Unsharp Masks Offer Benefits beyond Sharpness

by **Paul F. Wainwright**

Many photographers know that the major benefit of unsharp masking in black-and-white printing is increased edge sharpness. However, other wonderful byproducts, while not immediately obvious, can result in even greater improvement in prints.

A few years ago, I began making unsharp masks for many of my photographs after reading Howard Bond's series of masking articles in *PT* [March/April 2001, and Special Issue #11, *Mastering the B&W Fine Print*]. My primary motivation was to get more out of the negative and show more detail in my prints without losing shadow detail or blowing the highlights into pure paper-base white. Like many who have heeded Howard's wisdom, I was amazed by the improvements in some images. While unsharp masking is not ideal for every photograph, it's become a standard in my bag of tricks.

Orthochromatic film is an option

The first thing I learned—or I should say "stumbled upon"—concerns the type of film I use to make masks. Many articles tout the benefits of this or that film for making unsharp masks. While most of these films differ little from each other, the most obvious similarity is that they're panchromatic, and must be handled in total darkness.

So I got to thinking: why not use orthochromatic film? Orthochromatic film isn't sensitive to the red portion of the spectrum, and can be handled under a red safelight. It's rather old-fashioned, and often regarded as ancient stuff photographers used to take photos of the Wild West in the latter half of the 19th century. More recently, it was used as a major tool in the graphics industry (before computer graphics) because it could be used to make extremely finely detailed copies, but more importantly, because it could be used with a red safelight.

Ilford is the sole remaining manufacturer making orthochromatic film. Ilford Ortho film is available from Calumet (and probably other large mail-order companies), and it's relatively cheap. My last order for a box of 25 4×5 sheets was less than $20.

One word of caution: be sure to get the proper safelight before using this film. My old Wratten Series 1A safelight works fine, but last year I learned an important lesson at an unsharp masking workshop—their red safelight fogged my film. Safelights used for VC paper don't work either, so invest a little time in tracking down a 1A safelight before you begin.

Safelight fog test

Perform a safelight fog test for the film the same way you do (or should do) for paper: give a small exposure to the film to raise it above the exposure threshold, then place an object on your work surface (a pencil or metal ruler works best). Allow the object to sit a little longer than you would typically expose it, then develop the film. Any fogging will show up as a lighter area under where the object was placed. I used five minutes in my test, and no visible shadow was cast on my film.

Another benefit of Ilford Ortho film is that its exposure speed isn't too terribly different from photographic paper. This allows masks to be exposed under the enlarger using times that resemble typical printing times.

In addition, I made a special mask exposure system that works very well. I placed a 4-watt light bulb (the type used in night lights) inside a small plywood box with a diffuser over it, and mounted it to my darkroom ceiling about four feet above my work surface. I power the light using an old mechanical enlarging timer, and have found that a 30-second exposure results in a mask that lies on the straight section of the density curve. On the other hand, I've found that a 5–10 second exposure places the photograph's highlights in the toe region of the mask, resulting in less masking effect in the highlights than in the shadows. (I'll discuss the benefits of underexposing the mask a bit later.) Tray development of the masks is in HC-110 dilution F (1:19), usually for two or three minutes, with continuous agitation.

Separation of mid-tones

One nagging characteristic of most variable contrast papers is that they don't separate mid-tones well if the enlarger is set to give a lower than grade 2 exposure (yellow filtration). [See Phil Davis' article "Variable Contrast Papers Revealed" in *PT* (formerly *Darkroom & Creative Camera Techniques*) Vol. 15, No. 5, Sept/Oct '94.] The effect worsens as you decrease the contrast setting of your enlarger, so try to keep your enlarger settings above grade 2. This means that you want negatives to be on the less contrasty side of "normal," with at least a little magenta filtration required.

The usual way to decrease the contrast of negatives is to decrease film development time. However, because an unsharp mask decreases the overall contrast of the mask/negative sandwich, adding one has the hidden benefit of requiring an increased contrast setting on the enlarger, thus avoiding any possible loss of separation of your mid-tones. I've seen a noticeable improvement in my prints from this effect alone.

"Underexposing" the mask

Another interesting characteristic of Ilford Ortho is a pronounced toe in its density curve. With sufficient mask exposure, it's possible to place the mask on the straight line portion of the density curve. However, decreasing the mask exposure (and increasing development) makes it possible to place the photograph's highlights in the region of the mask's toe—or even below the exposure threshold of the mask film—with some wonderful results in certain circumstances.

Why is an "underexposed" mask a good thing? When you want to increase edge separation over the entire gray scale of your print, you obviously want a mask that has good definition over the entire range of values of the photograph. But what about when you've got wonderful white-on-white highlights with no pronounced edges? Separating such highlights is one of the most difficult things for me to do, and an unsharp mask that's given 5–10 seconds of exposure often works wonders for the final print.

To see why this is so, consider the density curves in figure 1. Figure 1a shows the density curve for a typical negative given the proper exposure and normal development. I use TMax-400 developed in XTOL for most of my negatives; this combination gives a nice straight density curve with very little toe. I adjust my film speed to place Zone I on the straight line of the curve—a density of between 0.15 and 0.2, which is a bit more than some photographers might use. I adjust my development time to place Zone VIII between 1.35 and 1.5 density units, resulting in a density range (Zone I to Zone VIII) of 1.15 to 1.3. I find this gives me negatives that print well (in theory) on grade 2 paper.

Figure 1b shows a density curve for a mask made from the negative in Figure 1a; it was exposed for five seconds and developed for three minutes. Notice that the mask density begins to taper off around Zone VI, and that by Zone VIII, the mask's density is pretty much just film base plus fog.

Now consider what happens when these are sandwiched together. Figure 1c shows the density curve for the mask/negative sandwich. The overall density range has decreased from about 1.15 in figure 1a to about 0.8 here, meaning that a higher paper grade (or increased magenta filtration) will be needed to print the mask/negative sandwich. In the areas of the photograph below Zone V, the combined density curve is fairly straight, and the edges will be well separated because of the effect of the unsharp mask. Above Zone VI the combined density curve gets steeper because the mask has little density increase in that region. While the edge effect will be less pronounced in this region, the separation of values in the highlight areas of the print will increase because a higher contrast setting is needed to compensate for the overall decrease in contrast range of the mask/negative sandwich.

Real-world results

Let's see how this works in a real photograph. Figure 2 is a straight print of a photograph I made several years ago while visiting Deer Isle, Maine. It was a foggy day, with the open ocean behind me. The scene had a wonderful sense of quietness and softness, from both the light and the moss that coats the trees. I call the photograph Quiet Woods.

This negative sat in my "to do" pile for many years. On several occasions, I tried to print it the way I felt it when I made the exposure, but was constantly frustrated by the tree stump. The stump had wonderful, silky detail to it, but I couldn't seem to print it with enough contrast without losing the darker parts of the photograph to pure black. I wanted to show detail in the stump, trees and shadows—too many requirements for standard burning and dodging techniques.

Howard Bond to the rescue! I made an unsharp mask exposed for good density in the shadow areas of the photograph, but little or none in the highlight area, i.e., the tree stump. The negative-mask sandwich prints with about a 2-grade increase in enlarger settings, wow look at that stump! What previously was a very light gray (almost paper-base white) stump now shows a lovely creamy texture. Meanwhile, all the details of the trees are helped along by

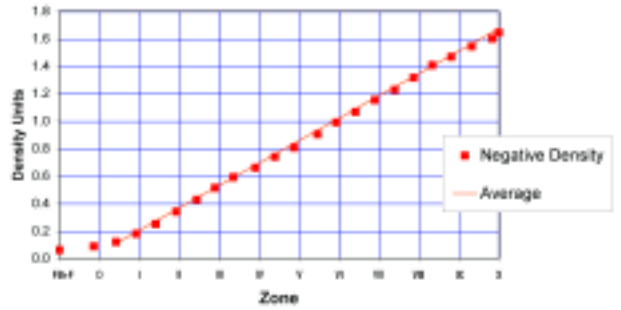

Figure 1a. *The negative density is plotted for a properly exposed and normally developed negative. My film/developer combination is TMax-400 developed in XTOL, which gives a nice straight density curve with very little toe. I adjust the effective film speed to place my Zone I exposure on the straight line part of the curve. In this example, the Zone I density is about 0.2 and the Zone VIII density is about 1.35, yielding a density range of about 1.15 density units (Zone I to Zone VIII). I find this exposure/development combination yields negatives that print fairly well (as a starting point) at a grade 2 setting with Ilford Multigrade IV.*

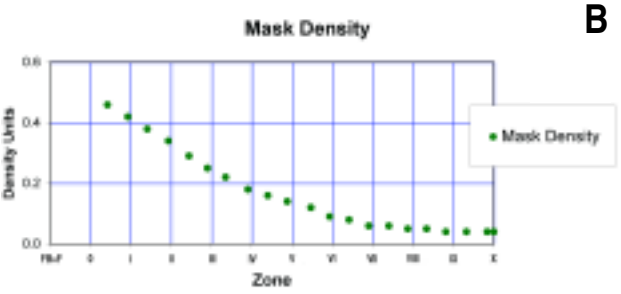

Figure 1b. *An unsharp mask is made from the negative in Figure 1a, and its density is plotted using the exposure zones of the original negative for the X axis. The mask has been purposely "underexposed," as described in the text, resulting in little or no mask density in the highlight areas (Zones VII and VIII) of the photograph.*

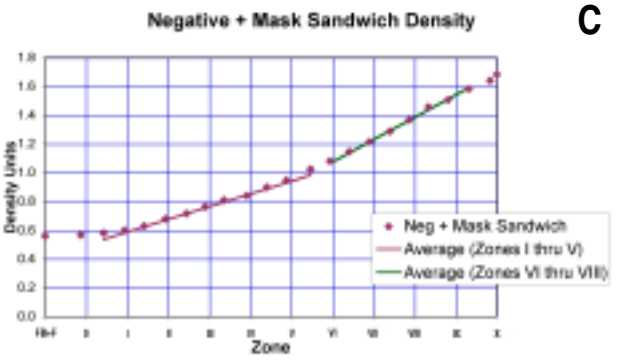

Figure 1c. *The negative and mask are sandwiched, and the combined density is plotted. The combined Zone I density is about 0.6, and the Zone VIII density is about 1.4, resulting in a density range of 0.8 density units (Zone I to Zone VIII). Considerable magenta filtration would be needed to print this negative. Details in the shadows and mid-tones would be enhanced by the unsharp masking effect, and highlights would be better separated because the density curve is steeper there.*

Figure 2. *Straight print of Quiet Woods without the mask. The difficulty in printing this negative is to get sufficient creamy texture in the tree stump while simultaneously holding details in the shadows.*

the edge effects of the mask, and no shadow detail is lost. Figure 3 shows the final print, cropped a bit on the left, and edge-burned.

Conclusion

Unsharp masking has made a substantial improvement in the quality of my prints. While it is not needed in every case, it has become a standard tool for me in getting the expression I want from my photographs. With a little work, you can, too. ■

Figure 3. *Final print of Quiet Woods. An unsharp mask was used to enhance the details of the mid-tones and shadows by increasing the apparent sharpness of the edges in these regions. However, since the mask was underexposed, it had little masking effect in the highlights of the tree stump, resulting in greater separation of these smooth white-on-white print values.*

Paul Wainwright, who has a Ph.D. in physics from Yale University, has been making black-and-white images for 40 years. He retired from his job as a Bell Labs researcher in 2001 to pursue large-format photography full time. His photographic interests include landscapes and architecture. He resides in Atkinson, NH, and teaches advanced workshops at the New Hampshire Institute of Art. His e-mail address is paul@wainwright.mv.com.