

*RetroCine.com*

**Instructions for**  
**Black & White Reversal**  
**Processing**  
**(1 Gallon Kit)**

**Mixing**

**Processing**

**Disposal of Used Chemistry**

**Important Notes:**

- Much information is available via the internet; you are encouraged to read as much as possible on the subject to become thoroughly familiar with processing, safety precautions and proper chemistry disposal.
- Safety and proper disposal are essential; if you are unsure about using and handling photographic chemistry, contact a qualified chemist. Contact your local household hazardous waste center to determine proper marking and disposal for used B&W chemical solutions. By using this kit, the user acknowledges that he/she understands the proper & safe use of B&W reversal chemistries. RetroCine has no control over the proper use of this kit by a user.

# **B&W Reversal Developing - Mixing Instructions**

## **Equipment needed:**

- 1 Gallon plastic containers for storing mixed chemistry (do not use glass!)
- Wide-mouthed plastic pitcher for mixing chemistry (do not use glass!)
- Stirring rod
- Thermometer with a range of approximately 50-150 degrees F.
- Funnel for pouring from the pitcher to the containers
- Proper personal protective gear: apron, gloves, mask and safety glasses

This is a minimal list of necessary mixing equipment using the kit. Other items may be needed depending on the specific arrangement of your darkroom.

## **Storage life of kit and mixed chemistry:**

### Unopened kits:

The storage life of unopened kits is well over two years when kept cool and dry. Since the chemistry is all in powder form, refrigerated storage is unnecessary and will not extend the shelf life.

### Mixed kits:

The storage life of mixed chemistry is approximately 3 months if *unused* and stored in tightly closed containers. *Used* chemistry life is approximately 4 weeks, primarily due to limited effective life of used bleach and clearing solutions.

## **Mixing instructions:**

### **Safety:**

Safety is simple but essential! Always be sure to comply with the following:

- ***Be neat*** and work slowly; avoid rushing which leads to mistakes and accidents.
- ***Do not inhale any dust!*** All photographic chemicals are toxic and must be handled accordingly. If you are unsure about handling, discuss with a qualified chemist.
- ***Always*** add chemistry to water, do not add water to chemistry!
- ***Always*** wear safety glasses
- ***Always*** wear the dust mask included in the kit
- ***Always*** wear the disposable gloves included in the kit
- Wear a full bib or apron when mixing (and using) the chemistry, preferably rubberized.
- Mix the chemistry in a well-ventilated area. In the event of a spill, clean up immediately and wash the area.
- ***Do not*** eat or drink anything in the mixing (or developing) area.
- Dispose of the disposable gloves and mask in the trash ***and*** completely wash your hands upon completion. Do not eat or drink anything until your hands are washed.

**Mixing:**

***First Developer:***

Fill the pitcher with approximately 3 quarts of water at approximately 90-100 degrees F. Select the jar marked "First Developer". Slowly and carefully mix in the powder, minimizing any dust. Add water to make a total of 1 gallon of solution.

Select a 1 gallon plastic container and place the label "First Developer" on it. Pour in solution and cap securely.

***Second Developer:***

Fill the pitcher with approximately 3 quarts of water at approximately 90-100 degrees F. Select the jar marked "Second Developer". Slowly and carefully mix in the powder, minimizing any dust. Add water to make a total of 1 gallon of solution.

Select a 1 gallon plastic container and place the label "Second Developer" on it. Pour in solution and cap securely.

***Bleach:***

Fill the pitcher with approximately 3 quarts of water at 70- 90 degrees F. Do not use hot water. Select the jar marked "Bleach". Slowly and carefully mix the powder into the water, minimizing any dust since potassium dichromate is toxic. Carefully re-close the container and dispose as hazardous waste. Add water to make a total of 1 gallon of solution.

Select a 1 gallon plastic container and place the label "Bleach" on it. Pour in the solution and cap securely. This label contains a note that it contains Potassium Dichromate (so that the local household hazardous waste location knows about it specifically)

***Clearing Solution:***

Fill the pitcher with approximately 3 quarts of water at 70-90 degrees F. Select the jar marked "Clearing Solution". Carefully and slowly mix the powder into the pitcher. Add water to make a total of 1 gallon of solution. Select a 1 gallon plastic container and place the label "Clearing solution" on it. Pour in solution and cap securely.

***Fixer:***

Fill the pitcher with approximately 3 quarts of water at approximately 90-100 degrees F. Select the jar marked "Fixer". Slowly and carefully mix in the powder, minimizing any dust. Add water to make a total of 1 gallon of solution.

Select a 1 gallon plastic container and place the label "Fixer" on it. Pour in solution and cap securely.

***You are now ready to start reversal processing your B&W film!***

## **B&W Reversal Processing and Disposal:**

There are several types of processing equipment usually available to the amateur:

- Rewind tank (motorized and manual) e.g. Arkay or G-3 tank system
- Spiral tank: e.g. Honeywell spiral, Superior Bulk Film spiral tank, Powell tank, Russian LOMO type tank.
- Separator strip: film is wound with a dimpled strip of the same length and submerged in the solutions e.g. Superior Bulk Film separator strip
- Revolving drum: various forms where the film is wound around a drum which then rotates in-and-out of the solution bath.
- Dip tank: film is wound around a board which is then dipped into a narrow tank. This is a variation to the spiral tank.

Each type of processor requires different development times and slightly different technique. For best results, follow the instructions provided with your processing unit. If you do not have instructions for your unit, there are resources available on the internet for this information. One very good site is provided by Martin Baumgarten of Plattsburg Photographic, who has an excellent article on B&W reversal processing systems.

The URL for this location is:

<http://lavender.fortunecity.com/lavender/569/homeprocessing.html#Homeprocessing>

Some other relevant locations are:

<http://www.geocities.com/gselinsky/>

<http://members.aol.com/Super8mm/Super8mm.html>

<http://groups.google.com/group/alt.movies.cinematography.super8/msg/2540d6c42666c8d3?hl=en>

<http://www.fortunecity.com/lavender/lavender/569/homeprocessing.html#>

<http://micahjg.tripod.com/film/sup.htm>

<http://www.filmshooting.com/thelab/processing.php>

## Processing times for spiral tank or dip tank systems:

<u>Step</u>	<u>Time</u>	<u>Temperature (F)</u>
First Development (most critical step)	See below	68
Wash	3 min.	65-75
Bleach	2 min.	65-75
Wash	2 min.	65-75
Clear	3 min.	65-75
<i>The remainder of processing may now be carried out in room light</i>		
Wash	2 min.	65-75
Re-exposure	see note below	
Second development	5-6 min.	65-75
<i>(time is not critical, just full development of the positive image)</i>		
Wash	2 min.	65-75
Fix	5 min.	65-75
Final wash (in running water)	10 min.	65-75
Drying	as needed	air not over 110 <sup>0</sup> F

### Notes:

#### First development:

***This is the most critical step in a reversal process, as it determines the final density.***

Time for first development will depend on the type of film, agitation and equipment used. For most reversal (and negative) films available to non-Hollywood filmmakers, the development time will be 6 to 8 minutes, when using a spiral reel or tank method. Exact timing will have to be determined for each film type by experiment using test footage and bracketed exposures. The effect of variations in agitation technique usually will not have a significant effect with spiral tanks and their variants, unless they are excessive. Typical agitation is 10 seconds every 1 minute of time. Development times should be extended approximately 20 seconds for each 100 foot roll of 16mm processed if full 1 gallon solutions are used.

#### Bleach:

Two minutes will usually be satisfactory for most films when the bleach bath is fresh. Increase time 20 seconds for each 100 foot roll of 16mm processed if full 1 gallon solutions are used.

#### Clearing:

The clearing bath removes the yellow staining produced by the bleach bath. Three minutes is usually satisfactory when the clearing solution is fresh. Increase time 20 seconds for each 100 foot roll of 16mm processed.

#### Re-exposure:

Re-exposure should be made with the film under wash water, during the wash step after the clearing bath. Expose the film on the reel to light of a 100 watt bulb, held about 12-18 inches from the film. Exposure is not critical but should be approximately 2 minutes. Move the light or the reel in circles to ensure all portions are exposed to the light.

#### Second development:

Five minutes will usually be satisfactory for most films when the developer is at or near maximum temperature of the recommended range. Increase to 6 minutes when developer is near the minimum recommended temperature. Second development merely completely develops up all the remaining silver halide particles remaining.

#### Fixing:

This step removes any cloudiness remaining in the highlights and removes any remaining undeveloped silver halide particles. It also hardens the emulsion. Theoretically, if the preceding steps have been conducted properly, no undeveloped particles remain and fixing is not required; however, final fixing is a safeguard to prevent the possibility of future staining and provides additional hardening.

#### Final wash:

This should be performed with running water at 65-75 degrees F. and is used to remove traces of fixer. If running water is not available, then a minimum of 10 changes of water should be made. A final water change should include an aid to drying, such as Kodak's Photoflo added to the water.

#### Drying:

Film must be completely dry before projection. Do not attempt projection of film prior to complete drying; disastrous emulsion damage will result. Drying can be accomplished in virtually any convenient manner. If heated air is used, it must not exceed 110 degrees F so as not to damage the emulsion. Do not attempt the dry film using a hair dryer. An effective non-heat method is to blow air through the spiral using a small desk fan.

**Processing times for Rewind tank systems (such as Arkay, G-3  
rewind tank, motorized Micro-record tank)  
For 100' roll of 16mm film**

<b>Step</b>	<b># of passes</b>	<b>Temperature (F)</b>
First Development (most critical step)	12*	68
Wash	4	65-75
Bleach	10	65-75
Wash	4	65-75
Clear	8	65-75
<i>The remainder of processing may now be carried out in room light</i>		
Wash	4	65-75
Re-exposure during wash step above (see instructions above)		
Second development ( <i>passes ensure full development of the positive image</i> )	8	65-75
Wash	4	65-75
Fix	4	65-75
Final wash (in running water)	10	65-75
Drying	as needed	air not over 110 <sup>0</sup> F

**Notes:**

- Exact number of passes must be determined by a test roll with bracketed exposures to determine desired final film density
- For rewind processing, since only about 1 quart of solution is used, it is recommended that the solution (1 quart) be discarded after 200 feet of 16mm or double 8mm film is processed.

## **Proper Disposal:**

It is *imperative* that all spent chemistry be properly disposed of. Virtually every locality has specific hazardous waste criteria. You *must* contact your local hazardous waste collection center to determine the proper disposal method. All B&W chemistry is considered hazardous waste!

If you have a septic or cesspool waste system, under *no* circumstances should any chemistry be disposed of by flushing down the drain!