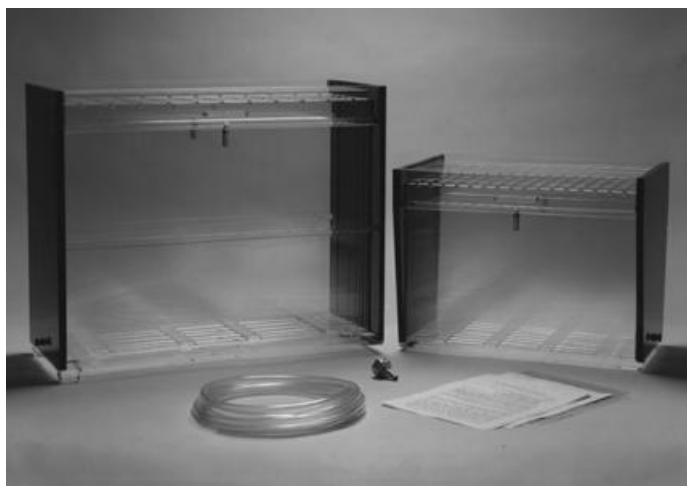


The Cascade Photographic
Print & Sheet Film Washer



[Instruction Manual](#)

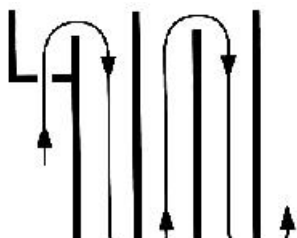
[Frequently Asked Questions](#)

Before I describe the features of the **Cascade** washer a few comments about washers and washing in general. Firstly, there is no such thing as an "archival" washer. Archival washing is a procedure that is only made easier by a washing machine. Archival processing requires that you fix properly, use washing aids, and then wash properly, which may include the use of a washing machine. Bruce Barnbaum, a master photographer and printer (see his book *The Art of Photography*) does not even advocate the use of a washing machine, preferring to use trays. The **Cascade** washer design is, in fact, based on sequential tray washing.

Secondly, there is a lot of hype regarding "archival" washers. One hype regards the virtue of rapid dumping of the washer to remove residual surface fixer from the newly inserted print. I recommend a simple pre-rinse (using the **Cascade's** effluent water running into tray) rather than wasting many gallons/litres of water from the washer tank each time prints are inserted. The photographer and prospective washer purchaser should read as widely as possible about the washing process and formulate a washing procedure that meets his/her needs. In this brochure, I will reference articles that compare washers and discuss the washing process. By using them you will be able to make an informed decision regarding your washing procedures and select the equipment that is best for you. Now about the **Cascade** . . .

The **Cascade** washes fiber based prints uniformly as fast as other washers but with water flow as low as 1/4 litre (that's 1 cup) per minute, washing a load of 11 by 14 prints with as little as 4 gallons of water (the exact volume and washing times depend on local conditions and processing technique.)

- With flow rates of 1 to 2 litres per minute, the **Cascade** will wash RC prints in the standard 4 minutes (again it is best to test for your local conditions).
- Freshly fixed prints can be added downstream without contaminating partly washed prints upstream, a feature especially useful for schools and production processing
- Sheet film and small prints can be easily washed by using Kodak 149 2586 dental film clips.
- **Cascade's** patented design has no moving parts and all parts of the washer are accessible for easy cleaning.



The design, awarded U.S. Patent 4,269,209, uses print compartments connected bottom to top, top to bottom, so that the water that is used to

wash the first print is reused to wash dirtier prints down stream. This saves a lot of water and energy used to heat the water to wash temperature. The compartments have minimum volume which allows rapid water exchange even at low flow rates. Finally, since water flows through the washer in only one direction, freshly fixed prints can be added down stream without contaminating partly washed prints up stream.

As a result of this unique design, the **Cascade** washes with minimum water consumption: the CW1116 @ 250 ml/min, the CW1622 @750 ml/min and the CW2024 @ 1 litre per minute (250 ml = 1 cup, 1 litre = 1 quart). Many people do not believe that the **Cascade** can wash well with such low flow rates. Kodak and other washing experts recommend that water in each pint compartment be changed 12 times per hour (once each 5 minutes). With all other washers the print compartment is the whole tank even if the washers have print separators. With the **Cascade** the print compartments are true compartments connected serially. Water flows through the washer from one side to the other, from one compartment to the next. Water from cleaner prints is reused to wash dirtier prints down stream. This reuse of water provides the high water efficiency.

The **Cascade** washer superficially resembles some of the other washers on the market, but has unique advantages. If you have ever hassled with other "archival" washers you'll appreciate these convenient features: small prints are not difficult to remove as the partitions flex allowing room for your hand or the partitions can be removed; there are two drain plugs to let the water out after use (a bottom drain and valve are standard on the CW2024); all parts of the washer are accessible for cleaning.

The **Cascade** is hand made of thick acrylic plastic, with carefully made joints and flame polished edges. Each **Cascade** is inspected and shipped complete with 8 feet of hose, a garden hose type faucet adapter and a booklet on fixing and archival washing. The washer is warranted for 5 years to do what we claim, without defects in material or workmanship (return unabused for a full refund or exchange). The **Cascade** has been used extensively in workshops, schools and classes with no reported failures.

An early, independent test of several print washers, including the **Cascade**, has been done by David Vestal in his book *The Art of Black and White Enlarging* (Harper and Row, 1984). The **Cascade**, the Oriental (made by Gravity Works), the Kostiner and the Salthill washers have more recently been reviewed by Steve Anchell in the April 1991 issue of *Camera and Darkroom Photography* (after testing Steve bought the **Cascade** for his own use). Complete copies of this article are available for \$1.00 (copy cost and postage). An excellent article on washing and washers, "Mysteries of the Vortex" by Martin Reed, appears in the July/August 1996 issue of *Photo Techniques*. As you read his article note the features that enhance washing and compare them to the features of the **Cascade**.

The following additional information may help you understand the washing process: You can think of the print paper as a sponge, filled with fixer. Since you cannot squeeze the paper, the only way for the fixer to exit the paper is by diffusion. Diffusion can be increased, practically, by increasing the temperature which increases the diffusion constant. Therefore, for faster washing use as high a temperature of water as recommended by the paper manufacturer. High water flow and lots of turbulence can't speed up diffusion.

Other factors that help the washing process are alkaline agents in the wash water; that is the way hypo clearing agents work. Fixer (sodium thiosulfate) can ionize and bond to charges on the paper fibers and gelatin emulsion. By adding hypo clearing agents, sodium bicarbonate or Kodalk, to the wash water, wash times can be reduced considerably. These substances are generally harmless to the print and can substitute for and displace the fixer. Hard alkaline water will generally give faster wash times than pure soft or acidic water. Hardening fixers require longer wash times. YOU need to determine wash procedures and times for your area and processing methods; there is no *a priori* wash time that will assure fixer free prints without testing!

For those of you interested in more information about washing prints and films there is a two

volume set of books by Grant Haist called Modern Photographic Processing, published by JohnWiley and Sons, 1979. David Vestal's excellent book has already been mentioned. David describes washing and washers in good detail. There is much malarkey and misinformation associated with print washing. Some of the myths include high water flow, lots and lots of bubbles, and washers that drain "heavy fixer" from the bottom (fixer from the paper is actually dissolved in the wash water). Both Vestal's and Anchell's tests destroy these myths. Most washers on the market work well if properly used, the **Cascade** works as well as any (better than some!) but with the lowest water and energy consumption.

Summitek is a small, quality oriented, one person business. I have been making and selling the **Cascade** washer since 1980 and have yet to have one returned because of customer dissatisfaction. If you purchase a washer and are not completely satisfied with its performance, your money,including shipping will be refunded (Shipping cost refund does **not** apply to orders outside North America). Washers are guaranteed for 5 years against manufacturing flaws.

Summitek regularly manufactures the **Cascade** in three sizes, 11x16, 16x22 and 20x24 selling for \$450, \$550 and \$650 respectively. Shipping is extra. The 11x16 washer holds 16, 11x14 prints or 32, 8x10 prints side by side. The 16x20 washer is big enough to hold 10, 16x20 prints or 20, 11x14 prints side by side. The 20 x24 washer has the same capacity as the 16x20 but will also hold 10 of the larger prints.

		Washer Dimensions		Water Vol(L)	Dry Wt. #	Water	Ship Wt#	Price
	Width	Length	Height					
CW11x16	11"	18"	13"	35	19	44	45	\$450
CW16x22	10"	24"	19"	46	33	72	56	\$550
CW20x24	10"	26"	24"	63	40	88	73	\$650

I usually stock all sizes of the washers. Personal checks are acceptable (with a delay for clearing) and I also take Visa and Mastercard. Twenty-four hour answering machines are available for messages and orders (they are secure). If you want more information or to chat please leave a message and a time that it is best to return your call.

Thanks for your interest and please call if you have questions. I do engineering consulting for a living and it may take a day or two to return your call, but I will.

Stephen Peterson

[Click Here for Ordering Information](#)

CASCADE PRINT WASHER INSTRUCTIONS

(Break with tradition and read these first!)

UNPACKING:

You should find the following components in the box:

- * Instructions and washing hints;

- * Print washer with dividers;

CW1116 15 dividers, 8 high and 7 low

CW1622 9 dividers, 5 high and 4 low

CW2024 9 dividers, 5 high and 4 low

- * 8 feet or more of clear vinyl hose

- * Package with extra O-rings, faucet/hose adapter, knurled screw plugs with O-rings.

Note! You may (rarely) find that the washer was damaged during shipment; do not panic. Call the shipper (usually UPS) and tell them that the washer was damaged as received. UPS will send an inspector to assess the damage and will take the washer for shipment back to Summittek. You do not have to pay for this return shipping. Call me (Steve) at Summittek 801 972-8744 or 801 277-4205 and let me know what happened. I will try to ship another washer ASAP.

The washer is shipped with the dividers correctly installed. During shipping the dividers may have been jammed inside the tank. If so, carefully un-jam them. Note that the high dividers have no notches while the low dividers have notches on one (top) edge.

SETTING UP:

Any grade of 3/8 inch (internal diameter) hose can be used for custom installation. Water pressure in the hose is very low because of the low water flow rates required. It is thus unlikely that you will need hose clamps.

In order to ensure uniform flow through the tank, the washer must be set up level, both front-to-back and side-to-side. If your darkroom sink slopes, a small strip of wood or plastic can be used to shim one end of the tank. Note that the washer has only three feet so that it will not rock on uneven surfaces. The shim can go under either the single foot or the paired feet. The washer can be used outside the sink but there will be a small risk of flooding if, for example, you operate the washer with too high a flow rate. Under normal operation no flooding should occur. (Aside... I set my washer on two wooden strips that run from the front edge of the sink to a bracket screwed to the back of the sink splash-board. This allows me to place a tray under the washer that collects the washer waste water and which I use to pre-rinse the fixed prints.

The brass drain plug screws (each with neoprene O-ring) should be only finger tight. **Do not over tighten the screws!** Only a slight compression of the O-ring is needed to prevent leakage. Over tightening may strip the threads in the tank wall.

Water enters and leaves the washer through the manifolds on the front and back of the tank. The hose connects to the brass hose barb fittings that are lightly threaded into the

bottom of each manifold. **Do not over tighten these fittings!** If some leakage is noted carefully unscrew the fitting and rub candle wax or paraffin on the thread. Carefully rethread the fitting into manifold. **Use only your fingers to tighten the fitting.**

The dividers must be correctly installed. The high dividers, the ones with **NO** notches should be inserted into the slots closest to the tank front and back and into **alternate** slots across the tank. Note that the high dividers do not rest on the tank floor but are held above the floor by notched strips on the bottom of the tank. Now insert the high dividers into the slots.

The low dividers have notches on their top edge. They are installed in alternate slots that are cut into the floor of the tank. Do not install them until the tank is filled with water (more on alternate filling methods later).

Recheck the diagram in the CASCADE brochure to recall how the washer works. Water flows into the tank from the distribution manifold. It is distributed evenly into the tank by a set of notches in the tank front wall. Water then flows down into the first print compartment and **under** the first high divider. Water can not flow under the next low divider because that divider rests in the tank floor. Water flows up into the next print compartment and over the top of the notched low divider--and so forth.

With hoses connected and no low dividers in place, turn on a **gentle** flow of water. The influx manifold will fill with water. If water sprays out of the manifold you have too high a flow rate--**BACK OFF!** Soon the water will flow over the notched side of the tank and the tank will fill. Eventually water will flow over the back, notched edge of the tank into the efflux manifold and drain from the collection manifold via the drain hose. At this point you can insert the low dividers **with the notched edge up**. Note that there is some end-play in the dividers. Acrylic plastic actually absorbs water and will expand hence the reason for end-play.

Alternate filling methods:

For faster filling disconnect the filling hose from the influx manifold and manually fill the tank. All dividers can be in place, but you then have to manually distribute water into all compartments to prevent divider flexing. Try it and you will see what happens if you try to fill one compartment at a time.

FLOW RATE ADJUSTMENT AND CONFIDENCE TEST:

Most people do not believe that the CASCADE washer works with such low flow rates. Kodak and other washing experts recommend that water in each print compartment be changed 12 times per hour (once every 5 minutes). With all other washers the "print compartment" is the whole tank even though those washers have print dividers. With the CASCADE washer the print compartments are true compartments, connected serially. Water from the down stream compartments cannot flow into earlier, upstream compartments. In fact waste water from the first compartment is used to wash dirtier prints in the second compartment and so forth. This reuse of water means that only the first compartment volume need be changed every 5 minutes.

For the CW1116 a flow rate of 250 millilitres/minute is needed. That is about one cup per minute and that flow results in 12 compartment changes per hour. Recommended flow rate for the CW1622 is 700 ml/min (about 3 cups per minute) and for the CW2024, 1000 ml/min (or about 4 cups per minute). Higher flow rates will **NOT** result in faster wash time, only wasted water and energy used to heat that water to wash temperature (see next section for facts about print washing). Measure the water flowing out of the washer using a cup

(official cup, not a demitasse or other socially interesting type) or graduated cylinder. Adjust flow so that it is correct for your washer. A little extra is OK and once you do this a few times you'll get better at estimating the correct flow without measuring.

Now that you have the flow correct and the washer set up do a test so that you can see how water actually flows through the washer. Add several drops of food coloring or fountain pen ink (for those of you justly clinging onto this form of writing instrument) along the top of the first print compartment. As the water flows it will carry the color down the first compartment and up into the second, et cetera. Note the smooth, laminar flow of water -- this flow helps keep the prints away from the dividers and results in a uniform wash.

INFORMATION ABOUT PRINT WASHING

Think of the photographic print paper as a sponge, filled with fixer, that you can not squeeze. The only way that fixer can get out of the sponge (paper) is by diffusion. Diffusion can only be increased, practically, by temperature, which increases the diffusion constant. Therefore, for faster washing use as high a temperature of wash water as is safe for your paper (see paper manufacturers' instructions).

Other factors that help the washing process are alkaline agents in the wash water. That is the way that hypo clearing agents work. Fixer (sodium thiosulfate) can ionize and bond to charges in the paper fibers and gelatin emulsion. By the addition of a hypo clearing agent (HCA), such as sodium bicarbonate, sodium carbonate or Kodalk, to the wash water, wash times can be reduced considerably. These substances are generally harmless to the print and can substitute or displace the sulfur containing fixer. Hard, alkaline water will thus give a faster wash than soft or acidic water. Hardening fixers also require a longer wash time.

YOU need to run experiments to determine wash times in your area and for your fixing procedures -- there is no wash time that will assure fixer free prints without testing.

For those of you interested in more information about washing there is a two volume set by Grant Haist called Modern Photographic Processing, published by John Wiley and Sons, 1979. David Vestal has written an excellent book, The Art of Black and White Enlarging, published by Harper and Row, 1984. David describes washers and wash testing in good detail. There is much malarkey and misinformation associated with print washing. Some myths include high water flow, lots and lots of bubbles and washers that drain "heavy" fixer from the bottom. Vestal tests several types of washers in his book, including the CASCADE, and his independent results destroy these myths. Most of the washers work well if used properly, the CASCADE works as well as any but with the least water and energy consumption and has other useful features.

INSERTING PRINTS

Since water flows from the influx side to the efflux (back) manifold you should insert prints first into the first (front) compartment. The next print should be inserted into the next (second) compartment et cetera, gradually filling the washer front to back. Since the water flow is from front to back, you can insert hypo laden prints at any time without contaminating prints already in the washer. Do not add freshly fixed prints up stream as you cycle prints through the washer. If your completely washed, early prints are removed and the washer is filled, move the now first print to the first compartment the now second print to the second compartment and so forth. Then add fixed prints to the downstream compartments.

Some users seem to have trouble inserting prints into the narrow compartments. If you do try the following: Wiggle the print as it is being inserted. If this doesn't work you can slide the rear compartment divider up, almost out of the washer, and stick the print to the divider. Now slowly reinsert the print/divider combination.

John Sexton, when evaluating the washer for inclusion in the Ansel Adams book "The Print" suggested years ago that one should get in the habit of rinsing the top of the high divider of residual fixer that might have been added when you slid the print into the compartment. A quick wipe or two with thumb and index finger should do the job. This is easy to do if you temporarily block the efflux (drain) hose, raising the tank water level to the top of the high dividers.

Small prints or sheet film should be hung from a divider top with the Kodak dental film clip. Clips (Kodak part 149-2586) are available from dental supply houses (Try JB Dental Supply at 800 777-0577).

REMOVING PRINTS

Big prints are easy to remove after washing. Small prints, hung using the clips are also easy to remove. Small prints at the bottom of the washer can be reached by gently inserting your hand into the compartment causing the dividers to flex. If you are "ham fisted" you might want to remove an additional divider to provide more room or Radio Shack sells a telescoping radio/TV antenna replacement element that has a button-like tip which acts as an eye protector on the antenna. Make sure you get one with a button-like tip so you can fish for the print. A paper clip taped to a stick also works in a pinch. You may be able to purchase a 1/4 inch diameter plastic rod from a plastic supply store. Sand the ends of the rod round and smooth and wrap a small rubber band or a short piece of rubber tubing around one end. Use this wand to fish small prints out of the washer.

AIR BUBBLES

Air bubbles on prints seem to cause lots of anxiety. It is amazing that water supplies contain so much dissolved air. If you watch carefully you will note that a given air bubble will form, grow and then float loose from the paper or tank wall. Over the 1 to 2 hours needed for archival washing, bubbles will come and go. Such is the nature of things. Residual fixer tests reveal that a bubble's coming and going doesn't seem to matter. Test to convince yourself and sleep well.

If for some reason you have trouble with prints hold the wayward print down with the dental film clip or find a synthetic sponge and cut it into about 1 inch cubes. The wetted cube can be wedged between the partitions above the wayward print.

DRAINING THE TANK

One local (and prolific) photographer has kept his washers filled with water for years. Most of us want to drain the tank at the end of a printing session. Two drain screws are present at the bottom ends of the tank for this purpose. **WARNING!** Before removing the screws remove the low dividers from the tank. Since these dividers form a relatively tight fit with the bottom of the tank, water in a compartment adjacent to the drain will not drain well and the resulting pressure will deform the dividers. The 20X24 washer comes equipped with a separate bottom drain fitting and an inline valve (see separate additional instructions).

If you want to mount the tank out of the sink you are stuck with siphoning the water out with a hose. Get a hose big enough to jam between two high partitions or "shim" a smaller hose with rubber foam or sponge. That way you don't have to stand there while the tank drains.

Once the tank is empty enough to lift or tilt you can quickly drain the remaining water. **I know no design is perfect!**

CLEANING

Eventually the washer will become dirty. The CASCADE is easy to clean since all parts are accessible. Mineral deposits can be removed by swabbing with bath or vinegar (acid is what we are after here) on the tank walls. Liquid dish washing soap and or a commercial plastic cleaner gets the rest of the dirt. Do not use abrasive or hydrocarbon based cleaners. Do not use water hotter than body temperature. Rinse the washer thoroughly before use. Remember that washing is good Zen.

A note regarding washer storage between uses.

The acrylic partitions absorb water during normal use of the washer. The partitions will warp unless they are stored properly. If you use the washer regularly, you can leave both water and partitions in the tank. The water level in the tank should be kept at full washing level, do not let it evaporate and thus decrease in height.

For occasional or irregular washer use store as follows:

Drain the washer as indicated above. Dry the washer tank and individual partitions with a towel or sponge. This will help prevent mineral spots.

Replace the dried partitions in the washer. This is important! It is necessary for both sides of the partitions to have exposure to the air. **DO NOT STACK THE PARTITIONS ON TOP OF EACH OTHER OR LEAN THEM AGAINST EACH OTHER AS IN PAGES OF A BOOK.** Each partition must have breathing space so that the absorbed water can evaporate evenly from both sides. Unequal evaporation causes warping which may not be reversible.

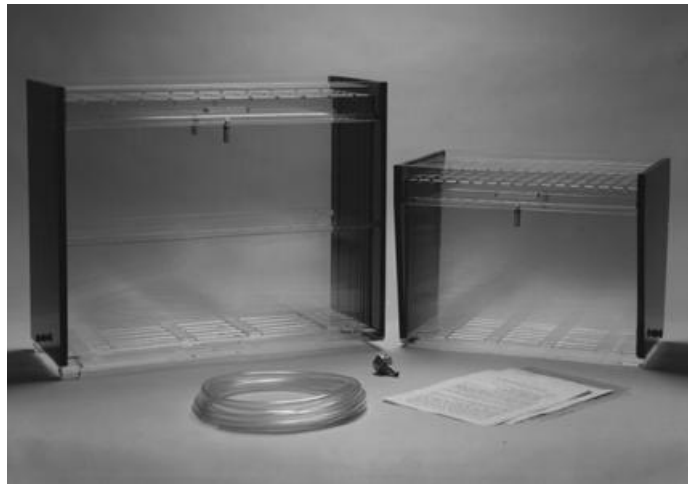
If you have questions about this procedure please call to clarify. 801 972-8744 Phone/fax or e-mail at steve@summitek.com. Please leave a time that is best to return your call.

Good luck and good washing. If you have any problems, please let me know of them. The washer has been around for 20 years and has evolved as a result of user input. I really do care and want to hear from you.

Stephen Peterson, Ph.D.

Rev 2/00

The Cascade Photographic
Print & Sheet Film Washer



Frequently Asked Questions

Can the Cascade washer be used out of the sink?

Yes; under normal operation water flows into and out of the washer via two hoses. Draining is another issue. All washers come with drain plugs at each end. If the washer is in the sink or next to the sink, just remove the plugs to drain. The CW2024 comes with a bottom drain and extra hose with an in-line valve. You can run the hose to a nearby drain. To drain the smaller washers away from the sink you can; remove partitions and bail the water out, siphon the water out, or ask me for a couple of drain plugs that have a small brass tube attached to which the hose can be attached. You will need to supply the hose and a pinch clamp (black spring type paper clip).

Will the prints stick to the smooth partitions?

Yes they can but independent tests by David Vestal and Steve Anchell suggest that this does not matter. You should be washing for about 1 hour and during that time fixer seems to have time to diffuse through the emulsion (usually it is the back of the print that sticks to the partition). If you still worry about this ask for "dimpled partitions" but that material costs more.

- Stephen Peterson