

# Controlling the Black and White Printing Process

Compiled by  
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## Good Prints Start With Good Negatives

There seems to be a direct relationship between a photographer's ability to make good quality negatives and his success in making finely crafted prints.

## Work Methodically in a Logical Step-By-Step Fashion

Surprisingly enough slowing down and thinking about what you are doing can actually INCREASE your productivity in the darkroom.

## Control as Many Variables as Possible

By eliminating as many variables as possible you will increase your ability to control the print in a more predictable fashion.

## Check Safelights

I estimate that over 50% of all darkrooms have "unsafe" conditions that are subtly degrading important high values in your prints. Run an effective safelight test.

## Proof All Negatives

It is important to make contact proof sheets of ALL negatives. It is extremely difficult to analyze an image in its negative form. Proof your negatives so that they are soft or low in contrast. You want to see lots of information in both the low and high values. Forget about the idea of producing an exhibition quality proof sheet.

## Start Low in Contrast and Work Slowly Toward Final Contrast

Always start with the softest paper or lowest filter you can imagine the image working with. Then slowly build the image contrast until you reach the desired contrast level. It is much easier to detect when you have achieved the proper contrast when increasing in contrast rather than "back-pedaling" contrast.

## Make a Good Useful Test Strip

Don't try and economize by using a miniature test strip. Use as big a piece of paper as needed for the image. Try to place the test strip so that it includes IMPORTANT light and dark areas. A good test strip will have one exposure that is TOO LIGHT and one exposure that is TOO DARK. The only way to know that you have given enough exposure is to see what it looks like with both too little and too much!

## **Expose for the High Values...Develop for the Low Values**

Just the opposite of making a negative in the field. The exposure under the enlarger is determined by looking at the light areas of the print. When the proper exposure is determined then look at the dark areas with that same exposure time. If they are gray and muddy, INCREASE contrast. If they are too black and lack detail reduce contrast. In printing there are more ways to control contrast than just development. Included in this control are paper grades (changing filters), different developers, different developer temperatures as well as changing the amount of developer-to-water ratio.

## **Always Make a “Straight” Print**

Even though you may be aware of some local controls (dodging and burning) that need to be implemented after examining the test strip, take the time to make a straight print. It will give you lots of good information about the image. Hang onto the straight print and the test strip for reference during the printing session.

## **Be Cautious of Dry Down**

This gremlin can get you. Your highlights will darken slightly as the print dries. Check a test print by drying it with a hair dryer or microwave oven to see what the highlights are going to look like before making a final print.

## **Work Frequently**

I find the more often I work — whether in the field or in the darkroom — the better I get. The best way to become a good photographer is to do a lot of it!

## **Keep Careful Notes**

This can save lots of time if you have to print the image again. Note all pertinent data such as exposure, aperture, paper, grade (filter), developer, dilution, developing time and more. On the back of the proofsheets is a good place to do this. Make drawings of any dodging or burning that was done on the image.

## **Get to Know Your Materials and Equipment**

Experiment with a number of different papers and developers...then settle on one or two papers and no more than a couple of developers until you are completely satisfied that you can produce the quality of image you desire. The same holds true for films and developers.

# Photographic Tips

## FILMS

- TMax films

Kodak manufactures three TMax-based films: ISO 100, 400 and 3200. These films offer finer grain with higher light sensitivity than Tri-X and Plus-X. The film must be processed carefully to achieve the best results.

ISO 100 and 400 seem to work well when processed in D-76, but Kodak does recommend TMax developer at 75 degrees. TMax 3200, which is excellent for sports or low-light situations, should be processed in TMax Developer. Acufine also works well. The ISO 100 and 400 films require vigorous agitation during development, while I have seen 3200 have better results with a water bath and a gentle agitation.

- Other film choices

Kodak also manufactures some other films that can provide some different results:

Kodak Infrared film — is sensitive to heat, rather than visible light. Tends to make people and landscapes glow and appear very pale. **Must be loaded and unloaded from the camera in complete darkness!** Use a 25A red filter over the camera when shooting. Focus must be adjusted on the camera as well. Look for the infrared mark on the depth-of-field scale on the lens.

Kodak Technical Pan — the normal ISO of this film is 25. It can be exposed and processed at ISO 100 to achieve high-contrast effects. This will provide an image that is mainly blacks and whites and few gray tones. Used for graphic effects.

- Bracketing

On the important images, make sure that you bracket your pictures. This means taking one picture at what the light meter recommends. Then close down one stop and take another picture. Open up one stop from the light meter reading and take a third picture. This gives you three negatives that prints could be made from, in case of film fog or scratches on the negative. This also helps protect you from false light meter readings.

## CONTRAST

- Contrast is the range of black to white found in our negative or print. Contrast can be affected/controlled through the following steps:

- The higher the ISO of the film, the higher the inherent contrast. ISO 3200 has more “built-in” contrast than ISO 100 film.
- The longer the developing time, especially with film, the more contrast builds up. The stronger the solution of developer (not diluted as much), the higher the contrast.
- The higher the temperature of the developer, the higher the contrast.

Anything that allows the developer to work faster increases contrast. This can be helpful when printing if the contrast level is not sufficient with a 5 filter (See filters below). Using a straight developer, rather than diluting it, can increase the contrast of the print. (Vice-versa, diluting the developer 1:3 or 1:4, will decrease contrast) Placing the tray of developer into another tray of hot water can also increase contrast. Blowing or rubbing an area of the print while it is in the developer can achieve the same effect in a localized area.

## PROCESSING

- Temperature of chemicals  
This is an incredibly important part of the process. Take time to make sure that your temperature is the correct one for your processing time. Use an adjustable thermometer that can be recalibrated on a regular basis. Check with the Science Department to see if they have a process thermometer that you can check your thermometer against. I recommend the Weston Dial Thermometer - about \$25.
- Fixing film  
The proper way to determine the correct fixing time for film is to drop a piece of film into the fixer and time it to see how long it takes to turn clear. (It will not lose its color, but you will be able to see through it.) Double this time and add 15 seconds. This will give you an accurate fixing time for your film.  
Kodak Rapid Fixer cuts the fixing time in half, but is too expensive to use on prints. Fresh Rapid Fixer will fix most films in 1-2 minutes, TMax films in 3-4 minutes. Regular fixer will double this time. Rapid Fixer can be saved and reused until the fixing time gets to 4 or 5 minutes.
- Washing film  
Film must be washed to remove all of the fixer from the plastic base. This means washing the film under running water for 10-15 minutes, or rinsing the film in Hypo Clear for 2 minutes and then washing for 5 minutes. Insufficient washing time will leave the negatives contaminated with fixer.
- Photo-Flo  
After washing the film it should be immersed into Photo-Flo, which is a wetting agent. This prevents water spots from drying on the film. **Photo-Flo must be mixed in distilled or deionized water** (check with the Science Department again) rather than tap water. After rinsing in Photo-Flo, dry the film in a dust-free (or as dust-free as you can make it) environment. This could be a cabinet or closet or in a film dryer. Just hanging it in the room will allow dust to dry in the emulsion, making it very hard to get a good print. If using a film dryer, make sure it has some type of filter on it to catch the dust out of the air.

## PRINTING

- Filters  
Most schools use a variable contrast paper when printing. This means the contrast level of the print can be adjusted during printing. To do this, you must use some type of filter on the enlarger. The filters usually range from a zero to a five filter, with zero providing the lowest contrast and the five providing the highest. The newest filters go to minus one.  
There are two basic types: filters that fit under the lens and filters that are placed in the enlarger. Filters that fit under the lens usually are encased in a plastic holder. These filters filter the image after the light has passed through the negative. If there are any fingerprints or scratches on the filter, they will degrade your image. These filters can cost \$35-40. Filters that fit into the enlarger filter only the light. Even if the filter has fingerprints or scratches they will not show up because the filter is filtering **only** the light. In addition, these filters have very little exposure change. Filter zero to filter three-and-a-half are the same exposure time. When you cross the line between a three-and-a-half and a four filter, you double your exposure time. These filters are much better to work with. Kodak and Ilford both manufacture sets - \$25.

- **Developers**  
Normal dilution for Kodak Dektol, which is a standard paper developer, is 1:2. This means for one ounce of developer you use two ounces of water. Developer should be mixed fresh (diluted from a stock solution) each day. If it is allowed to sit in the tray overnight, it oxidizes and loses its ability to give you acceptable print contrast. Your other chemicals can be saved until they are no good, but the developer must be fresh! Normal developing time is 90 seconds. Anything less than this will not give you the best results from your negatives. If the print is getting dark too fast, decrease the exposure time rather than pulling it out of the developer sooner. Trays should be agitated during the entire development time. This brings fresh developer into contact with the emulsion.  
Contrast in your print can be controlled in the same way that film contrast can be controlled (see contrast above). The most common way to affect contrast is by changing the variable contrast filters in the enlarger.  
The sharpest point of a lens is two stops closed down from wide open. Every time you print, you should start with your lens set at this aperture. This will ensure the best possible sharpness for your image. This will usually be either f/5.6 or f/8, depending on the lens.
- **Stop Bath**  
The second chemical in processing prints is a diluted acid that stops the action of the developer. Water can be used instead of stop bath, just as we do when processing film, but the stop bath will help the fixer last longer. Kodak's Indicator Stop Bath is very helpful because it starts out as bright yellow in color and then fades to a purple color when it is no good any more. If you are leaving this chemical sitting in the tray overnight, place another tray on top of the liquid to help keep air and light away from the chemicals. This will help them last longer. Edwal makes a stop bath that doesn't stink as much as Kodak's.
- **Fixers**  
There are two basic types of fixer — Rapid Fixer and regular fixer. Rapid Fixer is nice because it cuts the fixing time in half. But it is more expensive than regular fixer. We use regular fixer for our prints and Rapid Fix for our film.  
The proper fixing time is 4 minutes for RC (resin-coated) paper and 10 minutes for fiber-based paper. To determine if your fixer is still good you should use Edwal Hypo-Check. This chemical helps you test your fixer. You put a couple of drops of hypo-check into the fixer and if it turns cloudy or milky, the fixer is no longer any good.
- **Washing Prints**  
Proper washing of your prints will insure that all of the fixer is removed from the paper base and the print will not contaminate anything else. RC prints should be washed for 10 minutes in running water while fiber-based prints need to be washed for one hour. Using Kodak Hypo Clear or Orbit Bath will cut the washing time in half.

## SAFETY

- Proper safety must be observed in the darkroom. At all times should the student avoid getting chemicals on the skin. Tongs should be used when handling prints. Proper ventilation is important to insure fresh air in the darkroom and the venting of chemicals to the outside of the building. It is also important to comply with OSHA/EPA regulations regarding disposing fixer.

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