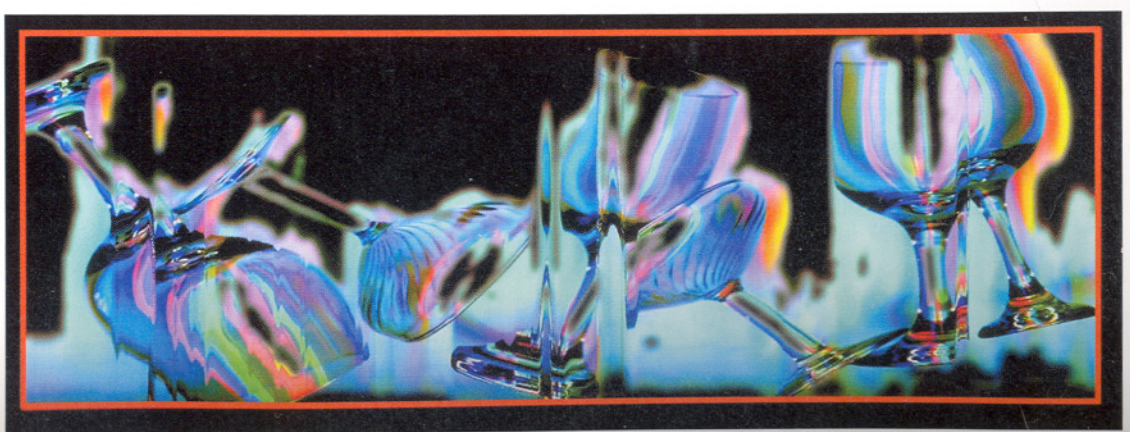
Scanning

Scanning creates digital images from negatives, transparencies, or prints. When images are scanned, their tones and colors are converted into numbers that the software can edit. A scanner captures samples of brightness and color in a regular grid pattern. The more samples it takes, the more detailed the scanned image is.

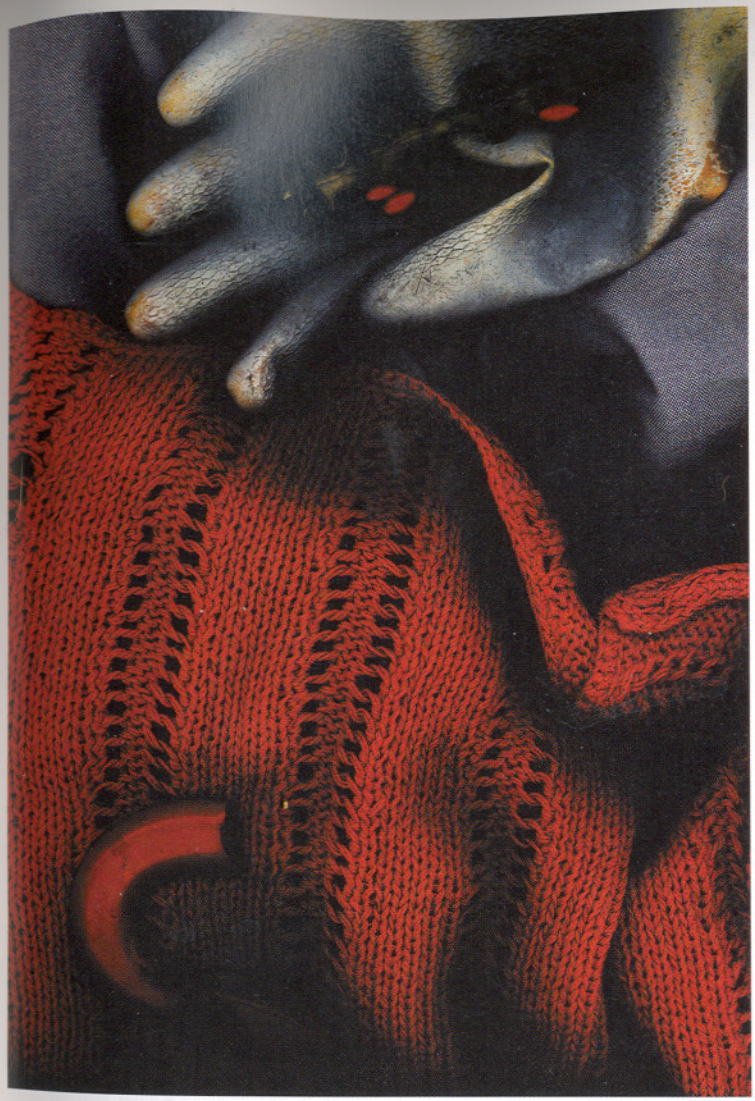
Image quality depends on the quality of the scan. Just as you can't get a good darkroom print from a poor negative, you can't get a good image from a bad scan (or a good scan from a bad negative or from a bad print). Scans made from poorly exposed or badly scratched film require extra time to edit and may not produce good results.

Just as in camera photography, it helps to know how the image will be used because you want each scan to give a good starting point for the editing process. If the final result is to be realistic, the scan should produce an image as close to realism as possible. If the final result is to be a colorful departure from reality, the scan should be as close to the intended colors as possible.

Before you scan an image, you need to know how it will be presented. Will the final image be viewed on a Web site or printed in a publication? Will it be exhibited as a fine print, and if so, how large will it be? A digital image has no real physical size until you print it or show it on a monitor. Potentially, it may be printed or displayed in many sizes, but if you select the wrong size settings for your scanner's software, you may have an image that is unsatisfactory for your purpose. Your scanning decisions must be based on both the physical size that you want and the characteristics of the printer or display device.



Katrin Eismann www.photoshopdiva.com



DARRYL J. CURRAN Three Red Seeds, One Red "S"

For over a decade, Darryl Curran has worked with constructed images. At first, he assembled the raw material for his images (sometimes by gluing the components together) and photographed them. Often he used a large studio camera, sometimes substituting color reversal photographic paper for film to create one-of-a-kind images.

In 1993, Curran began to use large flatbed scanners to capture his assemblages. Scanners permitted him to experiment more. Seeing the image on the computer display also gave him rapid feedback.

This image was taken while he was working at the imaging studio of Nash Productions, a producer of Iris inkjet prints for artists. Using materials found in the studio (the fabric, the red seeds, and an enamel "S") he evolved a composition that would depend on the computer's ability to deliver highly saturated colors.

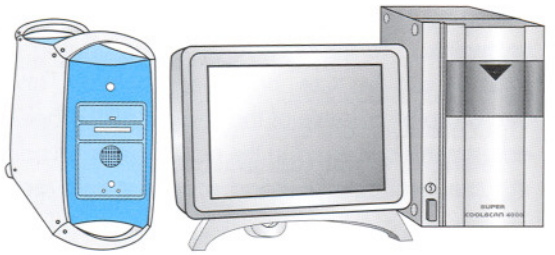
Scanning software is simplified image editing software. To get a good scan, the photographer adjusts the size, brightness, contrast, and overall color balance of the image. All the basic adjustments discussed in the next chapter on editing are available in good scanning software.

There are two types of scanning software packages. Some scanning software behaves like ordinary software: you open the software, command it to find the scanner and scan the image, and save the image as a file for later editing. The other type of scanning software is the **plug-in**, which cannot be used by itself. You first open the image editing software and choose File > Import (in Adobe® Photoshop®). You select the scanner's plug-in software from a list of image sources. Once chosen, the scanner plug-in will hide the image editing software and display its own interface and controls. When scanning is complete, the plug-in software will Quit (Exit) and the editing software will reappear with the image open and ready for editing or saving.

Alternatives to scanning. Kodak's Photo CD and Picture CD are good ways to digitize negatives and transparencies. Kodak software (available separately) permits your image editing software to open the disc's images. Many photo stores will scan 35mm film and store the images on a CD-ROM disc. Many of these services are available by mail order or can be located on the Web. For higher quality scanning, service bureaus for graphic arts businesses offer professional quality scans. These are found in most urban centers.

Making a Scan Step by Step

Scanner and Software

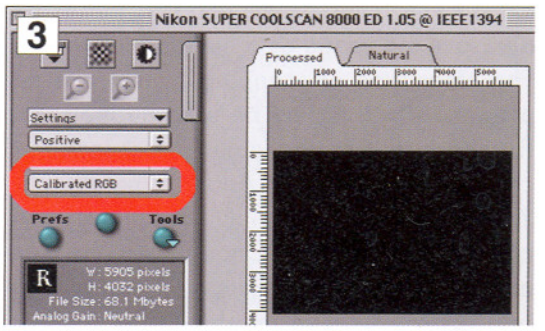


1. Prepare the scanner: Make sure the scanner is turned on and nected to the computer by the appropriate type of cable, and tha scanning software is loaded on the computer.

a. If using a flatbed scanner, make sure the glass is clean by wiping it a soft, lint-free cloth made for cleaning optical surfaces.

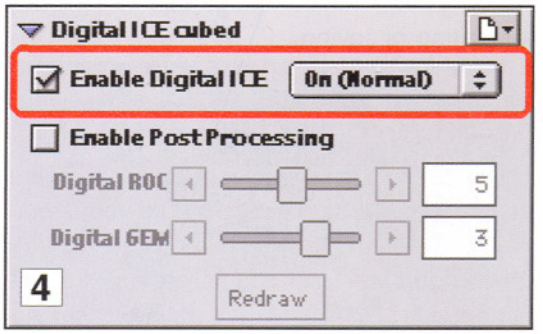
b. Dust the film or artwork with an anti-static brush or compressed

c. Load film into an appropriate film holder. Both flatbed and film ners usually require film holders for negatives and slides.



2. Open the scanner software. If you have plug-in software, lc your image editing software and launch the scanner through the I Import menu. Otherwise, open the scanner's stand-alone software your applications folder.

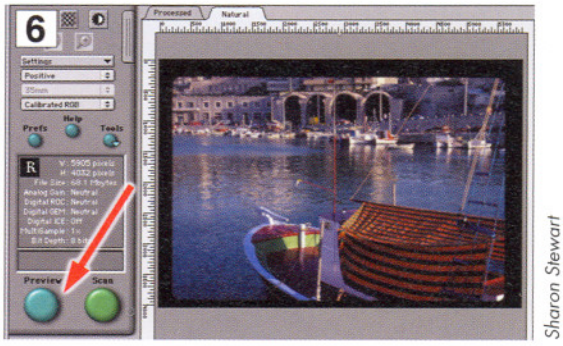
3. Set the color mode for Grayscale, RGB, or CMYK. In some case will need to set the bit depth of the scan. In general, scanning at a er bit depth allows you to change the tonality with better results, v as scanning at a lower bit depth keeps the file size usefully small.



4. Some film scanners employ dust and scratch reducing sof If you have a dirty or damaged original, you may want to turn on th consuming feature.

5. Most scanners provide a sharpening option, since the process c ning reduces the sharpness of the original film or print. Some ph phers do the sharpening later in the image editing software, wher is often more control over the sharpening.

6. Preview the scan. A preview is a quick, low-resolution sc shows you the image in miniature. It lets you plan and see correc the tonality, color, and cropping of the image.



Sharon Stewart

7. Crop the image. In the preview window, drag the outlines (edges) of the scanned area until only the parts of the image that you want to scan are within the rectangle. Many scanners will automatically adjust the exposure and color for the image inside the cropped area.

8. Determine the image output size and output resolution (samples per inch).

a. The scanner software often shows both the input size and the output size. The **input size** is the size of the cropped area you created on the original image in the preview, while the **output (or target) size** is the desired size the final product. (In the darkroom, the input size is the size of the negative you put in the enlarger and the output size is the size of the print you are making). Set the output size for the largest size you will need.

b. Set the **output resolution**. Make sure that the output size and resolution are what you need before continuing to scan. If you do not scan with enough resolution for your desired print size, your image may appear blurry. Most photographic prints need 200 to 300 ppi (pixels per inch), but when the scanned images are viewed only on a computer screen, 72 ppi is sufficient for Web sites or for e-mail.

9. Correct the preview image for brightness, contrast, and color balance. Most scanners will show your changes in the preview window. There may be several ways to make these adjustments, depending on your scanner's software. These could include the following tools:

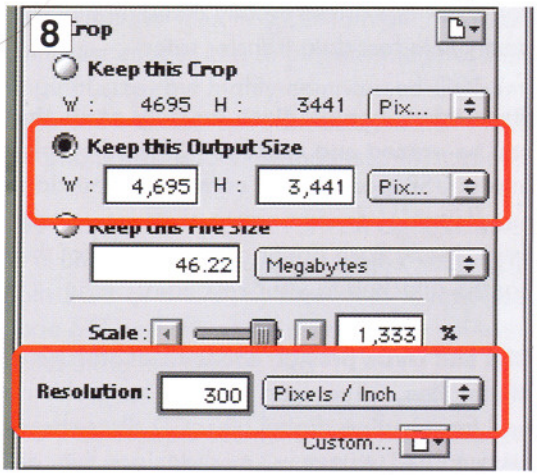
a. **Slider bars** for basic adjustments to brightness, contrast, and color.

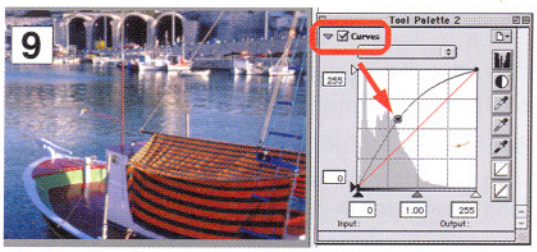
b. **Histogram controls** (page 36) for precise adjustments to highlights, midtones, and shadow areas made by viewing a graph of the image tones.

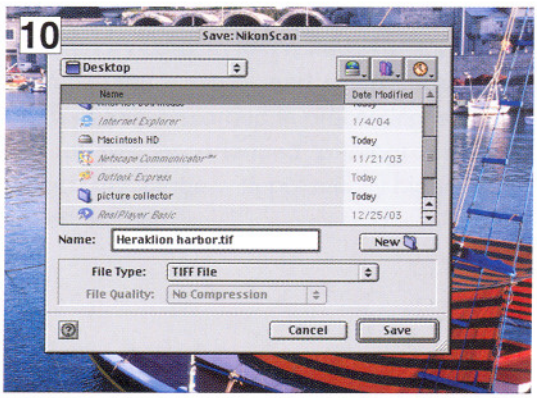
c. **Curve controls** (shown here) for specific adjustments to individual parts of the tonal range by shifting a diagonal line up and down along its length representing the tonal range from black to white (page 72).

10. Make the final scan and save the image in the appropriate format. (For formats, see page 29.)

Should you make the adjustments in the scanner or in the image editing software? The advantage of making the changes in the scanner software is that the resulting file may be of higher quality than if you try to make large corrections in the image editing software. On the other hand, Adobe Photoshop allows for far more precise adjustments and corrections than most scanning software. For most photographers, the answer is to make some correction in both places.







Storing Your Images

Portable storage media

Store your images to keep them available for later use. The hard disk in your computer is useful for downloading your digital camera files and for keeping them while you are making or editing scans. For security and permanence, you may want to store your files away from the main hard drive of your computer. Portable hard drives are excellent for storage and transfer. These drives may plug into USB or Firewire ports on the computer, and they function exactly like the hard drive inside the computer. Portable hard drives usually combine high capacity with fast data transfer rates.

Flash drives contain flash memory cards that can be erased and reused. Since they plug into a USB port on the computer, you don't need special equipment to read or write to them. Many flash drives are so small that they can be attached to your keychain.

CDs and DVDs provide economical storage of digital files. They can be used for archiving and transporting digital files. CD discs should be used as "write-only" media, since they are the most stable when the information is permanently burned into them. Write-once DVDs may also be preferable since a welter of incompatible standards for rewritable DVDs make future compatibility a gamble.

Most removable hard disks are not useful for storing and transferring images. These media tend to have a low capacity and are relatively expensive for the amount of information they store.

ANNA ULLRICH August Maiden with Seeds Sown

As digital images become more complex with artists combining existing images to create a new one, it becomes important to carefully store all your old images for possible reuse. Even fragments of images may find their way into new images.

Anna Ullrich's image (created for a calendar published by the creators of Photoshop, the Adobe Corporation) illustrates this need. The composite image was made from two photographic images (the woman and the boy), along with images from several flatbed scans of fabrics that Ullrich had in his studio. Many additional scans of fabric were made that did not appear in the final image. In all, the process of making the image resulted in the creation of dozens of image files, all of which had to be archived since they may be useful in the future.

Storing Your Images

File formats

Top, an image saved in an uncompressed, 24 bit file format. The area enlarged below is outlined.

Center, a 15x close-up of part of the image above. This file is in Photoshop format. A lossless compression format like TIFF would look exactly the same. The file size was 1.3 megabytes in Photoshop. It would be 1 megabyte as a TIFF file.

Bottom, a 15x close-up of the same part of the image after it was saved as a compressed JPEG file. JPEG allows you to choose the amount of compression. In this case maximum compression was chosen, and the file was compressed from 1.3 megabytes to 59 kilobytes, a reduction of almost 96%.

Note the loss of details and the irregular, chunky shapes that have appeared in the compressed image. These are imperfections in the compression, called compression artifacts. The more an image is compressed, the more noticeable the artifacts become. If this image had been compressed only 70%, instead of 96%, fewer artifacts would have been visible.

When you scan or edit a camera file, you'll need to save the image. There are many ways, called formats, in which software can save the image.

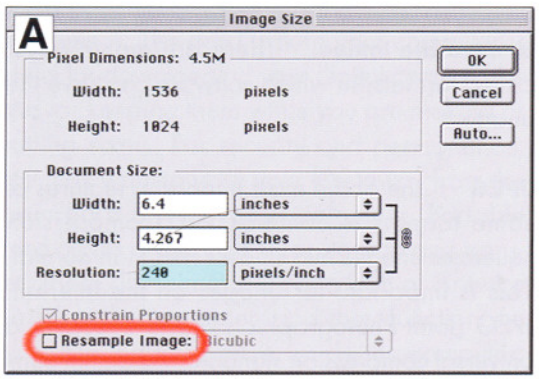
JPEG One of the most important features of some formats is *compression*. Compression squeezes images into smaller files than normal. This is important for images on the Internet. JPEG (Joint Photographic Experts Group) is a universal compression standard. All digital cameras can save files in JPEG format. JPEG can compress images to a small percentage of their original size, but highly compressed JPEG images show distortions (artifacts), which make the photographs look strange (see illustration).

TIFF (Tagged Image File Format) comes closest to a universal file format. It stores images in both RGB and CMYK, preserves layers (see page 66) and allows a little compression without altering the image.

PSD (Photoshop Document) is the native file format of Adobe Photoshop. PSD documents can be saved with all of their layers intact, which allows you to continue editing the image at any future time in Adobe Photoshop.

RAW is a format used by digital cameras to record the captured image without any processing. When a camera captures in JPEG or TIFF, it corrects the image for tone, color, sharpness, and white balance before saving it on the memory card. In RAW, however, the image remains unprocessed, and some image data that is usually discarded in processing is saved. This allows experienced photographers to process the image with potentially higher quality results.

Resizing an Image Step by Step

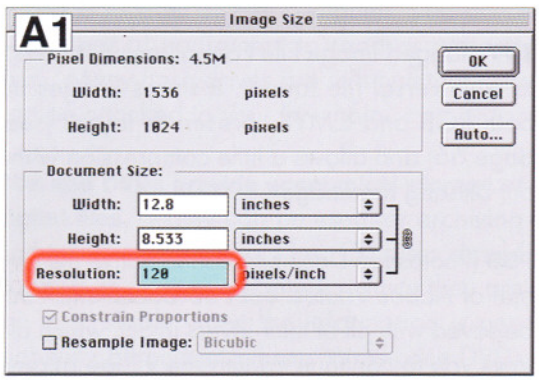


If you use an image more than once, you'll probably need to change it size. In digital imaging, changing the dimensions of an image is calle *resizing*. In Adobe Photoshop, resizing is done with the Image > Imag Size... command.

Be aware that the Image Size dialog presents two very different ways t resize the image: Document Size or Resample Image.

- Document Size does not affect the image quality or the size of th image's file on the hard disk; it merely tells the printer to print th image larger or smaller.
- Resample Image fundamentally and permanently changes the imag *the computer increases or decreases the number of pixels in the imag* thus data is usually lost and the file size is changed.

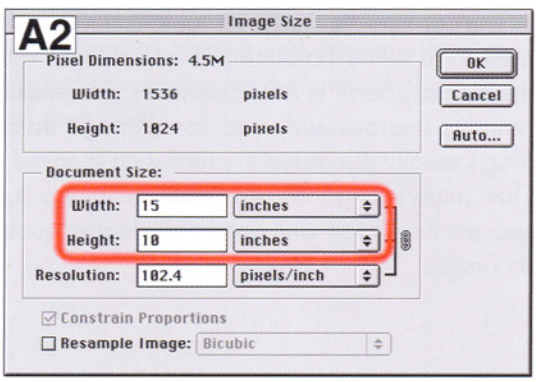
Both procedures begin by opening the image's file.



In Adobe Photoshop, select Image > Image Size... Then select one of th following options:

A. Sometimes you only want to change the document (print) size. To so uncheck the Resample Image checkbox. When this box has a check it, it changes the number of pixels in the image. Do not check this box you only want to change the print size.

1. Change the size of the document by typing a number in the Wid Height, or Resolution (pixels per inch) field. A change to any one will date the values in the others. For example, if the current print width is inches and you want the print width to be 10 inches, type 10 in the Wi field.



2. Note that automatically updated values for the Height and Resoluti fields are displayed. The resolution value is helpful as it tells you h many pixels per inch will appear in the print, so you can estimate h sharp it will look.

3. Click OK and you are finished.

B. Sometimes you must change the number of pixels in the image by resampling. If you reuse a large image for a Web site, you *must* use the resampling method to make it fit on screen. An image that begins its life as a print with a resolution of 2,400 × 1,600 pixels must be made much smaller to be viewed on the Web. It should be anywhere from 90 × 60 to 1,200 × 800 pixels.

Before you resample the image, consider rescanning it. If the resampled image will be *larger* than the original, consider scanning the image again at a higher resolution instead of resizing it. A rescanned image will have more quality than one you make larger by resampling.

Before resampling any image, save an archival copy of the original image. Resampling an image permanently alters it. Some of its data is discarded; a resampled image is usually not as good as the original.

To resample the image, select Image > Image Size... and then take the following steps:

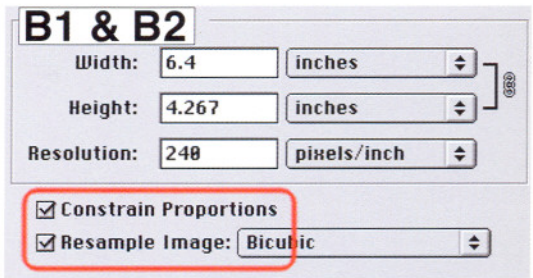
1. Check the Resample Image box. When this box has a check, it permits the number of pixels in the image to be changed.

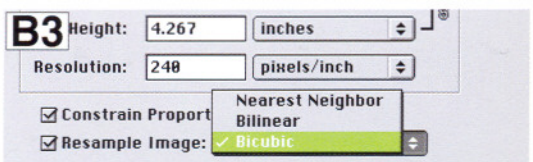
2. Check the Constrain Proportions box. When this box has a check, it keeps the shape of the image constant. Whenever you make a change to the width or height dimension, it automatically adjusts the other dimension.

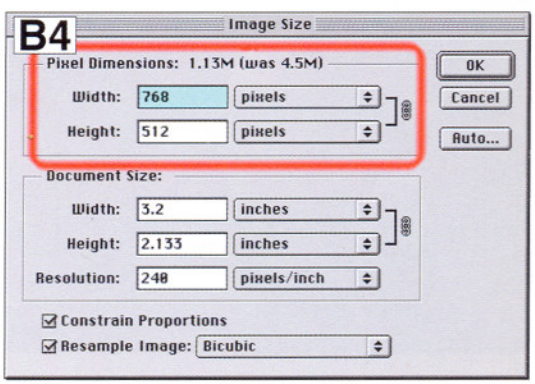
3. Choose Bicubic from the Resample Image popup menu. The Bicubic method resizes the image in a way that maintains the greatest amount of image quality. Use the faster but lower-quality methods only if Bicubic resampling takes too long with your computer.

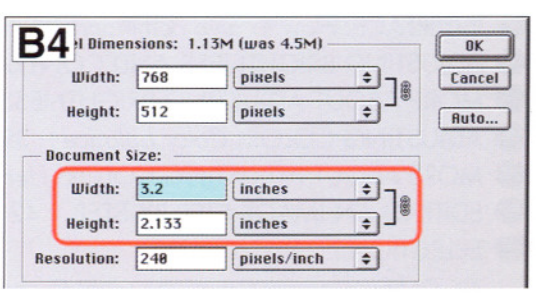
4. Change the number of pixels. There are three ways to change the number of pixels:

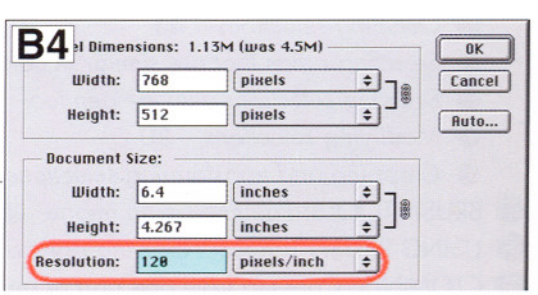
- Type in the desired number of pixels in the Pixel Dimensions: Width or Height field. *Note: the print size will simultaneously change.*
- Type in the value for the Document Size Width or Height. The number of pixels will automatically change to match the new document (print) size.
- Type a value in the Resolution (pixels per inch) field. The number of pixels will automatically change to match the new resolution. *Note: the print size will not change.*

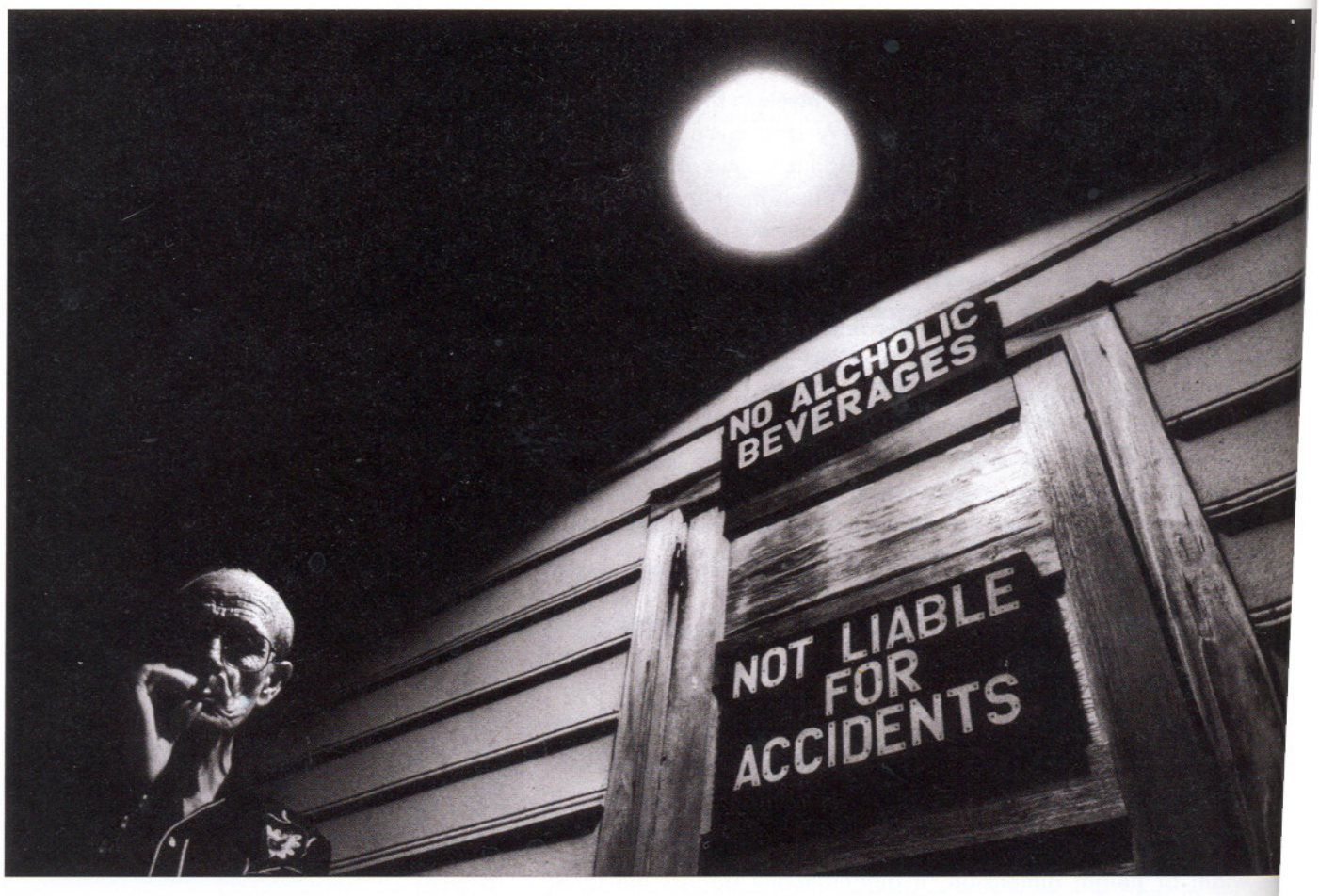












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