

processing step	time [min]	print processing	comments
1 Developer	3 - 6	Develop fiber-base paper with constant agitation at supplier-recommended strength, using factorial development times.	The exposed portion of the silver-halide emulsion is reduced to metallic silver during development. It is best to develop fiber-base papers using factorial development. The emerging time of important midtones is recorded and multiplied by a factor. This factor (typically 4-8x) is kept constant to compensate for temperature deviation and developer exhaustion but can be modified to control image contrast. The unexposed portion of the silver-halide emulsion remains and impairs the immediate usefulness of the photograph, until removed in the fixing bath.
2 Stop Bath	1	Agitate lightly in supplier-recommended strength, to terminate print development.	The stop bath is made of either a light acetic or citric acid. It will neutralize the alkaline developer quickly and bring development to a complete stop. Alternatively, a plain water rinse may be used.
3 1st Fix	1 - 2	Use ammonium thiosulfate (rapid) fixer without hardener at film strength. Agitate prints during fixing, and optionally rinse briefly between baths to prolong the activity of the second bath. Check silver contamination of the first bath frequently with silver estimators, and promote 2nd fix to 1st fix when first bath has reached 0.5-1 g/l silver thio-sulfate. Replace both baths after five such promotions.	During fixing, the residual silver halide is dissolved by thiosulfate without damaging the metallic silver image. The first fixing bath does most of the work but becomes increasingly contaminated by the soluble silver thiosulfate and its complexes. Soon, the entire chain of complex chemical reactions cannot be completed successfully, and the capacity limit of the first fixing bath is reached. A fresh second bath ensures that all remaining silver halides and silver thiosulfate complexes are dissolved. An intermediate rinse is optional, but it protects the second bath from contamination. Fixing time must be long enough to render all residual silver halides soluble, but not so long as to allow the fixer and its by-products to permeate the paper fibers; the former being far more important than the latter. Conduct a test to determine the optimum fixing time for any paper/fixer combination.
4 Rinse	1		
5 2nd Fix	1 - 2		
6 Wash	10 - 60	Remove excess fixer prior to toning to avoid staining and highlight loss. The choice of toner and toning process dictates the washing method and time.	Excess fixer causes staining and highlight loss with some toners. This step removes enough fixer to avoid this problem. For selenium toning, a brief 10-minute wash is sufficient. For direct sulfide toning, a 30-minute wash is required. However, the bleaching process required for indirect sulfide toning calls for a complete 60-minute wash prior to toning. Otherwise, residual fixer will dissolve bleached highlights before the toner has a chance to 'redevelop' them.
7 Toner	1 - 8	Choose a time and dilution according to the supplier recommendations or the desired color change and agitate frequently.	Sulfide, selenium or gold toner is essential for archival processing. They convert sensitive image silver to more stable silver compounds. Process time depends on type of toner used, the level of protection required and the final image color desired, but indirect sulfide toning must be done to completion. Some toners can generate new silver halide and, therefore, require subsequent refixing, but this is not the case with sulfide or selenium toner.
8 Rinse	5	Rinse briefly to remove excess toner to avoid staining and to prolong washing aid life.	To quickly remove toner residue, and to avoid highlight staining with sulfide toners, toning must be followed by a brief, but rapid, initial rinse before the print is placed into the wash. Excess toner also contaminates the washing aid and reduces its effectiveness. This increases washing aid capacity.
9 Washing Aid	10	Select a dilution according to supplier recommendation and agitate regularly.	This process step is a necessity for serious archival processing. It significantly supports removal of residual fixer in the final wash. Washing aid also acts as a 'toner stop bath' after direct sulfide toning. This protects the image from 'after-toning' in the final wash.
10 Wash	30 - 60	Use tray or syphon for single prints or vertical print washers for multiple-print convenience. Make sure to provide even water flow over the entire print surface at 20-27°C, and wash until residual thiosulfate levels are at or below 0.015 g/m ² .	The fixed photograph still contains considerable amounts of fixer together with small, but not negligible, amounts of soluble silver thiosulfate complexes. The purpose of washing is to reduce these chemicals to miniscule archival levels and thereby significantly improve the stability of the silver image. Print longevity is inversely proportional to the residual fixer in the paper. However, traces of residual fixer may actually be helpful in protecting the image. A simple test will verify washing efficiency.
11 Stabilizer	1	Use the supplier-recommended strength, wipe surplus from the print and dry normally.	Silver stabilizers, applied after washing, will absorb soluble silver formed by oxidant attack. Consequently, they provide additional archival protection but are a poor replacement for toning.