

Bathtub Film Processing

by Gary Popovich

Introduction

You should read all of these notes carefully before you buy any of the items listed. These notes and this system were developed to suit my need at a particular time and in a particular space ... you'll have to do the same.

There are numerous ways to process and tone your own movie film. I chose open trays or tubs placed in my bathtub because it gave me darkness, running water and most importantly I could work at any time in my own space, at my own pace. I was also interested in working directly with the surface of the film emulsion by using both suggested chemicals and anything available. At the very least you'll usually be putting some scratches on your film when you use this method — my interest was in working with scratches, water blotches, polarization, split toning and image fragmentation. However, if you're careful and adapt this system slightly (for example, using shorter lengths of film, using a rack system and deeper tanks, etc.) you can get lab quality images. In fact, I've often processed clean, pristine images in my bathtub; it's just that this system lends itself to experimentation and an idiosyncratic, personal approach.

These notes are a revised version of workshop notes I first wrote in 1986. The original notes developed out of a series of workshops given by Jeffrey Paull at Sheridan College in 1982.

B&W Movie Film

The tools you'll need (excluding chemicals):

4 or 5 plastic tubs, at least 10 cm deep and about 40x30 cm to contain the chemicals, water and film during processing. I use a larger tub for the water — it helps the wash. I put 3 tubs in the bathtub and the others on the floor next to the bathtub (see diagram). You'll need 5 tubs if you plan to use a stop bath (more on that later).

1 waterproof thermometer (for darkroom purposes). It should go to at least 50°C.

You don't need a fancy thermometer — a cheap \$3 one is fine for mixing chemicals, this B&W processing system doesn't require precise temperatures within a fraction of a degree.

1 plastic funnel for mixing chemicals AND NO OTHER USES.

1 plastic 2-gallon pail for mixing chemicals.

1 long plastic or wooden spoon for stirring chemicals AND NO OTHER USES.

1 photographic safe light — you can buy them in all sizes, styles and colors. You'll have to check the info sheets available on film stocks to determine which color you'll need. I made my safe light for a few dollars with a simple socket and electrical cord and a few inexpensive light bulbs ... it's not recommended but it worked for me ... I kept the light at least 4 feet away and covered it with a wash cloth to reduce its brightness.

At least *3 1-gallon plastic jugs to store chemicals* ... you can use recycled jugs (household bleach jugs are good) or you can buy them for a few dollars each at a darkroom shop. You'll need one each for the developer, bleach and fixer.

If you wish to use a stop bath you'll need another jug; you might want to store two types of fixer, one with a hardener, one without (I'll explain why later) so you'll need another jug for that. If you're into toning, you'll need a few more jugs, so buy or recycle accordingly. — if you feel relaxed and comfortable and reasonably accurate you can just count; if not use an expensive darkroom clock or an inexpensive cheap watch that glows green.

A pair of loose fitting rubber gloves.

A line and clothespins — clothesline, string, wire, anything on which you can hang your film to dry.

A splicer and projector so you can watch your images when you're done.

Processing

I'd suggest you process at least a couple of rolls of film before you begin toning because it will familiarize you with the process and it'll give you images to choose from to tone — stuff you don't mind losing (as you become familiar with toning you'll likely watch the emulsion completely slide off the film a few times).

You can process most B&W movie film — Super 8, 16mm, 35, Kodak, Agfa, etc. I've used mainly Kodak B&W camera stocks and printer stocks. I always ask Kodak to send me their free info sheets on the stocks I use — they give you starting points for a good developer and good development times.

I'd recommend doing tests and making your own notes so that you can repeat what you do, if you need to. Printer stocks aren't designed for camera use, but they create great high contrast images ... and hi-con is best for split toning. With most of the printer stocks you'll have to do tests to find an ISO to shoot at (most of them are around 2 to 12 ISO, so if you're shooting indoors you'll need a lot of light; I've used 3000 watts at 4 feet to get a good indoor image).

Experimentation

You can process neg as reversal and reversal as neg, you can solarize images, you can push and pull development, you can use spray bottles filled with developer to create spotted development. In the beginning you should consider everything you do as a test ... experiment, take notes. In the beginning, you should film things you care about but that you don't mind losing.

The chemicals you'll need:

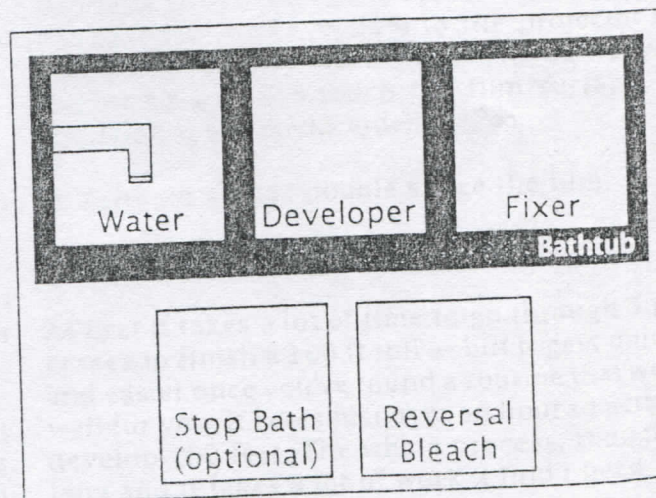
Developer. If you're filming with a regular B&W stock check the info sheets for a recommended developer and use it or an equivalent. I use D-19 or other hi-con developers for my hi-con images (the images I intend to tone). I usually put 2 gallons of developer in the plastic tub, and that's enough to do about 400 feet, or more, of film and costs about \$10.00.

Stop Bath. For a few bucks you get a small bottle of stop bath which helps stop development. I don't use it; I wash my images really well after development and I don't worry too much about critical development times.

Bleach. The bleach is a reversal bleach — 1 liter of water to 9.5 grams of potassium dichromate and 12 ml of sulfuric acid (concentrated). Stir the potassium dichromate into the water, then add the sulfuric acid. You can find these chemicals locally although they aren't immediately accessible — you're dealing with chemical companies and highly toxic and dangerous chemicals ... it's probably a good idea to share reversal bleach with others interested. Again, I'd use about 2 gallons, or about 8 liters of bleach in a tub. I found I could do between 400-800 feet with this quantity.

Fixer. If you intend to tone your film, use a non-hardening fixer; if you don't intend to tone, use a fixer with hardener to protect and preserve your film. Both are available. Some fixers come with hardener in a separate container that you can mix in. Fixer life is harder to gauge, especially with toning factored in; if you're doing a lot of footage you should have a few packages of fixer around.

Mix the chemicals ahead of time so that they can cool to room temperature before you begin processing. I work with development times based on a room temperature developer (remember, development time decreases as the temperature of the developer is increased).



As I said, I usually put about 2 gallons of chemical in a tub; that way I can more easily submerge the 30 feet of film I am developing at a time.

Leave a bit of space between the different chemicals, i.e., leave a bit of space between plastic tubs in your bathtub (see diagram) so that you don't splash one chemical into another and contaminate a particular chemical. I could only get 3 plastic tubs in my bathtub, so the other tubs would sit outside and next to the bathtub.

Getting Started

Make sure your bathroom (or work area) is light tight. After a few minutes in the dark you may find a bit of light seeping through the crack in the door or window. If you can see your hands or objects around the room then there's too much light leakage (especially for faster film stocks). For regular camera stocks such as Plus-X, Tri-X, etc., it's recommended you work in total darkness; for slow printer stocks you can work with the recommended safe light.

Always wear rubber gloves! These chemicals are toxic. I had a little pin hole at the end of my glove that let in reversal bleach, and I thought it was insignificant. My thumb turned prunish and took 9 months to heal ... not to mention that these chemicals also can make their way into your bloodstream. Be careful about splashing the chemicals onto your clothes or skin.

Determine your development time using the film stock info sheets as a starting point. Reversal is usually processed for about 2-3 minutes, negative about 5-7 minutes. Use the info sheets and your own test to determine your own parameters. The printer stocks require shorter development times (some require about 3 minutes for neg, or 1-2 minutes for reversal). I've found that printer stocks shot on an optical printer require a longer development than when they are shot with outdoor lighting. Do your own tests.

Set up your darkroom space, get a sense of where things are, then turn off the lights. I take my 100 ft 16mm roll, or my 50 ft super 8 cartridge, and wind off a portion (you can pull the super 8 out, or you can break the cartridge open). I usually use 30 foot lengths at a time because that's what fits comfortably into the tubs of chemicals. If you put too much film into the tub, the film will get tangled and stuck together causing uneven de-

velopment (which may be what you want). This system requires that I break off 30 feet indiscriminately and in the middle of a shot — if this bothers you, you can always use bigger tubs and more chemical and do 100 feet at a time.

Once you've broken off the length you will work with, put the remainder back into a light tight can, and dump the mass of film you have in your hands into the tub of developer and start counting immediately (if you want even development don't wind your 30 ft off the reel directly into the tub, gather it up in your hands and dump the whole mass in at once). It may be awkward at first, but it gets easier with experience. Gently work with the film in the developer — separating it from itself, submerging it (you may have film sticking up out of the developer). You must keep the film moving to provide fresh developer to the surface of the film because as the developer's chemicals come into contact with the film they become exhausted.

After development, lift and drain the bundle of film and dump it into the water tub. In your wash you should always use running water (room temperature, like the chemicals). Again, gently move and separate the film in the wash. Wash for 1-3 minutes. If you're using a stop bath, it cuts down on wash time and can preserve the life of your fixer. I cut this step because space considerations, and I wash a bit longer. There's a tendency to cut down the wash time because of impatience — it may mean you allow the film to overdevelop (because of residual developer on the surface of the film) and it could reduce the life of chemicals that the film goes into next. Once you take these factors into consideration and develop a few rolls, you'll learn what's best for you.

Always wash your film before moving to another chemical.

The next steps depend on what you want — *negative* images or *reversal* images.

Negative Images

After the wash, go directly into the fixer. You're still in the dark, or with the safe light on. Check the info sheets for fixer time — it's usually about 5 minutes. The rule for fix time is twice as long as it takes to clear the film (when the milky whites become transparent), which is usually about 2 minutes, then you can turn the light on for the

remainder of the fix time. The fixer clears the film, and rids it of chemical byproducts and residual developer.

Wash again for about 5 minutes. The info sheets probably tell you to wash longer and it's always a good idea. I often wash for a few minutes because I'm in a hurry to do a lot of footage *and* I'm not worried about the longevity of my images because I'm usually reprinting and reprocessing. If you're at all concerned, wash longer — up to 10 minutes or use a hypo clearing solution to cut down on wash time, to preserve your film longer, and to save water.

Finally, hang your film to dry. It gets all tangled like a mass of spaghetti, so you need a clean surface to do the untangling. I use newspapers and hang the film to dry on a clothesline strung across the apartment. As the film dries, go back into the washroom and do another 30 feet. It seems difficult, and involved at first, but it gets quite easy, and it's really rewarding and a thrill to watch your own images developing.

You can now project, or reprint your negative images. You can also tone them at any time in the future. Remember ... a non-hardening fixer works best if you plan to tone your film, and hardening fixer is best to protect and preserve your film.

Finally, a few additional techniques. Instead of dumping your film into the tub of developer, put the film into a dry tub and try filling a spray bottle with developer and spraying the surface of the film, then proceed as usual through the subsequent steps. Or try solarizing with the Sabattier technique ... midway through the development stage, flick your washroom light on and off very quickly, or use a quick burst from a flashlight ... this will cause a partial reversal of the tones — a stunning, radiating effect.

Reversal Images

After development and wash, transfer the film to the bleach, and gently move and separate the film. Bleach for 30-40 seconds. Don't splash — remember, this chemical is extremely toxic, so don't get it into your eyes, nose or mouth, or onto your skin. If you do, wash it off immediately.

Transfer the film back into the water. You may now turn on all the lights. Wash for 2-3 minutes. Your water will be quite yellow — I dump it en-

tirely at least once through this wash cycle. Your film will look pale milky white. Don't worry, you haven't lost the images.

What you have done is developed the exposed silver halide particles and turned them black, then removed them through the bleach stage. So what you have is clear transparent areas, and milky white areas. The milky whites are the unexposed silver halide particles. After washing, remove the film from the water and hold it near a regular light bulb for about one minute. You are exposing the rest of the unexposed silver halide particles on your film.

Next, dump the film into the developer again. I use the same developer (yes, you are working with the lights on now). You are developing the remaining silver halide particles you've just exposed to light, turning them to dark silver. The hi-con stocks take only a minute or so; other stocks take a few minutes. It's a process you can watch, so you can determine when your blacks are black enough; when they are remove the film and wash again for about 3-4 minutes. You now have dark areas, and clear areas in a reversal image.

Then put your film into the fixer. You don't really need to agitate the film much in the fixer — just a few times is sufficient — but you usually have to sit there with it to make sure all the film is submerged in the fixer. Fix for 1-2 minutes.

Wash for 5-10 minutes.

Dry.

Once you've done your entire roll of film and dried it, splice the processed lengths together (the first batch goes onto the empty reel first (and remember that the image feeds into the projector upside down, emulsion facing out — if you wet your fingers or lips and touch the film surface, the emulsion is the sticky side)).

You should always double splice the film.

Project your film.

At first it takes a lot of time to go through 3 processes to finish a 100 ft roll — but it gets quicker and easier once you've found a routine that works well for you. It takes just over an hour to actually develop 100 feet. The whole process, though, is long and it takes a lot of work. I find I need a

where between 6-12 hours at a stretch to feel good about what I'm doing. Since it takes a long time to set up and get organized and it takes time to clean up (stains in the bathtub, etc., can be removed with cleanser, water, brush). If you can keep some of your tools set up you can work shorter periods — on and off. Leaving film in toners for extremely long periods of time gives fascinating results.

Remember, this is my method. Yours might be different, tailored to your own needs. Experiment and be prepared to lose work and (seemingly) to waste time. It's all part of the process.

Toning

I've experimented with different types of toning techniques. Remember, this info I'm outlining is not a rule. It's a system that worked for me. Experiment for yourself. I prefer toning negative hi-con images. You should try various types of stock and techniques to see what you prefer — they work differently.

The best type of film to tone is one with a fair amount of density, i.e. blacks. That's what gets toned.

Toning can cost a lot of money. The toners are expensive and don't last that long. If you're doing a lot of footage you'll need a lot of toner to ensure that all of your film will be submerged or at least enough to swish around periodically and get a good potent color to take to the film.

What follows is a rough sketch — there is no one method. It involves looking, studying, guessing, chance, and repeated attempts. Experience and note taking are your guides.

The tools you'll need:

Toners — I use Berg toners — sepia, blue, gold and copper. You can buy 1 quart or 1 gallon boxes. Warning: the Berg Color Toning System is actually a box of multi-colored tints — tints are dyes that color the clear areas of your film. Toners are a chemical that chemically transforms the black silver of your film into another chemical/color.

About 4 plastic jugs for containing the toner bleach and the toners. I recommend 1 gallon jugs — even if you don't buy the

1 gallon boxes of toner, you may do so in the future (it's more economical).

3 containers for toning. I've used different systems. The best for me is 3 plastic garbage pails (about 2 feet tall) with lids that can be fastened shut (about \$7 each). I use 3 different colored pails for the 3 different colored toners I'm using. You can use smaller containers but I find I need this size. I like to work with about 30 ft lengths.

1 plastic 2-gallon pail (you already have this).

2 tubs for developer and fixer (you already have these).

Weight — something to keep the film submerged in the plastic pail (I use a 400 ft super 8 takeup reel).

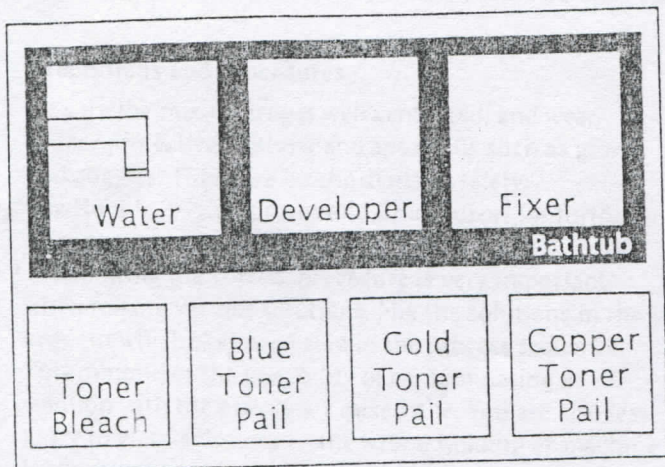
I only buy the sepia toner for the toning bleach included in the box; I like the other color toners better and find less use for the sepia. This sounds like a waste — buy sepia toner, throw out the sepia and use only the bleach (the other toners have no bleach included in the box). I have been able to purchase an order of bleach alone because I made a very large order of chemicals in the past. Try asking around. Kodak sells a separate toner but I personally don't like it much. It seems less potent. You can also mix your own toner bleach (I tried but I didn't find a formula that worked for me).

Mix the toners according to directions (later you might want to experiment with greater degrees of potency). *Use gloves!*

Mix the bleach.

Put each of the toners in separate garbage pails. You don't need to keep these three toner pails in the washroom at all times. It gets cluttered so I carry mind back and forth (see diagram below).

I start by submerging my film in the pail of bleach — I use the super 8 takeup reel to keep all the film submerged. The blacks must be turned to a sort of beige color. This takes a long time the first time you submerge a particular piece of film — anywhere from 5-20 minutes, sometimes more. The time depends on the stock and the density as well as the strength of the bleach. The bleach lasts



a long time but it does diminish in strength — once it starts taking 30 minutes or more to work it's time to dump it. You might have to rearrange the film in the pail of bleach, sometimes the film sticks to itself so tightly that the bleach can't get into some spots to change the blacks to beige.

Once you've transformed all the blacks to beige, pull the film out, drain it and wash it for about 1-2 minutes.

Then put the film into one of the toners for about 5 minutes or so. You can then wash for 1-2 minutes, dry, and project your film. You will have whites, and the blacks will have been replaced by the toner color you chose.

You can continue the process — when I begin I most often start with yellow because blue can be too powerful to begin with. In yellow, the film will turn a brownish color in the first few minutes (it gets more intensely yellow the longer you leave it in the toner). For the first round of toning, I usually leave the film in for a few minutes, then remove it and wash!

I then put the film into the developer for just a few seconds. I can't say how long exactly, it depends. Sometimes it's 10 seconds or so. The developer will take the toner out and start returning some of the blacks. Quickly remove the film from the developer and wash it. This process will give you split toning and image fragmentation later.

I then put the film back into the toning bleach which takes away the blacks that have reappeared and prepares the film for retoning. This bleaching usually takes only a couple of minutes.

Wash again.

Now place the film into another colored toner — try blue.

I continue this cycle of redeveloping, bleaching and toning 2-3-4 or more times. After a couple of cycles of yellow and blue, I might reverse my process. That is, I bleach first, then wash, then redevelop, wash and tone. This further fragments the image. You must experiment and observe. I make my decisions according to what I see happening and according to my previous experience. Keeping notes can help.

You can fragment the image so much that you have total abstraction. Sometimes the emulsion just slides off (not often). Sometimes the film becomes so heavily scratched that you lose the image. Again, experiment.

Once you feel you've done enough to the image, stop. Wash for a few minutes, dry and project it. You can always continue the process at any time in the future.

N.B. If you feel that the image is too dense — i.e., it's thick with developer residue, toner and byproducts, you can thin it out. A good test is to see if you can look through the image. Is it semi-transparent? If it's not, if you can't see through it even though it's colored, the projector lights will not be able to pass through and the screen will be dark. By placing the film in the fixer briefly you can thin out the film. If it stays in the fixer too long you lose your image — it slides right off or thins right out. I often fix for a few seconds, rinse it, and try looking through it again. If it's still too dense, try fixing again. You might lose a few before you get it right. Your eye must become experienced.

N.B.B. After you've fixed the image you cannot tone it again. So make sure you toned as far as you feel necessary. If you do try toning again after you've fixed you'll lose the emulsion — it comes right off.

Finally, this is all technique. At first you may be able to dazzle people with your images, but it can become empty technique without some thought and feeling involved. That's where your own personal investment has to come into play. ⊕