

Introduction to Scanning



Instructor: Geraldine Sombke

Prepared by Geraldine Sombke and Susan Johnson

©Brightwebs.com 2004

Course Objectives

This course will teach you how to capture images and text with a scanner and to save them on your hard drive, e-mail them to friends, use them in other documents. Being able to transfer images into your computer opens up a whole new creative world, as the computer is a very powerful tool for manipulating and editing them.

At the completion of this course, you should be able to

- Capture an image with a scanner
- Resize it for optimum use
- Understand the effect of different resolution settings
- Save a scanned image on your hard drive for later use
- Import a scanned image into a picture editing program

WHAT DOES A SCANNER DO?

A scanner is used to transfer pictures, patterns and images from printed material or photographs into your computer. A lamp passes over the item you are scanning, transferring the information back to the PC as digital data through a light sensitive chip called a CCD (charge coupled device). This is the same type of chip used in a digital camera.

Put simply, the sensors on the CCD measure the light being reflected from your picture by the three primary colours (red, green and blue). This is enough information for your image to appear in full colour by the time it reaches your computer.

HARDWARE REQUIREMENTS

Scanner manufacturers will list the minimum system requirements on their product, but some general guidelines follow:

At a minimum you need:

- 300 MHz processor
- 32 MegaBytes of RAM
- 3 Gigabytes of hard drive space
- 24-bit graphics card
- Colour monitor
- USB port (note that Windows 98 SE supports USB. Windows 95 does not).

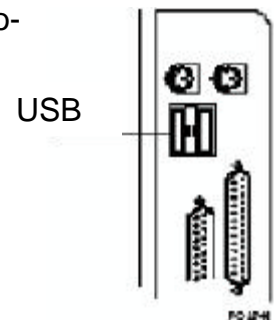
Introduction to Scanning

- The reason graphics programs demand a lot of space from your computer is that the graphics files are very large. Because they contain visual information, graphics files take up a lot of disk space and memory and the microprocessor has to work hard to manipulate the graphics information in memory. This is far more demanding than most other types of programs you run on the computer.

Of course, not having a lot of hardware horsepower doesn't mean you can't work with graphics. It merely means that the graphics software will run slower than it would on a computer with a faster microprocessor and more memory.

Each brand of scanner will come with different bundled software and may use different connection types. The most common are parallel ports, **SCSI** ports, and **USB** (Universal Serial Bus) ports. USB is the easiest to use if your computer has USB capability, as connections are Plug-and-Play (plug the component in and it should work automatically).

USB is becoming the standard on new computers so be sure to look for it on all new devices.



WHAT'S THE DIFFERENCE?

You may ask how much better is a \$500 scanner than a \$69 scanner?

They all do the same things, but there are definite reasons why some cost more than others. They relate to the following scanner attributes:

- Resolution
- Colour depth
- Optical density
- Interface

Resolution

This is a gauge of how much information (detail) the scanner can read from an image. The higher the resolution, the sharper the image. And with that higher resolution comes a higher cost.

The scanner's resolution is measured in dots per inch (dpi). Values range from 300 dpi on up to 2400 dpi or even higher. That tells you how many pieces of an image the scanner can read on a horizontal line. The more dots per inch the scanner can read, the more detail you will have in the final image.

●●●●●●
6 dots per inch

.....
24 dots per inch

The resolution you need depends on your final output media. A picture displays fine

Introduction to Scanning

on a web page or on any computer screen at 72 DPI, whereas to print it on a laser printer the resolution should be at 300 DPI, and if you wish to print in colour on an ink-jet printer it should be at 2400 DPI or greater. But bigger is not always better! The resolution you choose also effects file sizes, which affects download times.

The following table assumes a 4 in. x 6 in. color print as a starting point, and the same size output (i.e. 4 x 6, NOT full-page).

Final Output Media (4 in. x 6 in.)	Minimum Resolution – DPI	Approx. File Size as TIFF	Download Time at 56k (JPEG)
Screen / web / e-mail	72 - 96	96 DPI = 630 KB	46 seconds
Fax	200	200 DPI = 2.67 MB	
Laser (black and white) print	300 – 600	300 DPI = 6.01 MB 600 DPI = 24 MB	6 min., 50 seconds
Color ink-jet print	300 – 2400	1200 DPI = 96 MB	21 min., 25 seconds
Color photo print	2400 - 4800	2400 DPI = approx. 385 MB	

Colour depth

The depth of colour means how many levels of colour the scanner can capture. It is measured in 'bits', and the higher the bit value, the better the scanner is able to discern between two subtly different shades of the same colour. This is a definite advantage.

The minimum depth of colour you want should be 24 bits. This does not mean you will always use 24-bit colour, but you want the capability.

Interface

This refers to how the scanner connects to the computer. It may use the printer port, which means you will need to swap cables when you wish to use one or the other. It may use a USB port (see illustration) or a SCSI (Small Computer System Interface) which is pronounced "scuzzy". SCSI scanners tend to be more expensive, and also

Introduction to Scanning

require a separate card and cable. But they are much faster than USB scanners (at least twice as fast).

If your computer does not have a USB port or a SCSI port, they can be added.

SOFTWARE REQUIREMENTS

Drivers

This is the software used to run the scanner – the basic operating system programs. A TWAIN (Technology Without An Interesting Name) driver is the link between the software and your scanner, providing the interface that you need to perform a scan. A TWAIN driver will come with your scanner, and most photo editing programs will ‘talk to’ the TWAIN driver to acquire the image.

Scanning Programs

This is the program that operates the scanner, adjusting its many options and actually acquiring the image. The scanning program doesn’t run by itself but is used instead by the image-editing software to acquire the image. For the scanners in our lab, the program is Scanwise.

Image Or Photo Editing

All scanners come with basic image editing software, usually something like Adobe Photo Deluxe or a similar program. You can also download a free graphics editing program such as Irfanview, which offers basic editing capability.

Text Recognition

Usually your scanner software comes with integrated OCR (Optical Character Recognition software).

OCR converts a graphic picture of text into text that can be edited. When you scan text, the scanning software uses OCR to automatically convert the text to appear in your applications as editable text.

Don’t feel as though you have to install everything at once. You can manage with just the basic drivers and image editing software and install the other programs when you need them. You may not ever need OCR software, but it can save a lot of re-typing.

GETTING STARTED

Usually, but not always, you need to install the software before you plug in the scanner. Every scanner has a different setup process, so use the information that came with your particular model.

Restart

Introduction to Scanning

- It is usually necessary to restart your computer before you can use newly installed software. If the installation process does not provide you with the option, you can do a manual restart, by clicking on the **Start** button, then **Shut Down**. Once the computer has turned off, plug in your scanner to the USB port. **Restart** your computer. This allows the system to see what changes have been made and to recognize new hardware.

Scanner Settings

For this class we will use the default scanner settings, since each scanner model will have slightly different options.

Making a scan

There are several steps to the actual scan process. Most scanner software has similar menu choices. They include:

- Starting the scanner
- Selecting the area to be scanned
- Choosing the destination for the scan
- Adjusting the quality and size of the scan
- Saving the scan to your software application

Start your scanner software, usually by clicking on the desktop icon.

Lay your picture face down on the scanner bed, generally with the top of the picture closest to you. Click on **Preview**. You will hear the scanner operate and it will make a quick pass over your picture, which will appear in the preview screen. At this point the preview area represents the entire surface of the scanner bed.

You can adjust the image area by cropping, resizing or moving the scan area. This is done by drawing a marquee (a square made up of flashing, dotted lines) around the relevant area. Either there will be an existing marquee on the screen or you will have to draw one by clicking in one corner of the preview and dragging the cursor across to the opposite corner.

You can adjust the marquee so that it is exactly positioned around the area you want to scan. To move the entire marquee, place the cursor inside it and the cursor changes to a four-way arrow. Hold down the left mouse button and drag the marquee to enclose the area of the image that you want to be scanned.

Note: The next time you scan something, you may see a 'leftover' image in the preview area. It will go away when you preview the new image.

Don't forget to unlock it.

The lock mechanism, usually found on the back end or the bottom of the scanner, is used to prevent the image sensor from sliding around during shipping; however you must unlock the scanner before you can use it.

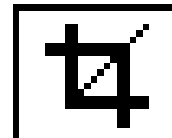
Introduction to Scanning

Choose the correct resolution (see above). If you are using Scanwise software, choose the destination for the scan (file, Word document, copier, image editor).

Click on Scan and the image will be scanned into the chosen software.

A few tips

- If you are placing multiple items on the scanner glass and the software does not detect them, place a white page behind the items.
- If you are scanning material printed on both sides of the paper and it bleeds through, place a black page behind the original. Magazine pages often bleed through.
- Crop the image to only the part you need. Cropping is the term used to describe the removal of unneeded background from your photos. Sometimes you only want one section of an image. The cropping tool allows you to cut off the unwanted edges. This will also help keep your file size smaller.



Saving the Image

Note that if you wish to do anything with the image at this point, it's a good idea to save it first in its 'default' format. That will generally be a Tagged Image File Format (TIFF) file, which will give you the maximum amount of information available for later editing. Other format options are Joint Photographic Experts Group (JPEG) pronounced jay-peg, and Graphics Interchange Format (GIF) pronounced jif or gif. Both of these are compressed formats.

The TIFF file will be very large, so if you only plan to use the image on the web, or e-mail it to someone, save it as a JPEG.

When you have saved the file, quit your imaging software. You now have the image in digital format, ready to use in other programs and applications. Some possibilities include Print Artist, MS Publisher, attaching it to an e-mail, inserting it into an MS Word document.

Exercises:

The following exercises will allow you to see the differences between files sizes and resolution settings. The more you use your scanner, the easier it will become.

For these exercises, scan the same picture at various resolutions to illustrate effect on image quality and file size.

Key Points

Save photos for the web as JPEG and other images as GIF

Avoid using GIF and JPEG for master copies of images you intend to edit later. Save master copies as TIFF

Introduction to Scanning

- 1 Scan a photograph and save it on the hard drive in the scanner software's default settings. (*Remember to save your work in your own folder in the Student Files folder*).
- 2 Scan the same photograph and save it as a JPEG.
- 3 Scan the same photograph and change the settings to 8 bit colour. Notice the difference in file size but also in image quality.
- 4 Scan and save as a TIFF file. This will be the largest file size.
- 5 Using Irfanview, try the Slide Show option – **File | Slideshow**

More reading:

The following materials have been quoted in the preparation of this material:

- *Digital Scanning and Photography*, Dan Gookin, Microsoft Press ©2000
- *Scanners and Printers*, Andy Ashdown, Dorling Kindersley ©2001
- Scanning 101 – <http://www.scantips.com> - Wayne Fulton, ©2000

The Jasc website has excellent tutorials on using the Paint Shop Pro program, an excellent, low cost image editor.

- See the links at <http://www.jasc.com/tutorials/scantip.asp> and
- <http://www.jasc.com/tutorials/revise/optmizing.asp>

Irfanview can be downloaded from <http://www.irfanview.com/> and is freeware for non-commercial use. Small enough to fit on a floppy (639 KB) , it supports multiple image formats.

The Wise Women site at <http://www.wise-women.org/resources/abc/graphics> has some good tutorials on scanning and image manipulation.

About.com is also a good source of easy-to-read information:
<http://graphicssoft/about.com/library/weekly/aa111799p3.htm>

Also try a search on Google for the words scanning+tutorial.