



Jennifer Bishop, *Route 10, California*, 1990

Some of Bishop's best photographs depict quintessential childhood memories. She has to be in the right place at the right time to get the shot, but taking the picture is only part of her job. To preserve the moment forever, Bishop also has to take special care to correctly develop her film. © Jennifer Bishop; courtesy of the artist.

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Developing Film

Latent image: page 25

Developing film is relatively straightforward, but there are variables that can affect your final results.

The Darkroom

See bw-photography.net for more on darkroom health problems.

Developing your film is a relatively straightforward and easy process. You treat the exposed film in a succession of chemical solutions to make the latent image visible and permanent. However, the logistics are a little more complicated. To begin with, film is light sensitive, so you will need a darkroom (literally a room with no light whatsoever) to load the film into a processing tank. This tank is designed to keep light out, but allows you to pour the developing solutions in and out of it until processing is complete.

Best results usually come from consistency and standardization. However, there are some variables that can either cause problems or improve the final results. Following is a discussion of the routine steps, as well as potential trouble spots and creative controls you can use.

A photographic **darkroom** is a lighttight room containing the equipment needed for developing film and/or making prints. In theory, you can use any room that can be made completely dark, even a bathroom or large closet. (You often can block window light with a black shade made of foam core, opaque plastic, or plywood.) You should always use a room with good ventilation—or one in which a ventilation system can be installed—because fumes from certain chemicals can irritate some individuals or potentially cause other health problems.

Furthermore, you will need tables or countertops to hold the developing and printing equipment. Running water is ideal, but not absolutely required; you can use pails or other containers to bring water into the darkroom and take used chemical solutions out of it, if necessary. Spaces that are not heavily used are best, such as a spare bedroom, bathroom, or a room in the basement or attic. This will allow you to keep the equipment ready for use; otherwise you will have to set up and take down the darkroom for each working session.

You should keep your darkroom as clean as possible. Spilled chemicals may cause contamination. They also may form dry residue that can be inhaled. So take special care to leave the darkroom spotless after each use, particularly if the darkroom is in your living space. Even well-cleaned areas may retain unpleasant stains or odors, so never use a kitchen or dining room for a darkroom. Also, avoid areas that children or pets can easily access.

You can build a home darkroom, but a darkroom outside the home is preferred.

A home darkroom is convenient because it's generally available when you need it, but most photographers find darkrooms outside the home more affordable, practical, and healthy. Look for a good, well-ventilated darkroom at a local school, camera club, or community center. There may even be a conveniently located school, art space, or business that rents darkroom time. It might even be worth enrolling in a class at your local art school, community college, or adult education program, just to secure darkroom access. Ask the staff at your local camera store if they know of any available darkroom space.

A darkroom outside your home may eliminate problems of space and odor, and shared or rental facilities are more likely to be well equipped than any home darkroom you build yourself. You also may meet a group of interested individuals with ideas, information, and photographs to share. All this could make your darkroom time more informative and engaging.

It's a good idea to air out the darkroom you use, whether it's well ventilated or not. If possible, open windows and doors from time to time. When working, take a break every couple of hours to walk around and breathe fresh air for a few minutes before returning to the darkroom.

Film Processing Equipment

What you will need

processing reels and tank
 rubber gloves
 apron
 thermometer
 timer
 stirring rod
 scissors
 bottle opener
 graduated cylinders,
 beakers, or other
 measuring containers
 storage bottles
 funnel
 film washer
 photo sponge or chamois
 film drying cabinet
 and/or string with film
 clips or clothespins
 negative storage
 protectors
 changing bag

Film developing does not require complicated or expensive equipment. Following is a list of equipment typically used for processing 35mm and medium-format films.

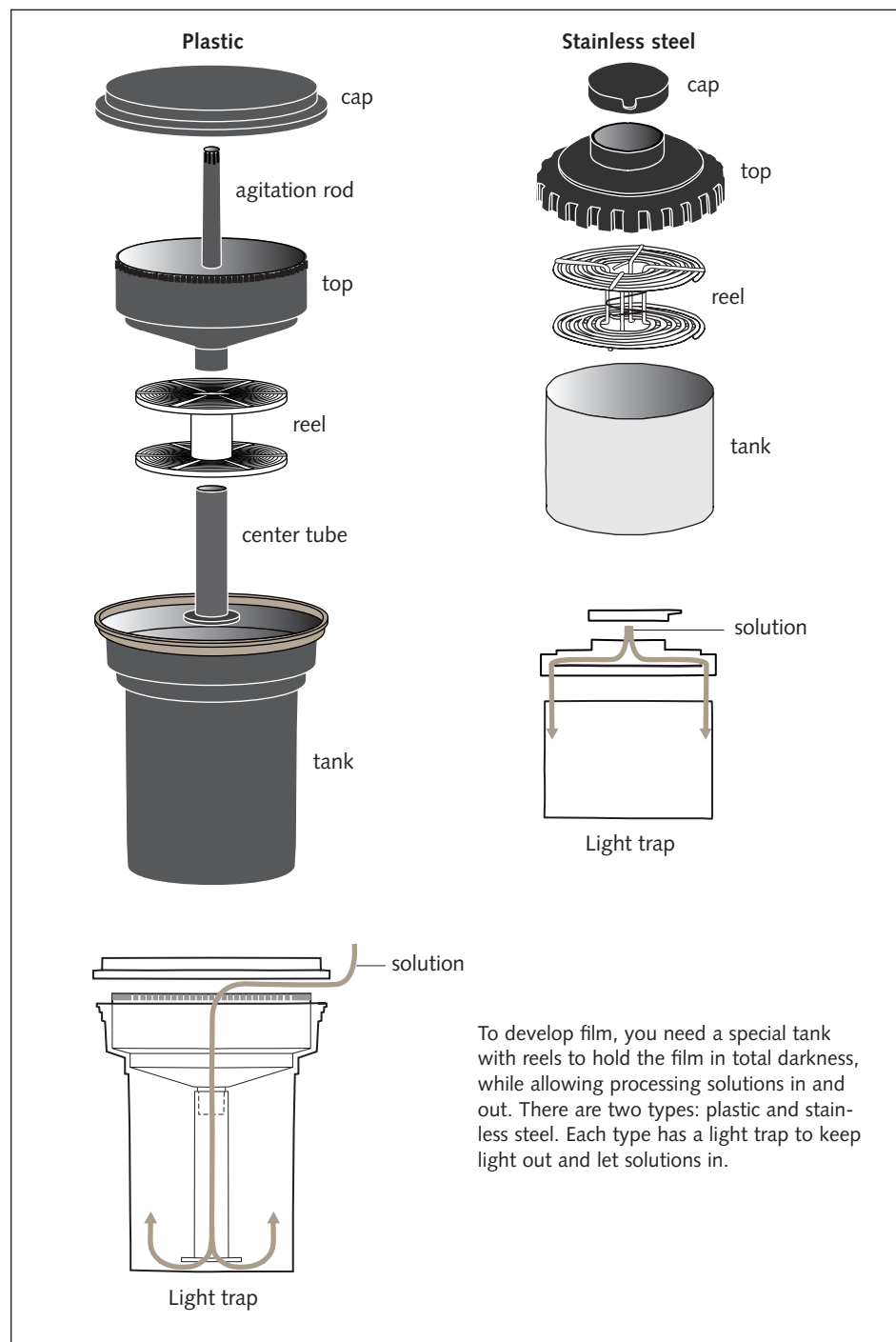
Processing reels and tank. Since film is light sensitive, you must develop it in total darkness. To do this safely and efficiently, you turn off the lights and load exposed film onto a spiral reel. You then place the reel in a lighttight **processing tank**. Once the film is in the tank with the top secured, you can turn on the room lights; the top of the processing tank has a **light trap**, an opening designed to allow processing solutions in and out without letting in light.

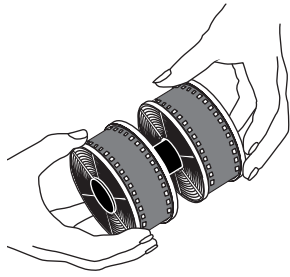
Reels and tanks are made of either plastic or stainless steel. Plastic reels are arguably easier to load. Stainless steel reels are more difficult to load at first, but are generally more durable. Note that both plastic and stainless steel reels can break or warp. This is especially true of equipment in a **gang darkroom**, a school or other darkroom shared by many people. If possible, buy your own reels and tank, preferably heavy-duty models that are less prone to damage than lower-quality models.

Stainless steel reels fit only one size of film—usually 35mm or 120 (medium format). If you shoot both kinds of film, you will need to purchase two separate reels. Most models of plastic reels are adjustable to accommodate either size.

Processing tanks are available in several sizes to hold one, two, four, and even more reels. The larger tanks are more expensive and a little unwieldy, but they allow you to save time by processing multiple rolls of film at once.

Processing Reels and Tanks





Step 14



Step 15

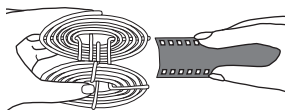


Step 16

12. *Slide the reel, now loaded with film, onto the plastic center tube that comes with the tank.*
13. *If you have another roll to develop, load it onto a second reel. Repeat steps 3 to 11.*
14. *Place the second loaded reel onto the center tube.* If you only have one roll to develop, place an empty reel on the tube above the loaded reel. Putting one or more empty reels in the tank holds the loaded reels in place during processing. Many models of plastic tanks take two reels, but if your tank takes only one, skip steps 13 and 14; if it takes more than two reels, continue loading film, as above.
15. *Place the center tube with reels into the processing tank.* If any of the reels are empty, they should be positioned on top of the loaded reels. The end of the center tube with a flared protrusion goes into the tank first.
16. *Screw the tank top in place, making sure it clicks in securely.* The center tube and tank top work together to provide a light trap that keeps light from entering the tank. Now it's safe to turn on the room lights.
17. *Put the watertight cap on the top of the tank, and you're ready for processing.* Many plastic tanks come with an agitation rod, which is not really useful; feel free to toss it out.

Light trap: page 131

Agitation rod: drawing, page 131



Step 2

Stainless Steel Reels and Tanks

1. *Follow steps 1–6 above for loading plastic reels and tanks.*
2. *Pick up the stainless steel reel in your other hand, and position it so the end of the spiral on the outer rim of the reel faces the film.* The film will not roll onto the reel if the end of the coil faces away from the film.

Summary: Film Processing

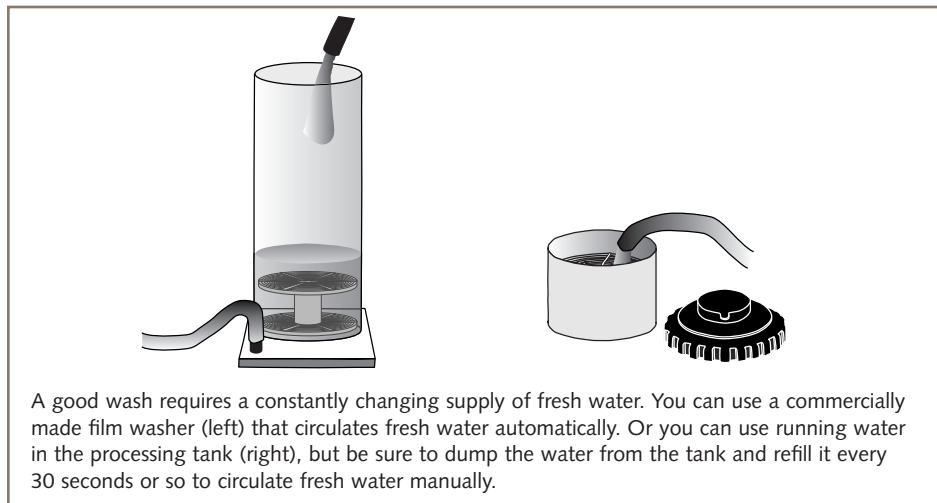
What follows is the sequence of steps to process film, along with recommended times and other instructions. Note that these are guidelines only; details may vary among types and brands of chemicals and due to conditions of use. Be sure to read all product labels for specifics.

Step	Time	Comments	Capacity*
Presoak Softens film emulsion to encourage even development.	1 min	Optional step: Pour water into tank. Temperature should be the same as temperature of succeeding solutions.	Not applicable.
Developer Makes the latent image visible.	Varies; refer to time-temperature chart.	Keep solutions in a range from 68–72°F (20–22°C), if possible, but 65–75°F (18–24°C) is acceptable.** Agitate by rotating and inverting tank continuously for first 30 sec, then 5 sec of every 30 sec thereafter.	Discard one-use developers immediately after use; replenished developers can be used for dozens of rolls.
Stop bath Ends development.	30 sec–1 min	Agitate by rotating and inverting tank for at least half of the time.	20 rolls of 36-exposure film per quart or liter of working solution.
Fixer Removes unexposed light-sensitive silver to make image permanent.	Standard fixers: 5–10 min Rapid fixers: 3–5 min	Agitate by rotating and inverting tank for at least half of the time.	15–20 rolls of 36-exposure film per quart or liter of working solution.
Rinse (first wash) Washes away most chemicals.	5 min	Use constantly changing water.	Not applicable.
Fixer remover Removes chemical byproducts from fixing.	2–5 min	Agitate by rotating and inverting tank for at least half of the time.	30 rolls of 36-exposure film per quart or liter of working solution.
Final wash Clears film of any remaining contaminating compounds.	5–10 min	Use constantly changing water. Periodically dump and fill tank to guarantee fresh wash water. Keep film on reel and reel in tank or film washer.	Not applicable.
Wetting agent Helps prevent spots and water marks from forming during drying.	30 sec–1 min	Keep film on reel while in wetting agent. Do not agitate.	60 rolls of 36-exposure film per quart or liter of working solution.

*A roll of 36-exposure 35mm film is approximately equal to 1½ rolls of 24-exposure 35mm film, one roll of size 120 (medium-format) film, and three sheets of 4" x 5" film.

**For best results, keep all processing solutions at the same temperature as the developer.

Washing Film



If you don't have a film washer, keep the reel(s) in the processing tank (with the top off) and put the tank under a faucet. Run water from the faucet into the tank for the required wash time, but dump the water out of the tank every 30 seconds or so to guarantee a changing supply of fresh water.

If you don't have running water, you can still wash film efficiently. Fill a bucket with 68–72°F (20–22°C) water. Pour water from the bucket into the processing tank. Let it sit for 20–30 seconds (agitate the tank if you like), then pour out the water and fill the tank again. Use six to eight exchanges of water for a first wash, and 12 to 15 exchanges for a final wash.

Whatever method of washing you use, it's important to keep the water temperature as consistent as possible. The temperature of running water, whether in a film washer or a processing tank, can vary widely; monitor it carefully during the entire wash. Stick your thermometer into the tank and check it constantly while the water is running.

Adjusting negative contrast

*Time-temperature chart:
page 136*

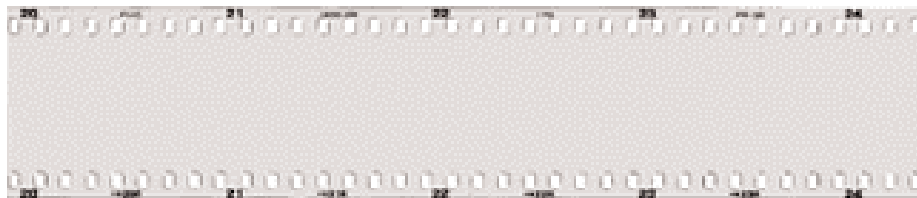
Most of the time, when processing film you'll want to use the standard development time recommended for the film and developer you use. Standard developing time is sometimes referred to as **normal development** and appears on a time-temperature chart, usually provided with the film, the developer, or on the manufacturer's Web site.

If you've exposed your film correctly, processing it for normal development will provide a good negative almost every time. However, there are times when



Jim Dow, *Woman's Face on Sign (On Brick Wall), "Art Work,"*
Mantako, MN, 1972

Some photographers work like anthropologists, searching for pictures in the cultural landscape. Their job is not so much to construct or direct the subject as it is to find and take compelling pictures. To this end, Dow travels extensively to record quirky details of Americana: vintage signs, architectural oddities, and roadside attractions. © Jim Dow; courtesy of Janet Borden Gallery, New York, NY.

Troubleshooting: Film Development

Problem: Frame numbers, but no images

Reason: No exposure in camera. Frame numbers and other information, which are exposed on the film's edge during manufacturing, appear during development. If you see frame numbers, but no images, the film was developed, but not exposed—probably because the film never advanced through the camera or you accidentally developed a fresh (unexposed) roll of film.



Problem: Completely clear film; no frame numbers or images

Reason: No development. Film that isn't developed is totally clear when fixed. Possible causes include using the fixer before the developer or forgetting to use developer at all.



Problem: Purple or cream-colored blotches

Reason: Film not loaded on the reel correctly. If parts of the film are in contact, they stick together when processing solutions are added. These areas remain unprocessed.



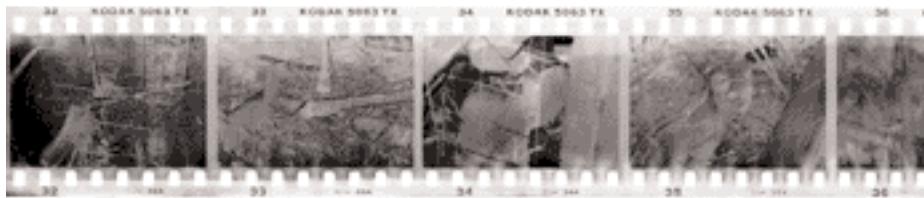
Problem: Film completely black

Reason: Film fully exposed to light before development. Since the entire surface of the film is light sensitive, dark edges indicate accidental exposure, such as from turning lights on when loading film into the processing tank or opening the camera back before the film is rewound.



Problem: Film unevenly darkened

Reason: Film partially fogged (unintentionally exposed) before or during development. In this example, the center post was left out of the plastic processing reels, allowing light to enter the tank. Other possible causes include loading film in a room that is not totally dark and the top of the tank coming off during development.



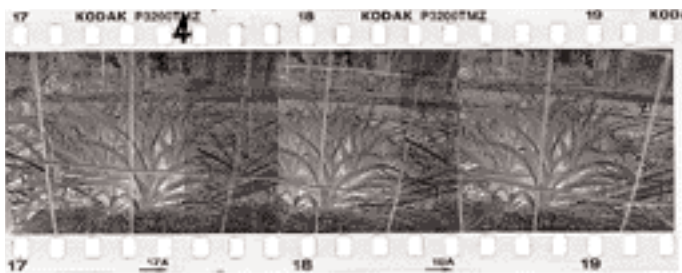
Problem: Film unevenly darkened

Reason: Incomplete fixing. Partially fixed film does not completely clear and may have a warmish tint. This sometimes occurs when the fixer is weak or depleted—or when fixing time is much too short.



Problem: Film fully developed only along one side

Reason: Insufficient developer in tank. If there isn't enough developer solution to cover the film completely, the fully immersed area will develop normally, while the uncovered area will not.



Problem: Overlapping images

Reason: Film did not fully advance through camera, either because of mechanical breakdown or user error.