COVERS PHOTOSHOP 3.0

026

Photoshop Techniques

Desktop Halftones: Part 2 of 4

How to

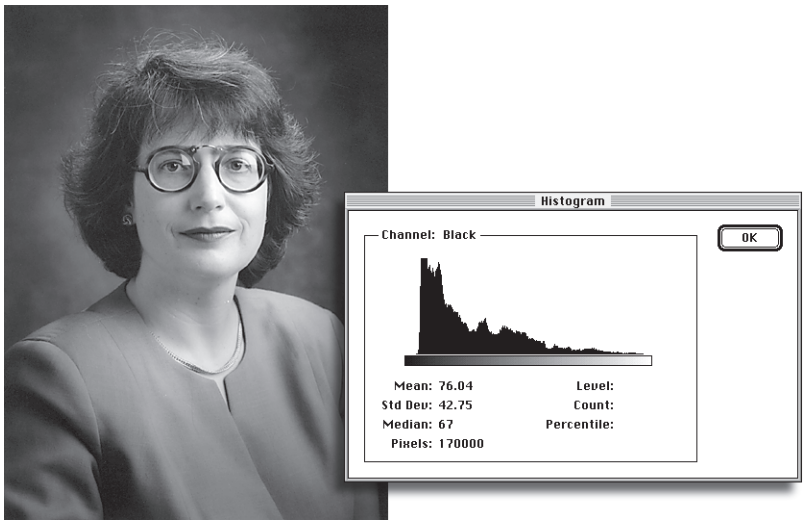
EVALUATE AND USE DESKTOP SCANNERS.

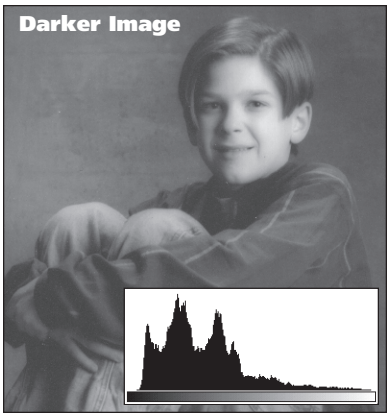
The quality of your scans influences the quality of the halftones you can produce. If your scanner cannot capture enough detail from the original photograph, there may not be much you can do in Photoshop to make it right.

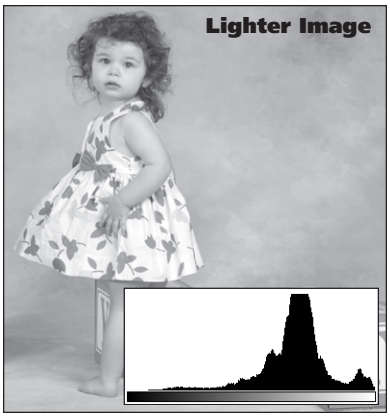
Luckily, capturing a good quality scan does not require a master's degree in physics. There are a few important concepts this issue will walk you through. With some basic information and a few step-by-step tests, we will help you evaluate your existing or future scanner.

With the large and growing number of scanners on the market, it would be impossible to cover them all in this limited space. Be prepared to experiment with your scanner software to learn how to get the best scan possible.

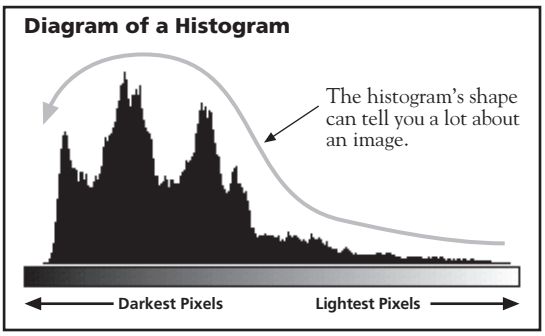
This issue is a companion piece for issue #025 "How to produce quick, clean desktop halftones." This issue provides background information for the step-by-step techniques covered there.







Looking at the Histogram



We will use Photoshop's *histogram* to help evaluate our scans.

A histogram is a visual representation of the gray values in your scan. The shape of the histogram's graph tells you about your scan's overall tonal values.

At left are two raw scans and their corresponding histograms. Notice how the darker photo's histogram is heavy on the left, while the lighter image's graph leans to the right.

Evaluating your scans through this tool can help you pinpoint problems with your scans. In the following discussion, we will use several sample histograms to show what to look for.

Issue #1: Bit Depth

Bit Depth	Gray Levels	Usable
1	2	
4	16	
6	64	
8	256	✓
10	1024	✓

Color Scanner Note:
Bit depth in this chart refers to grayscale scans only. For example a 30-bit color scanner actually captures 10-bits of information for each color channel. When this same scanner is used in a grayscale mode, only one channel of information is used.

Bit depth refers to the number of shades of gray your scanner can see. Most desktop scanners on the market today use an 8-bit scanning engine. Translated, this means they can see 256 levels of gray. Some new scanners are available that can potentially distinguish up to four times that amount.

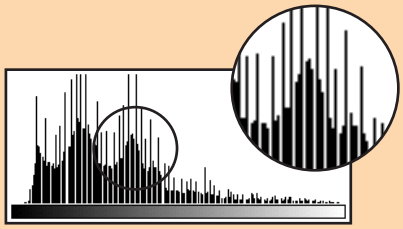
However, regardless of your scanner, Photoshop's grayscale mode only supports 256 levels of gray. The question of bit depth then becomes...

Can your scanner see more than 256 levels of gray?

No: Do not use the scanning software's tonal adjustments. As with Photoshop's tools, they're just filtering 8-bit data. Unless the scanner's controls are superior to Photoshop's, why use them? You could just be throwing away potentially useful information.

Yes: Use the scanner's controls to get the best scan possible. Tonal corrections performed in the scanning process work on the scanner's full range before it is boiled down to Photoshop's 256 levels of gray. This allows you more freedom in adjusting tones without data loss.

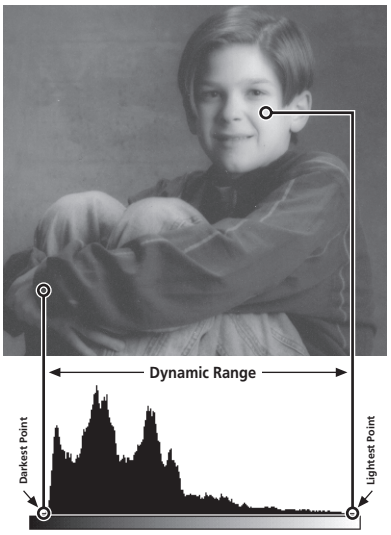
Test #1:
White Lines in Histogram



1) **Scan a test image using the scanner's tonal adjustments.**
Use brightness/contrast or other scanner settings.

2) **Choose Histogram from the Image menu.**
Examine the resulting histogram. If your histogram is broken up by vertical white lines, you are not getting a full 256 levels of gray from your scanner.

3) **Repeat Step 1 and work with scanner settings.**
Work with your scanning software to capture your scans with as smooth a histogram as possible.



Issue #2: Dynamic Range

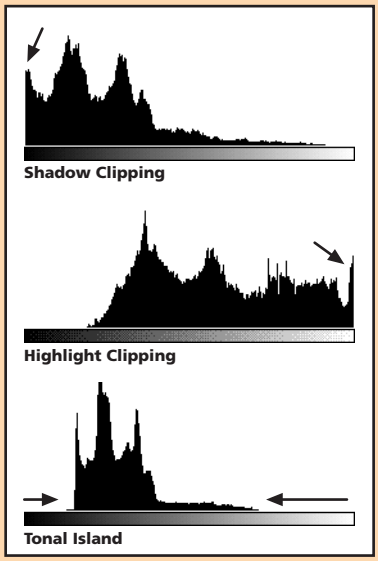
The term *Dynamic Range* describes the range between the lightest and darkest grays your scanner can see. To the left is a diagram showing how the dynamic range is expressed in a photo's histogram.

The histogram of a good scan should look something like the example at left. Notice how the graph has a little space on both the left and right side. This shows that our scanner is capturing a full range of gray tones from our photo without clipping shadow or highlight detail.

Clipping can show up on a histogram as *cliffs*—a sudden spike at one or both ends of the graph. (See Test #2 below)

Note: *If you have an 8-bit scanner, there may not be much you can do to improve the dynamic range of your scans. Evaluate your scanner's trends using the test below, but remember that your use of scanner settings is very limited.*

Test #2:
Dynamic Range Clipping



1) **Scan a test image.**
2) **Choose Histogram from the Image menu.**
   Examine the resulting histogram. Watch for the type of clipping shown in the examples to left. (Descriptions below)
3) **Adjust the scanning settings and repeat Step 1. (Optional)**
   Work with the scanner settings to fit your scanner's dynamic range to the photo you are scanning. The diagram in the upper left shows what a well-balanced histogram should look like.

Shadow Clipping: This type of histogram indicates that your scanner is losing shadow detail. The shadow areas in your photo are darker than your scanner is currently capturing.

Highlight Clipping: As with shadow clipping, this histogram indicates a loss of detail in the photo's highlights. The highlights in your photo are lighter than the scanner is seeing.

Tonal Island: This last histogram indicates that the scanner is trying to capture a wider dynamic range than the photo needs. You might gain additional detail by tightening in on shadows and highlights. However this is not as serious a problem as the other two.

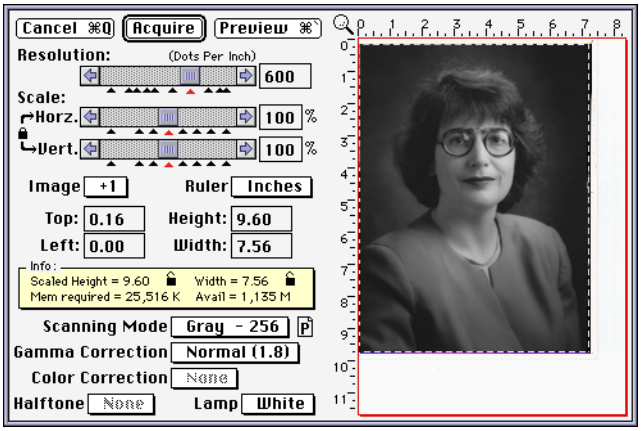
Issue #3: Optical Scanning Resolution

Resolution Note:
In general, the sensitivity of your scanner's dynamic range will have more impact on the quality of your halftones than the scanner's resolution. Do not let resolution become the most important factor when evaluating a scanner.

Optical scanning resolution refers to the number of pixels per inch your scanner can physically capture from your original photos.

Be careful here. Ignore a scanner's maximum *interpolated resolution*. Interpolated resolutions are achieved through the software—not through what the scanner's hardware actually sees in your photos.

Most desktop scanners use a 300, 400 or 600 pixel per inch scanning engine. Be wary of scanners claiming resolutions of 1200 or 2400—they are probably referring to the interpolated resolutions.



Issue #4: Other Options

In an effort to outdo the competition, more and more features are being added to scanning software. Some are very useful, and can greatly enhance the speed or quality of your scanning process. Others may add little, and actually interfere with the process of building halftones.

For the most part, if you are following the procedure outlined in issue #025, many of these options actually conflict with your work.

Sharpening: Many scanners are adding sharpening filters to their software. Some are good, others are lousy. If you are using Photoshop to adjust your final photos, turn this feature off (or set sharpening to *none*).

Scan Calibration Options: This falls under the earlier comments about bit depth and dynamic range. If your scanner can see more than 256 levels of gray, this might be useful, play with it. Otherwise, turn this feature off.

Color Management Systems: Color management in theory helps you get more predictable color from all your software. In reality, unless you address color issues over your entire production system, individual software approaches may get in the way more than helping. Unless you know how to integrate your scanner's approach into your existing system, I'd recommend leaving any options like these turned off.