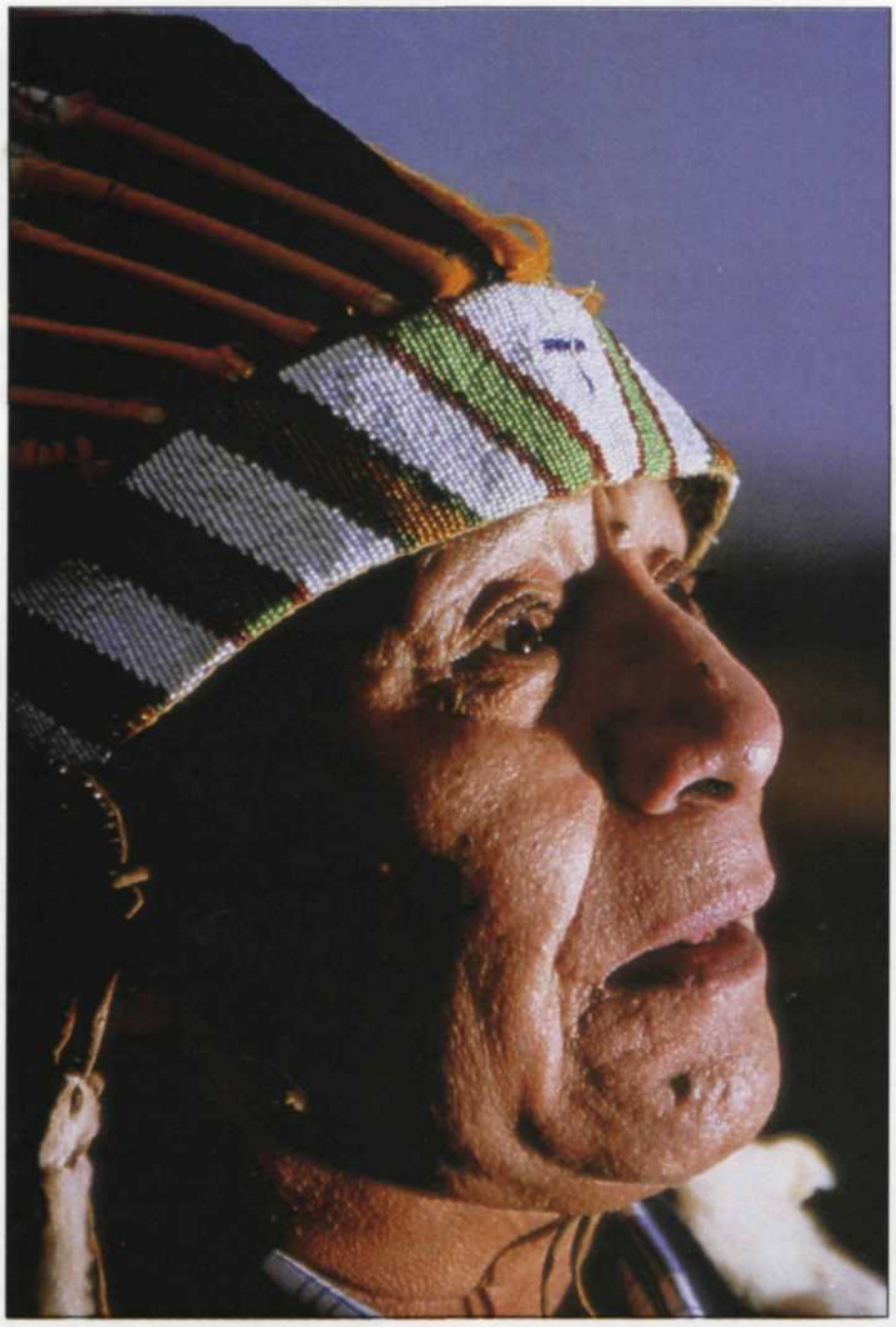
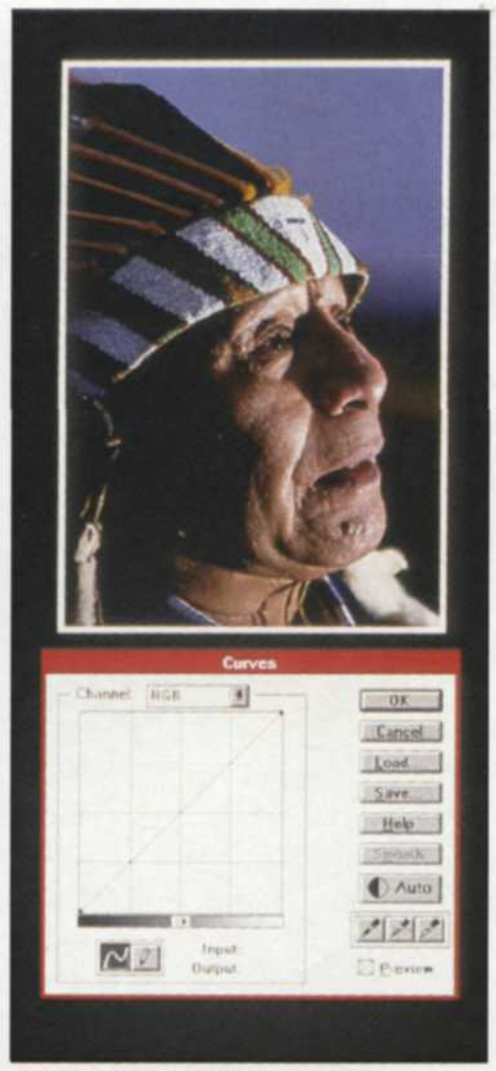
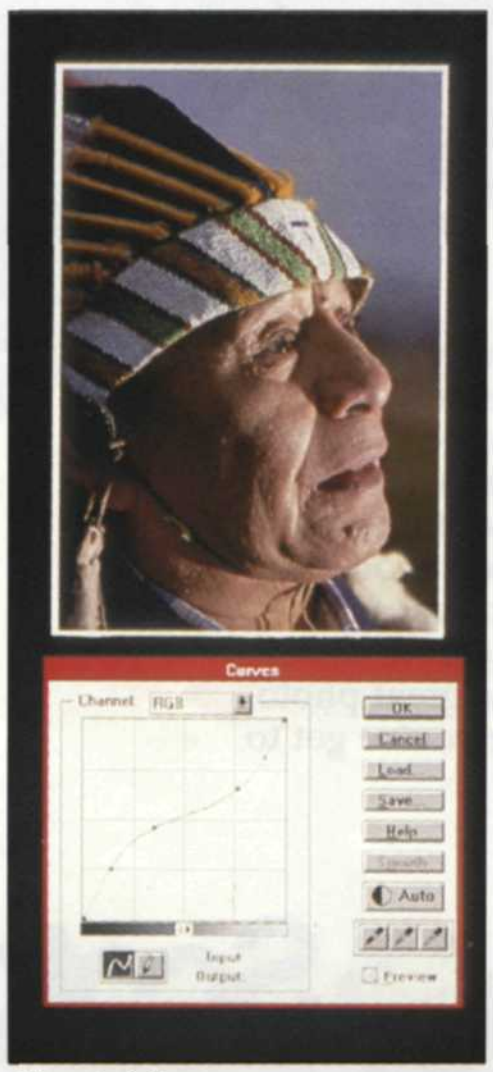


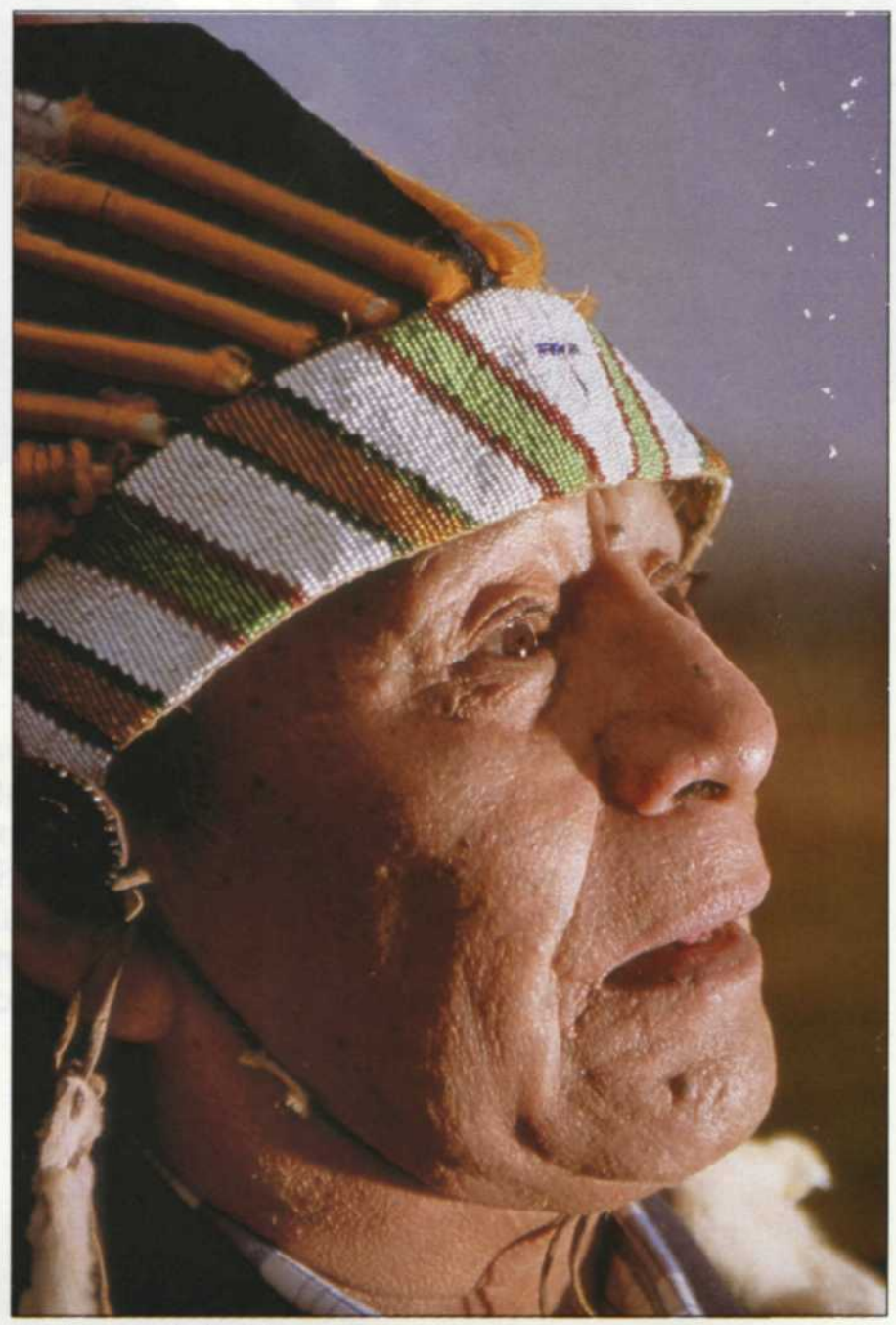
Straight scan, no corrections.



Characteristic curves.

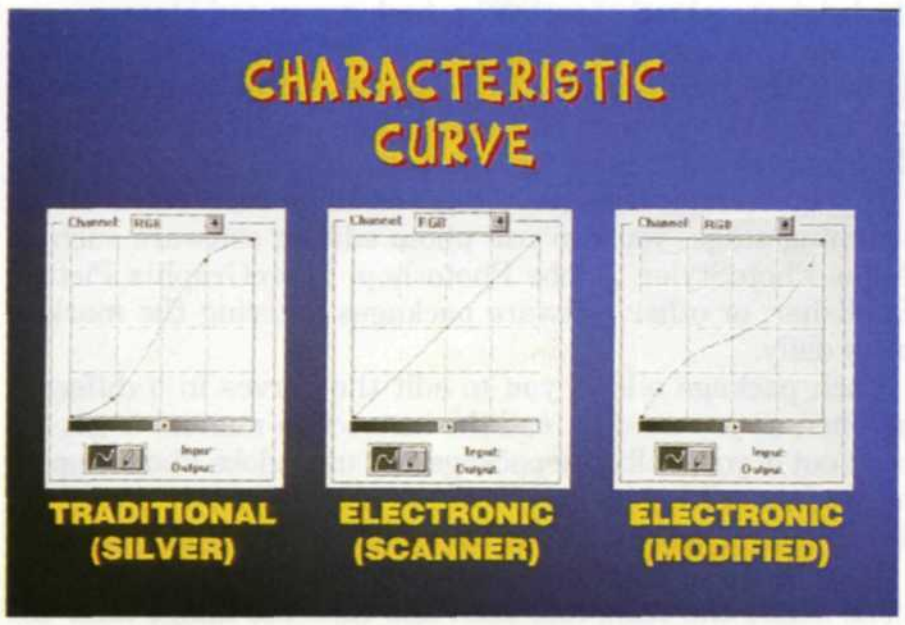


Characteristic curves.

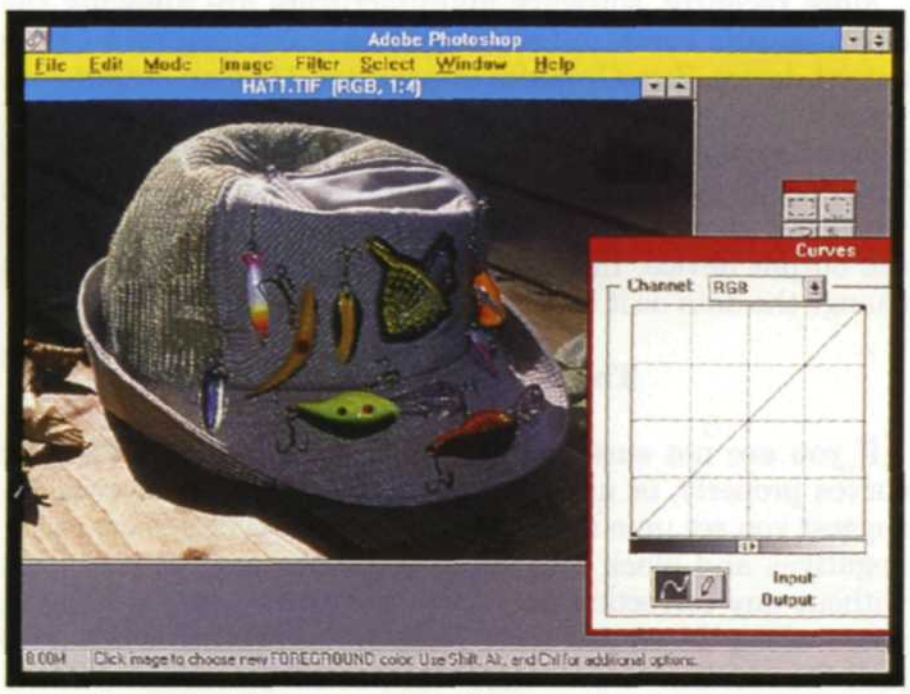


Toe increased, shoulder reduced

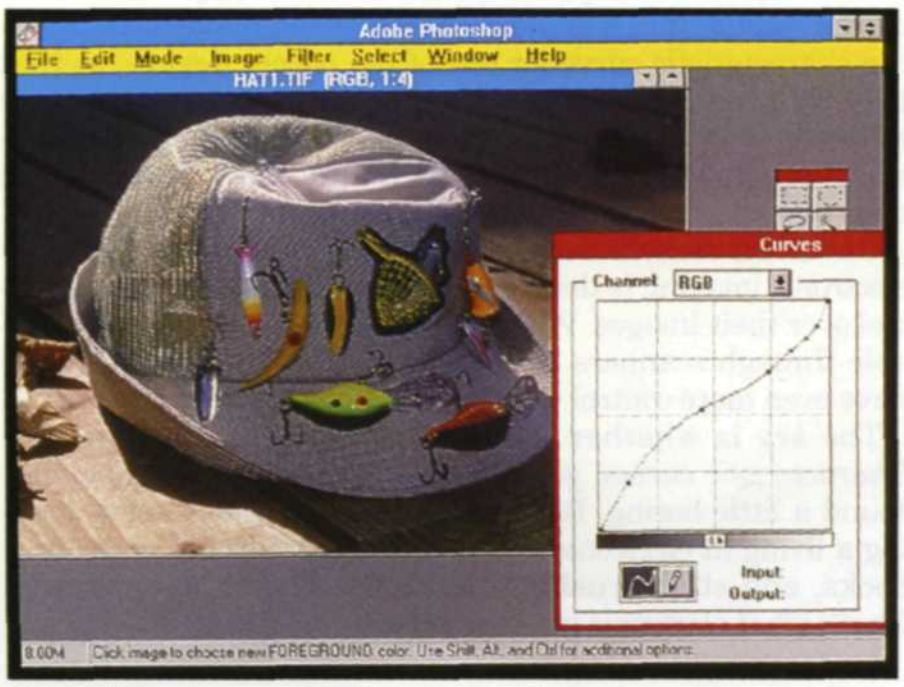
UNDERSTANDING ELECTRONIC CURVES



Characteristic curves.



Screen image, straight scan, no corrections.



Screen image, increase toe, decrease shoulder.

Jack and Sue Drafahl

A COMMON misunderstanding about electronic imaging is that it requires very little knowledge of traditional photography, and that its methods are far removed from the photographic process developed over 150 years ago. Many of the lecturers on electronic imaging today are informing their audiences that someone with very few photographic skills can quickly become an electronic photographer.

In truth, electronic imaging requires a better working knowledge of photographic basics than most of today's working professional photographers possess. In order to help you ease into this electronic imaging field, we will have to get technical. Try and stay with us, because it will make the difference between dollars and cents in your business.

The Characteristic Curve

The *characteristic curve* is a photographic tool that displays information on 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*. 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 the density (y axis) to the exposure (x axis) on this part of 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. The top of the curve, or shoulder, is used to display information about the highlights in an image.

In traditional lab operations, photographers will find these curves included with film data sheets, and with developer processing instructions. These curves are used to show them how a specific film and/or developer captures a real image.

For example, when the curve of a specific black and white negative does not match a printing paper, the lab will use contrast filters to adjust the paper's curve to fit the negative. With color negatives and slides, it becomes even more difficult to match characteristic curves to the final print, and may require special masks or manipulated internegatives. The problem with any of these adjustments is that they are usually very time consuming and difficult for even an accomplished lab technician.

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Understanding Electronic Curves

(Continued from page 11)

Electronic Curves

With electronic imaging, the lab tech can quickly look at an image's characteristic curves on the computer screen, make the necessary adjustments, and output the correct image. What makes this system even better is that the curves are automatically plotted, and you do not need densitometers, graph paper or the time needed to plot them.

Even more impressive is that with electronic graphs you can manipulate small portions of the curve any way you like. That may not seem very important to most people, but to a photo lab technician, that means that almost any problem in the lab can be solved with very little effort or expense.

Not only can any point of the curve be manipulated with the simple touch of the mouse, but the color curves can be broken down into their three components and individually changed to correct the final output image. Each change to the curve can immediately be viewed on the screen, and when the desired result is achieved, it can be saved as a new file or sent directly to an electronic output device.

For example, a customer brings in a problem slide that has a green D-Max, an extreme scene range and a pink highlight. Once the image is scanned into the computer, the operator would display the characteristic curve of the image, and select the curve for the green portion of the photo. By reducing the toe of the curve, you change the base density to black.

The pink highlight could be repaired by either reducing the shoulder of the red curve or increasing the shoulder of the green and blue curves. Finally, the full range of the image could be increased by raising the toe of all three layers and reducing the shoulder of all three at the same time. Remember that each change is displayed on the screen so you can see each modification before you save the final image.

The biggest problem with using electronic characteristic curves is knowing when and how to use them most effectively. From past experience, we have found that most scans from color and black and white negatives need little change to the curve itself, but rather changes in exposure and contrast. Fine tuning of negative images can generally be made in the software or when they are sent to the output device.

We have found that slides and large transparencies present more of a challenge. In more than 95% of our transparent scans we have to bend both the toe and shoulder portions of the images to match our output requirements. We increase the toe of the scanned image to improve shadow detail and the range of the overall subject. We then decrease the shoulder of the scan to reduce the highlight portion. We also look at the D-Max to see if there are any processing shifts in the original scanned image. If so, we select that specific curve and reduce the toe until the D-Max has a neutral balance.

When to Access the Characteristic Curve

There are three possible points at which you can access characteristic curves. The first is when you scan the image into your computer system. The amount of control you will have with these curves depends on the brand name of your scanner.

We use two types of scanners in our operation, and each has different controls. For flatbed scanning we use the Agfa Arcus scanner. With this scanner we can make a preview scan, adjust the gamma value (no curve visible), brightness, or adjust the brightness level of each color (red, green, and blue).

When we scan 35mm negatives or slides, we use the Nikon LS3510 AF Scanner, which displays a full characteristic curve, and allows us to manipulate any selected portion of all three curves individually or together.

If your scanner does not allow you to edit the curve at the scanning stage, you can use photo editing software such as Aldus PhotoStyler, Adobe Photoshop, MicroGraphix Picture Publisher, or other software packages entering the marketplace daily.

Each package allows you to edit the curves in a different manner, so you need to read the instruction manual to get the most out of your software package. We use Adobe Photoshop for most of our editing because it allows us to adjust the image before or after it is scanned into the system with a Nikon scanner.

If an image needs a lot of correction, we make course corrections before the scan, and then fine tune the image after the scan is made. With all the software packages we have mentioned, you can preview each change before it is saved to file or sent to an output device.

More recently, software manufacturers are allowing the characteristic curve to be changed as it is being sent to the output device. ZenoGraphics SuperPrint 3.0 is an output software that allows you to change Gamma, brightness, contrast, and color balance as it is being sent to the printer. These features really speed things up if you have determined that a whole series of electronic images need the same correction for the output device. Instead of changing each image, you can change the data as it is being sent to the printer.

The Results Are Proof

If you are not sure that you are using the characteristic curves properly, or are unsure just how much to correct, we suggest you set up a series of tests. Select several slides, color negatives and black and white negatives and scan in each without any correction and also with corrections at different points along the editing path. Keep accurate records and compare the results.

Make sure that you run separate tests for film recorders and color printers, as you may find that each requires a different correction. If this is the case, you would make a change to the characteristic curve for one of the output devices, so that they both match. Once you have set up tests with the basic software, scanner and output devices, you can easily add additional equipment and software with little effort. Better to run tests now than to practice on your customers.

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 actually have even more control than ever at their fingertips.

The *key* is whether they know how to use this power. *Characteristic curves, gamma, density, shoulder* and *toe* may sound a little boring. But, if you're really serious about making a living in electronic imaging, get out your old photo textbooks, and start brushing up on the photographic basics. That's what electronic imaging is really all about.

Jack and Sue Drafahl own and operate a custom lab in Portland, Oregon.