

Hot Processing of B&W Films

Jack and Sue Drafaahl

Editor's Note: Although the following process has been used successfully by Jack and Sue Drafaahl in their lab, we recommend that our readers run their own tests to determine its suitability.

MANY TIMES THE difference between a successful photo lab and one that fails, is the approach taken to lab procedures. Some labs do exactly as the manufacturers tell them, and others experiment and try to improve what took large corporations millions of dollars to perfect. We fall into the latter category.

You may ask why we don't leave well enough alone! We feel the phrase "Can't see the forest for the

films, the resulting negatives were as good as those processed at 68 degrees, but with many additional benefits.

Advantages of Hot Processed Films

The first and most obvious advantage to this process is the much shorter processing times. In most cases the overall processing time is

supply, and this process will help divert needed water to other uses. In many labs, especially during the hot times of the year, refrigeration units for processors are necessary to keep the chemistry at 68 degrees.

By not using these units, you remove another refrigeration chemical from the environment. Most labs are already using a 100 degree supply for their color processes, and the added energy is minimal for the

The most important part of setting up your hot black and white film processing line is your time-temperature charts.

trees" applies to many of these corporations. They develop wonderful products and then give generic instructions, so anyone buying the product will have success.

In our lab we want each product to be cost effective, easy to use, have maximum quality, and minimum effect on the environment. So when we set up a specific lab service, we try to go beyond the manufacturers recommendations.

We use a special rotary film processor called a Wing-Lynch Model 5 that allows us to vary photographic processes dramatically through the use of special software that drives the unit. In a matter of seconds we can change the wash time, development temperature, order of chemicals, and a variety of other variables. The Model 5 and our other film processors all process color film at 100 degrees.

When we started our black and white film processing service, we wondered why the manufacturers insisted on 68 degrees for the processing temperature. So we processed several types at 100 degrees and were surprised at the results. With the exception of a couple of

cut in half or more. The shorter processing time increases the capability of the processor, giving the customer a quicker turn-around time. The hot processing requires less chemistry and less work time to process each roll, thus reducing the film processing cost.

Quality of the films processed at 100 degrees is very similar to those processed at 68 degrees, except when some films are processed in T-Max developer. If you process at 68 degrees in T-max developer and do not fix the film long enough or use too short a wash time, a magenta stain may appear. With the 100 degree process we have never seen a magenta stain in T-Max developer. We have found that many of the films with long processing times do have a slightly tighter grain pattern due to the decreased wash time.

For environmentalists, we feel the 100 degree process is a new step in preserving the ecology. This process uses less chemistry, thereby less chemistry is wasted in the sewer system. A 50% reduction in water usage means 50% less treatment of waste water.

In many states water is in short

extra heat for the black and white film processors. We have also found that most all of the present day black and white films can be processed in one chemical for one development time which could simplify your lab tremendously.

Disadvantages of Hot Processing

The biggest disadvantage of this process is not knowing which films can or cannot be processed at 100 degrees. Before processing any black and white film at this temperature in your processor, you should run tests on each film type you plan on processing in your lab.

As a rule of thumb, we have found most of the older films developed before the T-grain films will reticulate, scratch, and possibly slide right off the film base. Of the two dozen films we tested so far we have found that Kodak Pan-x, Plus-x and Tri-x are definitely not candidates for this process. The Kodak T-Max line, on the other hand, seems to love the process, and we have many professional photographers coming to us just for our hot T-Max processing.

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**PROCESSING TIMES FOR HIGH CONTRAST
B&W FILMS IN KODALITH DEVELOPER
(KODALITH AND LPD LINE FILMS)**

100 DEGREES

PRE-SOAK	1 MIN.
DEVELOPER	3 MIN.
WASH	.5 MIN.
FIX	3 MIN.
WASH	3 MIN.

KODALITH DEVELOPER MIXED AT 1:3 RATIO

**PROCESSING TIMES FOR SPECIAL
APPLICATION B&W FILMS IN D-11
(RAPID PROCESS COPY FILM)**

100 DEGREES

PRE-SOAK	2 MIN.
DEVELOPER	2 MIN.
WASH	.5 MIN.
FIX	3 MIN.
WASH	3 MIN.

TWO FILMS CAN DRY D-11 TO 1 GAL WATER

Hot Processing

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Presoak the Film

Because of the high temperatures and short development times we have found it very beneficial to add

a presoak step to the process. This will heat up any mechanical parts touching the film, and will allow for more even development. The water that has soaked into the film acts as a buffer when the hot developer first strikes the film. This step is common practice with color films processed at this temperature.

Modify the Fixer

We use Kodak Rapid Fix in liquid form and add 500 ml with water to make 1 working gallon of fixer. We have eliminated the hardener for two reasons. First the newer black and white films no longer require the hardener as their emulsions can



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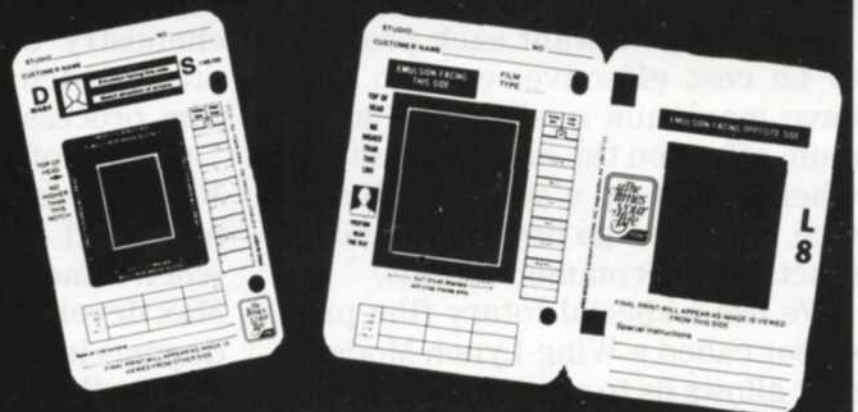
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stand the abuse. Secondly and most important, the fix does not work very well at 100 degrees when hardener is added. If it is added, the fix will die early and/or turn solid white and never clear. Many of the magenta staining problems attributed to T-Max films and developers can be traced to the hardener. Removing an unnecessary chemical will lower the chance of staining.

Selecting Your B&W Developers

Every photographer has a personal favorite developer for processing, but a photo lab has to go with the most cost effective, versatile developer that maintains the highest quality. We use the T-Max liquid developer for all the general films because it is easy to mix, works well at 100 degrees and has a shelf life of over one month when kept heated at 100 degrees, 24 hours a day.

Because of the higher temperatures, we found that we could reduce the chemical mixing ratios and still achieve proper film development. After extensive testing we settled on a 1:6 ratio for T-Max developer instead of the recom-

mended 1:4 ratio.

Our basic time/temperature combination for general purpose films shot at their correct ISO is 4 minutes in 1:6 T-Max developer at 100 degrees. A push of 1 stop would increase development to 5.5 minutes and a two stop push would increase to 7.5 minutes. We tested 3 Kodak films, 3 Agfa films, 3 Ilford films and 1 Fuji film at these processing times and found them to meet all our customers' requirements.

Most labs standardize on two lithographic films for high contrast copy work. Kodalith film is normally used to reverse the image and give a negative. For example, black type on white paper would become clear type on a black background. These Kodalith negatives are used to make high quality prints, and a variety of lecture slide manipulations. LPD film is very similar to Kodalith except it gives a positive rendition of the original. For example, black type on white paper would become black type on a clear background.

Kodalith A & B developer is our choice of developer for processing Kodalith and LPD line films. With the Kodalith developer we stuck to

the recommended 1:3 mixing ratio (surprise!).

We mix the powder version of this chemical and keep the A and B parts separated until processing. The Wing-Lynch processor we use automatically mixes the two parts at the beginning of the process. We have tested and proved that both Kodalith and LPD films can be processed at 100 degrees for 3 minutes using a 1:3 developer dilution and the same rapid fix without hardener as previously mentioned.

Our third chemical is an old favorite, Kodak D11. We use this chemical for any high contrast situation, or films like Kodak Rapid Process Copy Film. This very unique Kodak film has an unbelievable ISO rating of .03 that allows the lab to make direct black and white copy negatives as well as 35mm copies of large X-rays. Because this film is a direct positive, it must be processed in a moderately high contrast black and white developer. The biggest chemical saving was with D-11 chemistry, where we settled on a very unscientific measurement of two Kodak film cans of dry chem-

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PROCESSING STEP	TEMPERATURE		
	68	75	**100
First Developer	6 MIN	5 MIN	3 MIN
Rinse	.5 MIN	.5 MIN	.25 MIN
Bleach	2 MIN	2 MIN	2 MIN
Rinse	1.5 MIN	1.5 MIN	1 MIN
Clearing Bath	2 MIN	2 MIN	1 MIN
Redeveloper	6 MIN	5 MIN	3 MIN
Rinse	.5 MIN	.5 MIN	.25 MIN
Fix	5 MIN	5 MIN	3 MIN
Wash	15 MIN	15 MIN	7 MIN
Dry			

**The 100 degree process was not included with the data sheet, and was derived through processing in our lab on a Wing-Lynch processor.

PROCESSING TIMES FOR B&W CONTINUOUS TONE NEGATIVE FILMS IN T-MAX DEVELOPER

	100 DEGREES	NORMAL	PUSH 1	PUSH 2
PRE-SOAK	1 MIN.	1 MIN.	1 MIN.	1 MIN.
DEVELOPER	4 MIN.	5.5 MIN.	7.5 MIN.	
WASH	.25 MIN.	.25 MIN.	.25 MIN.	
FIX	4 MIN.	4 MIN.	4 MIN.	
WASH	6 MIN.	6 MIN.	6 MIN.	

TESTED FILMS INCLUDE:

KODAK T-MAX 100, T-MAX 400, T-MAX 3200
 AGFA APX 25, APX 100, AP 400
 ILFORD PAN F, FP4, FP5
 FUJI NEOPAN 1600
 KODAK TECHNICAL PAN AT HIGH CONTRAST

T-MAX LIQUID DEVELOPER MIXED AT 1:6 RATIO

Hot Processing

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istry mixed in 1 gallon of water.

Because of a very short 2 minutes developing time we recommend at least two minutes of water pre-soak. The wash in-between can be dropped to 1 minute, and 4 minutes

in the fix will completely clear the film. We found that the development time can vary considerably, depending on how much contrast the customer wants in the final copy. This film tends to have very low D-max and many of our customers prefer to have more contrast than in the original.

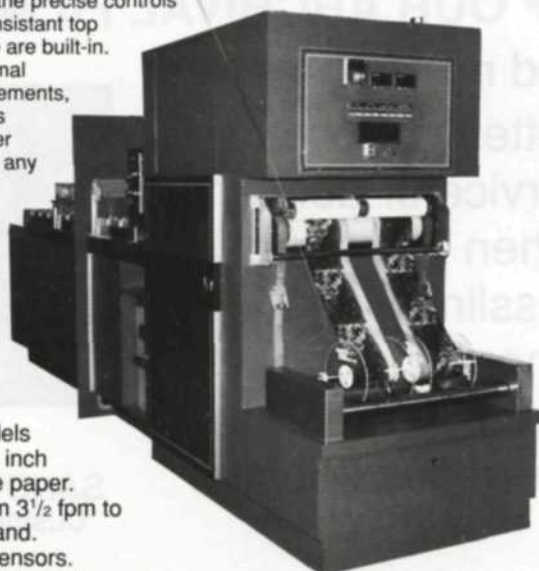
Time/Temperature Charts

Kodak T-Max 100 negative and Technical Pan films can be converted to a direct positive using a special processing kit from Kodak. The T-Max positive is used to make high quality black and white slides from color slides, color prints, and

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black and white prints. The Tech-Pan positive is used to make high contrast copy slides from line art work or high contrast slides.

We do not normally offer this process in our lab, but we had an opportunity to test a couple of kits to see how they would perform at 100 degrees. The quality of this process is excellent at 68 degrees and performs equally as well at 100 degrees. We did find that you should rate the T-max 100 at ISO 50 and the Tech-Pan at ISO 64 when you process at either temperature. At 100 degrees the first developer time has been reduced from 6 minutes down to 3 minutes and the remaining times are proportionally reduced as shown in the chart. We made no changes to the chemical mixing, except for the fix which remained the same as all our other black and white processes.

Run Your Own Mixing/Time-Temperature Charts

The most important part of setting up your hot black and white film processing line is your time-temperature charts. Since you will

be working in areas not discussed by the manufacturers, you will have to experiment. If you decided to try any or all of the processes discussed in this article you should run your own tests on mixing ratios and development times. Keep in mind that the mixing proportions and development times we listed work best in our lab. Use our numbers only as a starting point when setting up your own mixing/time-temperature charts.

In order to save you time and money we have included our time-temperature charts for the films we have tested. We realize that this only covers a small percentage of the films available, but we hope that there is enough variety in the films we tested that you will be able to correlate similar film types.

Be warned again, three films definitely do not work!! Kodak Tri-x, Plus-x, and Pan-x all will be destroyed if processed at 100 degrees. Since these films are gradually being replaced by the T-Max films, we get around this problem by explaining the virtues of the newer films and slowly convert all our customers to black and white films that can be processed in hot developers.

Putting It All Together

We recognize the fact that correctly setting up these systems in your lab will take considerable time and effort. We highly recommend a separate processing log book that will document all your research, since you will not be able to go back to a manufacturers fact sheet. Don't be afraid to vary from the manufacturers recommended charts—you will not be fined, yelled at, or prosecuted. If done properly, you should improve your lab services.

We feel that once you have made the change and find your black and white processing faster and more efficient, you'll wonder why you waited so long to make the change. But don't expect too much help from the manufacturers when you call with a question and inform them that you are processing at 100 degrees. Just tell them Jack and Sue told you about it in *Photo Lab Management* and they'll understand.

Jack and Sue Drafa operate a full-service commercial photo lab just outside Portland, OR. They are contributing writers to several photographic journals.

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