



Volume 19, Number 3  
April/May 2002

## ROAD WARRIOR

### Buying a Digital Camera

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I spend a fair amount of time speaking to attorneys about technology. Lately, I'm often asked about buying digital cameras. A serious amateur photographer for many years, I had my own darkroom for a period of time. In recent years I have virtually abandoned film for digital photography. Digital picture modifications take less time, require less effort, and cost less than corrections to film photographs.

#### It's the Optics

The quality of the camera's optics will dramatically influence the quality of the pictures. Manufacturers of high-quality film cameras, such as Nikon, Canon, Minolta, and Olympus, have moved into the digicam market, offering a wide selection of digital cameras with features and optics equivalent to those used in their film cameras. Additionally, manufacturers such as Sony include acquired high-quality optics to marry to the advanced computer technology that makes digicams work. Certain of the Sony cameras, for example, utilize optics made by Zeiss, which has a long-standing reputation as one of the world's premier lens manufacturers.

You'll want zoom capabilities to better and more easily frame your images. Many digicams come with one (or both) of two different types of zooms. Optical zooms increase or decrease the size of the entire image through placement of lens elements. Optical zooms require additional lens elements and generally result in a larger and heavier camera (some exceptions are, quite literally, done with mirrors). Digital zooms can offer significant magnification with no noticeable increase in camera size or weight because the process is done by manipulating the internal optical image through computer wizardry. Digital zooms take a portion of the image "seen" by the optical lens and magnify it, but this degrades the quality of the image, often significantly. Many of the better digicams combine both optical and digital zooms, giving you the flexibility of using the greater magnification when you want it without giving up the optical zoom's ability to get a tightly framed high-quality image. Look for an optical zoom of 3x or better.

If you plan to shoot a lot of pictures in low light, you will want a camera with a fast lens (which requires less light). The minimum lens aperture determines the speed; aperture sizes are called "f-stops." The lower the f-stop number, the faster the lens, so a camera with an f1.4 lens requires less exposure time to obtain an image than one with an f1.8 lens. Additionally, the greater light-gathering ability of the lower f-stop lens allows better-quality images in lower light conditions with similar exposure times. If you plan to shoot serious close-ups, you may want to get a camera with a macro feature. Alternatively, you could purchase an auxiliary lens to create macro capabilities.

#### Size Definitely Matters

In a digital camera, the sensor that receives the image contains photosensitive "pixels" (picture elements). The more pixels a sensor has, the higher the resolution. The higher the sensor's resolution, the higher the image resolution it produces. Higher resolution produces sharper pictures that show more detail and generally produce better projected and printed images. Not too long ago, most digicams offered less than 1 megapixel of resolution. Today, consumer digicams go as high as 5 mega-pixels, and professional digicams have already breached the 9-megapixel level. Generally, the more megapixels the camera produces, the more it costs. Cameras over 5 megapixels have remained quite expensive, but the price continues to drop for high-quality digicams. One manufacturer has already announced a consumer-level 6-megapixel camera to be released later this year at a list price under \$1,000.

For most purposes a camera rated at 2 to 4 megapixels should take care of your needs. If you'll be shooting a lot of detail, you can readily find cameras with 5 or 6 megapixels listing for \$1,000 or less. For pictures that will be viewed primarily on a computer, 2 or 3 mega-pixels should suffice. If you plan to project them onto a large screen, 4 or 5 will make you happier. If you'll be making prints of the digital images, think in terms of the following guidelines for cameras used in high-resolution mode:

Print Size Resolution  
(Inches) (Megapixels)  
5 x 7 2  
6 x 8 3  
8 x 10 4  
11 x 14 5 or more

The size of files generated by multi-megapixel images, combined with the desire to keep digicams relatively small, requires using replaceable media for storage (think of it as reusable film), in the form of small memory cards. CompactFlash and Secure Digital are two popular brands; newer Sony cameras generally use the company's Memory Stick. The replaceable memory cards come in a variety of sizes, from 8 megabytes to 1 or even 2 gigabytes (the gigabyte cards are relatively new, available in only a few formats, and still command premium prices). Recent Internet ads from reliable vendors offered 256-megabyte cards for about \$40, after application of available rebates.

#### Show Me the Image

Although some digicams have either an optical viewfinder or an LCD display, most of the newer and better models come with both. You will find having an optical viewfinder helpful, as LCD displays often wash out in bright sunlight, making it difficult (or impossible) to see the image. But LCD displays give you a better perspective on the color and, sometimes, composition of the shot. More importantly, LCD displays let you review the picture almost immediately after shooting it, so you can determine whether or not you captured the image you wanted. LCD displays come in different sizes. Before buying a digicam, check out the LCD display to make sure it appears crisp and sharp. If you need reading glasses, check to make sure the display is readable with or without them.

#### Let There Be Light

Most digicams have a built-in flash to supplement natural light, but few do the job well, except in the most basic situations. Some digicams also come with a flash shoe to enable connecting an external flash unit for better light control and/or more power (brighter or broader coverage). Built-in flash makes the camera more convenient. A flash shoe gives you the flexibility of adding whatever flash unit you choose. Ideally, the best choice would be a camera that offers both options.

Most built-in flash units produce close-ups of people who look like red-eyed demons, the result of the proximity of the flash and lens. The lens picks up the reflection of the flash from the eye and often ruins an otherwise very nice picture. Several software programs let you "remove" red eye fairly easily by coloring in the pixels in the eye. Many cameras have a red-eye reduction mode in which the camera sends a preparatory light burst that allows the eyes to adjust, then sends the main light burst an instant behind to record the image. That technology prevents or at least significantly reduces the incidence of red eye. You can also reduce red eye by having subjects not look directly at the camera when you use the flash.

#### Start Your Engines

Digicams require power to work. In the long run, rechargeable lithium-ion or nickel-metal-hydrate batteries save you money over disposable alkaline batteries; rechargeable batteries also have environmental benefits. The fact that the vendor shipped the camera with alkaline batteries should not prevent you from moving to rechargeables.

Most digicams have an automatic exposure feature that optimizes camera settings for particular scenes such as portraits or landscapes. This system works very well for many users, but more sophisticated photographers will want the option of manual control to override automatic settings in particular circumstances. Manual control of focus and exposure (lens aperture and shutter speed) may or may not make a significant difference to you; if they do, choose a camera that allows manual override of some or all of the camera's automatic focus and exposure controls.

#### The Path Less Traveled

You can find digicams in a variety of places and for widely differing prices. Depending upon your preferred method of shopping, you can pay list price for the camera at a local bricks-and-mortar store or acquire it at (an often substantial) discount over the phone or on the Internet. Telephone and Internet sales can save money, but they can also bring considerable aggravation-and sometimes hidden costs that cancel out bargains. If you are going to buy online or over the phone, use an appropriate level of caution and take some reasonable steps to protect yourself. Not every vendor has a level of business ethics deserving of your patronage. When it comes to camera equipment, I strongly recommend that you go to a local camera store and look at the models you are considering. Hold them in your hands to see how each camera feels; check out the convenience of the controls; look at the LCD displays; and check out a couple of pictures taken with each camera before you make your decision. Once you have confirmed what you want, you can buy it online or over the phone.

#### Personal (Current) Favorites

My current favorite digicam is Nikon's Coolpix 4500. I bought this camera to replace an earlier model, the Nikon Coolpix 990, which I enjoyed for several years. The 4-megapixel camera sports a built-in flash, optical viewfinder, LCD display, and 4x optical zoom supplemented by 4x digital zoom. The 4500's signature feature is its swivel-mounted lens, which allows you to move the lens 180 degrees while the body and viewfinder/display remain static, for ease of use. The camera uses CompactFlash cards for removable image storage memory. List price is \$699. Internet pricing ranges to \$514.

The 4500 offers features for both beginners and advanced photographers. The automatic settings make it easy for a beginner to take good pictures, while the manual overrides allow the advanced photographer to exercise creativity and control. Nikon's optics produce reliably sharp and detailed images with little distortion and excellent color reproduction. A USB interface allows quick and easy uploading to a computer. The camera has a built-in flash but no flash shoe.

The 5-megapixel Sony Cyber-shot DSC-F717 has a unique appearance: a large lens with a camera body attached to it. The F717 utilizes Zeiss optics to provide a 5x optical zoom, which Sony augments with a 10x digital zoom. The camera produces clear, sharp pictures with accurate color rendition. Memory Sticks provide removable memory for image storage. Sony lists the DSC-F717 for \$999, with Internet pricing as low as \$726. The F717 offers substantial creative control for more advanced photographers. In addition to its built-in flash (on the lens barrel), the F717 also comes with a flash shoe to accommodate an external flash unit. The USB interface makes uploading to a computer very easy.

The pocketable 3.2-megapixel Minolta Dimage Xi uses mirrors (think periscope) to provide a 3x optical zoom without the size and weight this usually entails. Minolta has configured the lens elements vertically, using mirrors to orient the image. The camera also has a 4x digital zoom. The Xi uses Secure Digital cards for image storage memory. Minolta lists the Xi for \$449, with Internet pricing as low as \$363. The camera offers style and convenience but not much in the way of manual overrides or other creative control; it's primarily a point-and-shoot camera that produces quite good images. If you want a convenient, stylish, simple point-and-shoot, you will like the Xi. If you want serious creative control, however, think of the Xi as a possible backup to a different primary digicam. A USB interface allows easy uploading to your computer. (This camera's predecessor, the Dimage X, remains in the current Minolta line. The X is substantially similar in design to the Xi but has a 2-megapixel sensor and a 3x optical zoom. It lists for \$350, with Internet prices as low as \$239.

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