Exploring DIGITAL photography

From pixels to print: Your guide to better digital image capturing and editing

Freeze Frame

Capture the rocket's red glare with your digital camera

by Stephen Dow

Digital cameras aren't known for their low-light exposure ability. In fact, they can be quite troublesome when trying to take nighttime shots, let alone shots of a fireworks show. The mixture of a dark sky and bright streaks of color can wreak havoc on your camera's image sensor. Traditional photographers have devised some reliable techniques for shooting fireworks, but these practices only partially apply in the digital world. To get great shots of your next fireworks show, there are some special steps you can take to make sure your fireworks images get the oohs and aahs you deserve.

Get on with the show

In this article, we'll tell you how to get some great shots from your digital camera at your next fireworks show. First, we'll discuss the challenges involved when a digital camera comes across such brief flashes of light against a dark background. Next, we'll walk you through the complete process of shooting the fireworks show, from setup and location selection to exposure settings and framing. Finally, we'll look at what you can do in your image-editing application to give your fireworks images some more punch.

Figuring out fireworks

Fireworks are unpredictable, short-lived, volatile, erratic, etc. Capturing a good photograph of a firework burst takes as much luck as it does planning. However, understanding the challenges when shooting a fireworks show is the key to getting quality images.

The biggest problem when shooting at night with a digital camera is the buildup of noise when the sensor is exposed to light for a long period of time. This isn't a problem with film cameras, where the traditional method is to open the shutter, cover the lens with something dark, and wait for the fireworks burst to remove the dark object and expose the film. But this process doesn't work so well with a digital camera, as the image sensor can produce noise even if no light is reaching it. So, getting good shots at a fireworks show is largely a matter of using your camera's settings to properly expose the image without developing any nasty noise.

Setting the scene

The process of capturing a spectacular fireworks display begins well before the show starts. One of the most important steps in this process is selecting your shooting location. Fireworks shots look best when they fill the frame but don't extend beyond it. While you could always crop out extra image space in post-processing, attempt to use as much of your image sensor as possible to get the best resolution and detail. To do this, try to get as close to the action as possible without putting yourself in harm's way. Anticipate where the fireworks will explode, but know that you'll probably have to make adjustments once the show starts. Position yourself upwind from where the fireworks are being launched and detonated, as shooting through a thick wall of smoke will do nothing good for your image.

A steady footing

For the best results, place your camera on a tripod or other firm foundation. We can't stress this enough—your shutter is going to be open longer than usual to capture enough light for the exposure. This long shutter time also exposes any camera movement, turning your bursts of light into squiggles! If your digital camera came with a remote control, consider using it to eliminate any camera shake that can occur when you press the shutter button.

Adding more than the sky

While shooting fireworks against the dark night sky is dramatic enough, you may want to consider adding other objects into your scene, as shown in **Figure A**. If you're shooting a show in a downtown area, consider adding a landmark to help set the scene and encourage some interesting reflective possibilities. Water creates beautiful reflections of the show and can create some captivating mirror images. Also, keep in mind that the audience may be as interesting as the show. Silhouette the crowd against the explosions, or turn your camera around and capture the glow of a burst on their faces. We've even seen some stunning overhead shots of fireworks shows from air-

Figure A: *By taking the time to set the scene, you can create some memorable shots.*

Lost your lens cap?

Lens caps have a nasty habit of walking away from you. But before you rush to the manufacturer's Web site and buy a pricey piece of plastic, first check your camera's manual to see if your lens cap has a standard configuration such as 24, 37 or 43 mm. Since these are standard lens cap sizes, a cheap replacement might be waiting for you at your local camera shop.

planes. While we don't think you have to go to this extreme, selecting your shooting position thoughtfully can yield some effective shots.

Getting your camera ready

First things first—you're going to need memory, and lots of it. Since your fireworks images will probably contain as many misses as hits, shoot as many images as possible. Use the largest memory card you have and shoot until you're out of memory. Also, make sure you have a fully charged battery in the camera—nothing is worse than running out of juice before the finale!

Next, we're going to go over some other settings to be aware of when shooting fireworks. While every digital camera is different, use these guidelines to make smart choices for what's the best combination of settings to get the most from your camera.

Selecting your image size

When shooting fireworks, shoot at the highest resolution possible. If your camera has an uncompressed RAW format option, go with that. Otherwise, select the image setting that will compress your image the least. Compression can skew colors and reduce saturation as well as add unwanted noise to your image, particularly in nighttime skies. Using the image sensor to its fullest potential also allows you extra image size in case you need to crop your image later.

Note: The trade-off of using a less compressed image format (such as RAW or TIFF) is the time it takes to write the file to your storage media. If you find your shots taking too long to save, go a step down to speed things up.

Focus on what?

It's basically impossible to predict the focal range of a fireworks burst. For that reason, it's best to give your camera the maximum range of latitude
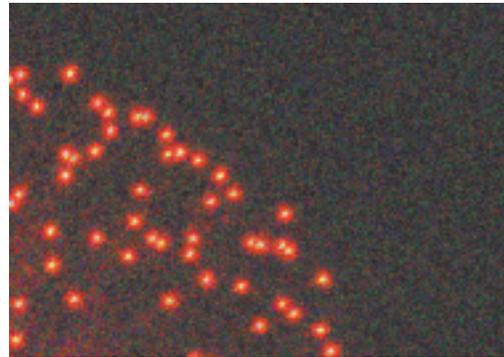

Figure B: *Noise can build up fast at night, so be aware of your exposure settings to keep noise at a minimum.*

when it comes to focal distance. The best selection is to set the focusing scale to infinity, but many digital cameras don't offer this option. Try to avoid using the autofocus option, as your shot will be gone by the time your camera focuses on the burst. If you can set your camera for a specific focal range, estimate your distance from the fireworks and hope for the best!

Getting the right exposure

If your camera offers manual exposure controls, you're going to want to use them to your advantage. Smaller apertures, such as $f/5.6$, $f/8$ and $f/11$, work best with fireworks as they produce thin streaks of color rather than the thicker bands produced when a larger aperture lets too much light in.

As for the shutter speed, you need to open the shutter long enough to get sufficient light without allowing noise to develop on the sensor. Some digital cameras offer a Bulb mode (B), which allows the shutter to remain open as long as the shutter button is pressed. This option is best for traditional film setups, but use it with caution in a digital camera. Noise can build up quickly, decreasing the quality of your image, as ahown in **Figure B**. Use a shutter speed range from ¼ to 2 seconds. Longer shutter speeds are desirable, so experiment with your camera to find out what your limitations are.

Keeping the noise down

The ISO setting on your digital camera determines how sensitive your image sensor is to light. While you might think that setting a higher ISO for a nighttime shot would give a better exposure in low-light conditions, it isn't a good idea to shoot above ISO 200 during a fireworks show. Again, we shoot at this setting because of noise, as higher ISO settings tend to create noisier images. ISO 100 or 200 does a good job while reducing the possibility of noise buildup.

What do heat and humidity have to do with image quality? Well, digital cameras are more susceptible to noise buildup in hot and wet conditions, which is likely at an Independence Day celebration. This is the infamous "hot pixel" issue, where pixels on the image sensor overheat and give false readings. Higher ISO settings are prone to display this noise, especially when you're shooting a larger area of dark color such as the bluish-black night sky.

What can you do about the heat and humidity? Unfortunately, there's no magic technique to overcome the elements. If you find a lot of dark noise in your images, set the ISO to the lowest possible setting and slightly reduce your exposure compensation to "desensitize" the image sensor and minimize the appearance of noise in your image.

Figure C: *We took this shot into an image-editing program and boosted the saturation levels to create a much more attractive image.*

Color concerns

The vivid colors of a fireworks show are what it's all about. For that reason, you want to set your camera up to take the best color possible. Ironically, good nighttime color comes from an unlikely source. By setting your camera's white balance setting to "Daylight" (or a similar setting such as "Sunny"), you give the camera the best chance to get an accurate range of colors. Other settings, even a "Night" setting, overemphasize portions of the spectrum that increase noise visibility. By exposing with a Daylight setting, you can capture the vibrant explosions without getting unwanted color details.

On with the show!

Once your camera is set up, shooting fireworks is largely a matter of reacting to the show. It's a good idea to start the show with your lens zoomed out—zoom in on the action once you have a good idea of the range of the explosions. Shoot as many images as possible—you can pick the winners later. Consider using your camera's continuous or burst mode, if available. This option takes a series of shots in quick succession, allowing you to shoot the burst from initial explosion to fade away. If you're shooting in a normal, single-shot mode, keep your camera's lag time in mind and adjust your reaction time accordingly. Since the explosions can be unpredictable, the best technique is to shoot first and ask questions later.

What to do after the show

What can you do to improve your fireworks images? Consider boosting saturation levels to make the streaks of light more vibrant, as we did in **Figure C**. You'll also want to eliminate as much noise in your image as possible, a topic explored in detail in "Remove unwanted noise from your digital images" in the June 2002 issue.

You may also find that some of your bursts have hotspots from the explosion—try using your image-editing application's Levels adjustment to decrease the intensity of the highlights and increase the midtones. Your image will be heavy in the shadows, but you'll want a nice dark sky as the background to isolate your explosions.

The post-processing stage is also the best time to add any sharpening to your images, as you have the maximum level of control. Since we aren't using a specific focal point, you might need to sharpen all images to some level. The trick is to keep your sharpening to a minimum so the fine details of the firework streaks don't become pixilated.

Grand finale

Shooting fireworks with a traditional film setup is hard, but shooting with a digital camera can be even more challenging. However, the results are worth the extra effort when you take the time to set up your shot and your camera to expose the perfect fireworks burst. Shoot often, be flexible and enjoy the show! ✳

Get up close and personal with your digital photographs

by G.H. Cloutier

Application: Adobe Photoshop 5.5/6.x
Operating Systems: Microsoft Windows, Macintosh

These days, quite a few digital cameras offer Close Up or Macro modes that allow you to take detailed images of small objects. The world of small things offers great creative potential for looking at things in a completely new way. The world of small details can translate into something interesting and fresh when seen at a larger size like our water droplet in **Figure A**. In many cases, you'll find that close-up images are more striking than vast landscapes. Close-up photography also has many practical applications for documentation, research and archiving purposes.

At close range

Whether you need to create images for a specific purpose or if you're just looking for a new avenue to explore, these steps will help you on your way. First, we'll give you an overview of some of the principles behind close-up photography, followed by basic shooting tips and other considerations you'll need to keep in mind to get optimum results. And, should you ever need to display an image at a specific magnification, we'll show you how to use Adobe Photoshop to determine the magnification of an image for print.

Is it close-up or macro?

Many people refer to close-up photography and photomacrography as the same thing, but they are actually different in terms of range. Close-up photography covers the realm of imaging from 1:10 (1/10th of life size) to 1:1 (life size). Pho-

Figure A:
Shooting small things can be as interesting as shooting a grand vista.

tomacrography is 1:1 to 80:1 (eighty times life size). While many cameras refer to their close-up mode as a macro mode, the cameras aren't actually capable of shooting 1:1 or greater. That ability really depends on the lens on your camera.

Determining your camera's capabilities

Many digital cameras come with macro zoom lenses. By reworking the lens positioning, a camera is capable of both telephoto and close-up photography. While this doesn't give you optimal close-up quality, it's good enough for most

uses. If your camera has a macro zoom lens, you'll probably have a setting for Close-up or Macro mode that prepares the camera for closer shots.

Analyze your lens

If you find the setting, check your manual for minimum focus distances. Even if your camera is able to focus quite closely on an image, you may not want to due to distortions. You can test your camera's propensity for image distortion by printing a test target like ours on the left in **Figure B**. We then shot the target with a Sony F-707 at full Wide Angle on the right. As you can see, it has some issues with barrel distortion in the corners of the frame as well as some fall off, while the center of the image is still straight. This is common with macro zoom lenses. This distortion means that you'll experience some edge distortions if you shoot close-up at the full Wide Angle setting. You may find it more effective to move away from the object and shoot farther away to minimize distortions that might be introduced by your camera lens.

Things you'll need

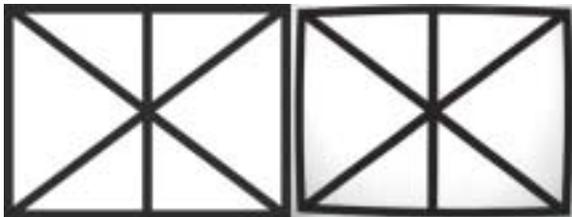The type of materials you'll need for close-up photography will depend on what you're shoot-

ing, but there are some basic things that are nice to have around. Other than a tripod, most are cheap and easy to come by.

For example, it's useful to have paper clips and modeling clay on hand to create small stands for your objects. White index cards or small mirrors make great reflectors. Backgrounds are typically simple and contain relatively neutral colors. It's useful to have black velvet or other matte surfaces that don't reflect a lot of light and show reflections. Glass plates are also useful to hold flat objects like stamps or paper.

Lighting small things

Your lighting for close-up photography is just as important as standard photography. Because you typically need to use small apertures for the greatest depth of field, you're likely to need a lot of light for your images. Adequate lighting conditions also reduce the possibility of noise developing during longer exposures.

You can shoot close-up images indoors or outdoors. When indoors, the best light to use is either flash or tungsten lighting. Using a flash can be tricky because of how close your camera is to the subject, but slave flashes set away from your subject can work effectively. Small tensor lamps are cost-effective and are excellent lights for close-up work because they're flexible and easy to position.

Figure B: *Test your camera to see if it has any distortions when shooting close up.*
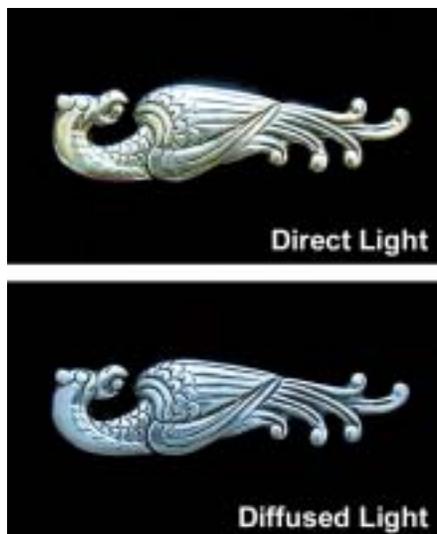
Figure C: *Your choice of lighting techniques affects the appearance of your image.*

Figure D: *For shiny metal, you usually get the best results with a diffuser, which you can make from a variety of objects.*

Quality of light

Your lighting choices will largely depend on what details you want to capture about your subject. If your subject has a lot of texture, you may want to skim light directly across the surface to enhance the appearance of that texture. If you're working with shiny objects like jewelry or coins, you'll probably want to consider diffused lighting with a light tent, as reflective objects usually look terrible if light shines directly on them, as seen at the top of **Figure C**.

Diffusing light with a light tent is low tech, but effective. As you can see in **Figure D**, to capture the silver brooch, we simply draped some interfacing material around the camera lens and then clipped it to hold it in place. Pieces of plastic milk jugs and Styrofoam cups can also work well as diffusers around small objects. And you can use Styrofoam cups over the tensor lamps as diffusers.

Diffused light is very important for shiny objects as they have a tendency to flare and pick up unwanted tone and reflections from surrounding objects. If you compare the two images in **Figure C**, you can see a tremendous difference in appearance caused by diffusing the light. The bottom image looks better as it accurately portrays the brooch. The soft light also fills in scratches and reduces their appearance rather than enhancing them the way direct lighting does. For some objects, you may find that a combination of both direct and diffused light works well.

The DOF challenge

Getting as much of your object in focus as possible is always a challenge with close-up work. The closer your camera is to the subject, the smaller your potential depth of field (DOF). There are some basic things you can do to give yourself the best chances possible. First, to have the optimum depth of field, use the smallest aperture that's available to you. Many digital cameras don't have very small apertures simply because they don't perform well at longer shutter speeds. On our example camera, the smallest aperture is f/8. You can see the beetle we photographed at that setting in **Figure E**. When we used f/3.5, we couldn't get our entire insect into focus because our depth of field was so shallow. Using a smaller aperture gives you more focus flexibility.

However, a smaller aperture is also likely to pick up your background detail. To alleviate this problem, move your background away from your subject. For example, place the specimen on a plate of glass and position the back-
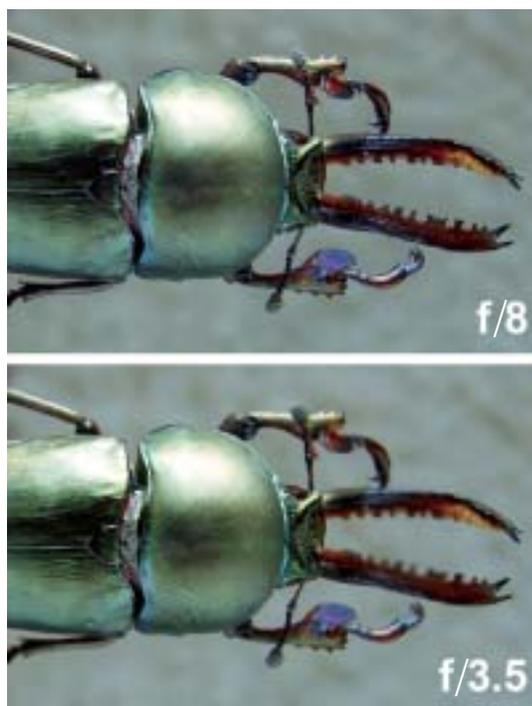

Figure E: *Your aperture setting has a dramatic effect on how much of your subject is in focus.*

ground a foot below it to make sure it stays out of focus.

The DOF in all close-up work is always small, so choose your point of focus carefully. Focus stretches half in front and half behind your point of focus. Therefore, you don't necessarily want to focus on the part of the subject that's closest to you, because half your available focus above that point is being wasted on air. There may also be areas in the subject that are important to show accurately—if that's the case, that needs to be your critical area of focus.

Finally, keep your camera and subject as parallel as possible. When you're working with a narrow DOF, a small amount of tilt in an object or camera can create a lot of blur. You can avoid tilt with the help of a level.

A fringe benefit of the DOF issue is the ability to isolate a subject easily. With a shallow DOF, the background is usually thrown out of focus, resulting in an image of striking simplicity with an almost graphical quality.

Printing to size, accurately

Once you've captured your images, you'll need to print them. If you're printing your images for display, it can be useful to give the magnification of the object. When you do so, someone looking at your insect pictures will know the subject is life size (1:1) or 5X life size (5:1). We'll show you how to use Photoshop's Measure tool to determine the size of your object before you print it

out. You can easily determine the size of an object with the following calculation:

Magnification = Image size/Object size

Photoshop's Measure tool

The Measure tool is useful to those who need precision. It's imperative for measuring size on the computer because it's difficult to determine the size of an object onscreen versus how it will appear in print. We want to print a 5:1 copy of our brooch. In real life, the tail on our bird brooch is 1.75 inches long. If we want to print a detail of the image at twice life size, how do we go about it?

Because our image is digital and composed of thousands of pixels, an adjustment in resolution changes the physical image size. To get the size you need, in this case 2:1, determine the physical size you want your image to be. To show the tail of the brooch at 2:1, we need it to measure 3.55 inches when printed.

To start out, place guides at the start and end points you wish to measure. Next, select the Measure tool (⬚) and click positions to measure the tail onscreen at its default resolution. Look at the Info palette to get the specific length. If the tail is larger than 3.55 inches, then choose Image ‣ Image Size to bring up the Image Size dialog box. Make sure the Resample Image option is *not* selected. You want to link the physical dimensions of your image and the resolution. Increase your resolution to shrink the physical dimensions of the image and then click OK. Use the Measure tool to check the exact distance again and adjust resolution as necessary until you have the physical dimensions you desire.

Then, open the Image Size dialog box once again and select the Resample Image option. Now, specify the resolution at which you want your image to appear and then click OK. In this case, we wanted our image to be 200 ppi for the journal. You can see our results in **Figure F**. This process may seem like a hassle at first, but if you work with the same camera system frequently, you'll find that you'll be able to guesstimate appropriate resolution settings quickly.

Up close and personal

We've given you a quick overview of the theory and techniques behind close-up photography. Digital photography is a great way to do close-up work. Your results are instant, which allows you to modify lighting and focus quickly and get the best results possible. ✳

Figure F: *It's easy to determine specific magnifications for your images if you use Photoshop's Measure tool.*

Quick Clicks

Rainy days got you down?

Looking to use your digital camera on a rainy day? Watch out—moisture is any digital camera's worst enemy. If you don't want to buy a special waterproof case, try a simple resealable plastic bag. Place the camera in the bag with the sealing end at the bottom. Cut a hole for the lens and place a rubber band around the opening to hold it in place. Your lens is slightly exposed to the elements, but the electronics should be kept reasonably dry. Although this may not be foolproof, it's definitely better than facing the elements with no protection at all!

Make quick color changes using brushes in Photoshop

by Stephen Dow

Application: Adobe Photoshop 5.5/6.x
Operating Systems: Microsoft Windows, Macintosh

Have you ever wanted to have a red car? Or blue hair? Or maybe turn the sky bright green? Color changes like this can be done in any image-editing program, but deciding which method is the fastest can be confusing. If you're looking for the quick and dirty technique to change a color in Photoshop, you can't beat using a brush set for the Color Painting Mode. With a few stokes of your virtual brush, you can turn your color world upside-down—and we're going to show you how.

Paint by numbers

To demonstrate this technique, we'll be turning a red tulip into a yellow tulip, as shown in **Figure A**. To accomplish this feat, we'll first isolate our red tulip using the Selection tool and make a few adjustments to make sure we don't change the color anywhere else. Then, we'll sample a color from the yellow tulip and use our Color brush to "paint" in our sample color. Finally, we'll use this brush with other Painting Modes and colors to make our adjusted tulip look just right.

Natural selection

The first step in this technique is to select the portion of the image you're targeting with one of the selection tools. If you have a steady hand, you could skip this step, but we don't recommend it. Selections are reusable, editable and create a better template to make adjustments. In this example, having a solid selected area will allow us to feather the edges, helping blend in our new color with its surroundings.

To start, open your file in Photoshop. Next, choose the Pen Tool ( ) and draw a path around your object. The Pen Tool works great for this type of work as you can draw precise paths that can be easily edited. We usually draw a rough outline around our object and then adjust the path at a higher magnification using the Direct Selection Tool ( ) and Convert Point Tool ( ). It's important to draw a good path—
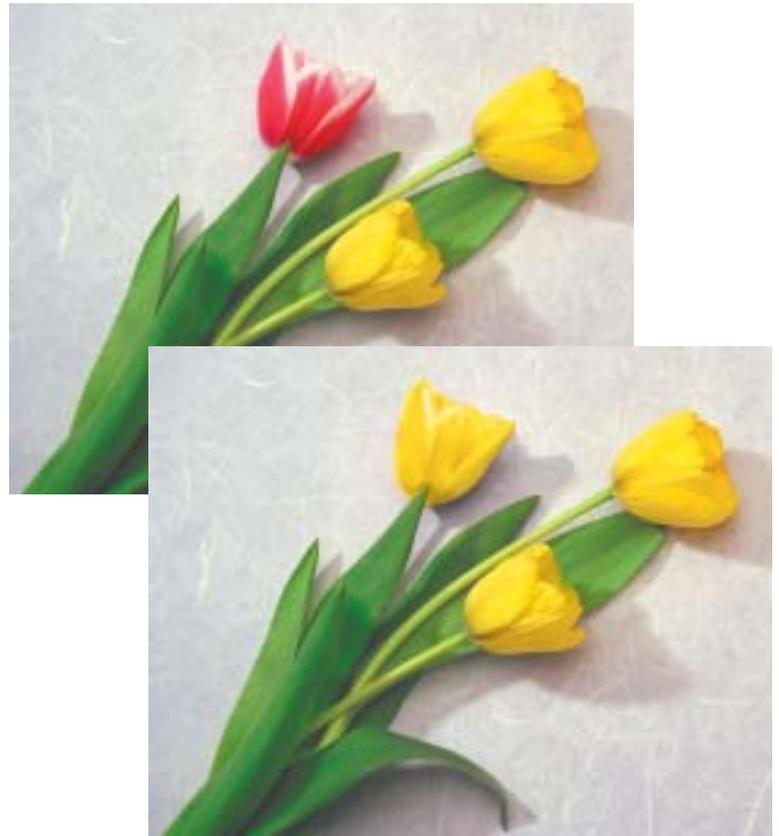

Figure A: *By using a brush and a few of Photoshop's Painting Modes, we can quickly turn this tulip from red to yellow.*

any image area outside of your target object that gets colorized is going to stick out like a sore thumb. The path we drew around our tulip is shown in **Figure B** on the next page.

Now that we have a path, let's activate the selection. Open the Paths panel by selecting Window ‣ Paths and click on the Work Path layer while holding down the [Ctrl] key ([control] on the Mac). Your path turns into "marching ants," Photoshop's indicator of a selected area.

Next, we want to slightly feather our selection to make sure our edges aren't too sharp and the new color blends in with the surrounding pixels. Open the Feather dialog box by selecting

Selection ▸ Feather. As shown in **Figure C**, enter 3 pixels in the Feather Radius text box and click OK. This will give us softer edges and make our color change look more realistic.

Coloring book time

With our selection made, the next step is to sample the color we'll be using to make our change. In this case, we have a target color available from the image itself, but you can use any color you want. We selected the Eyedropper Tool (⬛) and sampled the yellow color from one of the tulips. Granted, this single color doesn't represent the tonal range of the entire tulip, but we'll show you a way to fix this in a minute. The color we sampled appears as the current Foreground Color in the Toolbar, ready to be used with one of the brushes.

Click on the Paintbrush Tool (⬛) and take a look at the Options toolbar. While most people just paint with the straightforward Normal mode, we aren't normal or straightforward. Click on the Mode dropdown menu and select Color. This Painting Mode allows you to paint the luminance of the foreground color while preserving the hue and saturation of the image. This means that our tulip's color will change, but its details will remain the same. If we just painted yellow over our image, we'd end up with one flat-looking tulip shape.

Choose a brush size that fits your selection (bigger for a big area, smaller for a smaller area) and start painting. Make sure you cover the whole area as you paint—as we said earlier, omissions are obvious. **Figure D** shows our tulip making the switch to the yellow side.

Tweaking the image

Now, we only painted with one color, but you can paint with as many or as few as you want. Our tulip is certainly yellow, but needs a few more shades of yellow to make it look just right. We selected another shade of yellow from the tulip, this time from the upper petals, to get a darker hue. Then, we selected a smaller brush and painted in this color in the appropriate areas of our selection. We repeated the process until we thought we had a good match from tulip to tulip.

Recolor your world

As we showed in **Figure A**, our new yellow tulip is pretty close to its naturally yellow companions. It really only takes three things—a selection, a color sample and a brush set for the color mode—to make a quick color change in Photoshop. Once you get the hang of it, you'll be changing the color of everything. ✳

Figure B: *We used the Pen Tool to draw a tight path around our red tulip.*
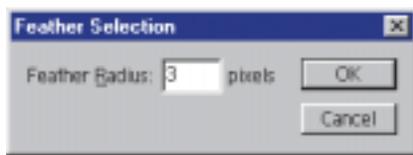

Figure C: *By feathering our selection by 3 pixels, we'll get a softer edge that will blend better with the surrounding pixels.*

Figure D: *Once your brush and selection are set, it only takes a few swipes to get rid of the red.*

Exploring Digital Photography

Exposure bracketing helps gets the right shot every time

by Stephen Dow

It's a once-in-a-lifetime shot—a colorful sunset fading away across the slow-moving waves of the ocean, perfectly silhouetting a lonely sailboat. You don't want to miss capturing this moment, but the tricky light levels are making the decision on the correct exposure settings a nerve-wracking endeavor. What do you do? You can rely on a technique known as *bracketing*, where you take several shots of the same scene at different exposures. While traditional photographers usually have to manually change the exposure settings to bracket their shots, most digital cameras have automated this process to make it very easy to use. With bracketing, you can reduce the chance that you'll miss that unique shot by increasing the range of exposures you capture.

Filling out your bracket

In this article, we'll discuss exposure bracketing and how you can use it to improve your digital images. First, we'll explain just why exposure bracketing will benefit the digital photographer. Next, we'll go over some shooting and lighting situations that lend themselves to using this technique. Then, we'll work through an example, explaining how different digital cameras handle the bracketing process. Finally, we'll show you how to manually perform exposure bracketing if your digital camera doesn't have an automated process.

Note: While you can bracket by adjusting shutter speed, aperture or ISO settings, most digital cameras use positive or negative exposure compensation to vary the exposure.

Shooting smart

When shooting a typical bracketed sequence, one shot is taken at the metered setting, one shot is underexposed, and one shot is overexposed, as shown in **Figure A**. One of the impediments of using exposure bracketing with traditional film cameras is that it "wastes" film. While you might think that getting the perfect shot out-
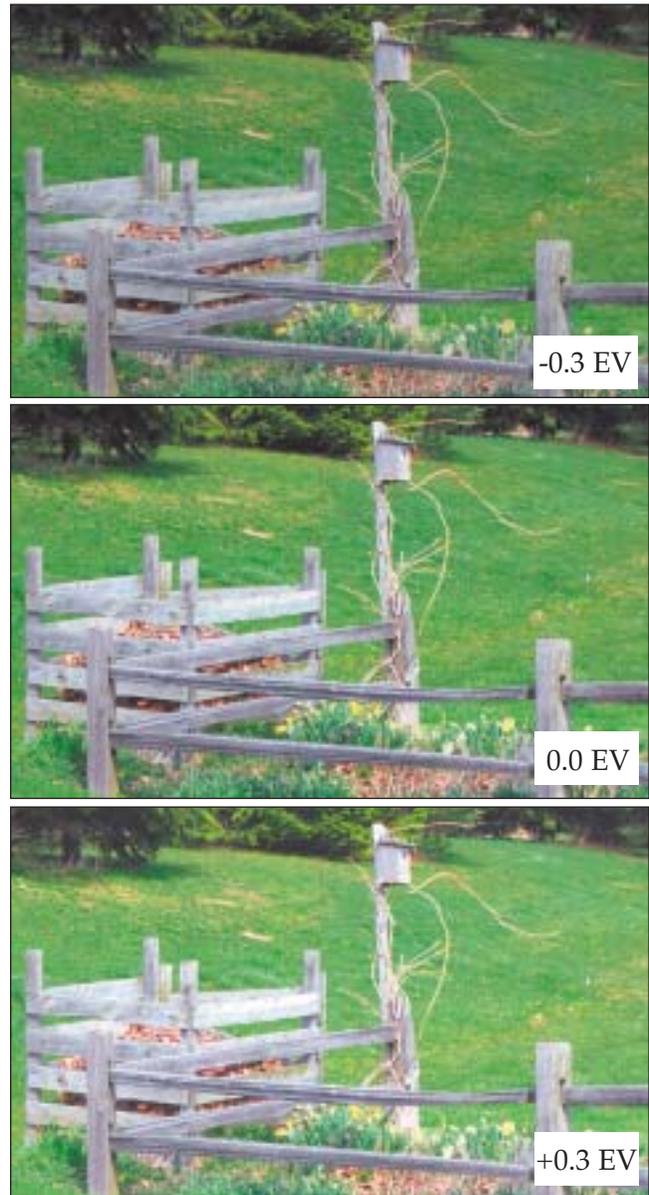

Figure A: *In this three-shot bracket, the exposure values are -0.3, 0.0 and +0.3. You can have a broader range, but a narrow bracket gives you a better chance of getting it right.*

weighs the burning of a few frames of film, the fact remains that for every shot you select from a bracketed sequence, there will be three or more shots that are useless. However, digital cameras

are limited only by the amount of storage—you can erase unnecessary images without any wasted resources.

When should you bracket?

Any shooting situation when you're second-guessing your metering ability is a good time to bring out the bracketing. These situations usually involve a scene that contains a wide range of lighting levels or a dramatic contrast between subject and background. Consider a scene where the background is a bright snow-covered field. For the subject to be properly exposed, your camera might decide to blow out the details in the background. Conversely, if you're shooting a particularly bright foreground subject, any negative exposure compensation applied to even out the exposure could reduce the amount of detail in your shadows.

For example, consider our ocean sunset example from the beginning of the article. The rapidly changing light of a sunset, as well as the reflections from the water, can make selecting an appropriate exposure difficult. By shooting at a variety of exposures, you have a better chance of capturing a correctly exposed shot.

Bracketing concerns

Before you bracket a series of shots, there are a few things to consider. First, since you'll be varying the exposure levels of the shots, it's a good idea to avoid your flash. You want to use the available light and make adjustments from there—using the flash will skew your results.

Next, be aware of your mode setting. Exposure variations are different depending on whether you're using an aperture priority, a shutter priority or a custom camera mode. Experiment first so you know what to expect from each mode. Finally, since you want each shot to vary only in exposure, use a tripod to keep the camera steady and the scene consistent, as focus and white balance are typically measured on the first shot, and not changed until the bracket sequence is complete.

Setting up an exposure bracket

Every digital camera, while technically performing the same procedure, seemingly has a different exposure bracketing procedure. The big differences from camera to camera are in the number of shots taken, the range of exposure values, and whether the bracketed shots are taken automatically or if they require you to manually push the shutter button. Consult your camera's manual to find out the capabilities of your camera.

For our example, we're going to use an Olympus C-3000, which allows us to shoot three or five bracketed shots at +/- 0.3, +/- 0.6 or +/- 1.0 increments. We selected five shots at +/- 0.3 as it gives us a good range of shots without getting too dramatic from shot to shot. This is an important point—you aren't looking to have radically different bracketed shots, as the extreme exposures are almost sure to go too far.

The Olympus requires you to hold the shutter button down while it takes the series of

Exploring Digital Photography

Quick Clicks

Make your skies stand out

If you like dramatic skies, consider putting a polarizing filter on your digital camera. A polarizing filter emphasizes blues by rejecting scattered blue light that causes the sky to appear overly bright. It also has the added benefit of reducing glare from reflective objects such as water.

shots. Once the five shots are taken, the shutter stops opening and you can release the shutter button. Some cameras automatically shoot all bracketed shots with one click of the shutter button, while others require you to click it for each shot. The bracketed sequence we captured is shown in **Figure B**.

Bracketing your shots manually

If your camera doesn't have automatic exposure bracketing but has adjustable exposure compensation, you can manually set up your own bracket. The technique here is to take one shot, allowing the camera to meter the scene. Then, take one shot at positive exposure compensation and one shot at negative exposure compensation. You get the same results—the automatic exposure bracketing just speeds the process along. While having your camera do all the work is certainly easier, the benefit of manually bracketing your shot is that you aren't limited to the range of exposure you can shoot with.

Bracketed shots in post-process

Bracketing shots can also be helpful if you want to combine two images to get the best composite image. Let's go back to the person standing in the snow—by taking a series of shots at different exposures, you can select a foreground subject that has the correct exposure from one shot with the background that contains good detail from another shot. Then, by combining these two elements, you can build a better composite shot. Often, this is the only way to make certain shots work, so keep it in mind when you shoot.

Get it right!

Exposure bracketing won't ensure that you get the perfect shot every time, but it will give you a better chance of capturing a scene when selecting an exposure is tricky. With digital cameras, shooting an extra frame or two is a small price to pay for a great shot, so take the time to get used to bracketing and find ways to incorporate this practice into your shooting technique. ✳

Figure B: *By shooting with a five-shot bracket, we were able to see the exposure extremes for this scene.*

Get the most from your digital camera's movie mode

by Stephen Dow

Let's face it—no one buys a digital camera primarily for its video capabilities. However, taking short video clips with your camera can be a lot of fun and extends your range of shooting possibilities. While you might have conquered taking still shots, getting quality clips from your video mode can be tricky. In this article, we're going to give you some tips for using the video mode that will help you use this feature to its fullest potential.

Know your camera's capabilities

The first step in using the video mode successfully is to understand the capabilities of your camera. The most important thing to know is the maximum length your camera will allow you to record. Most cameras limit you to a specific length, dependent on the camera's internal buffer size or the capacity of the storage media. This time can be anywhere from 15 seconds to several minutes, so knowing how long you have to shoot will ensure that you capture the action you're after. You may also be able to sacrifice quality for a longer recording time, so check out your manual to know exactly what to expect.

Most digital cameras record images at 320 x 240 pixels, but some allow you to cut this size in half (160 x 120) to allow you to take longer shots. While this is a nice option, the quality and size of the smaller movie size leave a lot to be desired. Stick with 320 x 240 and sacrifice the longer record time for better image quality.

However, if you're looking for a really long record time, check out the Fuji FinePix S602, which can record VGA movies (640 x 480) at 30 frames per second for the capacity of the storage card. Now that's some video muscle! Table A shows specifications for some of the more popular digital cameras.

Plan your shot beforehand

Editing digital video is time-consuming and tricky. Why not get the shot right the first time? By setting your scene before you start recording, you can capture video clips without going into a video-editing application to rework all the clips. Another reason to prepare your shot beforehand is that you may have some lag time when your camera writes the video file to your storage media. By planning out your shot, you reduce the risk that you'll miss out on the moment you were trying to capture.

Don't go toward the light

Obviously, your image sensor is very sensitive to light, but when it records frame after frame of video, this sensitivity is even more pronounced. Avoid backlighting your subjects or panning across bright lights and reflection as they can cause ugly hotspots in your video. Actually, having less light in the room usually produces better exposures, as the camera can control the amount of light and compensate to an appropriate level. Also watch out for color casts caused by influential light sources such as fluorescent or halogen bulbs—you might want to adjust your camera's white balance to make sure your subjects don't look like they're from another planet.

Table A: *Video capabilities of various digital cameras*

Camera type	Recording format	Frames per second	Sound	Maximum movie length
Minolta Dimage 7i	AVI	12	No	60 sec.
Nikon Coolpix 995	QuickTime	15	No	40 sec.
Olympus C-3040Z	QuickTime	15	Yes	32 sec.
Canon G2	AVI	15	Yes	30 sec.
Sony F707	MPEG	8 or 16	Yes	Storage capacity
Fuji FinePix S602	QuickTime	30	Yes	Storage capacity

Find your focal point

Most digital cameras won't auto focus while you're shooting a video clip. It's a good idea to pre-focus your camera before you start shooting and maintain your distance from your subjects. You can usually do this by half-pressing the shutter button to give the camera a chance to lock the focus to a specific range.

Resist the urge to zoom

When shooting video clips, most digital cameras disable the optical zoom. This means that any zooming you can do, if you can do any at all, will be digital. This process simply makes a smaller portion of the image sensor bigger, increasing the size of your pixels and decreasing the quality of your images. When possible, just avoid zooming altogether when shooting video clips.

Would you like audio with your video?

Many digital cameras include microphones to record sound. While this feature is primarily intended to allow the photographer to add audio annotations to their still images, you can also use it to gather sound along with your video. Be aware that these microphones are basic; don't expect CD quality from them. Keep your subjects in front of the camera and at a reasonable distance from the microphone to get the best possible quality. Also, be aware that if your camera can auto focus while shooting video, your microphone is probably going to pick that sound up as well!

To view or not to view

Whether you use the LCD screen or the optical viewfinder to frame your videos is a personal preference, but we found that using the LCD gave us a better idea of what we were shooting. The image displayed will be choppy, but you'll get a better preview of the action than if you're looking through the viewfinder. Also, know that the quality of

Figure A: *We created this index sheet from a video shot with an Olympus digital camera.*

Coming up…

- Avoid reflections when shooting through glass
- Create better images by understanding color depth

the LCD preview is usually just for compositional purposes only and not necessarily representative of the quality of your video file.

Would you just sit still?

As always, placing your camera on a tripod will give you the best video clips. If this isn't an option, keep the camera as still as possible to emphasize the movement of your subjects while the background remains static. The natural shakiness of human hands can add a distracting blurriness to your video—so stay still!

Check out those special features

There are tons of video features loaded on digital cameras these days, from night vision to on-board editing to 360-degree panoramic image stitching. Check out your camera's manual and educate yourself on the options—you may find a cool feature to play with. One quick look in our Olympus digital camera's manual revealed a video index feature, giving us the ability to turn our digital video into a frame-by-frame index sheet. This feature turned our little movie into an interesting series of stills, as shown in **Figure A** on the previous page. ✴

The Contact Sheet

Digital versus film: The great debate

by Stephen Dow

I've been shooting film for years, but I'm ready to make the move to digital. However, I want to make sure that I can get the same amount of detail I'm used to with film. How close are digital cameras to reaching the detail available with 35 mm film?

This is certainly a controversial issue between digital and traditional photographers, and one that doesn't have an easy answer. However, the general consensus is that a 35 mm frame contains approximately the same amount of information as an image taken with a six-megapixel (MP) CCD. This figure was derived using a top-quality SLR with an excellent lens and low-speed, perfectly exposed film. For that reason, many digital supporters claim the resolution calculation should be much smaller accounting for lesser cameras, films and lenses. Conversely, many film enthusiasts think it should be much higher, accounting for the larger negative of medium format cameras and the detail possible with highly sensitive film.
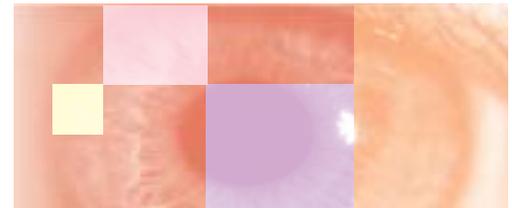
Professional digital cameras, such as the Kodak DCS760, sport 6.3 MP CCDs, but that level of resolution comes at a high price. Currently, there are plenty of four-MP cameras and even a few five-MP models that have broken the magical $1000 price point. With the rate of innovation in the digital camera industry, it seems possible that a six-MP camera will be within the reach of the consumer soon.

But there's more to the story than just the resolution. Larger CCDs need more power, more processing time and a faster transfer to the storage media. Plus, even with advances in lens technology, most digital cameras are still offering a built-in lens with a short focal length. This offers a compact size, but takes away the flexibility of an interchangeable lens system. So, while camera manufacturers are certainly working to offer the largest CCD possible, they have to weigh how it will work within the big picture of camera performance and flexibility (no pun intended).

The important thing to remember is that the technology is getting better and better every day. Today's cameras and inkjet printers give consumers unprecedented abilities to capture and print their own images. Think ahead a few years and you can only imagine where digital photography will be. For now, digital still has a way to go, but it's catching up fast. ✴