digitalphotography
the complete course

New York Institute of Photography

Output Basics

Unit Two
Lesson Eight

– +
page size

Quit

click to begin

Table of Contents

Introduction.

You've captured an image with your digital camera.

–or–

You've scanned a print or negative with your scanner.
Now what?

The answer is output. Output refers to the final destination for your digital capture. For some, output might mean an inkjet print to hang on the wall. Others may want to send a picture to a relative in another country via e-mail. Maybe you're not sure what you want to do with your images but want them ready in digital form for use later. In this case, you need to organize and store them, safely and efficiently, and that means output to a disk of some sort. Perhaps output to you simply means saving your image in a particular file format.

We'll cover output extensively later in your Course, including information on using your images in a variety of ways, from Web site design to desktop publishing. Before we cover those advanced topics, however, let's look at these basic output methods – saving your images to disk, archiving your images and printing your images.

©Olympus Dye Sub printer.

Saving Your Images.

As we discussed earlier in your Course, digital cameras will save your pictures in a variety of different types of file formats—JPEG and TIFF for example. If you are working with a digital camera, in essence your decision on how to save your images has happened long before you transferred them into your computer. You made the decision to save your pictures in one of these formats right in the camera.

In the next Unit, when we begin our study of Photoshop, we'll be showing you how to use Adobe Photoshop to convert your digital camera photos or your scanned images from one file format to another. For now, once you have transferred your camera's images into your computer, you need to determine where to keep them and whether or not you want to print them and the best way to do so.

Images that are scanned also need to be saved in one of several popular file formats. You have to make the exact same decisions with regard to file type with a scanned image that you do with an image captured with a digital camera. For instance, you may choose to save your scanned image in an uncompressed TIFF format, which would give you the option of enlarging or reducing the image without loss of quality.

Common file formats:

TIFF **(Tagged Image File Format)** Good for uncompressed digital images utilizing 24-bits of information per pixel (16.7 million colors). Use TIFF when you want the highest possible quality.
file extension: ***.tif*** *(eg: flower.tif)*

JPEG **(Joint Photographic Experts Group)** Good for compressing digital at varying compression ratios, utilizing 24-bits of information per pixel (16.7 million colors). When file size matters, JPEG compression can produce great quality and small files.
file extension: ***.jpg*** *(eg: myfamily.jpg)*

GIF **(Graphic Interchange Format)** designed for graphic elements such as type and logos. This format utilizes 8-bit color (256 colors) which is perfect for images with large areas of solid color with no gradients.
file extension: ***.gif*** *(eg: logo.gif)*

FPX **(FlashPix)** A proprietary format developed by Kodak in conjunction with Microsoft, Hewlett-Packard, and Live Picture. FPX is a multiple resolution image format that was designed for consumers and small office users.
file extension: ***.fpx*** *(eg: camerapix_1_03.fpx)*

BMP **(Bitmap)** Windows native image file format.
file extension: ***.bmp*** *(eg: desktop_pattern.bmp)*

PICT **(Quickdraw Picture)** Mac native image file format.
file extension: ***.pict*** *(eg: screenshot.pict)*

You may choose to save your scanned photograph as a compressed JPEG because you might be using it on a Web site or sending it by e-mail. If you decide to use the JPEG format, you may want to minimize compression or maximize compression depending on how you plan to use the image.

You may sometimes want to use a third popular compression file format called GIF, which is more suitable for scanned artwork like company logos as opposed to photographs.

Keep in mind that until you are familiar with Adobe Photoshop, which will let you save your scan using any file format you choose, you will have to save your scanned image in whatever format your scanner's software will allow.

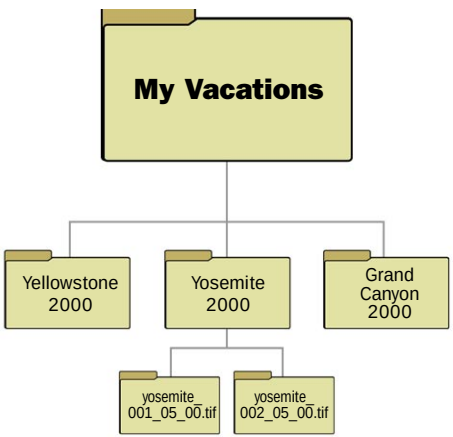
Some scanners will let you choose the format after the scan, others will require you to pick a format when you first set up the software, and still others limit the formats in which they can save images.

The important thing to remember is that you will need to save your images in any one of several file formats and that these file formats work the same way regardless of whether you are dealing with a camera image or a scanned image. Saving your image as a file is really the first basic output decision.

To learn even more about JPEGs, TIFFs and other file formats, read the Digital Dialog articles found in the Student Lounge.

Understanding and Creating File Names.

Most digital cameras automatically name individual files with long strings of numbers that are rarely meaningful. Renaming your digital camera files logically will mean easier searching and retrieval. With scanned images, create a logical naming system from the start since your scanner will let you pick the name of the file. The type of images being organized will probably dictate how a file is named.



Example 1

If you are filing vacation photographs, perhaps a location/image number and a date would be sufficient. For example, "*yosemite_001_05_00.tif*" would designate an image taken in Yosemite National Park (yosemite). It's the first in a series of at least 100 (001). The month and year of capture was May, 2000 (05_00). Dates can be helpful when naming images, especially if the subject has been photographed on multiple occasions.

Once you've named your individual images you can group them together in a folder. Image "*yosemite_001_05_00.tif*" might reside in a folder named "*Vacation Yosemite 2000.*" By grouping all your Yosemite images in one folder you will be able to find them quickly and easily. Just like an efficient filing cabinet, accurate labeling and logical organization will make your digital archiving trouble-free.

You can even make a folder to hold your folders. Perhaps all of your folders reside inside a master folder named "*My Vacations.*" In the master folder you could store all of your vacation images.

Example 2

If you are filing photographs of inventory for your store, cross-referencing an existing catalog number might make sense for the new name of your file. This way, the name remains consistent regardless of whether you are referring to an actual product or the digital image of the product.

Example 3

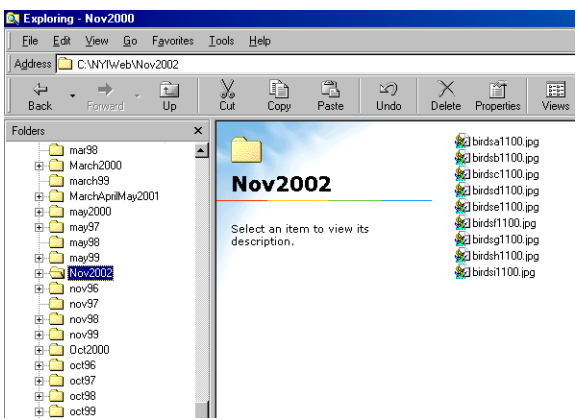
Perhaps you will be scanning images for an article in a printed magazine or for an online e-zine. For instance, when we scan images for a Web article, let's say on photographing birds, the five images in the article might be called *birda0903.jpg, birdb0903.jpg, birdc0903.jpg, birdd0903.jpg* and *birde0903.jpg*.

In this case, the file names tell us what article the image is used for (bird), the placement in the article (a,b,c,d or e) which would be a big help to your layout people, as well as the month (September – 09) and the year (03).This may not seem very important at first, but just imagine that it is five years from now and you've amassed a huge collection of images from sixty months of magazines. Being able to identify the pictures that ran in a specific month would be very handy.

Example 4

On your Unit Two audio CD, we explain why you might want to keep a master folder of your images in uncompressed TIFF format and create all other files you need from those masters. In this case, you might want to create a folder called Masters and call each of the files in there something like *masteryosemite_001_05_00.tif*.

The point is that you need to think carefully about how to keep track of your image files. It's easier to create a logical naming system now than trying to set one up after you have hundreds or even thousands of files with names that no longer seem relevant or useful.



How to Create an Empty Folder.

WINDOWS: On a Windows-based machine, this can be done in Windows Explorer. Simply choose **File>New Folder** and give the folder a name.

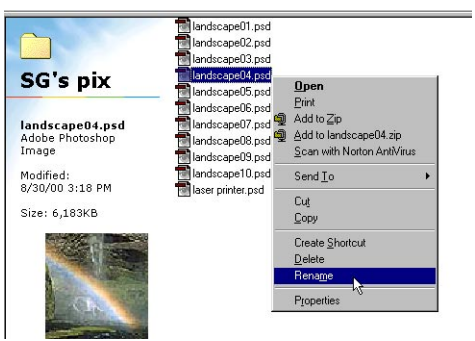
MAC: On a Mac, you choose **File>New Folder** and name the folder.

Dragging images into the open folder (or right on top of the folder icon) will deposit those files inside.

How to Re-name a File.

WINDOWS: On a Windows-based machine, you can change the file name by clicking the right button of your mouse on the file name in Windows Explorer or on your Desktop. Select rename from the menu and type a new name in. If your file name shows up with an extension, for instance *mypicture.jpg*, remember not to change anything after the period, since those three letters indicate what type of file format the image is saved as. Changing the extension could result in your file becoming corrupted.

MAC: On a Mac, renaming any file can be accomplished by clicking once on the file title to highlight it, and then typing in the new name. One small tip: If you are planning on giving this file to someone using a Windows-based machine, we recommend that your Mac file name includes a period at the end and three letters indicating the file format the image was saved as. For instance, *mypicture.jpg* if the image was saved in JPEG format or *thisphoto.tif* if it was saved as a TIFF. Otherwise, the Windows-based user may not be able to open the file.



Renaming a file in Windows.

Archiving/Storage.

Once your images are saved on your computer's hard drive, then the issue becomes where to store them and how to retrieve them when you need them. We call this archiving.

Archiving means different things to different people. Lots of people store their photographs in shoeboxes or drawers, fumbling through hundreds of prints and negatives until they find what they need. Others file their prints and negatives carefully and methodically for easy access and viewing. Whether you fall into either category (or are somewhere in-between) you will have to decide the best way to store your digital images to suit your needs.

Digital image storage has two stages: First, saving and cataloging your images on your hard drive, and second, backing up your images onto another form of storage media. Let's take a look first at the options you have for storage.

©Agfa

Hard Drive.

As we've explained above, while it is a good idea to store your images on your hard drive, it is not a good idea to make your hard drive the only place where you keep those files. Hard drives do crash, so having your digital photos safely stored on some type of backup media is essential. Furthermore, digital image files can be quite large—it's not unusual for a single image to be 20, 30 or even 100 megabytes. Even the largest hard drive will fill up quickly with files that large. So, always make sure that you have copies of your files on a removable form of media.

That said, this does not mean that you don't want to keep your photos on your hard drive in some form or another. As we will explain below, you may want to use software which will allow you to easily identify, catalog, and retrieve your digitized images when you need them. However, it is possible to keep low-resolution small-size images on your system for easy identification while keeping the larger "masters" on removable storage. This way, you get the best of both worlds.

Floppy Disks.

A standard 3.5-inch disk can only handle 1.4 megabytes, which means that the average digital scan or an image captured by a megapixel digital camera will not fit on a single 3.5-inch disk. While there are ways of compressing the information you store so that you can fit more information on a single 3.5-inch "floppy," compression doesn't always work successfully and will ultimately cause damage to the file. In addition, 3.5-inch disks are prone to failure. They physically don't stand up to rough handling so it's not unusual for these floppies to crack open or have the metal tabs fall off rendering them useless. Like other forms of magnetic media, they are also prone to damage from heat, moisture and magnetic fields. Some computers don't even come with 3.5-inch drives any longer, so using these disks as storage devices for your digital photos isn't really a viable option.

3.5-inch floppy disks.

©Iomega

Zip disks and an external Zip drive are one example of a high capacity magnetic storage system.

High Capacity Disks.

High capacity magnetic media are popular storage devices. Many computers now ship with them as a standard built-in accessory and you can add one to your system for under $100. One example, a Zip drive works just like a 3.5-inch drive—you save, copy, rename and remove files from Zip disks in exactly the same way that you would use a floppy. Unlike a 3.5-inch disk, that holds only 1.4 megabytes, high capacity disks come in several sizes—100 MB, 250 MB, or 750 MB depending on which type of drive you have purchased. Obviously, the advantage of high capacity disks is that they can hold large amounts of data and that means you can store a lot of your photos on a single disk that costs less than $20. While these disks are similar to 3.5-inch disks in construction and prone to the same types of damage from heat, moisture and magnetic fields, they are less prone to damage from rough handling than floppies since they are considerably thicker and much sturdier.

Recordable CDs.

An increasingly popular form of digital image back-up is the recordable Compact Disc or CD. In order to write information to a CD, you need a CD "burner." CD burners are different than the CD–ROM players that come installed on almost all computers today. CD–ROM drives are designed only to read information. Recordable CDs are recorded, or "burned," with a laser, which creates "pits" (indentations) and "lands" (reflective areas) that correspond to digital information. Easy-to-use software coupled with low prices have made CD output perfect for storing large amounts of digital information. At 650 MB, CDs can store 6 ½ times more information than a standard high capacity disk.

There are 2 main types of recordable CD media: CD-R and CD-RW. There are some significant differences between the two. CD–R media cannot be erased and re-written. CD-RW can be erased and re-written over and over again making it a much more flexible storage media. CD-R, however, is preferred by many for archival back up because it can't be erased and is also a good deal cheaper than CD-RW. The choice of which to use is strictly a personal one.

DVD.

Another form of digital storage is the DVD burner. DVD backup is very similar to the CD burning process, the main difference being that DVD lasers burn at varying intensities allowing more information to be stored on a disc. Rapidly dropping prices, coupled with the ability to store from 5 to 9 gigabytes of information, fast transfer speeds, and promises of long life make this storage medium hard to ignore.

Storage Media Considerations.

Now that we've explained some of the popular forms of removable storage, how do you decide what type of storage is best for your needs? Here are some tips on evaluating these options:

Capacity: The ability to store more images is important for efficient storage. You should evaluate which type of storage device to buy based on its capacity. However, you may decide to buy several different types of storage devices. It's not unusual for instance, to have a computer that has both a CD-RW drive and a Zip drive. If you do have both types of drives, you'll want to evaluate which storage device to use on a case–by–case basis. For example, you may store your image files on CD-RW but you may choose to send a disk to your service bureau because it's quicker and easier to put a few images on a disk as opposed to the effort required to burn a CD.

Reliability: How does a particular type of media storage hold up under adverse conditions? Manufacturers do subject their media products to accelerated aging tests and you should be able to track down some information on the longevity of files saved on a specific brand of storage. However, the bottom line is that these devices haven't been around long enough for anyone to guarantee that they will survive 20, 30 or even 50 years in the future. All technology fails at some point, so

careful attention to making multiple backups will eliminate the possibility of a catastrophic loss. It is also not a bad idea to check magnetic types of media like floppies and high capacity disks periodically to make sure that they are still functional and perhaps copy the files onto new media every few years or so.

Standardization: Try to choose a medium that is nearing its peak popularity. This is especially important if you plan on sharing your image files with other people or companies. The newest technology may not become widely accepted and the older products may be headed for obsolescence. The most important thing is to be aware of obsolescence when it comes to hardware, formats, and media. Be aware of shifts in the industry and don't get caught with a bunch of files that you can't read because the storage devices no longer exist. For instance, when was the last time you saw 5¼–inch disk drive in a modern computer? As we've already noted, there are more and more computers being manufactured without any floppy disk drive which was a standard item just a few years ago.

Cost Per Unit: This formula will help you determine how much you're paying per storage unit, allowing you to compare a variety of media for cost efficiency. Let's look at a few examples:

A standard Zip disk can sell for about $10.00, and can store up to 100MB of digital information per disk, so:

100MB divided by $10.00 = $1.00/ MB.

The cost per MB for a Zip disk is $1.00.

A CD-R disc can sell for about $1.00 if you buy them in quantity. A CD-R disc can hold up to 650MB of digital information, so:

650MB divided by $1.00 = .0015 cents per MB
(that's less than a penny per megabyte).

A CD-RW disc that sells for $2.00 means you'll be paying .003 cents per megabyte of information.

On a cost-per-unit basis, you can plainly see why CD media makes sense when it comes to storing large amounts of digital information.

Please realize that these figures are an approximation. While a 100 MB disk can theoretically hold 100MB, it starts to get crowded once you pack 90MB on to it. Remember that some space is taken up by directories and other internal information.

In the same way, the CD-R or CD-RW is about full when you've loaded 620MB of your image content.

So, why would you ever you use a high capacity disk based on this scenario?

The simple answer is convenience, which is another major storage consideration.

Popularity: The popularity of magnetic media technology ensures that your disks can be read by a wide variety of computer users since they are a standard feature in a lot of machines. Any serious service bureau will be able to read a high capacity disk, so they are great for transporting files for output.

Transfer rate: Transfer rates are a way of evaluating how fast data will be copied from your hard drive onto the storage media. These rates vary widely. Speed is a big factor when it comes to making copies. Fast transfer rates will make backup easier and faster and, as a result, more likely to take place. Burning a CD or DVD can be a slower and more labor-intensive operation compared to making a disk backup. In reality, a measured use of both media will help streamline your digital workflow. Magnetic media is great for short-term storage and CDs and DVDs for the long haul.

One last tip: Do not buy cheap media of any kind. Using "no-name" brands is an invitation for problems. Stick with the current respected leaders in the storage media industry that all offer a wide variety of different types of storage including 3.5 inch disks, high capacity disks, CD-R, CD-RW, and DVD-R.

In the end, if you use a combination of long-life media, a proper storage environment, proper handling, error-detection, and you make a sufficient number of backups, you will ensure having a long-lived and safe digital library of your photographs.

Storage Workflow From Your Camera.

If you are working with a digital camera, you will want to transfer your images from the camera to a hard drive on your computer using the camera software or a card reader of some sort. You don't want to leave your images on the camera's storage media, because memory cards and other "digital film" types are simply not as durable as hard drives or CDs. Once you have transferred your images to your hard drive, be sure to try to open your downloaded images immediately to check that the files were not corrupted during the download process. If any problems occurred in the transfer process, you don't want to find out after you've deleted the images from your camera. Always confirm that the transfer was successful.

At this point, you may want to duplicate those files on a removable disk. This is a simple precaution that acts as your safety net if your computer's hard drive suddenly decides to crash. Now with two backups confidently completed, one on your hard drive and the other on another form of storage media, you can safely delete the images from the camera's memory card.

Storage Workflow From Your Scanner.

Working with scanned images is similar. Depending on your scanner's software, your images will either automatically be saved by the scanner onto your hard drive or will wait in your computer's RAM memory until you give the scan a file name and designate where to save it. We recommend that you should always save your scanned images first on your hard drive and then copy them to a removable storage device.

It is best that you don't try to save your scan directly to a removable disk. That's because the image may be larger than your removable disk will allow, or the process may require too much RAM, thereby resulting in the system crashing.

In addition, it's a good idea to save your scan in a non-compressed format like TIFF before you attempt to correct the scan in the digital darkroom. This way, if you are not happy with the results of your corrections, you have the untouched file safely stored inside your computer.

Furthermore, if the scan has not been saved, it is held temporarily in your computer's RAM. By saving your image to your hard drive you are essentially clearing the RAM for more important operations, like making another scan.

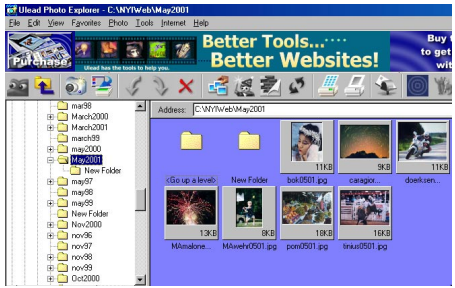
Organizing Your Images.

Database Technology for Archiving and Retrieval.

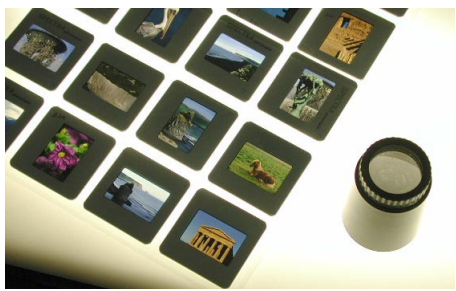
Once you start using a digital camera and/or start scanning your photographs, you are going to find yourself suddenly overwhelmed with a large number of digital image files. The question then becomes: How best to keep track of what you have and how to find a particular image when you need it? Just imagine receiving a call from a client whose wedding you photographed two years ago or a stock photo agency looking for that great picture of an exploding volcano you know you took. Can you put your hands on those photographs?

Looking for a digital image in this scenario can be just as frustrating as trying to put your hands on the original slides or negatives in your filing system, especially if you don't have a system in place to easily locate the files.

The truth of the matter is that one of the reasons to have digital files of all your images is so you can locate the picture when you need it. It should be easier than finding the original hard copy photograph. But as you go along and accumulate more images, you'll find that the folders you set up earlier won't do the entire job.



Ulead Photo Explorer



©Jim Barthman

In the early days of digital management, images were organized with customized database software. The task of processing, organizing and delivering digital images was left to the high-level computer programmer who often had to convert software that was meant to handle text-based information. Today, there are many off-the-shelf software packages that will let you catalog, search and retrieve your photographic data files quickly and intuitively.

Let's examine some of the options available.

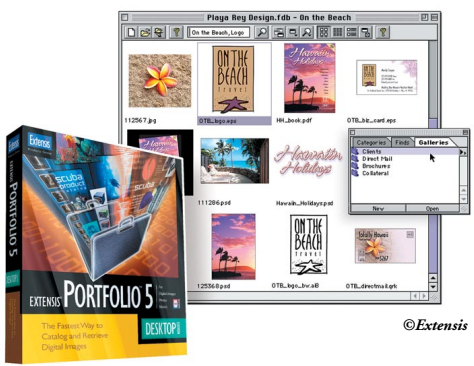
The simplest form of this type of software lets you view the contents of a folder and see what the files look like in thumbnail form. Macintosh computers have the ability to see thumbnails of all their files automatically, as do many Windows-based machines.

However, if you have a lot of digitized photographs, you may find that you need to move up to a more sophisticated database program that can easily handle the hundreds, perhaps thousands, of image files stored both on your hard drive and in multiple disks. Database programs that handle images work similar to database programs that many office workers are familiar with, like the type used by your doctor or your local Motor Vehicles department. The major difference is that they let you see the photographs.

Extensis Portfolio is an example of database technology that everyone can use. Fairly simple to use, Portfolio creates a database of digital files including thumbnail images that are easily searchable. Portfolio also has the ability to attach keywords for custom organization of your files. In simple terms, Portfolio creates a "table of contents" of any group of files.

Extensis Portfolio comes in several different versions including software that lets you manage images on an office computer network or on the Web. Obviously, which version you'll need will depend on the amount of images you expect to have and the sophistication you require.

Extensis is also not the only manufacturer of this type of software. Other brands are ImageAXS Pro and Cradoc Photo Management System. You can also find shareware and freeware on the Web. Here are some considerations you should take into account when deciding which type of archiving software will work best for you.



©Extensis

Database Considerations.

What will your image collection consist of? Is it for business or personal use?

One photographer or a group? Different archiving software may suit one need better than another.

How big is your current collection? A small collection may be well served by a word processing program, your computer's file managment system and some careful filing. A large file will be more manageable with a database program like the ones we've mentioned.

How fast do you expect it to grow? Consider the maximum and assume that your photo collection is going to grow quickly. Multiple copies of one image may include a digital master, an edited version, a creatively manipulated version. One image can quickly become three.

Do you need the database that can be used by many people? A program like Portfolio produces files that can be read on different platforms including Macs, PCs and Unix machines. If you don't know who your audience is, this feature will be invaluable.

©Sharon Gumerove

Is security an issue? Consider who may have access to your valuable image assets. Stealing images, whole or in part, has become very popular with the advent of digital imaging.

Will you need the software to coordinate with your existing hard copy slide, print and negative filing system? For instance, should the software you use have the capability to create labels?

Would it be helpful for the software to have the ability to create printouts of thumbnail index pages or create a Web site portfolio you could show to clients? Not everyone likes to (or is able to) stare at a computer monitor for long periods of time. Printouts of small low-resolution images can be a great way to cull through large amounts of image files.

We can't recommend a single product, since the needs of different students vary widely. However, if you answer the questions we've listed above, and check the features of each of the different products available, you'll find the software that's right for you.

Outputting Your Digital Images.

As we've discussed, output doesn't just mean creating a digital file. Output also refers to being able to print out your images on paper. Creating prints from your digital photos is perhaps the most popular form of output. You have lots of different options when it comes to being able to get a print from your image files—you can print them yourself on either an inkjet printer, dye sublimation printer or at a self-service kiosk, send them out to a service bureau or lab, or even upload them onto the Web for output. As technology advances, there will be more and more ways for you to output your digital images into print form. Let's discuss what some of today's choices for print output entail.

Creating prints of your digital files really falls into two distinct categories. Outputting the images yourself on a machine you own in your home or sending the digital files to someone else for output on paper, film, or even t-shirts, mugs and just about anything else that will accept a photographic image.

Printing Images Yourself.

Creating digital prints yourself at home is getting easier and easier. At this time, there are three different types of printers that you might purchase to print your digital files—inkjet printers, photo-quality inkjet printers and dye sublimation printers.

Inkjet Printers.

Inkjet printers fall into two distinct types, traditional inkjet printers and photo-quality inkjet printers specifically designed for photographic output. Inkjet printers work by firing tiny droplets of ink at tremendously high speeds through nozzles mounted on a print head. The print head moves horizontally across a sheet of paper as the paper itself moves vertically through the machine. On some machines, in particular Hewlett–Packard and Canon inkjets, the ink that is squirted through these nozzles is first heated to very high temperatures, causing the ink to bubble. When the nozzles spray these bubbles, they burst against the sheet of paper. Other manufacturers, like Epson, use a method where a piezo crystal behind the print head is electrically charged and that causes the ink to spray through the nozzles. This method allows for smaller droplets of ink and more nozzles. How many nozzles a print head contains is directly proportional to the resolution of the inkjet printer.

Inkjet resolution is usually described as dpi (dots per inch). The dots produced by an inkjet printer are so small that 3 or 4 drops will fit within the space of a pixel. That's why you'll see printers with a resolution specification of 720 x 1440 dpi or more. If these models require a pixel resolution input of 240 ppi to produce optimum output, we can ascertain that they can produce three drops of ink per pixel. Let's see why:

720 dpi divided by 240 ppi = 3 dots-per-pixel

Inkjet dots are so small that when they are combined they give the illusion of a continuous-tone image, just like a photographic print.

We've mentioned it before but we feel it's important to understand the difference between dpi and ppi. Go to the Study Hall for a brief discussion on the differences between the two.

Photo-Quality Inkjet Printers = More DPI.

The major difference between traditional inkjet printers and those designed specifically for photo-quality output has to do with the resolution of the printer and the number of droplets of ink that the printer can spray per inch. The more droplets, and the smaller and finer these drops of ink are, the better the resulting print will be. For that reason, owning an inkjet model specifically designed for photo output is preferable to a traditional inkjet printer if you wish to create photo-quality output. Photo-quality ink jet printers have dropped dramatically in price in the last few years, so this is a very viable alternative for most people. As easy as the printing process is, there are a

number of other factors that can have an impact on how good your inkjet prints will be:

Paper Considerations.

Paper for your inkjet comes in variety of grades, sizes and surfaces depending on what type of look you require. In addition, you can buy paper made by third-party manufacturers as opposed to the manufacturer of your inkjet printer. Read the article on Inkjets and Inkjet Paper on your Unit One WebCenter to learn more about the different choices in both inkjets and paper. However, if you wish to get the highest photo-quality output possible, it is best to stick with the paper designated as "Photo Paper" put out by your manufacturer. "Photo Paper" is usually a grade above paper designated as "Photo-Quality." It is important to use paper designed for photo-quality output. The hard smooth surface of these papers keeps the ink on the surface which helps to create sharp images.

Although Photo Paper costs more, it's worth the price if you're looking for the best quality. Depending on your printer, which paper you choose may also have an impact on the longevity of the print that you create.

Ink Considerations.

Your inkjet printer manufacturer will give you specific recommendations for which ink cartridges that you need to buy for your printer. Depending on the model inkjet printer you own, you may need to buy two cartridges—black and a combined color cartridge (usually cyan, magenta, yellow) or separate cartridges for each color plus black.

Some inkjet printers allow the use of special archival inks. Archival inks can mean the difference between long-lasting color or a faded print. However, archival inks may not be made by your manufacturer. There are third-party inks available on the market, including archival inks, but it is very important to make sure that these third-party inks are rated for your specific model printer. You can destroy the print heads on your printer by using the wrong third-party ink, and void the warranty on the machine to boot. Always be cautious about using any ink that isn't made by the company that manufactured your printer.

Longevity.

How long your inkjet print will last is a major decision to consider before buying a printer. With the exception of a few models, many of the inkjet printers on the market create prints that will last anywhere from six months to several years before the image starts to degrade. While it is true that one advantage to digital photography is that you can always create another print, you will have a lot of disgruntled customers if you sell them an inkjet print of their wedding or of their children that starts to change color after a few months. So, if you plan on selling inkjet prints that you've made, you need to consider how long they'll last.

Many manufacturers are now offering archival options for their printers.

Epson, for instance, now has inkjet printers on the market that they claim can create prints that will last as long as traditional photographic color prints. Keep in mind, of course, that this claim is through testing under simulated conditions—inkjets haven't been around long enough to truly know just how long a particular print made by a particular manufacturer will last. In addition, how the print is stored will also have consequences on its longevity. Ozone and other atmospheric conditions like smoky environments and high humidity can cause color shifts. Storing your inkjet prints in a sunlit room can cause the prints to fade. Inkjet prints are not waterproof either, so be careful with them near liquids.

Resolution Considerations.

A resolution setting of 200-300 ppi will provide the best output on a wide variety of inkjet printers today. Remember, that ppi differs from a printer's dpi specifications. As we discuss on your Unit Two audio CD, finding out exactly what the recommended ppi is for your printer is not an easy task, but well worth knowing. For instance, you can save considerable amounts of time and create larger

images if the optimum resolution of your printer is 240 ppi as opposed to 300 ppi.

Read the articles on inkjet printers and inkjet paper in your Unit One WebCenter to find out more about what models are available.

Dye Sublimation Printers.

Another type of printer available for you to buy for your home is the dye sublimation printer. Since everything in the computer world needs a name in computer lingo, these are usually called "dye sub" printers.

Dye sub printers differ from inkjet printers in a number of ways. Let's start with the sublimation process itself. A dye sub printer's head heats up a ribbon which produces a gas that hardens onto the paper. This process of converting a solid into a gas is called sublimation. The ribbon, also called a transfer roll, is really a plastic film that contains cyan, magenta, yellow and black inks. The heat of the print head diffuses the inks onto the paper from the ribbon. How hot the print head gets controls both the density and the intensity of each particular dot of ink that appears on the paper. The paper used in dye sub printers is special paper that is designed to accept these vaporized inks. A dye sub printer's tones are smoother and more continuous than those of inkjet printers because technically dye sub printers don't use dots. As a result the prints produced appear to be more like traditional photo prints.

©Olympus

Dye Sub Costs More.

While dye sub printers can create better looking images than inkjet printers, they do so at a higher cost. The consumables—paper and the transfer roll of ink—can be considerably more expensive than inkjet consumables. You will also not have the varieties of paper and ink that you find with inkjet printers and you will most likely be limited to what the manufacturer of your dye sub printer makes.

The advantage to dye sub printers is that they create good looking prints at lower resolution and can do so faster than inkjet printers. They are also reported to create prints that are considerably more archival than standard inkjet prints.

One feature found on some dye sub printers is the ability to accept and print from camera storage media directly. Olympus makes a dye sublimation printer, for example, that is designed to accept and print directly from SmartMedia, Compact Flash and even Sony's Memory Stick, eliminating the need to use a computer. While this may make printing easier for digital beginners, it ultimately reduces your control over the image. If you're serious about digital imaging you'll quickly outgrow this feature when you see what's possible with digital darkroom.

Making a Print.

In this discussion, we refer to the term *digital image-editing software*. Adobe Photoshop falls under this category, but so do a host of other programs. While all of this software performs similar tasks, the methods may be somewhat different. In Unit Three, once we start discussing Photoshop, the explanations of these tasks will become much more specific and meaningful. For now, understand that your application may work slightly differently. All of these topics will be covered again within the context of a common image-editing program—Adobe Photoshop.

Before we continue with our discussion of other types of output, let's run through the actual process of making a print using a typical desktop printer.

Basically, the process of creating a print is not very different than printing a word processing document. Make sure that your printer is on, then:

1. Install your printer's driver software if you have not already done so. Your printer comes with driver software that operates your printer. On a Mac or a Window's based machine, you install the printer driver by simply inserting the CD and running the Installer program.

2. Turn your printer on and start your digital imaging/editing program. Later on in your Course, we'll show you step by step how to create a print using Photoshop as well as how to create specialized types of prints like duotones. For now, you'll want to start whatever image-editing program came with either your scanner, digital camera, or printer. Remember, this type of program is different from your scanner's software, your camera's download software or your printer's driver software.

3. Open an image. Using your image-editing software, open up the file containing the image that you wish to print. What type of image will work best? For the most part, you will want to print from either a JPEG, or TIFF or whatever file your camera or scanner has used to store your image.

4. Check the resolution and print size. Your software should tell you what size image you have and what resolution it is in as well as what size output you can get depending on the resolution. Remember, unless you know what the optimum resolution is for your printer, you will want to use a 300 pixel per inch image.

The best way to determine that your image has the correct resolution for your output method is with the Image Size dialog box. Most digital image editing programs have one.

For those of you who have Photoshop already, here is how the Image Size command works. Go to the menu command **Image>Image Size.**

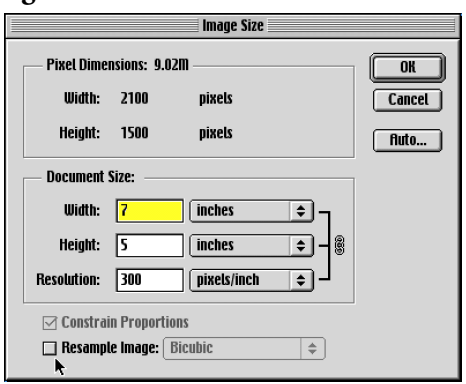


Image Size dialog box in Adobe Photoshop.

This command brings up the Image Size dialog box.

The Resample Image check box in the lower left hand corner of the Image Size dialog box is checked by default. By leaving this box checked we are asking Photoshop to interpolate pixels when we adjust either the physical size of the image or the resolution.

By un–checking the Resample Image box you are free to change the resolution to the suitable pixel-per-inch value necessary for your printer. In this un–checked mode, no pixels are thrown away or added, they are simply reconfigured to the pixel per inch setting that you need. For instance, many digital cameras produce files at a default setting of 75 ppi, which makes for a nice big image on screen, however when you want to print your image, the resolution must be adjusted to 300 ppi in order for it to print cleanly. While adjusting the resolution may reduce the physical dimensions of your printed image, you are also insuring that the quality of your output is as good as it can be. If you find that your size doesn't meet your needs you can either scan your image again at a higher resolution, or increase the quality setting on your camera.

If you don't have Photoshop yet, or you can't find the Image Size commands in the software you do have, you can always

download a demo from Adobe's Web site to begin to learn how this important function works.

5. Choose the Print Command. Go to Menu Command **File>Print** to open your printer dialog box.

6. Set the print options. Depending on your printer, you may be able to tell it what type of paper you are printing on. You may also be able to select quality settings like photo-quality or indicate resolution, orient your paper so that you can print sideways on a sheet of paper (landscape mode), choose paper size (large sheets of paper or small sheets like 4x6 inch), even scale a large size file so that it prints on a single sheet of paper. You should read your printer's manual carefully so that you understand exactly what settings you have available and how they work.

7. Choose **Print**. Your printer should now go ahead and create a print based on the specifications that you put into your printer's software.

Note: If you have more than one printer's driver software installed, you will need to make sure that the printer listed is the one that you want to be using to make your print.

On a Windows–based machine, this is accomplished by choosing the **Print–Command (File>Print)** and, in the print dialog box, indicating your printer.

On a Mac, click on the Apple Menu (it's the little apple in the upper left corner of your desktop) and find the Chooser. The Chooser dialog will contain two panels, find your printer on the left and click once to highlight it. You'll then be prompted to choose a printer port. Choose the appropriate port (printer or modem) and you're done.

©Sharon Gumerove

Troubleshooting.

If you find that you are getting prints that don't look good, there are a number of common printer problems that can cause this.

Resolution is Set Too High.

If the optimum resolution for your printer is 300 ppi and you send a 600 ppi image to your printer, a couple of things can happen:

1. Your printer will slow down significantly due to the fact that it has to process more information than is necessary.

2. Your image quality may actually decrease because your printer will have to eliminate image information to produce the print.

3. The physical size of the print may be smaller than what you expect.

Resolution is Set Too Low.

If the optimum resolution for your printer is 300 ppi and you send a 75 ppi image to your printer, a couple of things can happen:

1. At 75ppi, image pixels will be quite visible.

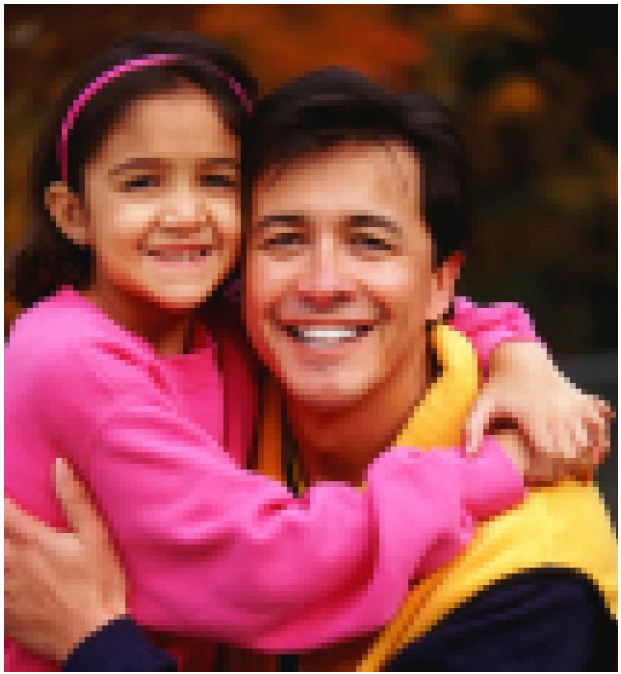
2. Smooth lines will begin to "stair-step."

3. Fine detail will be lost.

4. Overall quality will decrease.

5. Physical size of print may be larger than expected.

It's up to you to be sure that the resolution is set correctly before you send it to print. If you are unsure about resolution necessary for your printer, use the industry-accepted standard of 300 ppi. A better choice is to consult with the manufacturer of your equipment. Be sure to check out the additional information on resolution in the Unit Two Study Hall. When we begin to use Photoshop in Unit Three, we'll all be on the same page when it comes to image resolution adjustments.



An example of a low resoution image where pixels are visible and image quality is lost.

Landscape/Portrait Setting is Wrong.

When sending an image to print be sure to check the page set-up dialog box for the proper orientation of the paper. If your image was shot horizontally (landscape mode) and the printer is set up for a vertical print (portrait mode) a couple of things can happen:

1. Your printer may inform you that some clipping will occur when printing. Clipping in this case means your image will be cropped.

2. Your printer may reduce your print to fit on the page yielding a print which is smaller than you expect.

3. Your printer may simply go ahead and print your image cutting off portions of it. If you are printing a landscape picture in portrait mode, then it is easy to fix. Simply change the orientation setting. If that is not the problem, then you may need to change the scaling.

Physical Size/Scaling.

1. If you find that your image is printing on more than one sheet of paper or you are only getting a small portion of the picture, then your image is physically too large. You may be able to change the resolution and thereby change the size of the printed image. However, you can also check the box in your printer's option menu that says shrink to fit. This will let you print an oversized image on a single sheet of paper without changing the resolution. Unfortunately, this method will allow the printer to determine which pixel information is discarded in order to make the image fit on the paper. This inevitably leads to lower quality.

2. If you find that your image is printing too small, check the resolution and make sure that it is correct for the size print that you need. If there aren't enough pixels to satisfy the output, consider re-scanning your art at a higher resolution.

Paper and Inks.

Remember that your prints will only be as good as the paper that you use. You can see this if you print a photograph using either Photo Paper or Photo-Quality paper and then print the same image using plain paper. You will notice a considerable difference in quality. However, using another manufacturer's paper or ink may also have a detrimental effect on the quality of the image. So, if you are not satisfied with what you are getting and you are using a third-party product, this might be the cause.

Most printers seem to behave themselves when it comes to laying down a nice, clean image on paper. However, when you start to make lots of prints, or use unusual paper surfaces, or experiment with special inks, you may run into problems. Check your printer's manual for the proper cleaning procedure for your model. Also, as we noted before, special inks can cause special problems. Follow all the cleaning instructions to the letter.

Outside Printing Services.

There will be times when you won't want to create your own inkjet prints. Perhaps you don't have a printer, can't create the size output that you need, or don't have the time to handle the number of prints that you need to make. The reasons why you might want to take your digital files to an outside service for output are numerous. In fact, we can guarantee that at some point, no matter what kind of printer you own, you will want to produce a print by some other means. Let's discuss what other options are available for print output:

Online Services—Camera to Computer to Print.

Digital image processing has been taken to a new level with online services. Upload your images to an online lab service and you can get fast digital prints for a reasonable amount of money. The quality is generally pretty good.

Why would you want to use an online print lab? Convenience and cost for starters. Depending on the cost for paper and ink for your printer, and the time it would take you to make two or three dozen prints, you may find that paying 30-40 cents per print from an online lab is cost effective. Using an online lab is also very convenient. For instance, if you shoot mostly

©Shutterfly

Shutterfly is one online print lab example.

slide film, you may find that sending your slides out to have a Photo CD made and then uploading them to an online lab will allow you to get good quality prints that are better, faster and certainly less expensive than having the slides printed by a traditional lab. That's because slides generally require inter-negatives in order to produce a standard print. An inter-negative is a film negative of a film positive. Because inter-negatives require film, chemicals, an imaging device and a photo technician to produce, they are expensive.

Tip: If you upload your images to an online service, make sure that they are 300 ppi in order to ensure best quality. You'll also find the upload is a lot faster if you have access to a cable modem or high speed connection rather than a 56K modem.

©SanDisk

Self-Serve Kiosk.

Another possible mode of direct output is the self-serve kiosk. Photo-giant Kodak has produced one such machine, called the Kodak Picture Maker. It's found in many labs across the country and allows you to bring an image from a floppy disk or a Photo CD and make a print from the file by yourself. Other manufacturers offer these types of kiosks as well and you can find them in places like Kinko's, department stores and drug stores.

Service Bureaus and Digital Labs.

As we mentioned in Unit One, many traditional labs have gone digital when it comes to output. Digital labs or service bureaus are popping up all over the place, providing yet another way to produce prints from your digital images. These labs and service bureaus usually provide a variety of different types of output. They can make color laser prints, oversized prints like posters and signs, or you can have your digital file output as film to create a negative or transparency of your image. These types of labs also provide many high-end options that you might need if you are going to incorporate your images into professionally printed pieces for instance. Most of these labs can usually handle high-end drum scans, Picture and Photo CDs and other imaging services as well. It is a good idea to scout around your area to find out what service bureaus and labs are available and what services they offer so that you know who to go to when you suddenly find yourself needing something you can't do in your own digital darkroom.

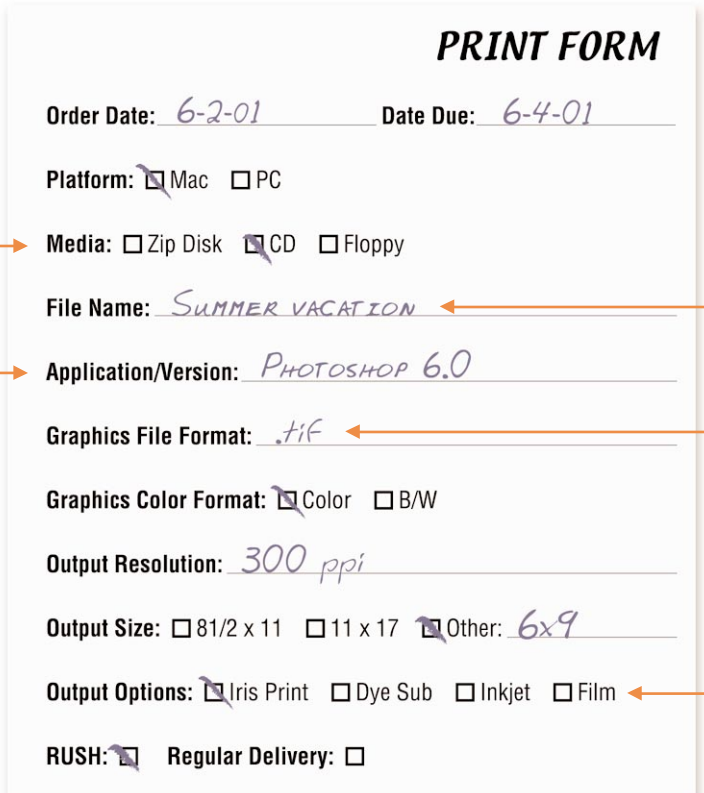
Always check with your vendor for their best specifications for file delivery. By providing them with an optimized file, you can help to guarantee satisfactory results. If the file provided is saved in a format they can't read or if the resolution is too high or too low the print quality will suffer.

©Kodak

When submitting images to a service bureau you may be asked to fill out a form which will follow your job throughout the production. A typical production order from a service bureau might include some of the items in the sample order form on the previous page.

A good service bureau can recommend the best format or resolution needed to produce optimum output based on their equipment and your needs. Ask questions if you're not sure. A good service bureau only wants to do a job once. A job that has not been prepared properly means lost time and possibly bad output. Sometimes a service bureau will charge

Sample Order Form.



PRINT FORM

Order Date: 6-2-01 Date Due: 6-4-01

Platform: ☒ Mac ☐ PC

Media: ☐ Zip Disk ☒ CD ☐ Floppy

File Name: SUMMER VACATION

Application/Version: PHOTOSHOP 6.0

Graphics File Format: .tif

Graphics Color Format: ☒ Color ☐ B/W

Output Resolution: 300 ppi

Output Size: ☐ 8½ x 11 ☐ 11 x 17 ☒ Other: 6x9

Output Options: ☒ Iris Print ☐ Dye Sub ☐ Inkjet ☐ Film

RUSH: ☒ Regular Delivery: ☐

How are you delivering your files? Zip disk or floppy disk or CD? NOTE: Be sure all media is returned with job. This is an easy way to lose a disk.

If a file was created in Photoshop and is being delivered as .psd file, you will want to be sure your service bureau has the software necessary to work with the file.

Very important, spell the file names exactly, especially if you have multiple documents on the same disk You don't want them to print the wrong file.

TIFF, JPEG, BMP, etc. your file should have the appropriate three letter extension. (Example: .tif; .jpg; or .bmp)

Iris print, dye sublimation, inkjet, Giclee, film (35mm or 4x5). A good service bureau will offer many different output options.

extra to prepare a file for output if it has not been done correctly on the file you submit. So be sure to ask your questions before you send your job out.

With this lesson on basic output, plus the lessons on digital acquisition, we've come full circle. You can now start to appreciate how input affects output in the digital environment. Careful consideration of how you want to use your images has a direct correlation to the techniques you need to use to capture them.

Conclusion.

In Lesson Nine, we're going to turn our attention to content, meaning, and aesthetics of the photos you take. We'll return to advanced output issues in Unit Five.

Cover: Photo Illustration ©Jim Barthman

Artwork, CD-ROM and Lessons designed by Joan Essmyer

CD-ROM production by TC Graphics

Quit

DPC_U2L8