

APPENDIX C

SCANNING RESOLUTION

Scanning or capturing the right amount of image information is an essential aspect of successful composing. Images that don't have enough image information are soft, or, even worse, they are pixilated and are not a pleasure to look at. Scanning is the step where you translate the actual object or film from analog terms—or the real world—into digital terms—or discrete pieces of binary information. Many books and even more articles have been written about scanning. The following discussion will hopefully serve as a good starting point for capturing the right amount of image information to create pleasing images.



Tip

Just because you can physically scan a photograph, magazine, or object doesn't mean that you have the right to do it. U.S. copyright laws are in a state of flux, so protect yourself by visiting www.copyright.gov; www.whatiscopyright.org; and <http://fairuse.stanford.edu/> for extremely important and useful information on copyright, fair use, and your rights as a visual artist.



RESOLUTION EQUALS INFORMATION

Resolution is the amount of image information required to create the optimal image. Just as scanning not enough information will yield poor results—over-scanning can also result in unsatisfactory images that are too cumbersome to work with efficiently. When scanning objects or photographs for compositing, answer the following questions before making the scan to determine the appropriate scanning resolution:

1. How big will the final output (most likely a print) be?
2. How will you be outputting/printing the file—via inkjet, offset press, photographic direct digital, or monitor display?
3. How large an area will an image or part of an image occupy in your final composite?

Size and Type of Output

The first decision to make is, how big will the print be? When in doubt, opt for a larger print size (within reason) rather than smaller. The effort you will expend to create a 5 × 7 print is exactly the same as what is required to produce an 8 × 10 print. So if you're already planning to take the

time to make a beautiful composite, think bigger—up to 150% bigger. You'll rarely regret having more image information, as long as it's within reason.

Next you must decide how you are going to produce the print—via an inkjet printer, offset press, direct digital photo or film printer, or monitor display. Each type of output technology requires a different amount of image information, and planning ahead will always result in a better print. To make a high-quality scan that will produce a good print, follow the guidelines in [table C.1](#).

When creating images that will only be displayed on the Web and not used in print, work at twice the final display size and then select Image > Image Size with Bicubic Sharper interpolation enabled to scale the image down. Personally, although many of my images end up on the Web, I still work in print size and then size the file down for Web display. Sizing a Web graphic up to make a good print is a close to-useless endeavor. Before undertaking a large project or making a lot of scans, test the entire imaging process from start to finish to see if the image quality is acceptable. For example, when working with inkjet prints I personally never create a file past 360 ppi because I can't discern the difference between 360 and 480 ppi, while the file size difference is quite noticeable.

table C.1

Output Types and Resolution Requirements

Type of Output	Examples	Print resolution in pixels per inch
Inkjet	Epson inkjet printers	180 ppi (lowest acceptable)
		240 ppi (works well for matte paper)
		360 ppi (recommended for luster and glossy paper)
		480 (images with extremely fine detail)
Offset	newspaper (85 line screen) average magazine or brochure (133 line screen) high-end magazine or book (150 line screen) fine art book (200 line screen)	170 ppi
		266 ppi
		300 ppi
		300 to 400 ppi
Direct digital	dye sublimation Fujix 3000 and 4000 Durst Lambda CSI Lightjet	200, 300, and 400 ppi
		400 ppi
		200 and 400 ppi
		200, 305, and 406 ppi
Monitor	Web and interactive display	width x height in pixels

The resolution you use to scan your image needs to be balanced against such factors as your available hard-drive space, the computer's processor speed, and the level of quality you're looking for. Of course, we would all like to make huge prints with exquisite detail, but often the amount of time available, the budget, and hardware reality just don't allow for the biggest file you can scan. In other words, just because you can make a huge scan doesn't mean that you should.

Photoshop's File Size Calculator

After determining your print size and type of output, use Photoshop to calculate the ideal file size you need to scan in. For example, to make a color 11 × 14 inkjet print in Photoshop, you would select File > New and type in the desired parameters using RGB Color mode and then note the file size (figure C.1). Think of this file size as the scanning goal. As you adjust the scanner software, scan to the target file size.



figure C.1

Working in hi-bit requires twice the file size.

Figures C.2 and C.3 show scans I am in the process of executing. In figure C.2, I'm using a flatbed scanning software interface; in figure C.3, I'm using a film scanner interface. In both cases, I am attempting to make scans that are approximately 57 MB. I usually scan a bit higher than what I think I need so that I allow myself some cropping options, so in these cases, I would scan in a 60 MB file.

As you can see, working in hi-bit doubles the file size. I work in hi-bit on portfolio projects in which I know the image information is true hi-bit—that is, I photographed and processed the file or made the scan.

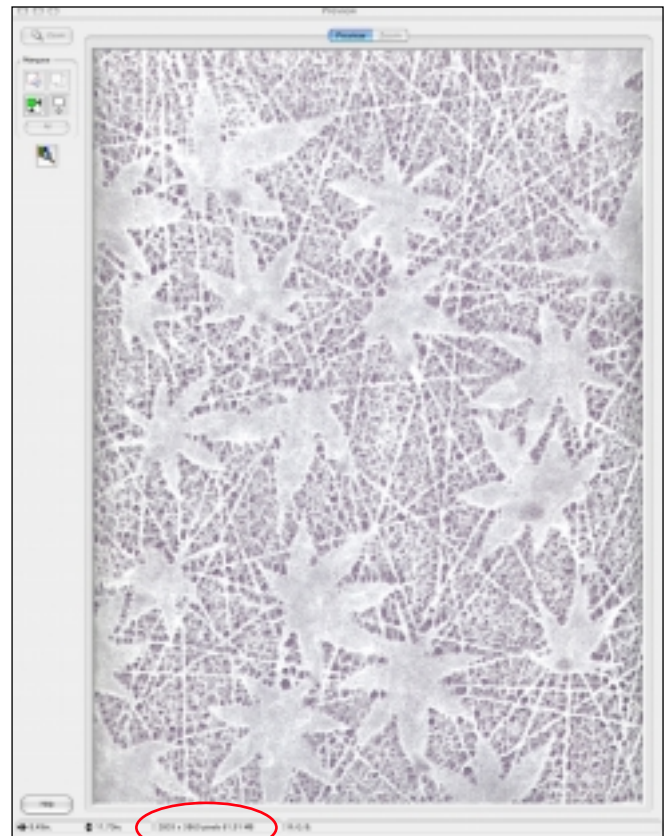


figure C.2

Scan to the required file size.

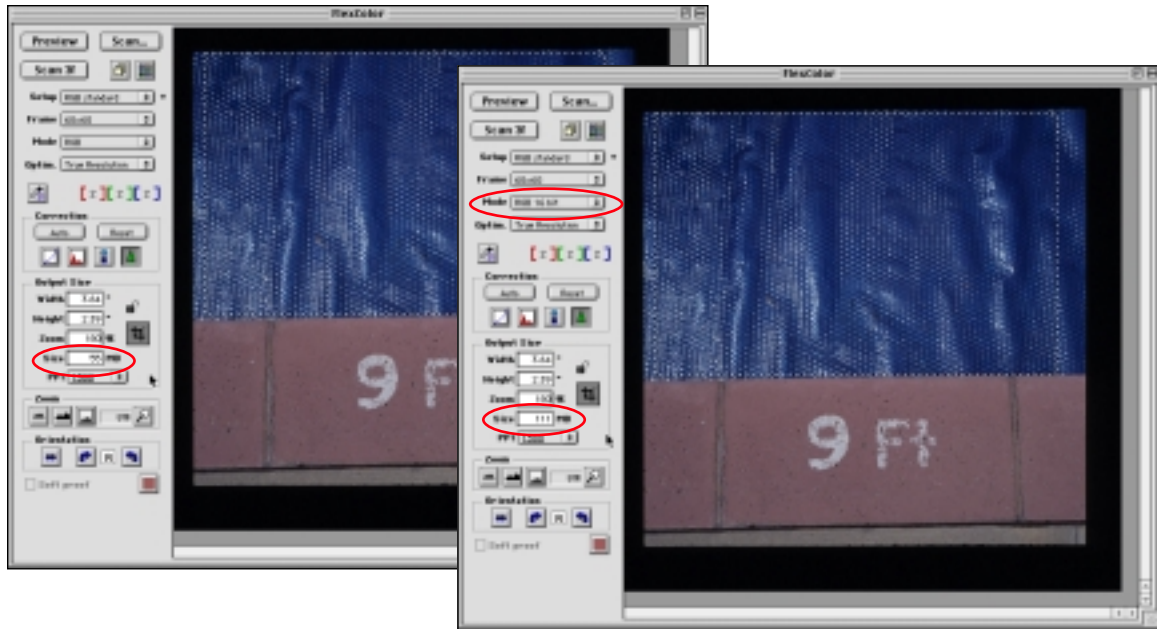


figure C.3

The same scan—once in 8-bit and once in hi-bit.



Tip

Scanning in more image information (within reason) is always better than scanning in too little. Making fine-edged masks and composites with a high-resolution file will yield better results than working on a lower-resolution file.

If a high-bit file is too large for your computer configuration, you might consider at least scanning in high-bit, doing the initial color and contrast corrections in high-bit, and then choosing Image > Mode > 8-bit to downgrade the file to a reasonable working size.

While scanning, make sure you turn off all scanner sharpening settings, and if you are scanning preprinted materials, experiment with the descreen functions that many flatbed scanner software offer to remove the screen patterns caused by the printer separations.

Pixel Distribution

Now that you have the initial scan in Photoshop, it is helpful to set the correct pixel distribution. Choose Image > Image Size. Next, and most importantly, deselect Resample Image and type in the desired output pixel distribution. Deselecting Resample Image changes how close together the pixels are and does not impact image quality in any way. Setting the correct pixel distribution is helpful to see how large the image will print.

Size Relationships

If a specific image element is going to take up only a small area of an image, you only need to scan in its relational image size. For example, [figure C.4](#) shows a rough sketch I used to plan image placement and size relationships. I can see that the question mark is only approximately 25 percent of the final image, meaning that I only need to scan the wood cut letter in figure C.4 at 25 percent of the final image resolution. If I were using my 11 × 14 inch 360 ppi RGB file, which requires approximately 60 MB of image information, I only need to scan it in at approximately 15 MB to capture the correct amount of image information.

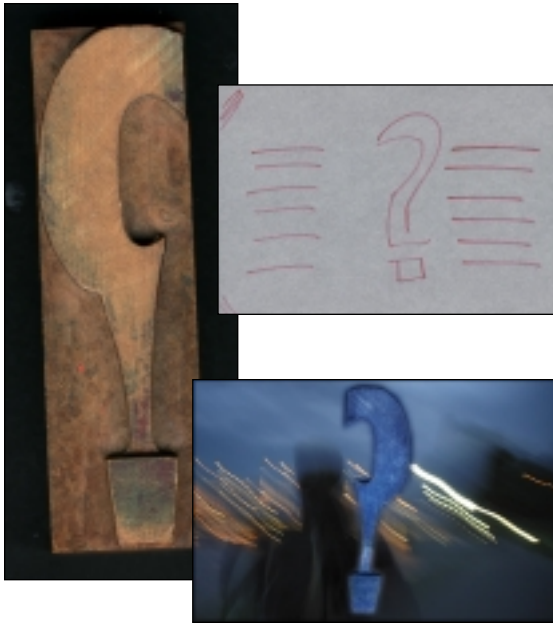


figure C.4

Scan in only the amount of information you need.

Resampling Images

Sometimes no matter how well you calculate scan resolution or try to tweak the very last pixel out of your scanner, the file may be simply too small. In this case, complete your work first and then scale up the file just before making the print.

When scaling up, which is also referred to as *sizing up images*, choose Bicubic Smoother as the interpolation engine in the Image Size dialog box. When sizing images down, choose Bicubic Sharper. When in doubt about just how large a final image can be, do an evaluative test from start to finish—that is from the scanner to Photoshop to the printer. What may look great to me may not be of acceptable quality for you.

Image Size Surprises

Sometimes when you're compositing elements, you encounter unexpected size-relationship surprises that throw you out of your creative rhythm. For example, I tried to add the watch in [figure C.5](#) to the back of the theater stage. But look at what happened. The watch was much too big for the image ([figure C.6](#)).



figure C.5

The source files before combining.



figure C.6

Why is the watch so big?

To avoid surprises like this, make sure you compare your image elements at the same viewing ratio before combining them ([figure C.7](#)). In this example, both files are at 50% view. The view size in Photoshop has nothing to do with image resolution, but it does show you the relative size of the images and that the watch is too big.

Once you're aware of the size relationships among the elements you plan to combine, you can opt to rescan or resize the files, depending on how extreme the image size difference is and how important the project is. Rescanning to match image resolution is always the best option—but often it isn't possible or practical. My personal rule of thumb is not to resize images or image elements more than 25 percent up or down. If the image size difference is greater than 25 percent, then I try to rescan the originals.

In most cases, I usually take the time to rescan the image elements at the proper resolution. But just in case you want or need to resize, I'll show you how to make the images proportional in Photoshop (and eliminate the guesswork involved).

It is better to downsize images with Photoshop than it is to upsize them. So in the case of the giant watch, I opted to reduce its size rather than increase the size of the stage:

1. Position the files in relationship to one another and at the approximate zoom ([figure C.8](#)).
2. Note the view percentage in the image title bar. In this example, the watch is at 20% view. Select Image > Image Size, change the Pixel Dimension unit of measurement to percent, check Resample Image and enter the view value. In this example, the view value was 20% ([figure C.9](#)).



figure C.7

Viewing the files at the same view ratio illustrates their size relationships.



figure C.8

Zoom in and out to see the size of the images in relationship to one another.

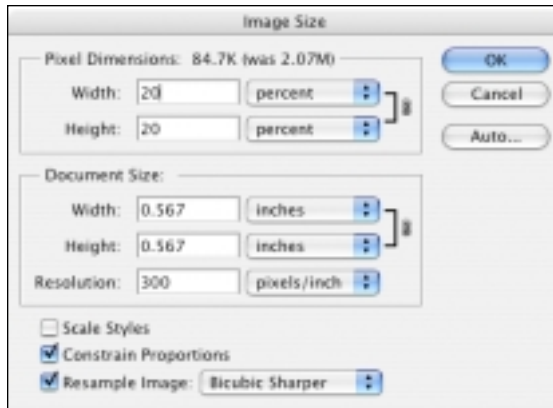


figure C.9

Decrease the image size based on the view ratio.

3. Once you've matched the view percentage, review the image. In this example, the watch is now correctly sized (**figure C.10**). Best of all, I am able to drop it onto the other element without being thrown off track by having to deal with the size relationship between the two elements (**figure C.11**).

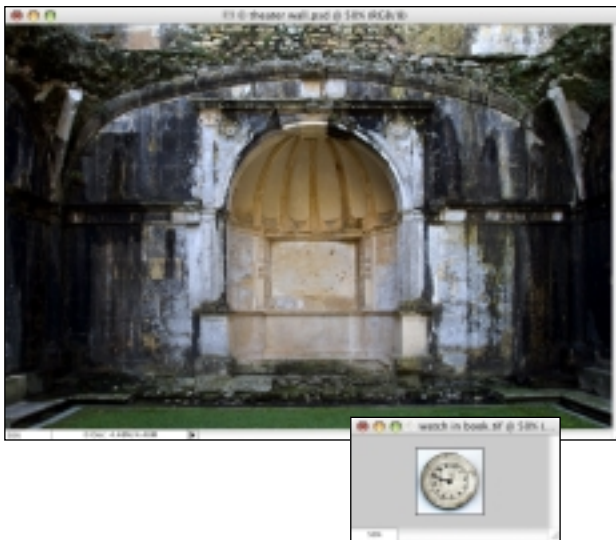


figure C.10

After resizing the watch, you can more accurately predict how the elements will come together.



figure C.11

Now the watch looks proportional to the stage.

I always compare image elements in the same view percentage before compositing them together. In case one image or image element is larger or smaller than expected, you can also select **Edit > Free Transform** and type the view percentage into the **Width** and **Height** fields in the **Options** bar to achieve identical results.

FILM FORMATS AND TYPES

The film format you photograph with will have great impact on your final image quality. Medium- and large-format film capture inherently more image information and image quality. If you have a choice of camera formats, opt for the larger format, if possible. If you have a choice between scanning the original film or a print, it is better to scan the film versus scanning a print because the print is a generation removed from the original.

Slide film has a narrower dynamic range but also less film grain, while color negative has a wider dynamic range between shadow and highlight, but often at a cost of more noticeable film grain. On the rare occasions when I shoot film, I use color slide film because I find it easier to more accurately evaluate and scan. To avoid image structure and film grain differences when photographing for compositing, use one film type and format to photograph all the elements.

DIGITAL CAMERA FILES

Today's variety and the capabilities of digital cameras are simply fantastic. I rarely walk out of the house without a digital camera, because I never know if I'll see a cloud formation, texture, or image element that I could use or add to my stock image collection.

It's a good idea to use a digital camera, even if it's a prosumer snapshot model that captures 3–5 MB to test out or sketch out an idea. This way, when you come up with an idea for a project, you can do a quick, low-resolution *proof of concept* using the digital camera to see if the idea has legs, rather than taking the time to gather the image elements and make the scans. If the quick snapshots show promise, then you can plan the image and work with high-resolution scans or digital camera files to execute it.

If your camera supports the RAW file format, I highly recommend using it because the image quality and flexibility the format provides when acquiring the file is well worth the larger file size.

Because a camera image is generally a fixed resolution, decision-making is much simpler in regard to image resolution. You can increase the resolution of your digital camera by photographing image elements on the diagonal, which will increase the number of pixels used to capture the subject. Or you can photograph the subject in sections and use layers and layer masks to stitch them together, or use Photomerge to accomplish the same thing (Photomerge is discussed in Chapters 11 and 13).

My husband, John, uses Photomerge to create oddly shaped, yet pleasing abstract photographs, such as the one shown in [figure C.12](#). The digital camera he used for this image has a 6 mega-pixel CCD. By combining seven images, he created a 36 MB file. So don't think in limitations—learn to create with possibilities.



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figure C.12

Increase digital camera resolution by shooting overlapping frames.

CLOSING THOUGHTS

Although scanning is just the first step of the imaging process, don't underestimate its importance. To paraphrase a Chinese proverb—the first step is half the journey. Image input, whether it's in regard to a film scanner or flatbed scanner or a digital camera, is the foundation of the imaging process. The time and care you take in selecting it are essential to creating successful composites. So take a few minutes to read your scanner documentation and make sure you are familiar with your scanner software before you begin using it.