

GAMMA

Jack and Sue Drafahl

MANY OF THE TRADITIONAL darkroom tools are still used by photographers as they enter the world of digital photography. Well, sort of. Many have different names, slightly different uses and often produce varied end results. For example, the digital manipulation of the photographic curve is quite different than in the darkroom, but offers significantly more control than with the old silver process. For those of you not familiar with this darkroom control or need a little brush-

ing up, we will give you a short review course on how it works, and then show you the digital equivalent.

The characteristic curve is a photographic tool that displays information about a specific photographic image, and plots image density vs. exposure. The bottom of the curve displays data about shadow exposure and is called the toe. The top of the curve, or shoulder, is used to display information about the highlights in an image. Most of the data in photographic

images is displayed in the middle of the curve and is called the straight line portion of the slope.

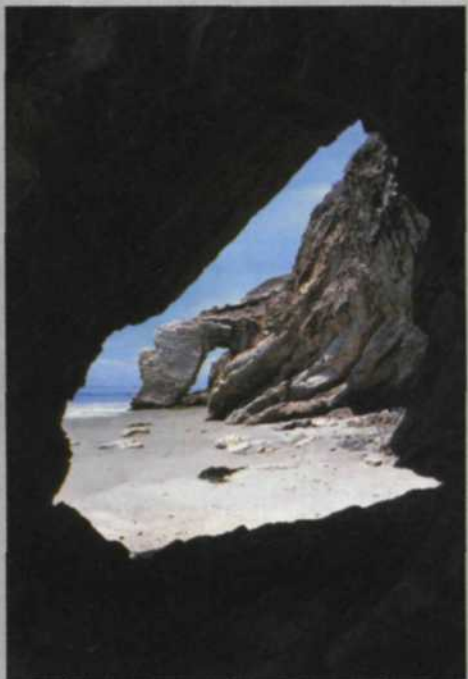
The ratio of density (y axis) to exposure (x axis) on the curve is called the gamma. To find the gamma of a curve, measure over from the bottom portion of the straight line along the x axis and then up to the top portion of the straight line along the y axis. Divide the y value by the x value and you have the gamma of the curve. The higher the gamma the steeper the slope of the curve.



Scan at a Gamma of 1.0.



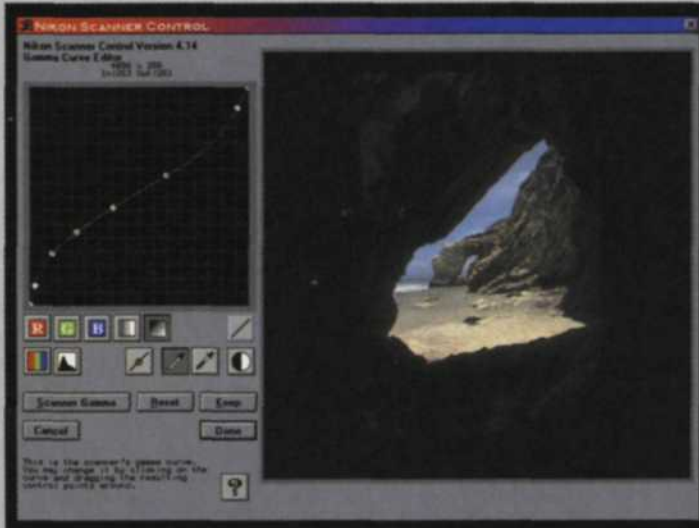
Scan at a Gamma of 1.2.



Scan at a Gamma of 1.3.



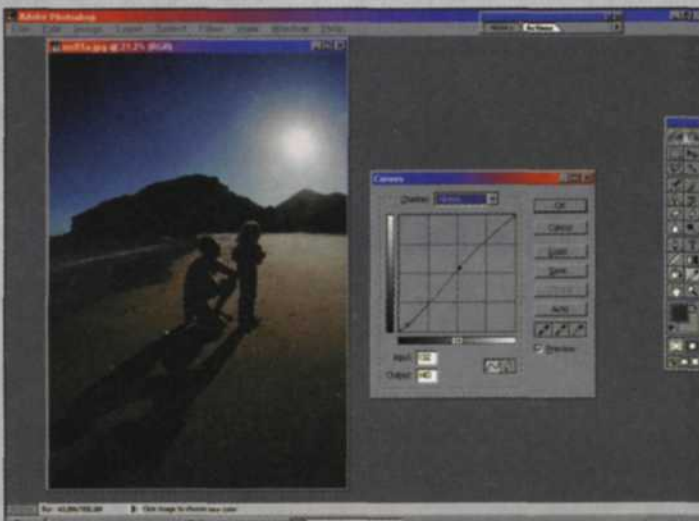
Scanner screen with Gamma curve bend for shadows. Highlight part of curve is too high at this point.



Scanner screen with Gamma correction for highlights.



Scanner screen with too much correction.



Gamma correction to shadow on green curve.



Scan at a Gamma of 1.0.



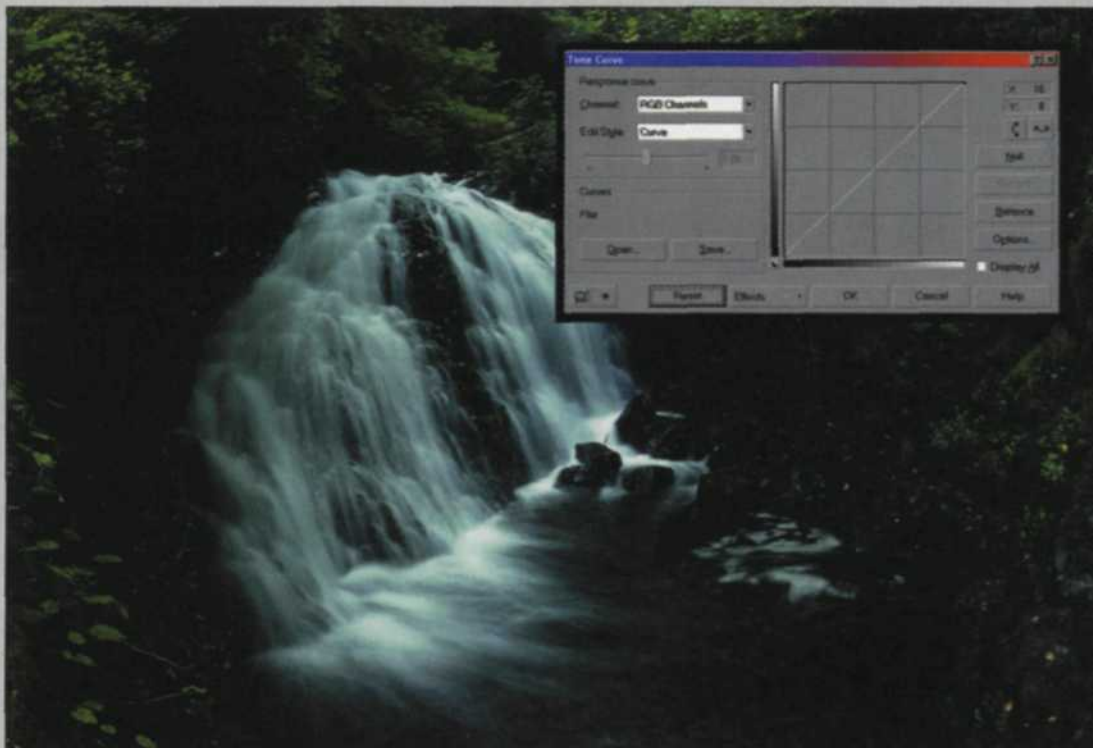
Final image with all gamma corrections show in next two images.



With this image we first selected the sky area, and then did a reverse select. We then made the gamma correction to the selected area only, leaving the sky area alone. The selected area was feathered at 5 pixels to make the blend smooth.



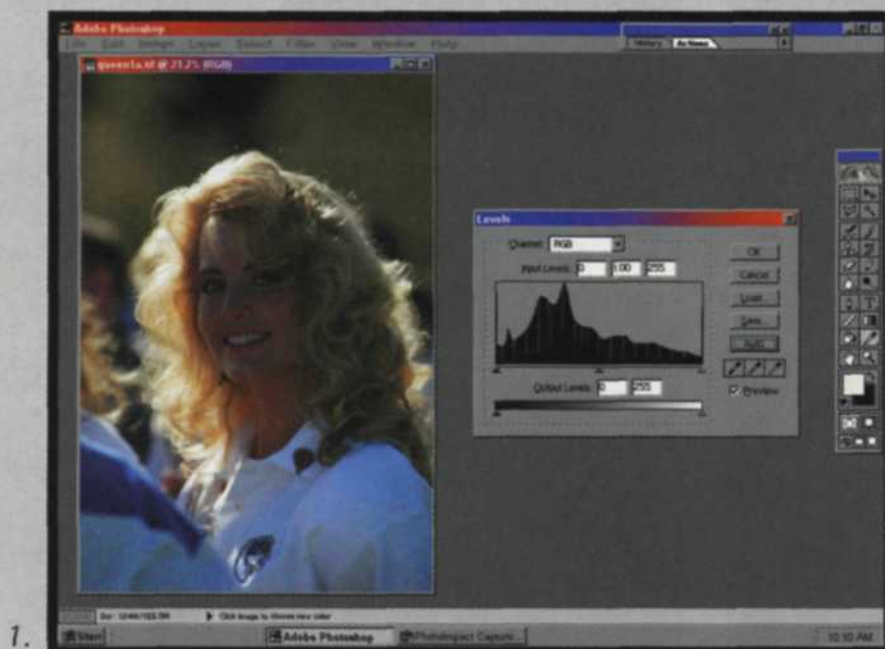
Screen shot showing the result of the process in the preceding image.



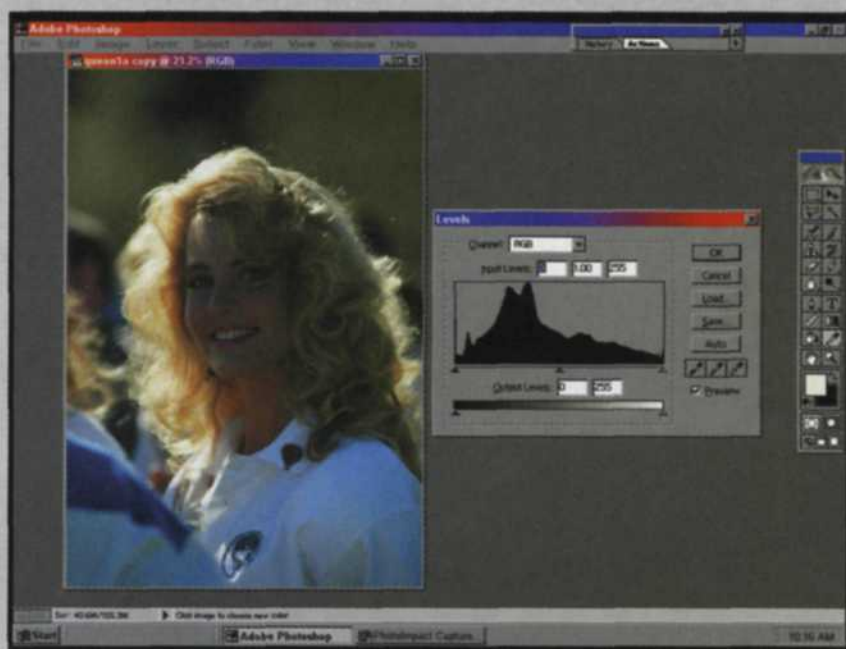
Original image at gamma 1.0 with chart inserted (Photoshop layer).

Captions, below:

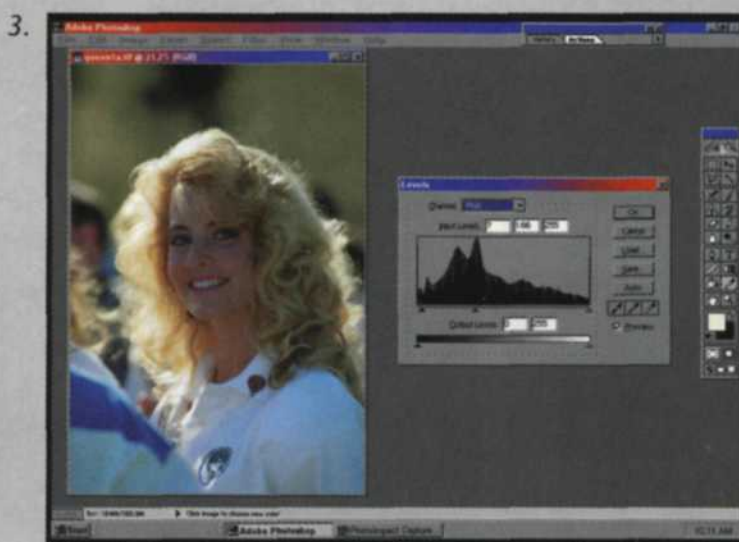
1. Histogram of a gamma 1.0 image.
2. Same with red correction to shadows.
3. Adjustment to histogram using middle slider.
4. Gamma correction screen with before and after correction.
5. Original image at gamma 1.0.
6. Corrected image. In this case we could not use any of the auto correction controls, because we wanted the detail in the face to be lighter than the auto functions would allow.



1.



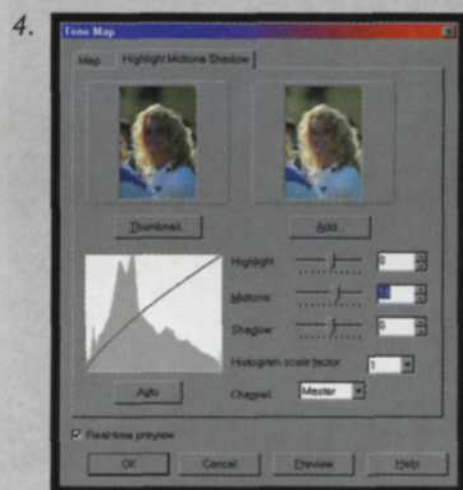
2.



3.



5.



4.



6.

Adjusting Curves Digitally

In traditional darkrooms, photographers will find this curve information included in film data sheets and with developer processing instructions. These curves are used to show how a specific film and/or developer captures a real image. With electronic imaging, the tech-

nician can quickly look at the characteristic curve of an image directly on the computer screen, make any necessary adjustments, and then output a corrected image.

Two types of displays are available for curve editing. The histogram shows the percent of gray values along the x-axis and the pixel amount within each

value on the y-axis. The second type of display is a standard digital curve representing your image. Most of the more advanced programs allow you to edit curves using both displays, but some of the simpler programs only allow you to view the data via the histogram. The immediate joy of using these digital displays is that the curves are automatically plotted. No longer do you need densitometers, graph paper or the lost time required to do plots.

When you first bring up the histogram, you need to look to see if the image fits within the full range of the digital curve. In many cases, the scan may not be perfect, and the highlight data may fall short of the maximum allowed. At this point you have two ways of correcting this problem. At the bottom of any histogram you will usually find three sliders for controlling shadows, midtones, and the highlights. Using the mouse, move the slider over until it approaches the highlight image data. When you release the mouse, the image data will be adjusted so that the highlight data now better fits the curve.

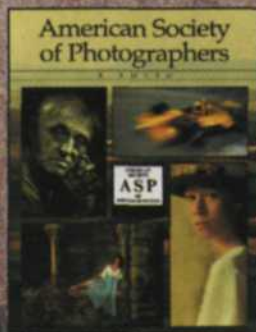
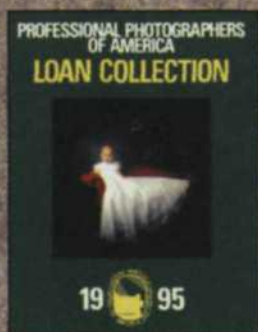
A second method of changing highlight data is with the highlight pointer control. It is usually a small box or eyedropper in the highlight end of the histogram. Select this function with your mouse pointer, and then touch the area in the image where you want maximum highlights. The curve will then adjust automatically so the highlight data in the image fills the digital curve.

You then need to look and see if the shadows in the image fit in the digital curve. In most cases, there is usually a small space at the left with no data. Move the slider so the shadow data fits the curve. Finally, look at the overall image. If the important midtones in the image still look dark, move the slider to the left, and the midtones will increase. If they are too light, move it to the right. You can also use the mid-tone pointer and select an area that you want to be the middle of the curve. Once you do this, the remaining data will automatically fall in place.

The auto curve editor is a great shortcut that lets the computer perform all the operations we have just described. When you first decide to edit the curves, press this button and view the results. If they are satisfactory you have just saved yourself a lot of time, and you can now move on to perform

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other editing functions. If the computer did a poor curve edit, simply select the undo and manually edit the curve.

Some scanned images will have what is called a color cross-over. This is due to mixed lighting in the original image, bad processing, or a poor scan. Because of this, the color curves react differently when a general curve edit is performed. An image cross-over may have yellow highlights and blue shadows, or cyan highlights and red shadows. These images require separate edits for each color curve that is crossed.

You must first analyze which curve is crossed. You can then select a specific color to edit via a pulldown menu. If you are editing a 24-bit color image, you will have the choice of editing the red, green, or blue curves if the image is in RGB mode. Select the desired curve and play with the highlight and shadow sliders until the cross-over is minimized. As you adjust this curve, you may find that you also have a smaller cross-over in a different color. This tells you that you had more than one color cross-over, but couldn't see it until you fixed the worst one. Work with each until all are corrected. Now that we have given you a taste of these practical curve-editing tools, we must issue a warning. Don't overuse these tools! If you go to far, or try to drastically change the data, you risk getting a posterization effect and losing critical data. When an image needs massive correction, we recommend making the changes in stages, saving out the image under a different name each time. You may find that the image partially corrected is more desirable than one fully corrected.

One of the reasons many photographers hesitate to get into electronic imaging is that they feel they have lost creative control over their images. With all the sensitometry options available through scanners and software, photographers now have more control than ever at their fingertips. The key to success is whether they know how to use this power. Characteristic curves, gamma density, shoulder and toe may all sound a little boring. If you're really serious about getting into digital imaging, get out your old photo textbooks, and start brushing up on photographic basics.

The best way to learn how to use the curve editor is to take several poor images and play with the curve-edit controls until you feel comfortable. Remember, each

time you make a change, the visual results are displayed. If you are not satisfied with the change, simply undo and try again. Your only risk is the loss of time and pixels, but we think you'll agree that the end results will be well worth the effort.

[Editor's note: The term gamma as it applies in this article is not to be confused with monitor gamma, a plug-in used to aid

in calibration of your monitor, input and output devices. The Drafahls will be discussing monitor gamma in an upcoming article on color management.]

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