negatives, we set the proper exposure as the minimum time necessary to print to maximum black (or DMax) using the target negative material. We test for DMax by printing on our target photo paper through the specific negative material (white film or transparency film) to determine the minimum time for which the density of the photo paper is the same with or without the negative material. The minimum time can be easily calculated by printing using a test strip.

Figure 6-5 A normal paper. Prepare a piece of paper normally.

Steps for Determining the Base Exposure

1. Prepare a piece of printing paper as you would normally (Figure 6-5). For silver emulsion papers and some other papers, the paper has been prepared for you. For most alternative processes, this involves coating a piece of art paper with chemistry. Typically, a 5 × 7-inch sheet is sufficient.
2. Cut the 5 × 7-inch sheet into three or four strips about 1½ inches wide. Three strips is usually enough to determine the base exposure.
3. Get a piece of the appropriate negative material (white film for visible light processes and transparency film for UV light processes) cut to about 1 × 7 inches. Place the negative material so that it covers half of the test strip along the length of the strip (Figure 6-6).
4. Get a piece of material that is dense enough to completely block the exposure light. A piece of standard 1/16 cardboard or the black plastic packing for photographic materials both work well (Figure 6-7). Cover the printing paper and negative material so that about 1/4 of the length of the test strip is exposed. Place the partially covered test strip under the exposure light and expose the first 1/4 of the strip. For most light sources and printing materials, make the first test exposure

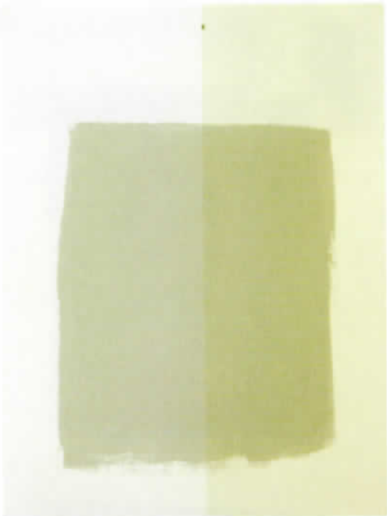


Figure 6-6 Cover with negative material. Lay a piece of plain negative material across the emulsion.

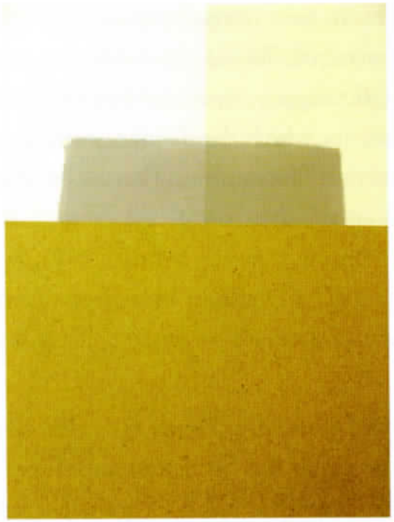


Figure 6-7 Cover with cardboard. Cover most of the image to make the first exposure.

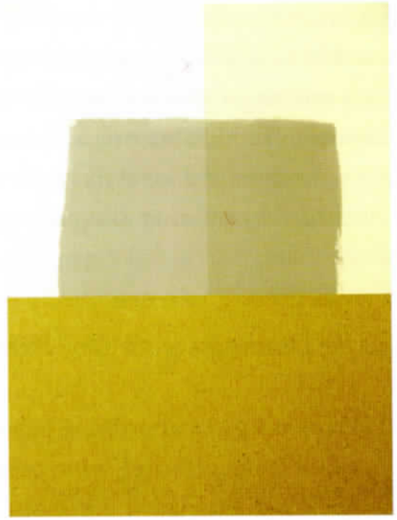


Figure 6-8 Cover and expose again. Make additional exposures along the entire test strip image.

about 30 seconds long. You will find that your test exposures will need to be longer or shorter with some experience.

5. Move the light-blocking material down so that 1/2 of the strip is now exposed. Expose it again, using the same test time as in the previous step (Figure 6-8).
6. Move the light-blocking material down again so that 3/4s of the strips is exposed and expose it again.
7. Finally, remove the light-blocking material and expose the test strip a fourth time.

   The test strip now has four small sections that have been exposed to four different durations of light: 30, 60, 90, and 120 seconds (or 1×, 2×, 3×, and 4× test exposure time).

Figure 6-9 Develop normally. Develop the print normally; find the time for maximum black.

Figure 6-10 Examining the test strip. Base exposure text on a piece of sensitized photo paper.

8. Remove the printing paper and develop it normally (Figure 6-9). Complete the entire process of development to ensure that the process will be the same as you will perform when developing your images. Dry the printing paper as well.

9. Take a close look at the printed test strip (Figure 6-10). The lightest value step has been exposed for 1× the exposure time and so on, up to the darkest step. The first step, where the covered and uncovered parts of the test strip are the same dark black, was exposed for the correct base exposure time. If none of the covered parts of the test strip are as dark as the uncovered parts, then the exposure time was too short; make it 4× as long and repeat the process. If the entire test strip is solid black, then the exposure time was too long; make it 4× as short and repeat as well.

10. Once you have the correct base exposure time, take careful notes to ensure that you can repeat it. For many of the light sources used for printing digital negatives, the only variable element of the exposure is the exposure time. But for some, like using an enlarger, you may need to note the aperture of the enlarger lens and the height of the enlarger head. You should also take notes on the process that you have tested; note the target printing paper and development process.

The instructions for printing images onto both silver and palladium in Chapters 4 and 5 assume that the base exposure is determined using this process. You may have a very different light source than we are using, but if you determine the correct base exposure the instructions in these chapters will work well. You will need to determine the base exposure for your darkroom in order to use the instructions provided in these chapters.

You will also need to determine the base exposure as the first step for creating a correction curve for your own specific processes. Chapters 4 and 5 are merely quick starting points for printing with digital negatives, and give you a chance to practice determining the base exposure. But learn to determine your exposure quickly as you will be repeating it every time you change your printing processes.

We have found that setting the base exposure to be the amount of light that just produces DMax through the negative products good results for printing with digital negatives, and it has the added benefit of being fairly easy to reproduce in different labs using different equipment.

Figure 6-11 Ilford meter.

A Tool for Consistent Visible Light Exposures

A darkroom light meter, such as the one sold by Ilford (Figure 6-11), is a handy tool for measuring the light output of a visible light source. If you measure both the brightness of a light source and the time for a correct base exposure, you can return at a later

7 making correction curves for digital negatives

The best part about making digital negatives is the ease with which the contrast range of the negative can be precisely tailored to the contrast range of the particular emulsion you wish to print on. The use of digital negatives actually got its start because of the difficulty of producing enlarged wet darkroom negatives for platinum printing. It is not all that hard to produce an enlarged wet darkroom negative, but to produce one of a predetermined density range can be challenging. Digital technology mechanizes the process and makes it easy to control density range.

The key to making good digital negatives is learning how to derive a good correction curve. Basically we think of a correction curve as a type of profile (similar to color printer ICC profiles): it is an adjustment put in the middle of the overall printmaking process to ensure that the image tones you carefully set within the computer will be closely matched by the image tones in the final print.

To make a correction curve, start with an image that has known tones — normally this test image is a grayscale step tablet composed of defined shades of gray — run it through the printing process, and measure how much each tone is distorted by the time it reaches the final print. Knowing how much distortion there is in the overall process, it is a simple matter to derive a correction curve that will correct for those distortions and make the final print closely resemble the starting image.

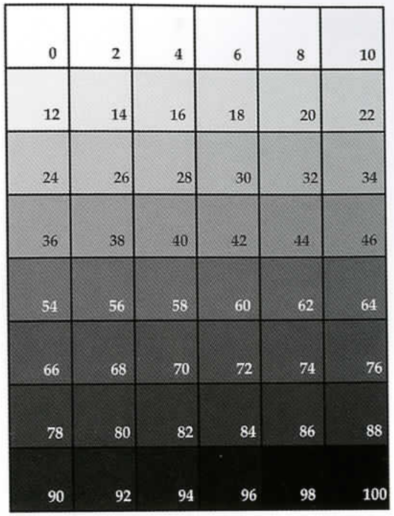


Figure 7-1 Page o' steps.

It is important to realize that every printing process distorts the starting image to a different degree and therefore requires a different correction curve. A good correction curve will be specific to one set of printing conditions — exposure time, emulsion chemistry, paper substrate, developer, and so forth. Hopefully, the correction curves we offer in this book will get you in the ballpark and allow you to make a reasonable print, but you should get comfortable with creating correction curves yourself so that you can use one that is tailored exactly to your own printing conditions.

You should get comfortable creating correction curves so that you can create a new one whenever you make changes to your process.

A Good Step Tablet Print

You need first to create a good step tablet print for the process you want to measure. Follow the steps in Chapter 6 to determine the correct exposure for your specific process. Remember that, when using digital negatives for printing, we set the proper exposure as the minimum time necessary to print to maximum black (or DMax) using the target negative material.

Open the step tablet image in Photoshop®, invert it to make a negative, print the negative onto the appropriate substrate (white film or transparency film), then use this negative to make a positive print of the step tablet for the process of your choice. You can obtain the tablet image on the Web site at www.digital-negatives.com. For this, you will print a negative of the step tablet image and make a print of this image in exactly that same way that you intend to print the final image. Follow the exact same steps for preparing the image outlined in Chapter 4 (for silver prints) or Chapter 5 (for palladium prints and for other processes), except that you will skip the step for applying a correction curve; at this point, you do not have the correction curve to apply.

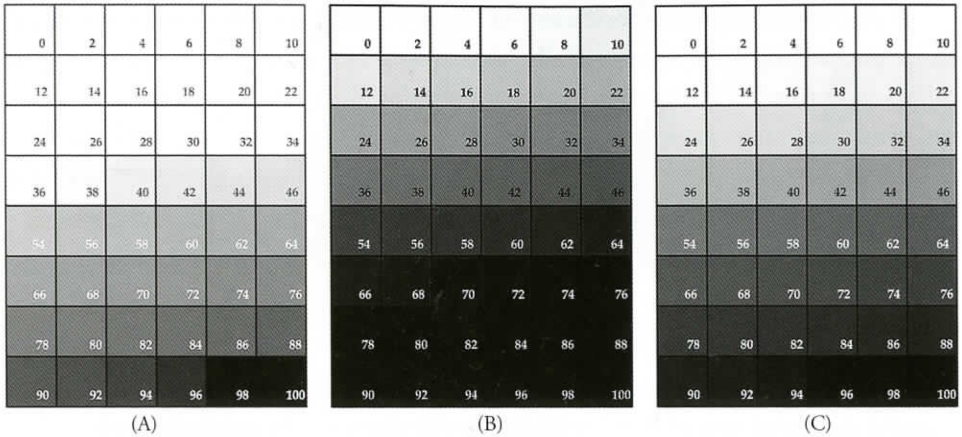


Figure 7-2 Good and bad step tablet prints. (A) Too light. (B) Too dark. (C) Good light and dark values.

Proceed with printing a negative of the step tablet and making a final print using the specific steps for your final process. Remember, every part of the step should be identical, except for applying the correction curve.

A good step tablet print contains a full range of gray values through the middle of the tablet with some white steps (these are paper white) and some black steps (these are maximum black) (Figure 7-2).

If you follow the steps for determining the precise exposure, ideally only the last square in the step tablet (100) will be pure black or DMax. In reality, it is likely that a few squares near to this value will also be pure black. Do not worry about this; the correction curve that you are creating will be calibrated to your specific exposure. If there are no pure black or pure white squares in your step tablet, then your exposure is too long or too short, respectively. Revisit your exposure test; often there is something in your process that you did not repeat in exactly the same manner as you did for your exposure test. A common mistake is not to set the printer settings exactly the same. Check for these mistakes before you redo your exposure test (Figure 7-3).

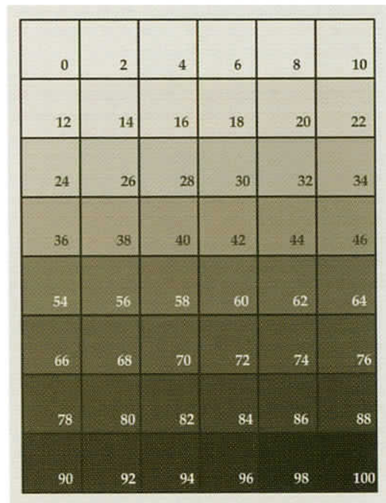


Figure 7-3 A scan of a real test tablet.

Develop and dry the exposure step tablet normally. It is important that you follow all of the development steps carefully, as this step tablet print will be your master calibration print. Also, it is important that the print be dried thoroughly, as any moisture remaining in the paper can lead to small variations in print density. The easiest way to dry the prints is to use a hairdryer on the low or medium setting for 1–2 minutes to dry the print.

Making a Good Scan

Scan the developed step tablet print it into the computer to determine the resultant densities. You will want a scanner that can scan the full density range of your paper; that is, a scanner that can scan the density from paper white to maximum black for your process. Most scanners purchased within the past few years should be able to scan this range well.

1. Place the developed step tablet print onto your scanner, run the scanner software, and create a preview scan for the print.
2. When scanning, you need to make sure that your scanner does not add any correction; this would change the shape of the density curve and mess up the overall process. The software for many scanners will automatically try to correct your scan.
3. Check to make sure any options for auto color, auto levels, or auto curves are turned off.
4. If your scanner has an option to preview the histogram, take advantage of the feature. Often the scanner automatically will set the black and white points for your image in order to maximize the image contrast. If necessary, pull the black and white points for the histogram back out to prevent the scanner from adding any contrast (Figure 7-4).

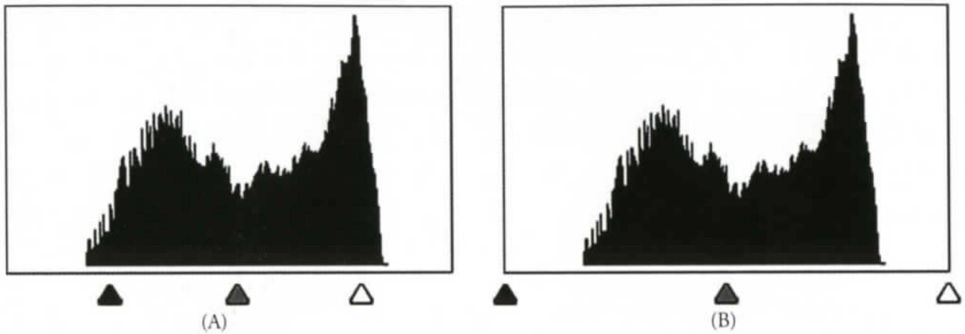


Figure 7-4 Scanner histogram. (A) The scanner software may try to adjust the histogram. (B) Adjust the histogram so that it scans the image in unaltered xxx.

5. If your scanner has no option for previewing a histogram, it is likely that the scanner will automatically adjust the black and white points for your image. If there is no way to turn off this automatic adjustment, you will likely be unable to create a good correction curve using your scanner. You will need to obtain software that allows for these adjustments.

6. Set the scanner software to make a black-and-white or grayscale scan. Set the scanner software to scan at 16 bits per channel at a moderate resolution, around 100–150 ppi.

7. Scan the image. The resulting scan will likely be somewhat flat with no pure white values and no pure black values.

Adjust the Scanned Image to Full Contrast

1. If you run your scanner software outside of Photoshop, run Photoshop and open the image of the step tablet. If the scanner scans using a different gray working space than you have configured in Photoshop, Photoshop will display the Embedded Profile Mismatch window.

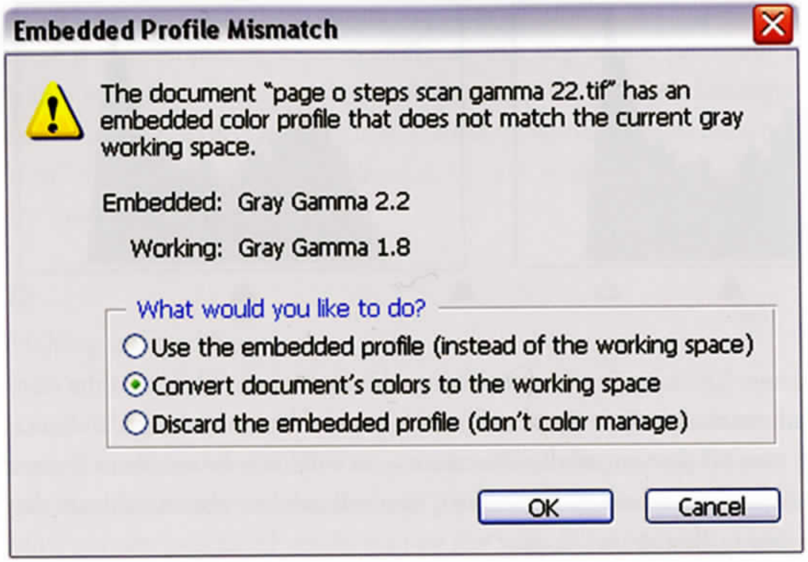


Figure 7-5 Embedded Profile Mismatch window.

Select Convert document's colors to the working space, which should be the default option. (More on working spaces in Chapter 8, Calibrating the System.)

2. Blur the image to eliminate any slight variations in the step tablet print. Go to Filter > Blur > Gaussian Blur (Figure 7-6) and set the radius; typically a radius of 3–4 pixels is sufficient. Use the highest radius that allows you to read the numbers in the step squares. You will need to read these when you record the data for the correction curve.

3. You then need to adjust the contrast of the scanned step tablet image. The original step tablet image had a range from 0% (white, or 255 in Photoshop units) to 100% (black, or 0 in Photoshop units), so adjusting the scanned step tablet image to the same range will allow you to measure the curve for your printing process from the

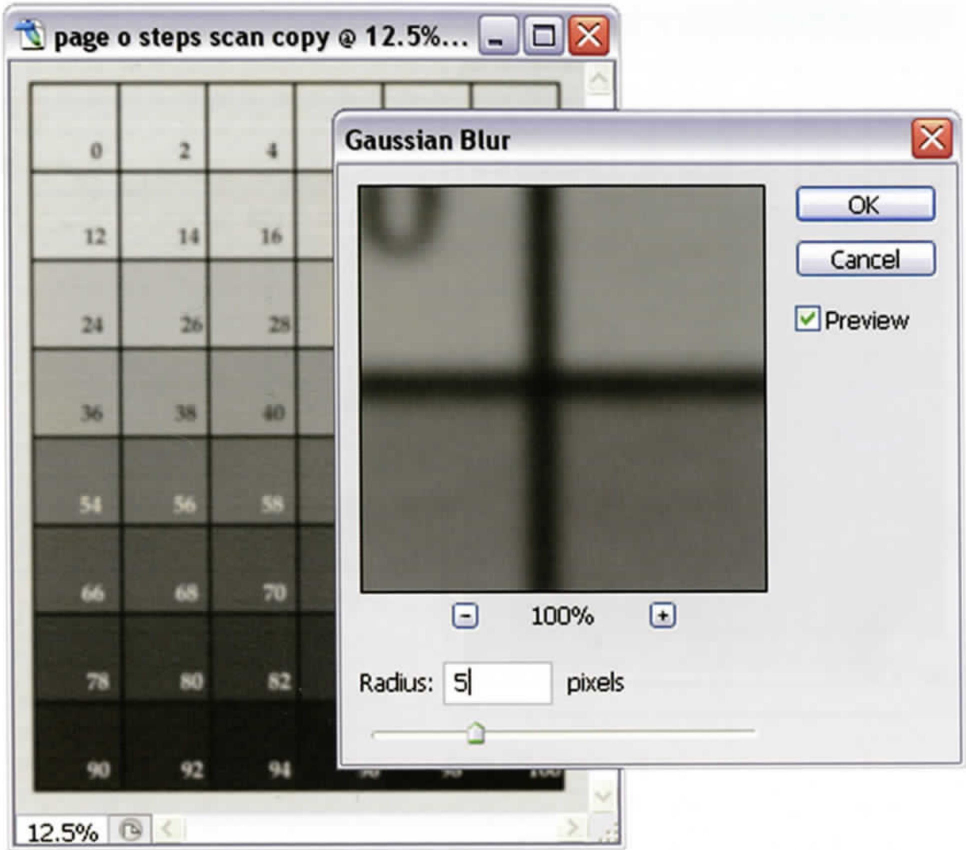


Figure 7-6 Gaussian Blur window.

original step tablet to the printed step tablet. You can make this adjustment using levels; go to Image > Adjustments > Levels. . . . Bring in the black and white point sliders until they are just under the darkest and lightest points of the histogram. This will make image have full contrast from black to white (Figure 7-7).

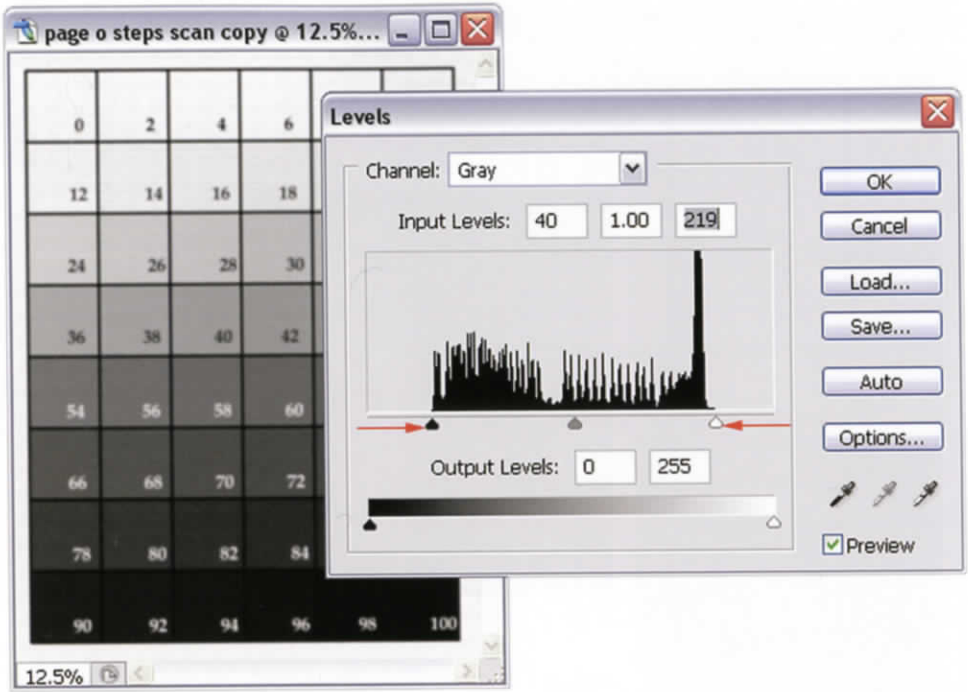


Figure 7-7 Levels window.

Read the Values from the Scanned Image

Now, measure the resulting density for each square in the scanned step tablet.

1. Select the Info palette and make sure that the grayscale values are displayed; they are listed as K values (or percent black). Click the eyedropper symbol to access the menu and select Grayscale (Figure 7-8).

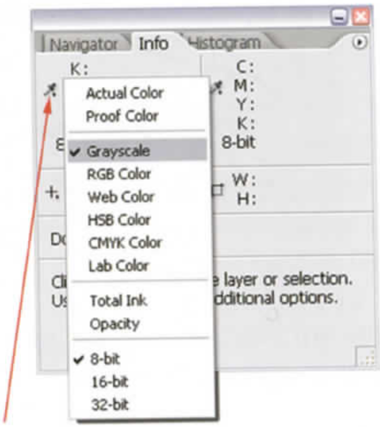


Figure 7-8 Info palette and menu. Select the eyedropper on the Info palette to access the menu; select Grayscale.

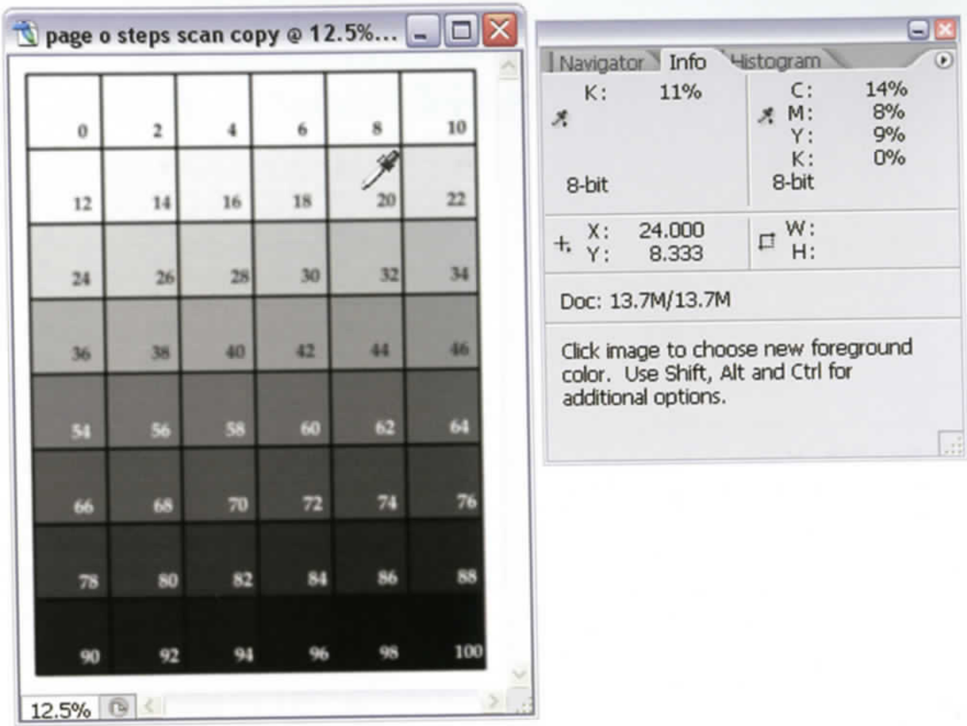
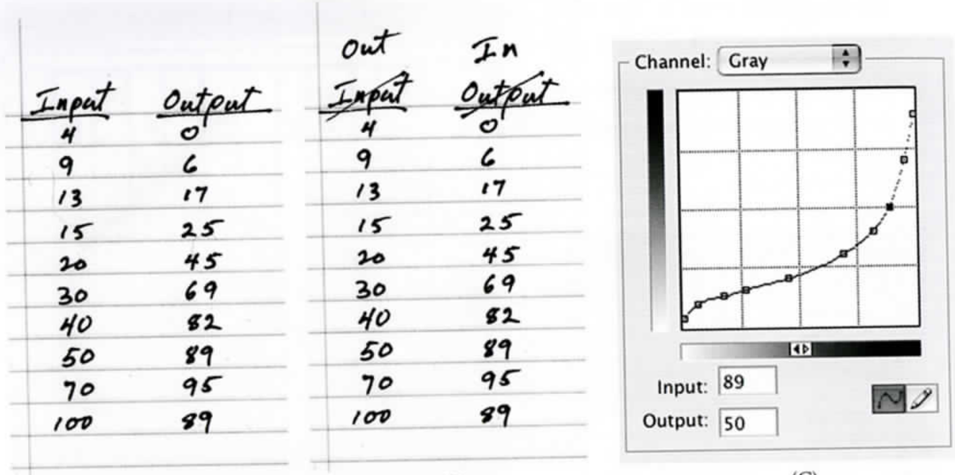


Figure 7-9 Reading values.

2. Move the cursor over the step tablet image, and the Info palette will display the K value for the pixels underneath the cursor (in this situation the K value is essentially identical to percent gray value). As shown in Figure 7-10, make a table with two headings, Input and Output. Input is the percent gray value written within each square of the step tablet. Output is the K value you read from the Info palette for that particular square. In Figure 7-9, the eyedropper is located in a square labeled with the Input value of 20% and the Info palette shows an Output K value of 11%.



(A) (B) (C)

Figure 7-10 Making a correction curve. (A) Step 1. (B) Step 2. (C) Step 3.

You do not have to measure every square of the step tablet, but measure more squares at the light and dark extremes since there will be greater changes to the curve in these parts. You will also likely have several input squares that read an Output K value of 0% (often the input squares from 0 through 20 or more will produce an output value of 0%). You need only to use the data for the last square, the one adjacent to the real density values. Similarly, you may have a few squares that read an Output value of 100%; pick the square that is adjacent to the real density values. When you are finished, you should have a table of paired Input/Output data points somewhat like the one shown as step 1 in Figure 7-10.

3. Make a simple table on a sheet of paper that lists these values or, better yet, make the table on the back of the step tablet print that you scanned into the computer. You now have a table that shows the relationship between the original Photoshop values and the final densities on the print (i.e., an original Photoshop value of 40% maps to

a print density of 24%, and so on). The correction curve uses the inverse of this table to correct each value in Photoshop before printing. With the correction curve in place, the Photoshop values will map directly to the target print densities (i.e., an original Photoshop value of 40% now maps to a print density of 40%) (Figure 7-10).

Creating the Correction Curve

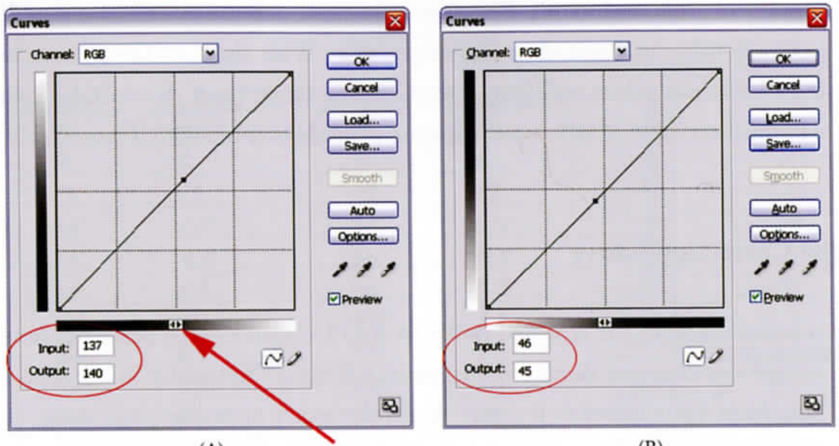
The data you collected from the scanned tablet in step 1 (Figure 7-10) describes how the original image was changed during the transition from a Photoshop image into a final print. You want your correction curve to do the exact opposite processing; so merely change Input to Output and Output to Input on your data table as shown in step 2. Now you have the data for your correction curve.

To build the curve, pick 10–15 Input/Output pairs from the table created in the previous section (Figure 7-10). Pick more pairs at the extremes (light and dark) of the curve since there will be greater change in this area of the curve. These are the values that show the highlights and shadows in the final print.

Open the Photoshop Curves window (Figure 7-11); go to Image > Adjustments > Curves. Typically, we apply this adjustment directly over the scan of the step tablet to see the result of the correction curve. Make sure the curve values are being measured in percent (just click a point on the curve to see if the Input and Output values are shown as percents or as values from 0 to 255; if the latter, click the double arrow in the middle of the gradient below the curve to change to percent).

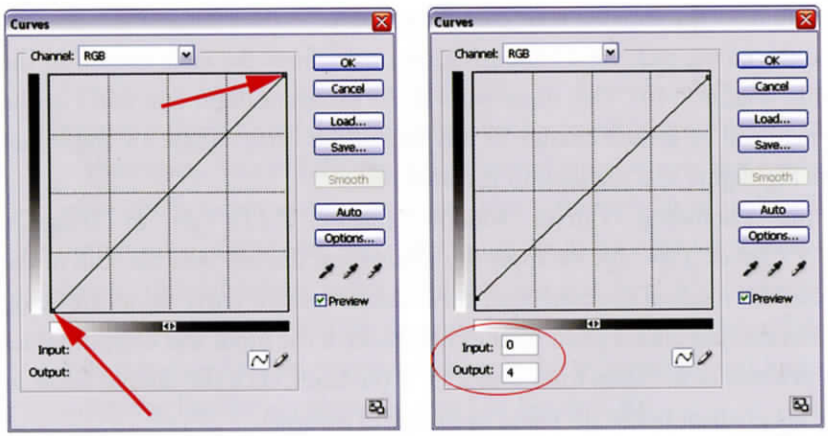
Now you can enter the Input and Output values from your data (Figure 7-12). The first points to edit are the black and white points, the top and bottom points of your data table. Click on the white point on the bottom left of the curve line. Its data values start at Input = 0 and Output = 0. Change these values to match your first data point

Figure 7-11 Switch curve direction. (A) Photoshop curve does from dark to light. Input and Output values shown in Photoshop units. Click the small arrow in the midtone to switch mode. (B) Photoshop curve does from light to dark. Input and Output values shown in percents. Use this mode to enter your curve data.



(A) (B)

Figure 7-12 First and last points. (A) Starting black and white points at 0:0 and 100:100. Click the points to edit the Input and Output values. (B) Change the Input and Output values to match your first and last data points.



(A) (B)

(Input = 0 and Output = 4 in the example table shown in Figure 7-10). Click the black point on the top right of the curve line. Its data values start at Input = 100 and Output = 100. Change these values to match your last data (Input = 99 and Output = 100 in the example table shown in Figure 7-10).

Ryoanji Garden 2005

Ron Reeder

'This austerely elegant landscape was built in the 1500's. The name of the designer is unknown and he left no record of any intended meaning. The space invites meditation and introspection.'

Palladium

Image captured with a 4 × 5 view camera. No tripods were allowed so the camera was balanced on a daypack laid on the veranda. After scanning the film with an Imacon 646, extensive image editing was done in Photoshop. A correction curve was applied to the edited image file, the file was inverted to negative, and the negative was printed on Pictorico OHP. The digital negative was used to expose a sheet of Arches Platine coated with a pure palladium emulsion.

Final print, about 18 × 15 inches.

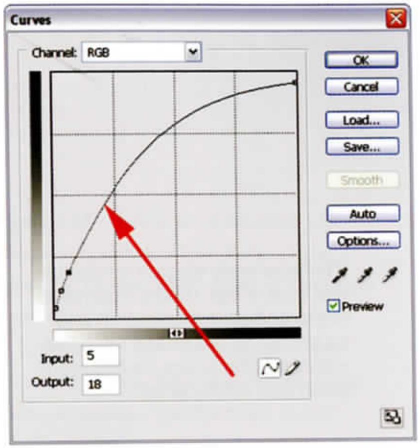


Figure 7-13 Adding data points. Click an open part of the Photoshop curve to add a new point, and enter the appropriate Input and Output data values.

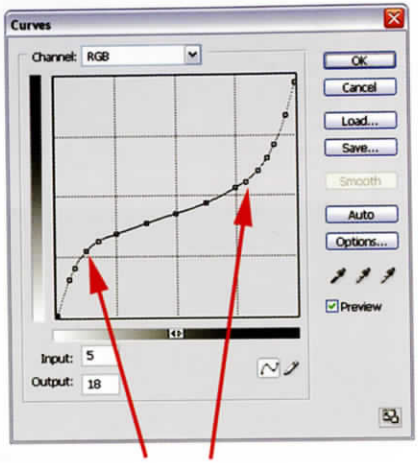


Figure 7-14 Data points at the ends of the curve. Place more points near the dark and light ends of the curve, where there is more change in the curve.

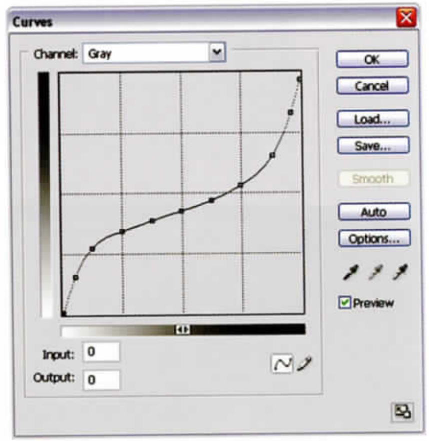


Figure 7-15 A good curve.

Now add the rest of your data points. Click on the middle part of the Photoshop curve where there are no data points. Start with the top most data point and merely type the Input and Output values into the dialog (Figure 7-13).

Then just click again on the curve to create another point and add another value, and so on, until you have a complete curve. It is useful to have more points near each end of the curve, where the curve changes most, and fewer points in the straight center section of the curve (Figure 7-14).

The curve should reduce the overall contrast of your image; it should be flatter in the middle than on the ends. If you have a curve that is steeper in the middle (i.e., looks like a traditional H&D curve), then you have the Input and Output values backward (Figure 7-15).

Now save your curve. Click the Save option in the Curves window and give the curve a name that is specific to your process (Figure 7-16).

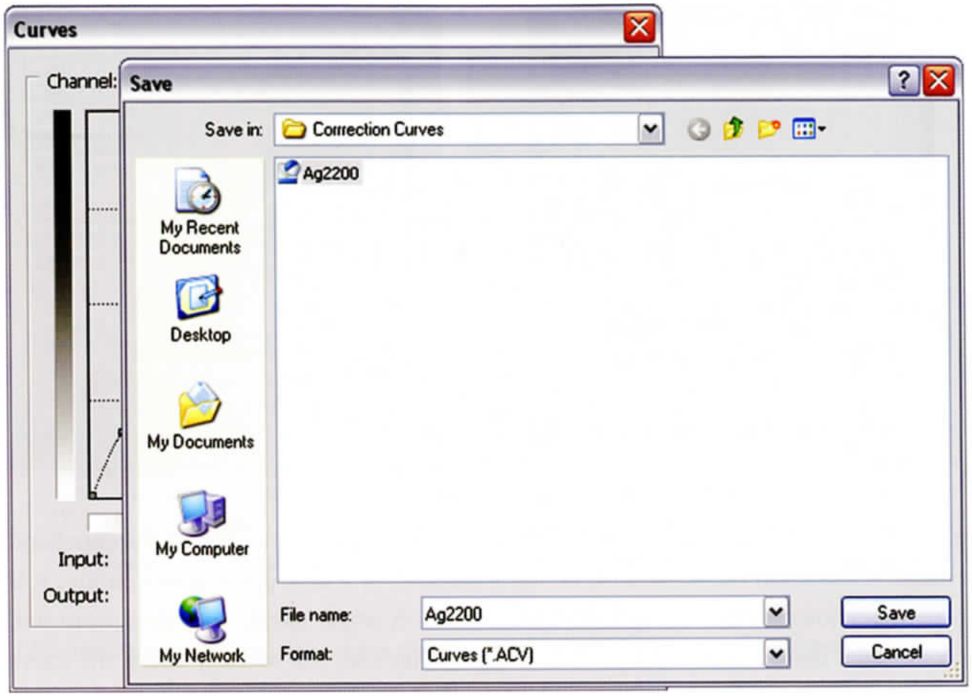


Figure 7-16 Save the curve.

Now you can apply this correction curve to your original test image and run through the process again. You should have a resulting print image that looks fairly similar to the original test image on the computer.

Tweaking the Curve

The process for creating correction curves is fairly precise, but it is common that one or two data points are not exact. This is especially true for creating curves for alternative

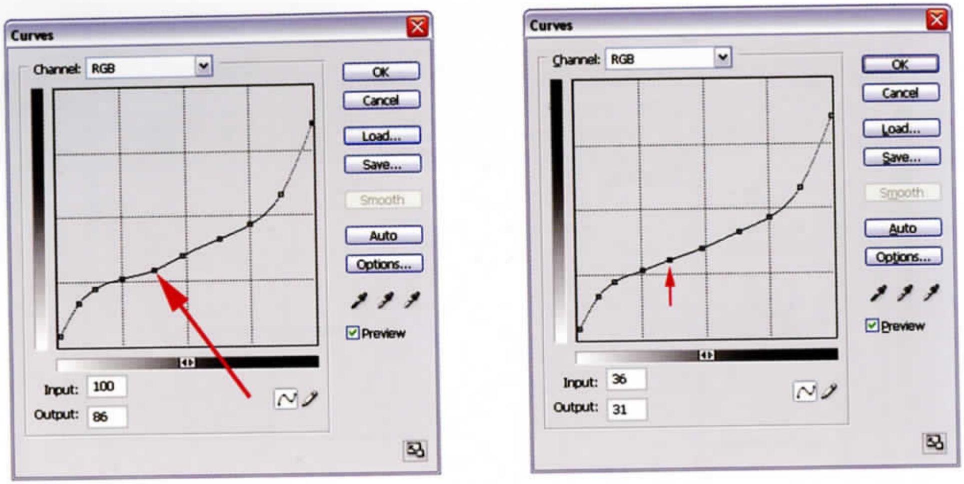


Figure 7-17 Tweaking a curve. Corrections curves should be smooth. If a point appears to disrupt the curve, you may wish to tweak it to make a smoother curve.

processes where the emulsions may have some minor variability because they are hand coated. Correction curves should be fairly smooth. If a data point is inaccurate, it is usually obvious when looking at the final curve. A small 'tweak' to a data point will often make the final curve appear much smoother and will actually make the curve work better. Just look for the points that are obviously out of line.

Testing Correction Curves

Check to see if your new correction curve actually works. Open the original, unmodified step tablet image. Apply your new curve to this image, invert to make a negative, print it out as a digital negative, and print it on paper using the same process you used to derive the curve. Scan the printed step tablet and measure paired Input and Output values for several of the squares. If the correction curve was properly made, Input and Output values should be nearly identical this time around. If the paired Input and

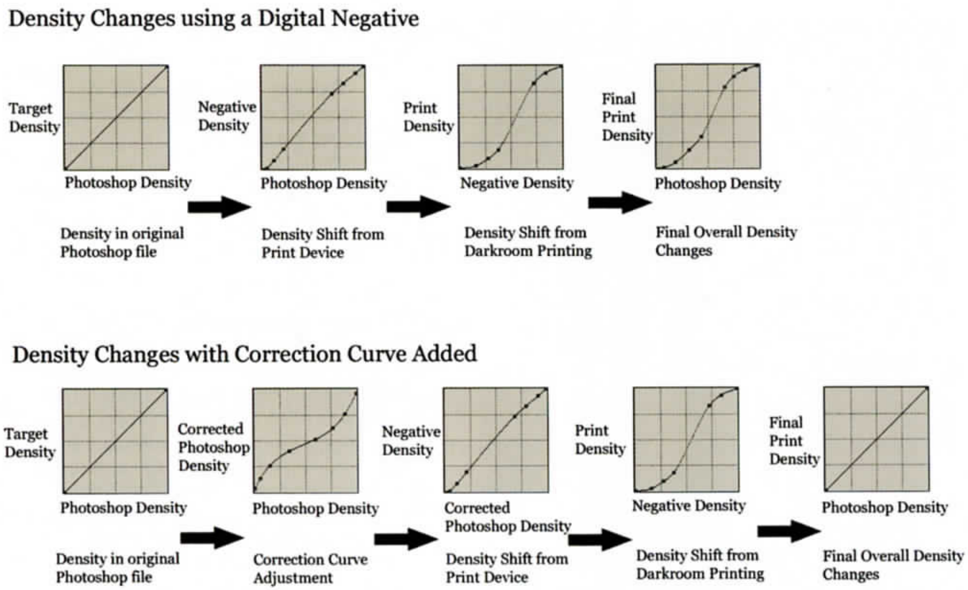


Figure 7-18 How the correction curve affects the density changes when printing with digital negatives.

Output values are not close, you need to go back and correct your procedure before you can use the derived correction curve with any confidence. A common mistake is to perform a small part of your procedure differently; make sure you keep notes for your process so your can repeat it identically for each negative. The most common mistake is not to set the printer settings in exactly the same way for each negative.

Use this curve layer for all images for which you want to apply this particular process. Create a new curve for any new paper or chemistry.