But the problem still persists. Most of us now use a 5000K system. But that doesn't mean that all is O.K. Unless



you take the time and trouble to change the light tubes every six months and wash the unit to remove any dust or grime, the light source will gradually change. This happens with everyone. You might make a print for a client and have it looking great at your shop, and find that it doesn't match the clients viewing system. I recommend the MacBeth viewing systems. They come in all sizes and are considered the "state of the art" by the advertising community. Other companies produce

similar light boxes, and I am sure that they also measure up to the standard.

Another company called Acculight, is also making many variations on a light box. They make carrying attache cases and large storing systems as well as light tables that are just beautifully made. Their prices start at \$79 and could reach \$300.

You have all read about my "magic box".

This is simply a color head that has been dissassembled and place into a convenient

carrying unit. I set the color balance of the light source as close as possible to the 5000K standard. I then record the actual filter settings. I can then place a clients transparency on this

light box, adjust the color balance until he is satisfied with the change, and record the new filter settings. These numbers can then be used to make the necessary changes in the final print so that it looks more like what he wants, than what he has in the original transparency.

Densitometers.

There are so many makes on the market now. I remember when they were almost impossible to find. If you are serious about quality, whether it is in making Dye

Transfer prints, or Cibachrome prints, or just black and white, it is a piece of equipment that you must have if you plan to survive. The good old days of flying by the seat of your pants are about over. If you can't figure out how to use a densitometer, or a computer, you will be in for a shock. Many young people are now entering the photographic field with the knowledge of calculation and electronics and will be the new force to be reckoned with.

The makes of densitometers begin with MacBeth, and are followed by Speedmaster, Photronix, X-Rite and a few others. The least expensive of the quality densitometers start around \$1,200 and can go as high as \$5,000. Depending on what kind of work you plan to do, purchase the right tool for the job. You will not require a sophisticated unit that reads reflection as well as transmission, or even a unit that can be hooked up to a computer. Just get what you need.

Easel meters.

This is where the photographic business went wild. 30 years ago, there were only two easel meters on the market. I won't mention any names. They were very inefficient. Then, along came Speedmaster. Their unit has the ability to read every color

of the rainbow, and repeat the filter settings and exposure times. I still consider it one of the best. It has been around for quite some time. Every enlarger manufacturer makes an easel meter. Beseler, Omega, Durst, Wallace Fisher, Jobo, and many others. I personally prefer the Speedmaster SM 400. The price is \$625. The prices on the other units vary from less than \$100 to well over \$1000. They all work.

Voltage control.

This is a simple problem to solve. You have two methods of controlling the electrical current in you lab. The first is with a variable unit that allows you to read the correct voltage coming into your exposing system. Variac is one company that makes such a unit. This kind of unit requires that someone must monitor the electrical flow constantly, and make adjustments whenever the need arises.

The kind of unit that I prefer is one that lets the exact amount of electrical flow enter your exposing system, and requires no attention. The only drawback to this kind of fixed voltage is that its voltage capacity must match the power intake of the exposing unit. This means that if you want to regulate the power to a 250 watt bulb, you must have a voltage stabilizer that gener-

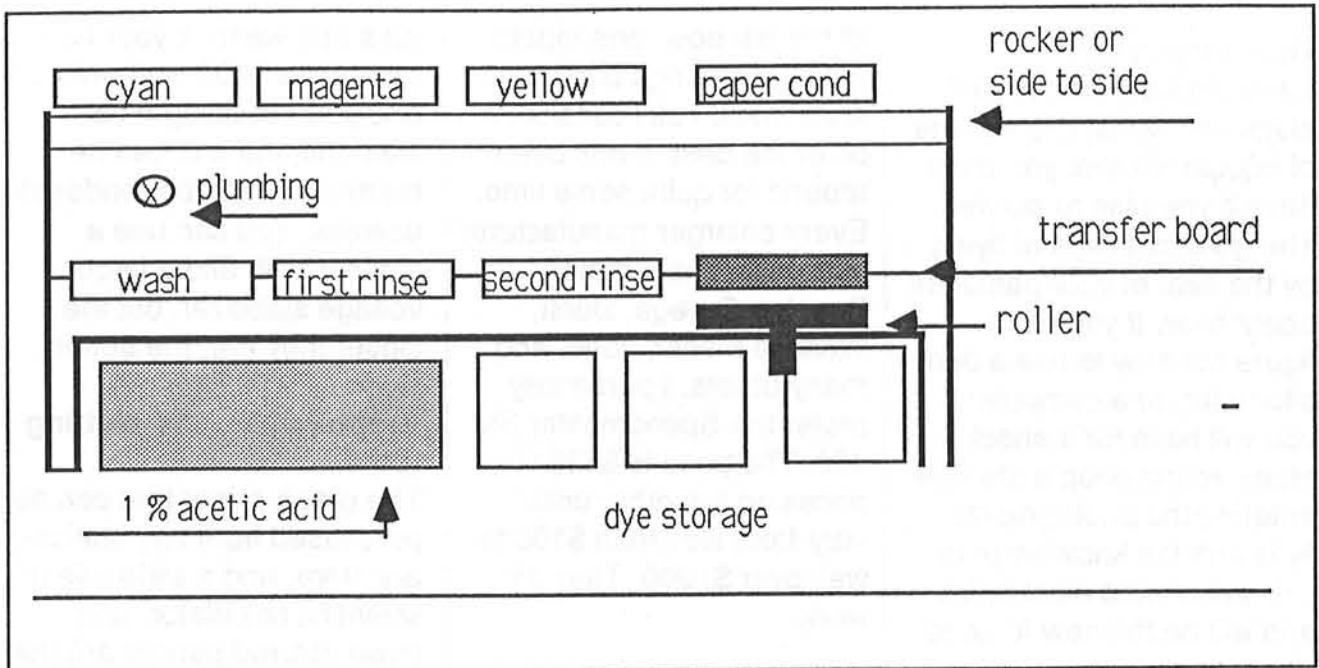
ates 250 watts. If your bulb requires a 1000 watt unit and you are using a 250 watt unit, the unit can be burned out and be rendered useless. You can use a smaller bulb and a larger voltage stabilizer, but the closer they are, the better.

Graph paper, and plotting tools.

The graph paper that can be purchased from any stationary store, and a slide rule or scientific calculator, and three colored pencils are the main ingredients in plotting curve shapes and determining charts and measurements.

When you learn how to plot a curve of a sheet of film, you will have learned the most important thing about photography. When you know and understand what happens to film as it is exposed and developed for more or less time, you will be aware of just what control you suddenly have over a sheet of film. You will be the master of the kind of print you wish to make. It is not enough to purchase variable contrast paper, and any black and white film and hope and pray that the processing turns out right, and if it doesn't, you can save the job with Polycontrast paper.

If you have been paying attention to my writing, I have explained just what the masks are for and how the



separation negatives must balance. A straight black and white negative can be a beautiful thing to produce when you know what happens to film. The photographic masters, Ansel Adams, Ed Weston, John Sexton, Bruce Birnbaum, and a few more have learned what happens to film by determining for themselves just what occurs when variations are made in processing.

Kodak sells a booklet entitled "Densitometry and Sensitometry". Get it. If you have trouble understanding it, let me know.

Sinks

This is an area that requires a tape measure. You must figure out what kind of process you plan to work in. If it is Dye Transfer, then lay out the trays that you will need, in order, and measure the

space. A shelf over the sink can hold 4 trays. One for each of the dye trays and one for the paper conditioner. If you place them with the smaller side facing you, the sink may not have to be too long. This shelf can be a rocker system or a sliding system. The sink only needs to hold 3 trays. There will, therefore, be room for a transferring area, built into the sink. I prefer a sheet of granite instead of glass as a transferring table. Granite is flat and has a slight tooth which will prevent the paper from slipping out of register accidentally.

Air filtering

Keeping a lab clean is a full time job. The walls and the woodwork should be painted with a good gloss coat paint. The floors should be vinyl or painted cement. An indoor/outdoor rug will keep the

noise down, but will capture and hold more dirt.

The air supply can be filtered and de-ionized. There are systems available that can keep the lab spotless. This is not an inexpensive situation. I once had a small darkroom that I used for making separation negatives. I glued black vinyl to the walls and painted the floor with a glossy deck enamel. Every morning, I rubbed the walls with a piece of fur. (Cat or rabbit) This created a wall that was magnetically charged and most of the dust in the room was attracted to the wall. An electronic de-ionizer created a negative charge to most of the free dust in the room, and caused the rest of the dust to fall to the floor.

Water filtration and temperature control

In order to keep my matrices from collecting mineral

deposits, I installed a de-ionizer water unit. (It looks like a water softener) This effectively removed the minerals from the water. This is great for mixing all of the chemicals required in any lab. This is different from water softening. My diagram for temperature control follows.

Filtering dyes or any other chemicals.

The following diagrams will show you what it requires to filter specific chemicals.

Drying films and prints

There are plenty of dryers on the market. However, if you are involved in producing negatives or positives that must be registered, then I would suggest that a soft and gentle breeze be used, rather than one of the more commonly used dryers found in most commercial labs.

Storing Negatives, Matrices and other finished materials

The safest place to save finished work is in a fireproof cabinet. The negatives, whether they are separation negatives, or color negatives, or color transparencies, should be kept in a dry area.

If this is impossible, purchase those little bags of silica that are found in most boxes that cameras are shipped in. These bags of silica will absorb most of the moisture

in the air and will prevent moisture damage.

A fine piece of art is usually handled with love and care. Your fine work deserves the same attention.

Dye Transfer matrices are especially important. These films will last indefinitely and can be transferred again many times and for as many years as the dyes will be made. If you are concerned about color being considered archival, let me assure you that it is as archival as any black and white process.

The matrices will last indefinitely.

I usually place my matrices between the yellow sleeves that accompany the film in its original box.

When I place my separation negatives into a manila envelope, I write all of the important information on the front part of the envelope.

This includes the masking times and development times. I can use this information whenever I get the urge to make another attempt at a different size or if I just want to experiment.

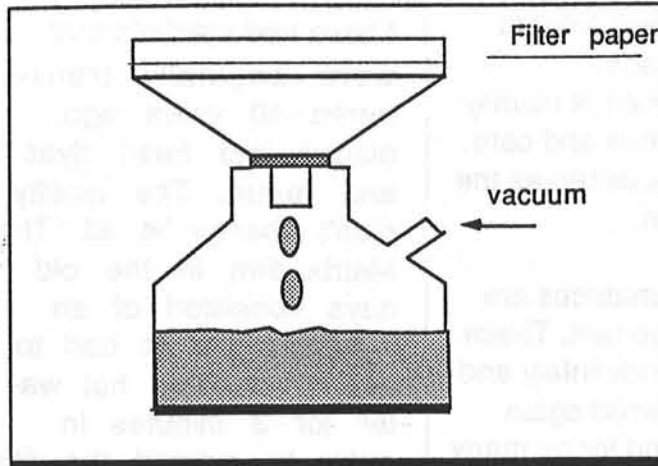
A sheet of paper describing all of the steps that are used to run the matrices, are taped to the yellow matrix sleeves.

This keeps all of the information where it belongs.

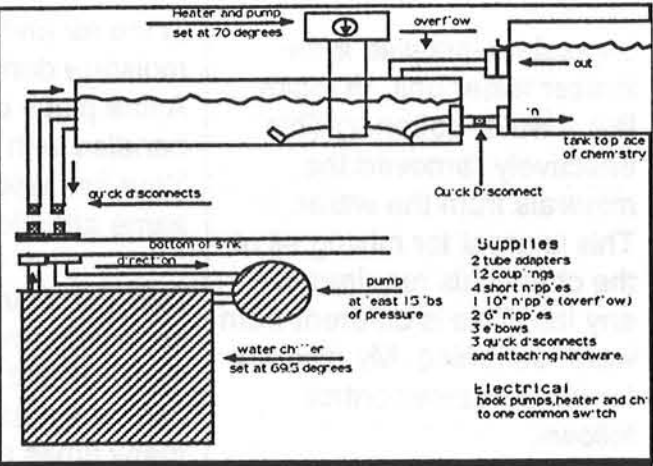
I have had matrices that were originally transferred 40 years ago, placed into fresh dyes and re-run. The quality didn't change at all. The Matrix film in the old days consisted of an Acetate base. It had to be expanded in hot water for 3 minutes in order to expand the film to its proper size. Except for that chore, the material was fine. The Dye prints should never be placed emulsion to emulsion as they can transfer color to each other and ruin a good print. Place them emulsion to back, and in this way you can stack them.

Finished prints that are considered valuable, should be kept in a box. The archival boxes that are used to house black and white prints will be of no advantage when storing dye transfer prints or Cibachrome prints. The amount of acid that these prints had to endure in their production will overshadow any possible acid contamination.

This doesn't mean that I am opposed to archival storage, but just concerned that it is being used in the wrong places.



A simple way to vacuum clean dyes.



A water chiller system

The End of one year of newsletters

For those of you who have subscribed to my newsletter, I would like to say "Thank You". I hope that I kept you informed.

"Keeping Pace" had a double meaning. I hope you kept pace with me, and you certainly helped to keep Pace alive and well.

It's rare that a person gets the opportunity to spread his information out to a group of individuals that are keenly interested in the quality aspects of the photography. According to the mail that I receive every week from students and sub-

scribers, many of you have appreciated the many comments I have made pertaining to darkroom skills. Again, Thank You.

For those of you whose subscription has run out, this is it.

If you wish to re-subscribe to my newsletter, or to purchase my book, "the Art of Photo Composition" just fill out the coupons below and send them in. I will be devoting the next year to the Cibachrome and Dye Transfer enthusiasts, as well as darkroom enthusiasts.

Name _____	Yes, I would like to subscribe to "Keeping Pace"
Company _____	
Address _____	For the year, \$60.
City _____ State _____ Zip _____	
Phone () _____	
<p>Yes, I would like a copy of "The Art of Photo Composition" \$50. plus P&H 4.00</p>	